Autism: recognition, referral and diagnosis of children and young people on the autism spectrum

National Collaborating Centre for Women's and Children's Health

Commissioned by the National Institute for Health and Clinical Excellence

September 2011

Changes since publication

December 2017: This guideline was updated by a standing committee in December 2017 and attention deficit hyperactivity disorder was added to the list of factors associated with an increased prevalence of autism. The recommendation is in section 1.3 of the guidance. The evidence for this change is in evidence review A: factors and neurodevelopmental disorders that increase the likelihood of a diagnosis of autism spectrum disorder. References to DSM-4 were updated to DSM-5 in the guidance.

Minor changes

March 2022: We changed the description of psychologists in the recommendations about the autism team, in line with current practice and the British Psychological Society's best practice in psychology recruitment. We updated mentions of ICD-10 to ICD11.

June 2021: We changed 'children and young people with autism' to 'autistic children and young people', and 'symptoms' to 'features' to align with current terminology.

For the current recommendations, see www.nice.org.uk/guidance/CG128/chapter/recommendations.

Published by the RCOG Press at the Royal College of Obstetricians and Gynaecologists, 27 Sussex Place, Regent's Park, London NW1 4RG

www.rcog.org.uk

Registered charity no. 213280

First published 2011

This guideline has been fully funded by NICE. Healthcare professionals are expected to take it fully into account when exercising their clinical judgement. However, the guidance does not override the individual responsibility of healthcare professionals to make decisions appropriate to the circumstances of the individual patient.

Implementation of this guidance is the responsibility of local commissioners and/or providers.

NCC-WCH Editor: Karen Packham

Original design: FiSH Books, London

Contents

Guideline development group membership and acknowledgements

Guideline development group (GDG) members

Gillian Baird	(GDG Chair) Professor of Paediatric Neurodisability, King's College, London and Consultant Paediatrician, Guy's & St Thomas' NHS Foundation Trust, London
Susan Anderson	Parent/carer representative
Carol Bagnall	Specialist Health Visitor, Pennine Care NHS Foundation Trust, Heywood, Middleton and Rochdale Community Healthcare
Tony Charman	Professor in Autism Education, Centre for Research in Autism and Education (CRAE), Department of Psychology and Human Development, Institute of Education, London
Diana Howlett	Consultant Community Paediatrician, Weston Area Health Trust, Weston-super-Mare, North Somerset
Anne Marie McKigney	Consultant Child Psychologist, Aneurin Bevan Health Board, Wales
Ann Le Couteur	Professor of Child & Adolescent Psychiatry, Institute of Health and Society, Newcastle University
Jamie Nicholls	General Practitioner, Essex
Sharon Richman	Consultant Community Paediatrician, Ealing Child Development Centre, London
Lorraine Scott	Head of Learning and Support and Assessment Educational Officer, Middletown Centre for Autism, County Armagh, Northern Ireland
Emily Simonoff	Professor of Child & Adolescent Psychiatry, Institute of Psychiatry, London
Zoe Thompson	Parent/carer representative
Penny Williams	Principal Speech and Language Therapist for Autism, The Mary Sheridan Centre for Child Health, London

National Collaborating Centre for Women's and Children's Health (NCC-WCH) staff

Shona Burman-Roy	Senior Research Fellow (until March 2010)
Hannah Rose Douglas	Associate Director – Health Economics, Project Lead
Huajie Jin	Research Assistant (until November 2010)
Monica Lackhanpaul	Clinical Co-Director Children's Health (until September 2009)
Rosalind Lai	Information Scientist
Juliet Kenny	Project Manager (from March 2010)
Sarah Latreille	Research Assistant (until December 2009)
Hugh McGuire	Research Fellow
Gemma Malin	Research Fellow (until May 2010)
Stephen Murphy	Clinical Co-Director Children's Health (from September 2009)

Expert advisers

Iain McClure	Consultant Child and Adolescent Psychiatrist, Royal Hospital for Sick Children, Edinburgh, NHS Lothian
Shehla Mohammed	Consultant Clinical Geneticist and Head of Service, Guy's Hospital, London
Neil Dalton	Professor of Paediatric Biochemistry, WellChild Laboratory, King's College London

Acknowledgements

We thank Simon Baron-Cohen, Danya Glaser, Monica Lakhanpaul, Simon Lenton, Iain McClure, Tony O'Sullivan, Jeremy Parr and Eric Taylor for their comments on an earlier draft of the guideline.

1 Summary of recommendations and care pathway

1.1 Introduction

This guideline covers the recognition, referral and diagnosis of autism in children and young people from birth up to 19 years.

The term 'autism' describes qualitative differences and impairments in reciprocal social interaction and social communication, combined with restricted interests and rigid and repetitive behaviours. Autism spectrum disorders are diagnosed in children, young people and adults if these behaviours meet the criteria defined in the International Statistical Classification of Diseases and Related Health Problems (ICD-10) and the Diagnostic and Statistical Manual of Mental Disorders DSM-IV Fourth Edition (Text Revision) (DSM IV-TR) and have a significant impact on function. The over-arching category term used in ICD-10 and DSM-IV-TR is pervasive developmental disorder (PDD), a term now used synonymously with autism spectrum disorder (excluding Rett syndrome): it is a behaviourally defined group of disorders, which is heterogeneous in both cause and manifestation.

The guideline development group recognised that individuals and groups prefer a variety of terms, including autism spectrum disorder, autistic spectrum condition, autistic spectrum difference and neuro-diversity. For clarity and consistency, in this guideline the term 'autism' is used throughout in keeping with the use of 'autism' in recent Department of Health, National Audit Office and Public Accounts Committee documents. However, in this guideline 'autism' refers to 'autism spectrum disorder'.

Autism is a lifelong disorder that has a great impact on the child or young person and their family or carers. When autism is diagnosed, families and carers and the child or young person themselves can experience a variety of emotions, shock and concern about the implications for the future. They may also have a profound sense of relief that others agree with their observations and concerns. Diagnosis and the assessment of needs can offer an understanding of why a child or young person is different from their peers and can open doors to support and services in education, health services and social care, and a route into voluntary organisations and contact with other children and families with similar experiences. All of these can improve the lives of the child or young person and their family.

Core autism behaviours are typically present in early childhood, but are not always apparent until the circumstances of the child or young person change, for example when the child goes to nursery or primary school or moves to secondary school. Autism is strongly associated with a number of coexisting conditions. Recent studies have shown that approximately 70% of people with autism also meet diagnostic criteria for at least one other (often unrecognised) psychiatric disorder that is further impairing their psychosocial functioning. Intellectual disability (intelligence quotient [IQ] below 70) occurs in approximately 50% of young people with autism.

Autism was once thought to be an uncommon developmental disorder, but recent studies have reported increased prevalence and the condition is now thought to occur in at least 1% of children. This has increased demand for diagnostic services for children and young people of all ages in the health service.

Health services have a key role in recognising and diagnosing autism. Levels of understanding of autism among healthcare and other relevant professionals and the availability of services differ greatly from one area to another. In addition, children and young people with certain coexisting conditions, such as

intellectual disability, are less likely to be diagnosed with autism, leading to inequalities in healthcare and service provision.

Coordination between health agencies and other key services, such as education, social care and the voluntary sector, is important. Multi-agency staff should also work in partnership with the child or young person with autism and their family or carers.

This guideline does not cover interventions for autism but aims to improve recognition, referral and diagnosis, and the experience of children, young people and those who care for them.

1.2 Key priorities for implementation

A local pathway for recognition, referral and diagnostic assessment of possible autism

A local autism multi-agency strategy group should be set up, with managerial, commissioner and clinical representation from child health and mental health services, education, social care, parent and carer service users and the voluntary sector.

The local autism strategy group should appoint a lead professional to be responsible for the local autism pathway for recognition, referral and diagnosis of children and young people. The aims of the group should include:

- improving early recognition of autism by raising awareness of the signs and symptoms of autism through multi-agency training (see tables 1–3)
- making sure the relevant professionals (healthcare, social care, education and voluntary sector) are aware of the local autism pathway and how to access diagnostic services
- supporting the smooth transition to adult services for young people going through the diagnostic pathway
- ensuring data collection and audit of the pathway takes place.

In each area a multidisciplinary group (the autism team) should be set up. The core membership should include a:

- paediatrician and/or child and adolescent psychiatrist
- speech and language therapist
- clinical and/or educational psychologist.

The autism team should either include or have regular access to the following professionals if they are not already in the team:

- paediatrician or paediatric neurologist
- child and adolescent psychiatrist
- educational psychologist
- clinical psychologist
- occupational therapist.

Consider including in the autism team (or arranging access for the team to) other relevant professionals who may be able to contribute to the autism diagnostic assessment. For example, a specialist health visitor or nurse, specialist teacher or social worker.

Provide a single point of referral for access to the autism team.

Autism diagnostic assessment for children and young people

A case coordinator in the autism team should be identified for every child or young person who is to have an autism diagnostic assessment.

Include in every autism diagnostic assessment:

- detailed questions about parent's or carer's concerns and, if appropriate, the child's or young person's concerns
- details of the child's or young person's experiences of home life, education and social care
- a developmental history, focusing on developmental and behavioural features consistent with ICD-10 or DSM-IV criteria (consider using an autism-specific tool to gather this information)
- assessment (through interaction with and observation of the child or young person) of social and communication skills and behaviours, focusing on features consistent with ICD-10 or DSM-IV criteria (consider using an autism-specific tool to gather this information)
- a medical history, including prenatal, perinatal and family history, and past and current health conditions
- a physical examination (see recommendation 45)
- consideration of the differential diagnosis (see recommendation 46)
- systematic assessment for conditions that may coexist with autism (see recommendation 54)
- development of a profile of the child's or young person's strengths, skills, impairments and needs that can be used to create a needs-based management plan (see recommendation 47), taking into account family and educational context
- communication of assessment findings to the parent or carer and, if appropriate, the child or young person (see recommendation 60).

Consider the following differential diagnoses for autism and whether specific assessments are needed to help interpret the autism history and observations:

- Neurodevelopmental disorders:
    - specific language delay or disorder
    - intellectual disability or global developmental delay
    - developmental coordination disorder (DCD).
- Mental and behavioural disorders:
    - attention deficit hyperactivity disorder (ADHD)
    - mood disorder
    - anxiety disorder
    - attachment disorders
    - oppositional defiant disorder (ODD)
    - conduct disorder
    - obsessive compulsive disorder (OCD)
    - psychosis.
- Conditions in which there is developmental regression:
    - Rett syndrome

    - epileptic encephalopathy.

- Other conditions:
    - severe hearing impairment
    - severe visual impairment
    - maltreatment
    - selective mutism.

Communicating with parents and professionals about the results from the autism diagnostic assessment

With parental or carer consent and, if appropriate, the consent of the child or young person, make the profile available to professionals in education (for example through a school visit by a member of the autism team) and, if appropriate, social care. This is so that it can contribute to the child's or young person's individual education plan and needs-based management plan.

1.3 Recommendations

Number	Recommendations	See section
	A local pathway for recognition, referral and diagnostic assessment of possible autism	
1	A local autism multi-agency strategy group should be set up, with managerial, commissioner and clinical representation from child health and mental health services, education, social care, parent and carer service users, and the voluntary sector.	3.4
2	The local autism strategy group should appoint a lead professional to be responsible for the local autism pathway for recognition, referral and diagnosis of children and young people. The aims of the group should include: • improving early recognition of autism by raising awareness of the signs and symptoms of autism through multi-agency training (see tables 1–3) • making sure the relevant professionals (healthcare, social care, education and voluntary sector) are aware of the local autism pathway and how to access diagnostic services • supporting the smooth transition to adult services for young people going through the diagnostic pathway • ensuring data collection and audit of the pathway takes place.	3.4
3	In each area a multidisciplinary group (the autism team) should be set up. The core membership should include a: • paediatrician and/or child and adolescent psychiatrist • speech and language therapist • clinical and/or educational psychologist.	5.20
4	The autism team should either include or have regular access to the following professionals if they are not already in the team: • paediatrician or paediatric neurologist • child and adolescent psychiatrist • educational psychologist • clinical psychologist • occupational therapist.	5.20
5	Consider including in the autism team (or arranging access for the team to) other relevant professionals who may be able to contribute to the autism diagnostic assessment. For example, a specialist health visitor or nurse, specialist teacher or social worker.	5.20
6	The autism team should have the skills and competencies to: • carry out an autism diagnostic assessment • communicate with children and young people with suspected or known autism, and with their parents and carers, and sensitively share the diagnosis with them.	5.20

Number	Recommendations	See section
7	Autism team members should: • provide advice to professionals about whether to refer children and young people for autism diagnostic assessments • decide on the assessment needs of those referred or when referral to another service will be needed • carry out the autism diagnostic assessment • share the outcome of the autism diagnostic assessment with parents and carers, and with children and young people if appropriate • with parent or carer consent and, if appropriate, the consent of the child or young person, share information from the autism diagnostic assessment directly with relevant services, for example through a school visit by an autism team member • offer information to children, young people and parents and carers about appropriate services and support.	5.20
8	Provide a single point of referral for access to the autism team.	3.4
9	The autism team should either have the skills (or have access to professionals that have the skills) needed to carry out an autism diagnostic assessment, for children and young people with special circumstances including: • coexisting conditions such as severe visual and hearing impairments, motor disorders including cerebral palsy, severe intellectual disability, complex language disorders or complex mental health disorders • looked-after children and young people.	5.20
10	If young people present at the time of transition to adult services, the autism team should consider carrying out the autism diagnostic assessment jointly with the adult autism team, regardless of the young person's intellectual ability.	5.20
	Recognising children and young people with possible autism	
11	Consider the possibility of autism if there are concerns about development or behaviour, but be aware that there may be other explanations for individual signs and symptoms.	3.4
12	Always take parents' or carers' concerns and, if appropriate, the child's or young person's concerns, about behaviour or development seriously, even if these are not shared by others.	3.4
13	When considering the possibility of autism and whether to refer a child or young person to the autism team, be critical about your professional competence and seek advice from a colleague if in doubt about the next step.	3.4
14	To help identify the signs and symptoms of possible autism, use tables 1–3. Do not rule out autism if the exact features described in the tables are not evident; they should be used for guidance, but do not include all possible manifestations of autism.	3.4

Number	Recommendations	See section
15	When considering the possibility of autism, be aware that: • signs and symptoms should be seen in the context of the child's or young person's overall development • signs and symptoms will not always have been recognised by parents, carers, children or young people themselves or by other professionals • when older children or young people present for the first time with possible autism, signs or symptoms may have previously been masked by the child or young person's coping mechanisms and/or a supportive environment • it is necessary to take account of cultural variation, but do not assume that language delay is accounted for because English is not the family's first language or by early hearing difficulties • autism may be missed in children or young people with an intellectual disability • autism may be missed in children or young people who are verbally able • autism may be under-diagnosed in girls • important information about early development may not be readily available for some children and young people, for example looked-after children and those in the criminal justice system • signs and symptoms may not be accounted for by disruptive home experiences or parental or carer mental or physical illness.	3.4
16	When considering the possibility of autism, ask about the child or young person's use and understanding of their first language.	3.4
17	Do not rule out autism because of: • good eye contact, smiling and showing affection to family members • reported pretend play or normal language milestones • difficulties appearing to resolve after a needs-based intervention (such as a supportive structured learning environment) • a previous assessment that concluded that there was no autism, if new information becomes available.	3.4
18	Discuss developmental or behavioural concerns about a child or young person with parents or carers, and the child or young person themselves if appropriate. Discuss sensitively the possible causes, which may include autism, emphasising that there may be many explanations for the child's or young person's behaviour.	3.4
19	Be aware that if parents or carers or the child or young person themselves have not suspected a developmental or behavioural condition, raising the possibility may cause distress, and that: • it may take time for them to come to terms with the concern • they may not share the concern.	3.4

Number	Recommendations	See section
20	Take time to listen to parents or carers and, if appropriate, the child or young person, to discuss concerns and agree any actions to follow including referral.	3.4
	Referring children and young people to the autism team	
21	Refer children younger than 3 years to the autism team if there is regression in language or social skills.	3.4
22	Refer first to a paediatrician or paediatric neurologist (who can refer to the autism team if necessary) children and young people: • older than 3 years with regression in language • of any age with regression in motor skills.	3.4
23	Consider referring children and young people to the autism team if you are concerned about possible autism on the basis of reported or observed signs and/or symptoms (see tables 1–3). Take account of: • the severity and duration of the signs and/or symptoms • the extent to which the signs and/or symptoms are present across different settings (for example, home and school) • the impact of the signs and/or symptoms on the child or young person and on their family • the level of parental or carer concern and, if appropriate, the concerns of the child or young person • factors associated with an increased prevalence of autism (see table 4) • the likelihood of an alternative diagnosis.	3.4 4.12
24	If you have concerns about development or behaviour but are not sure whether the signs and/or symptoms suggest autism, consider: • consulting a member of the autism team who can provide advice to help you decide if a referral to the autism team is necessary • referring to another service. That service can then refer to the autism team if necessary.	3.4
25	Be aware that tools to identify children and young people with an increased likelihood of autism may be useful in gathering information about signs and symptoms of autism in a structured way but are not essential and should not be used to make or rule out a diagnosis of autism. Also be aware that: • a positive score on tools to identify an increased likelihood of autism may support a decision to refer but can also be for reasons other than autism • a negative score does not rule out autism.	4.4

Number	Recommendations	See section
26	When referring children and young people to the autism team, include in the referral letter the following information: • reported information from parents, carers and professionals about signs and/or symptoms of concern • your own observations of the signs and/or symptoms.	3.4
27	When referring children and young people to the autism team, include in the referral letter the following information, if available: • antenatal and perinatal history • developmental milestones • factors associated with an increased prevalence of autism (see table 4) • relevant medical history and investigations • information from previous assessments.	3.4 4.12
28	Explain to parents or carers and, if appropriate, the child or young person, what will happen on referral to the autism team or another service.	3.4
29	If you do not think concerns are sufficient to prompt a referral, consider a period of watchful waiting. If you remain concerned about autism, reconsider your referral decision.	3.4
30	If the parents or carers or if appropriate, the child or young person, prefer not to be referred to the autism team, consider a period of watchful waiting. If you remain concerned about autism, reconsider referral.	3.4
31	If a concern about possible autism has been raised but there are no signs, symptoms or other reasons to suspect autism, use professional judgment to decide what to do next.	3.4
	After referral to the autism team	
32	When a child or young person is referred to the autism team, at least one member of the autism team should consider whether to carry out: • an autism diagnostic assessment and/or • an alternative assessment.	4.16
33	Carry out an autism diagnostic assessment if there is regression in language or social skills in a child younger than 3 years.	4.16
34	Refer first to a paediatrician or paediatric neurologist (if this has not already happened) children or young people: • older than 3 years with regression in language • of any age with regression in motor skills. The paediatrician or paediatric neurologist can refer back to the autism team if necessary.	4.16

Number	Recommendations	See section
35	When deciding whether to carry out an autism diagnostic assessment, take account of the following (unless the child is under 3 years and has regression in language or social skills – see recommendation 33): • the severity and duration of the signs and/or symptoms • the extent to which the signs and/or symptoms are present across different settings (for example, home and school) • the impact of the signs and/or symptoms on the child or young person and on their family or carer • the level of parental or carer concern, and if appropriate the concerns of the child or young person • factors associated with an increased prevalence of autism (see table 4) • the likelihood of an alternative diagnosis.	4.16 4.12
36	If there is insufficient information to decide whether an autism diagnostic assessment is needed, gather any available information from healthcare professionals. With consent from parents or carers and, if appropriate, the child or young person, seek information from schools or other agencies.	4.16
37	If there is uncertainty about whether an autism diagnostic assessment is needed after information has been gathered (see recommendation 36), offer a consultation to gather information directly from the child or young person and their family or carers.	4.16
38	Once it has been decided to carry out an autism diagnostic assessment, with consent from parents or carers (and the child or young person if appropriate): • seek a report from the preschool or school if one has not already been made available • gather any additional health or social care information, including results from hearing and vision assessments.	4.16
39	Avoid repeated information gathering and assessments by efficient communication between professionals and agencies.	4.16
	The autism diagnostic assessment for children and young people	
40	Start the autism diagnostic assessment within 3 months of the referral to the autism team.	4.16
41	A case coordinator in the autism team should be identified for every child or young person who is to have an autism diagnostic assessment.	9.8

Number	Recommendations	See section
42	The autism case coordinator should: • act as a single point of contact for the parents or carers and, if appropriate, the child or young person being assessed, through whom they can communicate with the rest of the autism team • keep parents or carers and, if appropriate, the child or young person, up-to-date about the likely time and sequence of assessments • arrange the provision of information and support for parents, carers, children and young people as directed by the autism team • gather information relevant to the autism diagnostic assessment (see recommendation 38).	9.8
43	Discuss with the parents or carers and, if appropriate, the child or young person, how information should be shared throughout the autism diagnostic assessment, including communicating the outcome of the assessment. Take into account, for example, the child or young person's age and ability to understand.	5.25
44	Include in every autism diagnostic assessment: • detailed questions about parent's or carer's concerns and, if appropriate, the child's or young person's concerns • details of the child's or young person's experiences of home life, education and social care • a developmental history, focusing on developmental and behavioural features consistent with ICD-10 or DSM-IV criteria (consider using an autism-specific tool to gather this information) • assessment (through interaction with and observation of the child or young person) of social and communication skills and behaviours, focusing on features consistent with ICD-10 or DSM-IV criteria (consider using an autism-specific tool to gather this information) • a medical history, including prenatal, perinatal and family history, and past and current health conditions • a physical examination (see recommendation 45) • consideration of the differential diagnosis (see recommendation 46) • systematic assessment for conditions that may coexist with autism (see recommendation 54) • development of a profile of the child's or young person's strengths, skills, impairments and needs that can be used to create a needs-based management plan (see recommendation 47), taking into account family and educational context. • communication of assessment findings to the parent or carer and, if appropriate, the child or young person (see recommendation 60).	5.20

Number	Recommendations	See section
45	Perform a general physical examination and look specifically for: • skin stigmata of neurofibromatosis or tuberous sclerosis using a Wood's light • signs of injury, for example self-harm [i] or child maltreatment[ii] • congenital anomalies and dysmorphic features including macrocephaly or microcephaly.	5.20

46	Consider the following differential diagnoses for autism and whether specific assessments are needed to help interpret the autism history and observations:
	• Neurodevelopmental disorders:
	  ○ specific language delay or disorder
	  ○ intellectual disability or global developmental delay
	  ○ developmental coordination disorder (DCD).
	• Mental and behavioural disorders:
	  ○ attention deficit hyperactivity disorder (ADHD)
	  ○ mood disorder
	  ○ anxiety disorder
	  ○ attachment disorders
	  ○ oppositional defiant disorder (ODD)
	  ○ conduct disorder
	  ○ obsessive compulsive disorder (OCD)
	  ○ psychosis.
	• Conditions in which there is developmental regression:
	  ○ Rett syndrome
	  ○ epileptic encephalopathy.
	• Other conditions:
	  ○ severe hearing impairment
	  ○ severe visual impairment
	  ○ maltreatment
	  ○ selective mutism.
		6.8

47	Consider which assessments are needed to construct a profile for each child or young person, for example: • intellectual ability and learning style • academic skills • speech, language and communication • fine and gross motor skills • adaptive behaviour (including self-help skills) • mental and emotional health (including self-esteem) • physical health and nutrition • sensory sensitivities • behaviour likely to affect day-to-day functioning and social participation • socialisation skills.	5.20

[i] See 'Self-harm: the short-term physical and psychological management and secondary prevention of self-harm in primary and secondary care' (NICE clinical guideline 16). Available from www.nice.org.uk/guidance/CG16
[ii] See 'When to suspect child maltreatment' (NICE clinical guideline 89). Available from www.nice.org.uk/guidance/CG89

Number	Recommendations	See section
48	If there are discrepancies during the autism diagnostic assessment between reported signs or symptoms and the findings of the autism observation in the clinical setting, consider: • gathering additional information from other sources and/or • carrying out further autism specific observations in different settings, such as the school, nursery, other social setting or at home.	5.29
49	Use information from all sources, together with clinical judgment, to diagnose autism based on ICD-10 or DSM-IV criteria.	5.20
50	Do not rely on any autism-specific diagnostic tool alone to diagnose autism.	5.20
51	Be aware that in some children and young people there may be uncertainty about the diagnosis of autism, particularly in: • children younger than 24 months • children or young people with a developmental age of less than 18 months • children or young people for whom there is a lack of available information about their early life (for example some looked-after or adopted children) • older teenagers • children or young people with a complex coexisting mental health disorder (for example ADHD, conduct disorder, a possible attachment disorder), sensory impairment (for example severe hearing or visual impairment), or a motor disorder such as cerebral palsy.	5.20
52	Be aware that some children and young people will have features of behaviour that are seen in the autism spectrum but do not reach the ICD-10 or DSM-IV diagnostic criteria for definitive diagnosis. Based on their profile, consider referring to appropriate services.	5.20
53	If the outcome of the autism diagnostic assessment clearly indicates that the child or young person does not have autism, consider referring them to appropriate services based on their profile.	5.20

54	Consider whether the child or young person may have any of the following as a coexisting condition, and if suspected carry out appropriate assessments and referrals:
	• Mental and behaviour problems and disorders:
	  ○ ADHD
	  ○ anxiety disorders and phobias
	  ○ mood disorders
	  ○ oppositional defiant behaviour
	  ○ tics or Tourette syndrome
	  ○ OCD
	  ○ self-injurious behaviour.
	• Neurodevelopmental problems and disorders:
		7.4

Number	Recommendations	See section
	○ global delay or intellectual disability ○ motor coordination problems or DCD ○ academic learning problems, for example in literacy or numeracy ○ speech and language disorder. • Medical or genetic problems and disorders: ○ epilepsy and epileptic encephalopathy ○ chromosome disorders ○ genetic abnormalities, including fragile X ○ tuberous sclerosis ○ muscular dystrophy ○ neurofibromatosis. • Functional problems and disorders: ○ feeding problems, including restricted diets ○ urinary incontinence or enuresis ○ constipation, altered bowel habit, faecal incontinence or encopresis ○ sleep disturbances ○ vision or hearing impairment.	
55	Be aware that in children and young people with communication difficulties it may be difficult to recognise functional problems or mental health problems.	5.20
	After the autism diagnostic assessment	
56	If there is uncertainty after the autism diagnostic assessment about the diagnosis, consider keeping the child or young person under review, taking into account any new information.	5.29
57	If any of the following apply after assessment, consider obtaining a second opinion (including referral to a specialised tertiary autism team if necessary): • continued uncertainty about the diagnosis • disagreement about the diagnosis within the autism team • disagreement with parents or carers or, if appropriate, the child or young person, about the diagnosis • a lack of local access to particular skills and competencies needed to reach a diagnosis in a child or young person who has a complex coexisting condition, such as a severe sensory or motor impairment or mental health problem • a lack of response as expected to any therapeutic interventions provided to the child or young person.	5.29
58	During the autism diagnostic assessment, consider any potential risk of harm to, and from, the child or young person and take appropriate action.	5.20

Number	Recommendations	See section
	Medical investigations	
59	Do not routinely perform any medical investigations as part of an autism diagnostic assessment, but consider the following in individual circumstances and based on physical examination, clinical judgment and the child or young person's profile: • genetic tests, as recommended by your regional genetics centre, if there are specific dysmorphic features, congenital anomalies and/or evidence of intellectual disability • electroencephalography if there is suspicion of epilepsy[iii]	8.4
	Communicating the results from the autism diagnostic assessment	
60	After the autism diagnostic assessment discuss the findings, including the profile, sensitively, in person and without delay with the parents or carers and, if appropriate, the child or young person. Explain the basis of conclusions even if the diagnosis of autism was not reached.	5.25
61	Use recognised good practice when sharing a diagnosis with parents, carers, children and young people.	5.25
62	For children and young people with a diagnosis of autism, discuss and share information with parents or carers and, if appropriate, the child or young person, to explain: • what autism is • how autism is likely to affect the child or young person's development and function.	5.25
63	Provide parents or carers and, if appropriate, the child or young person, with a written report of the autism diagnostic assessment. This should explain the findings of the assessment and the reasons for the conclusions drawn.	5.25
64	Share information, including the written report of the diagnostic assessment, with the GP.	5.25
65	With parental or carer consent and, if appropriate, the consent of the child or young person, share information with key professionals involved in the child's or young person's care, including those in education and social care.	5.25
66	With parental or carer consent and, if appropriate, the consent of the child or young person, make the profile available to professionals in education (for example, through a school visit by a member of the autism team) and, if appropriate, social care. This is so it can contribute to the child or young person's individual education plan and needs-based management plan.	9.8

[iii] See 'The epilepsies: the diagnosis and management of the epilepsies in adults and children in primary and secondary care' (NICE clinical guideline 20). Available from www.nice.org.uk/guidance/CG20

Number	Recommendations	See section
67	For children and young people with a diagnosis of autism, offer a follow-up appointment with an appropriate member of the autism team within 6 weeks of the end of the autism assessment for further discussion (for example about the conclusions of the assessment and the implications for the child or young person).	5.25
68	For children and young people with a diagnosis of autism, discuss with parents or carers the risk of autism occurring in siblings and future children.	5.25
	Information and support for families and carers	

69	Provide individual information on support available locally for parents, carers, children and young people with autism, according to the family's needs. This may include:
	• contact details for:
	  ○ local and national support organisations (who may provide, for example, an opportunity to meet other families with experience of autism, or information about specific courses for parents and carers and/or young people)
	  ○ organisations that can provide advice on welfare benefits
	  ○ organisations that can provide information on educational support and social care
	• information to help prepare for the future, for example transition to adult services.
		9.4

1.3.1 Tables 1–4

Using tables 1–3

The signs and symptoms in tables 1–3 are a combination of delay in expected features of development and the presence of unusual features, and are intended to alert professionals to the possibility of autism in a child or young person about whom concerns have been raised. They are not intended to be used alone, but to help professionals recognise a pattern of impairments in reciprocal social and communication skills, together with unusual restricted and repetitive behaviours.

Table 1 Signs and symptoms of possible autism in preschool children (or equivalent mental age). See 'Using tables 1–3' on page 18.

Social interaction and reciprocal communication behaviours

Spoken language

- Language delay (in babble or words, for example less than ten words by the age of 2 years)
- Regression in or loss of use of speech
- Spoken language (if present) may include unusual:
    - non-speech like vocalisations
    - odd or flat intonation
    - frequent repetition of set words and phrases ('echolalia')
    - reference to self by name or 'you' or 'she/he' beyond 3 years
- Reduced and/or infrequent use of language for communication, for example use of single words although able to speak in sentences

Responding to others

- Absent or delayed response to name being called, despite normal hearing
- Reduced or absent responsive social smiling
- Reduced or absent responsiveness to other people's facial expressions or feelings
- Unusually negative response to the requests of others (demand avoidant behaviour)
- Rejection of cuddles initiated by parent or carer, although may initiate cuddles themselves

Interacting with others

- Reduced or absent awareness of personal space, or unusually intolerant of people entering their personal space
- Reduced or absent social interest in others, including children of his/her own age – may reject others; if interested in others, may approach others inappropriately, seeming to be aggressive or disruptive
- Reduced or absent imitation of others' actions
- Reduced or absent initiation of social play with others, plays alone
- Reduced or absent enjoyment of situations that most children like, for example, birthday parties
- Reduced or absent sharing of enjoyment

Eye contact, pointing and other gestures

- Reduced or absent use of gestures and facial expressions to communicate (although may place adult's hand on objects)
- Reduced and poorly integrated gestures, facial expressions, body orientation, eye contact (looking at people's eyes when speaking) and speech used in social communication
- Reduced or absent social use of eye contact assuming adequate vision
- Reduced or absent joint attention shown by lack of:
    - gaze switching
    - following a point (looking where the other person points to – may look at hand)
    - using pointing at or showing objects to share interest

Ideas and imagination

- Reduced or absent imagination and variety of pretend play

Unusual or restricted interests and/or rigid and repetitive behaviours

- Repetitive 'stereotypical' movements such as hand flapping, body rocking while standing, spinning, finger flicking
- Repetitive or stereotyped play, for example opening and closing doors
- Over-focused or unusual interests
- Excessive insistence on following own agenda
- Extremes of emotional reactivity to change or new situations, insistence on things being 'the same'
- Over or under reaction to sensory stimuli, for example textures, sounds, smells
- Excessive reaction to taste, smell, texture or appearance of food or extreme food fads

Table 2 Signs and symptoms of possible autism in primary school children (aged 5–11 years or equivalent mental age). See 'Using tables 1–3' on page 18.

Social interaction and reciprocal communication behaviours

Spoken language

- Spoken language may be unusual in several ways:
  - very limited use
  - monotonous tone
  - repetitive speech, frequent use of stereotyped (learnt) phrases, content dominated by excessive information on topics of own interest
  - talking 'at' others rather than sharing a two-way conversation
  - responses to others can seem rude or inappropriate

Responding to others

- Reduced or absent response to other people's facial expression or feelings
- Reduced or delayed response to name being called, despite normal hearing
- Subtle difficulties in understanding other's intentions; may take things literally and misunderstand sarcasm or metaphor
- Unusually negative response to the requests of others (demand avoidant behaviour)

Interacting with others

- Reduced or absent awareness of personal space, or unusually intolerant of people entering their personal space
- Reduced or absent social interest in people, including children of his/her own age – may reject others; if interested in others, may approach others inappropriately, seeming to be aggressive or disruptive
- Reduced or absent greeting and farewell behaviours
- Reduced or absent awareness of socially expected behaviour
- Reduced or absent ability to share in the social play or ideas of others, plays alone
- Unable to adapt style of communication to social situations, for example may be overly formal or inappropriately familiar
- Reduced or absent enjoyment of situations that most children like

Eye contact, pointing and other gestures

- Reduced and poorly integrated gestures, facial expressions and body orientation, eye contact (looking at people's eyes when speaking), and speech used in social communication
- Reduced or absent social use of eye contact assuming adequate vision
- Reduced or absent joint attention shown by lack of:
  - gaze switching
  - following a point (looking where the other person points to – may look at hand)
  - using pointing at or showing objects to share interest

Ideas and imagination

- Reduced or absent flexible imaginative play or creativity, although scenes seen on visual media (for example, television) may be re-enacted
- Makes comments without awareness of social niceties or hierarchies

Table 2 continued on next page

Table 2 (continued) Signs and symptoms of possible autism in primary school children (aged 5–11 years or equivalent mental age). See 'Using tables 1–3' on page 18.

Unusual or restricted interests and/or rigid and repetitive behaviours

- Repetitive 'stereotypical' movements such as hand flapping, body rocking while standing, spinning, finger flicking
- Play repetitive and oriented towards objects rather than people
- Over-focused or unusual interests
- Rigid expectation that other children should adhere to rules of play
- Excessive insistence on following own agenda
- Extremes of emotional reactivity that are excessive for the circumstances
- Strong preferences for familiar routines and things being 'just right'
- Dislike of change, which often leads to anxiety or other forms of distress (including aggression)
- Over or under reaction to sensory stimuli, for example textures, sounds, smells
- Excessive reaction to taste, smell, texture or appearance of food or extreme food fads

Other factors that may support a concern about autism

- Unusual profile of skills or deficits (for example, social or motor coordination skills poorly developed, while particular areas of knowledge, reading or vocabulary skills are advanced for chronological or mental age)
- Social and emotional development more immature than other areas of development, excessive trusting (naivety), lack of common sense, less independent than peers

Table 3 Signs and symptoms of possible autism in secondary school children (older than 11 years or equivalent mental age). See 'Using tables 1–3' on page 18.

Social interaction and reciprocal communication behaviours

Spoken language

- Spoken language may be unusual in several ways:
  - very limited use
  - monotonous tone
  - repetitive speech, frequent use of stereotyped (learnt) phrases, content dominated by excessive information on topics of own interest
  - talking 'at' others rather than sharing a two-way conversation
  - responses to others can seem rude or inappropriate

Interacting with others

- Reduced or absent awareness of personal space, or unusually intolerant of people entering their personal space
- Long-standing difficulties in reciprocal social communication and interaction: few close friends or reciprocal relationships
- Reduced or absent understanding of friendship; often an unsuccessful desire to have friends (although may find it easier with adults or younger children)
- Social isolation and apparent preference for aloneness
- Reduced or absent greeting and farewell behaviours
- Lack of awareness and understanding of socially expected behaviour
- Problems losing at games, turn-taking and understanding 'changing the rules'
- May appear unaware or uninterested in what other young people his or her age are interested in
- Unable to adapt style of communication to social situations, for example may be overly formal or inappropriately familiar
- Subtle difficulties in understanding other's intentions; may take things literally and misunderstand sarcasm or metaphor
- Makes comments without awareness of social niceties or hierarchies
- Unusually negative response to the requests of others (demand avoidant behaviour)

Eye contact, pointing and other gestures

- Poorly integrated gestures, facial expressions, body orientation, eye contact (looking at people's eyes when speaking) assuming adequate vision, and spoken language used in social communication

Ideas and imagination

- History of a lack of flexible social imaginative play and creativity, although scenes seen on visual media (for example, television) may be re-enacted

Unusual or restricted interests and/or rigid and repetitive behaviours

- Repetitive 'stereotypical' movements such as hand flapping, body rocking while standing, spinning, finger flicking
- Preference for highly specific interests or hobbies
- A strong adherence to rules or fairness that leads to argument
- Highly repetitive behaviours or rituals that negatively affect the young person's daily activities
- Excessive emotional distress at what seems trivial to others, for example change in routine
- Dislike of change, which often leads to anxiety or other forms of distress including aggression
- Over or under reaction to sensory stimuli, for example textures, sounds, smells
- Excessive reaction to taste, smell, texture or appearance of food and/or extreme food fads

Other factors that may support a concern about autism

- Unusual profile of skills and deficits (for example, social or motor coordination skills poorly developed, while particular areas of knowledge, reading or vocabulary skills are advanced for chronological or mental age)
- Social and emotional development more immature than other areas of development, excessive trusting (naivety), lack of common sense, less independent than peers

Table 4 Factors associated with an increased prevalence of autism

- A sibling with autism
- Birth defects associated with central nervous system malformation and/or dysfunction, including cerebral palsy
- Gestational age less than 35 weeks
- Parental schizophrenia-like psychosis or affective disorder
- Maternal use of sodium valproate in pregnancy
- Intellectual disability
- Neonatal encephalopathy or epileptic encephalopathy, including infantile spasms
- Chromosomal disorders such as Down's syndrome
- Genetic disorders such as fragile X
- Muscular dystrophy
- Neurofibromatosis
- Tuberous sclerosis

1.4 Key research recommendations

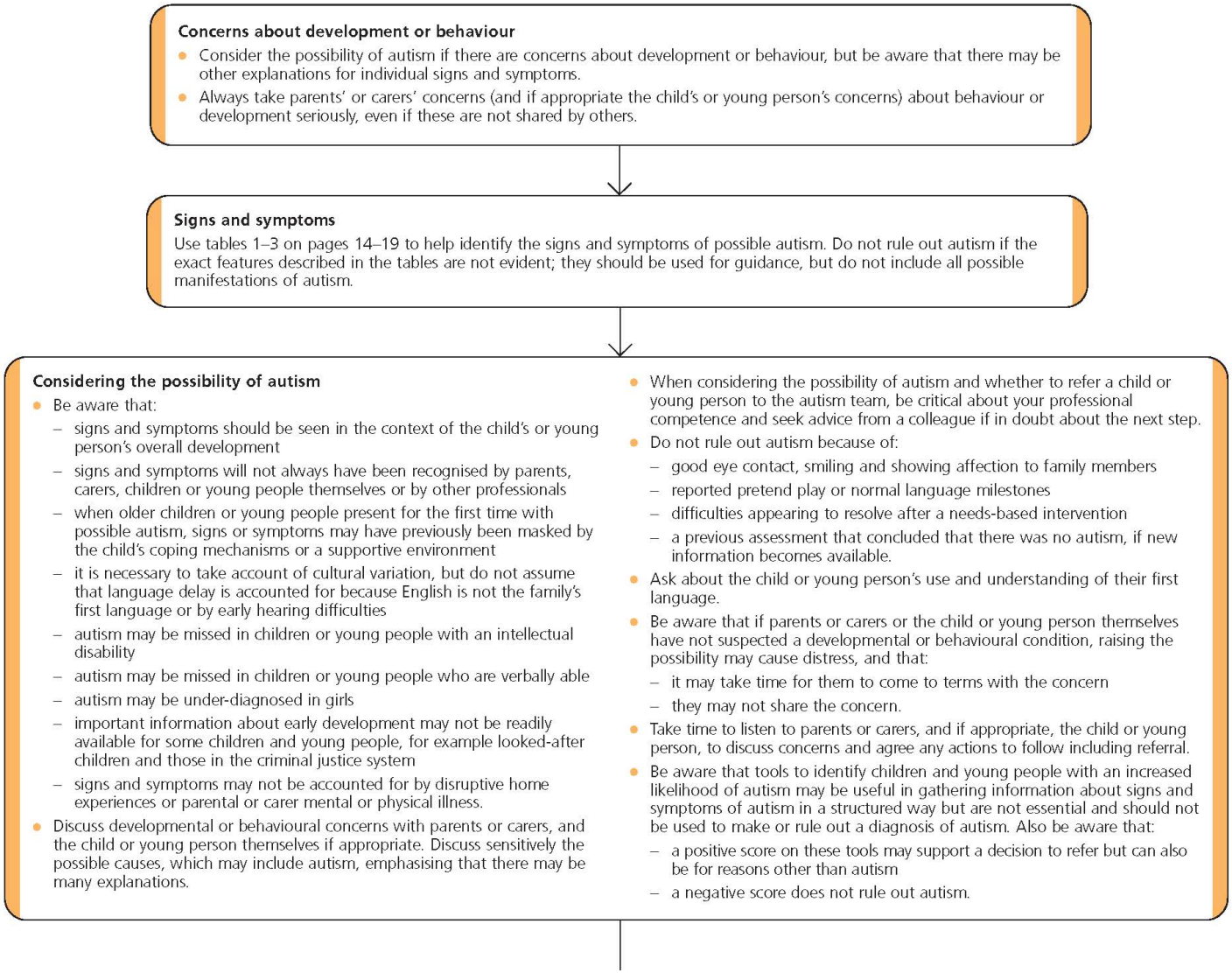
Number	Research recommendation	See section
	Recognition	
RR 1	Does training professionals to recognise signs and symptoms of autism lead to earlier assessment of needs and earlier diagnosis (and by implication reduce morbidity/improve health outcomes) among children and young people with suspected autism compared with no training? Why this is needed Successful training of healthcare professionals in the Netherlands has been shown to improve their ability, confidence and skills in identifying children or young people who need an autism diagnostic assessment. A fully trained workforce can identify the number of children or young people with autism and provide accurate information both for planning individual care and at a strategic level for planning appropriate service provision. If training improves earlier recognition and referral, this could be of particular benefit to at-risk groups for which there is evidence that autism is currently under-diagnosed, such as girls, and children and young people: • with parents of lower educational level • with English as an additional language • with sensory impairments • with intellectual disability. Before extending training to a wider population, it is important to better understand its effectiveness in terms of age, number of children and young people at referral, and time between parents' concerns and autism diagnosis.	3.5
	Following referral – information from other sources	
RR 2	Does routine additional information from educational settings (such as nursery or school) improve accuracy in diagnosing autism among children or young people up to the age of 19 compared with signs and symptoms alone? Why this is needed The term autism includes conditions primarily characterised by difficulties in social reciprocity, social communication and social understanding, along with rigid and repetitive ways of thinking and behaving. Diagnostic accuracy may be improved by interpreting information about how the child or young person presents in social settings away from the home and immediate family. Nurseries or schools are the most obvious settings from which such information may be collected. However, the degree to which information from teachers and schools helps in accurate diagnosis has not been well tested.	4.17

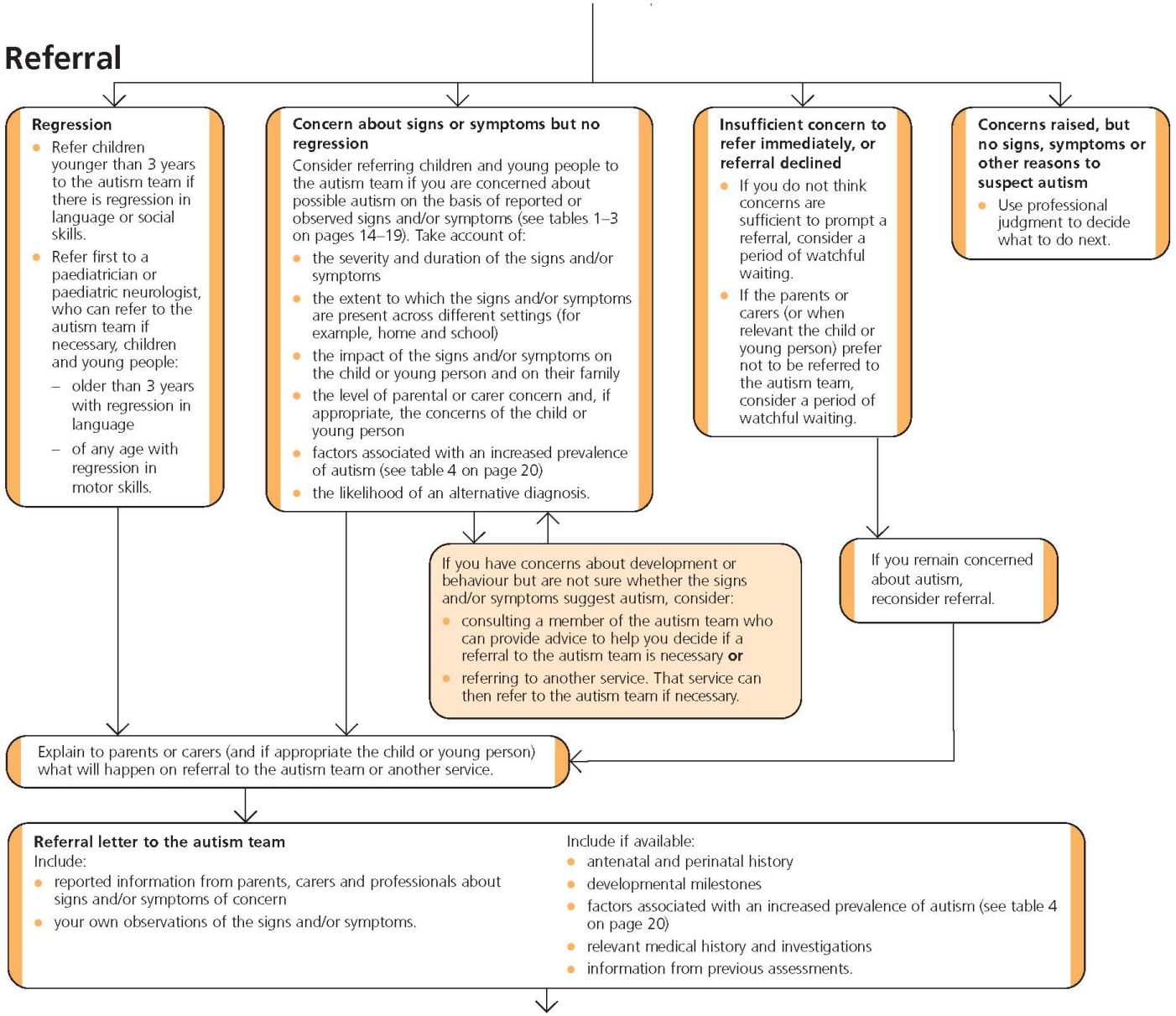
Number	Research recommendation	See section
	Diagnostic assessment	
RR 3	Do additional assessments (for IQ, language ability and motor ability) improve accuracy in diagnosing autism among preschool children (younger than 5 years) compared with signs and symptoms alone? Why this is needed Current NHS practice varies widely with regard to the proportion of children having an autism diagnostic assessment who also routinely undergo assessments of IQ, language and motor abilities. As a consequence we do not know whether such assessments aid more accurate diagnosis of autism. This is particularly important if a differential or coexisting diagnostic decision is called for and/or if there may be specific management implications. Studies may prove valuable to parents in terms of explaining some of the child's behaviours, leading to more targeted and informed support for the child, parents and the wider family.	5.21
	Medical investigations	
RR 4	What is the effectiveness and acceptability of comparative genomic hybridisation (CGH) array compared with current genetic testing in children and young people with identified autism? Why this is needed Recent scientific advances have led to the detection of genetic abnormalities that may partly or wholly explain why a child or young person has autism. As the tests become increasingly sophisticated (for example using methods such as CGH array that detect more subtle variations), more genetic abnormalities are being identified, although their causal role in autism is not always clear. Improved detection of genetic causes of autism could increase the precision of genetic counselling for parents of a child or young person with autism and also for the wider family. At present, the yield of abnormal genetic results using CGH array is known to be higher in those with dysmorphic features and/or intellectual disability, but this may extend to the wider autism population with increasing test sophistication. Before extending CGH array testing to a wider population, it is important to have a better understanding of its diagnostic yield. It is also essential to identify any negative consequences that may result from routine testing.	8.5

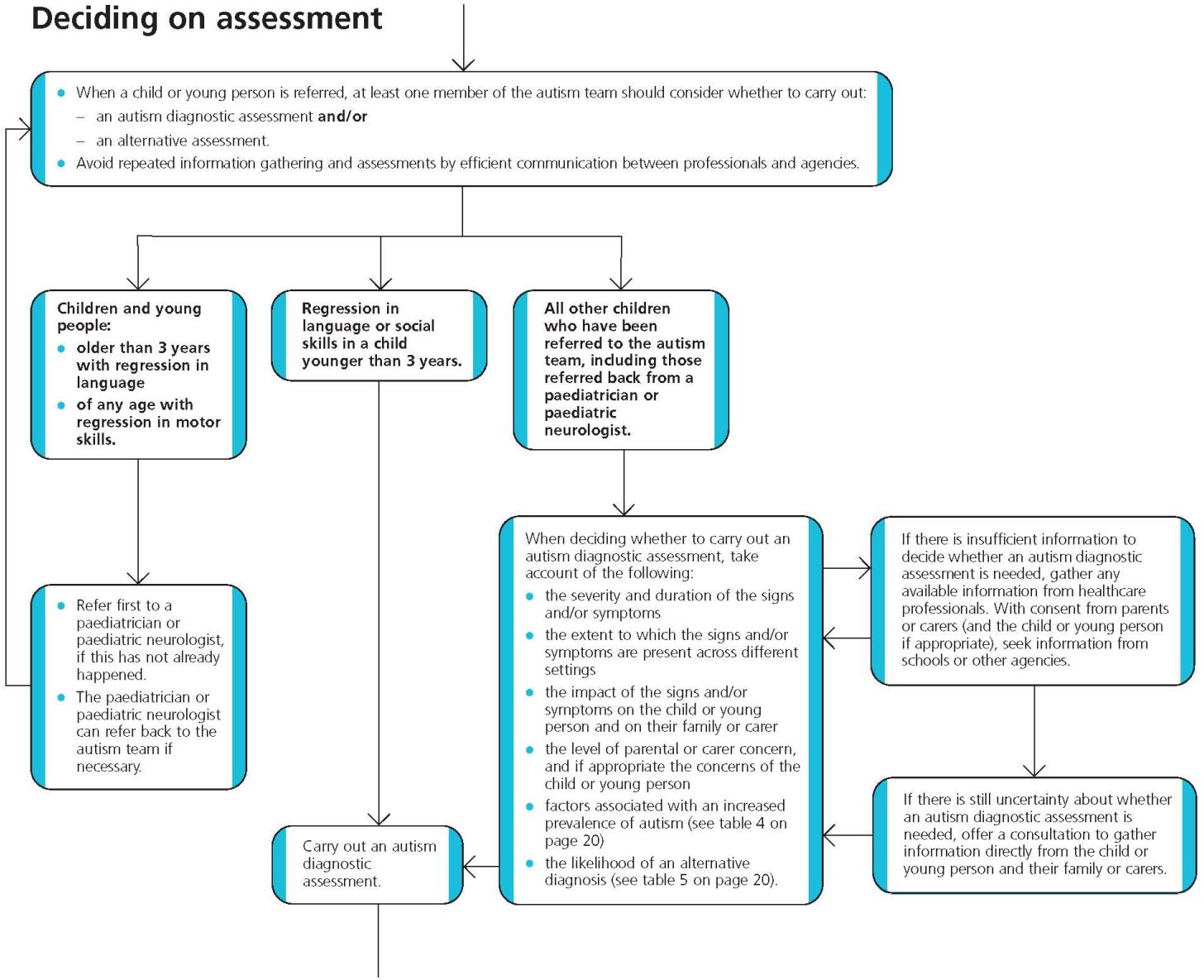
1.5 Care pathway

See pages 26–31.

Recognising possible autism




Referral
Regression
Refer children younger than 3 years to the autism team if there is regression in language or social skills.
Refer first to a paediatrician or paediatric neurologist, who can refer to the autism team if necessary, children and young people:
– older than 3 years with regression in language
– of any age with regression in motor skills.
Concern about signs or symptoms but no regression
Consider referring children and young people to the autism team if you are concerned about possible autism on the basis of reported or observed signs and/or symptoms (see tables 1–3 on pages 14–19). Take account of:
the severity and duration of the signs and/or symptoms
the extent to which the signs and/or symptoms are present across different settings (for example, home and school)
the impact of the signs and/or symptoms on the child or young person and on their family
the level of parental or carer concern and, if appropriate, the concerns of the child or young person
factors associated with an increased prevalence of autism (see table 4 on page 20)
the likelihood of an alternative diagnosis.
Insufficient concern to refer immediately, or referral declined
If you do not think concerns are sufficient to prompt a referral, consider a period of watchful waiting.
If the parents or carers (or when relevant the child or young person) prefer not to be referred to the autism team, consider a period of watchful waiting.
Concerns raised, but no signs, symptoms or other reasons to suspect autism
Use professional judgment to decide what to do next.
If you have concerns about development or behaviour but are not sure whether the signs and/or symptoms suggest autism, consider:
consulting a member of the autism team who can provide advice to help you decide if a referral to the autism team is necessary or
referring to another service. That service can then refer to the autism team if necessary.
If you remain concerned about autism, reconsider referral.
Explain to parents or carers (and if appropriate the child or young person) what will happen on referral to the autism team or another service.
Referral letter to the autism team
Include:
reported information from parents, carers and professionals about signs and/or symptoms of concern
your own observations of the signs and/or symptoms.
Include if available:
antenatal and perinatal history
developmental milestones
factors associated with an increased prevalence of autism (see table 4 on page 20)
relevant medical history and investigations
information from previous assessments.


Deciding on assessment
When a child or young person is referred, at least one member of the autism team should consider whether to carry out:
– an autism diagnostic assessment and/or
– an alternative assessment.
Avoid repeated information gathering and assessments by efficient communication between professionals and agencies.
Children and young people:
older than 3 years with regression in language
of any age with regression in motor skills.
Regression in language or social skills in a child younger than 3 years.
All other children who have been referred to the autism team, including those referred back from a paediatrician or paediatric neurologist.
Refer first to a paediatrician or paediatric neurologist, if this has not already happened.
The paediatrician or paediatric neurologist can refer back to the autism team if necessary.
When deciding whether to carry out an autism diagnostic assessment, take account of the following:
the severity and duration of the signs and/or symptoms
the extent to which the signs and/or symptoms are present across different settings
the impact of the signs and/or symptoms on the child or young person and on their family or carer
the level of parental or carer concern, and if appropriate the concerns of the child or young person
factors associated with an increased prevalence of autism (see table 4 on page 20)
the likelihood of an alternative diagnosis (see table 5 on page 20).
If there is insufficient information to decide whether an autism diagnostic assessment is needed, gather any available information from healthcare professionals. With consent from parents or carers (and the child or young person if appropriate), seek information from schools or other agencies.
If there is still uncertainty about whether an autism diagnostic assessment is needed, offer a consultation to gather information directly from the child or young person and their family or carers.
Carry out an autism diagnostic assessment.

Assessment

General principles

- A case coordinator in the autism team should be identified for every child or young person who is to have an autism diagnostic assessment.
- The autism case coordinator should:
  - act as a single point of contact for the parents or carers, and if appropriate the child or young person being assessed
  - keep parents or carers, and if appropriate the child or young person, up to date about the likely time and sequence of assessments
  - arrange information and support for parents, carers, children and young people
  - gather information relevant to the autism diagnostic assessment.
- Start the autism diagnostic assessment within 3 months of the referral.
- Discuss with the parents or carers (and if appropriate the child or young person) how information should be shared throughout the autism diagnostic assessment, including communicating the outcome. Take into account, for example, the child or young person's age and ability to understand.
- With consent from parents or carers (and the child or young person if appropriate):
  - seek a report from the pre-school or school if one has not already been made available
  - gather any additional health or social care information, including results from hearing and vision assessments.

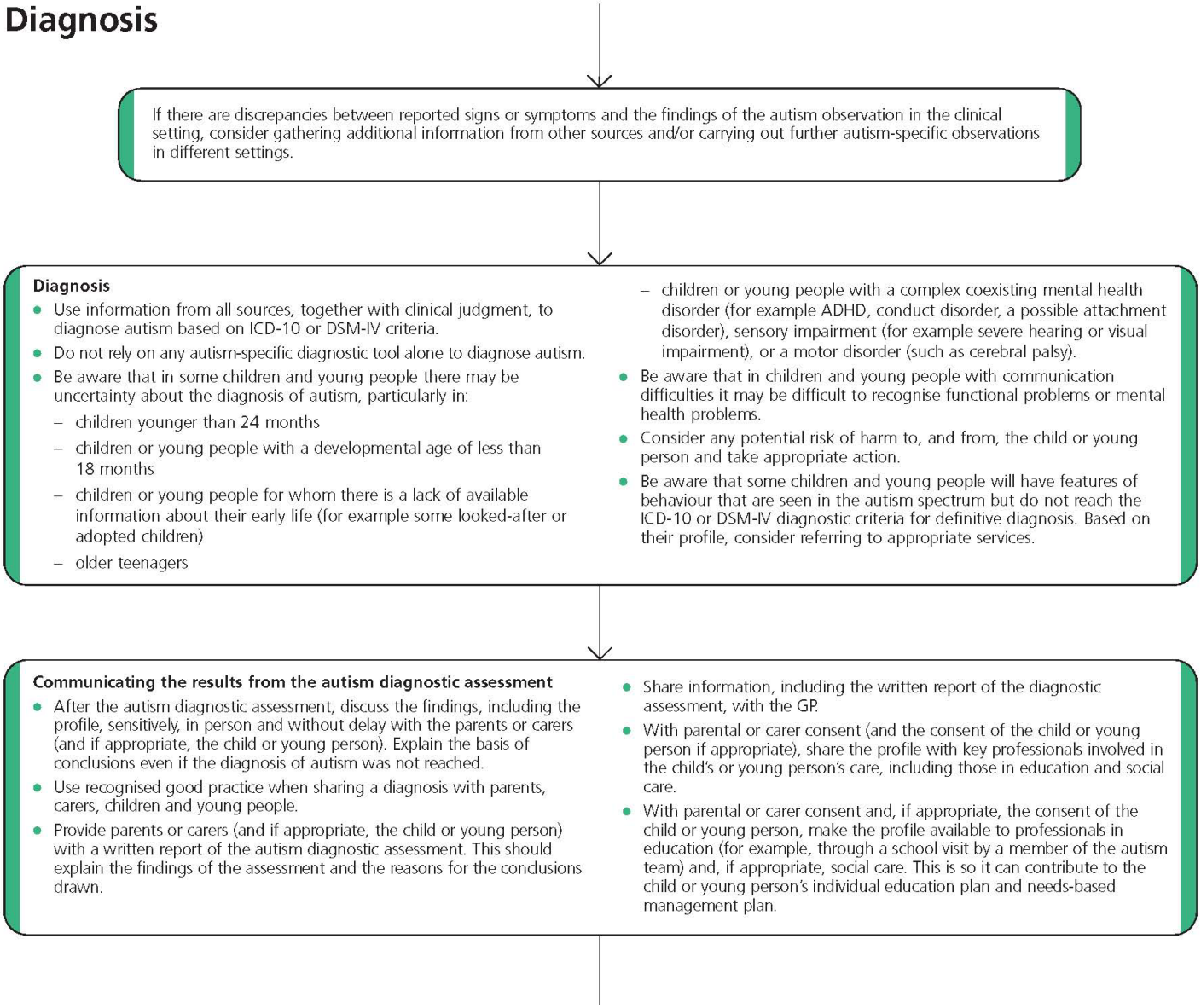
Consider which assessments are needed

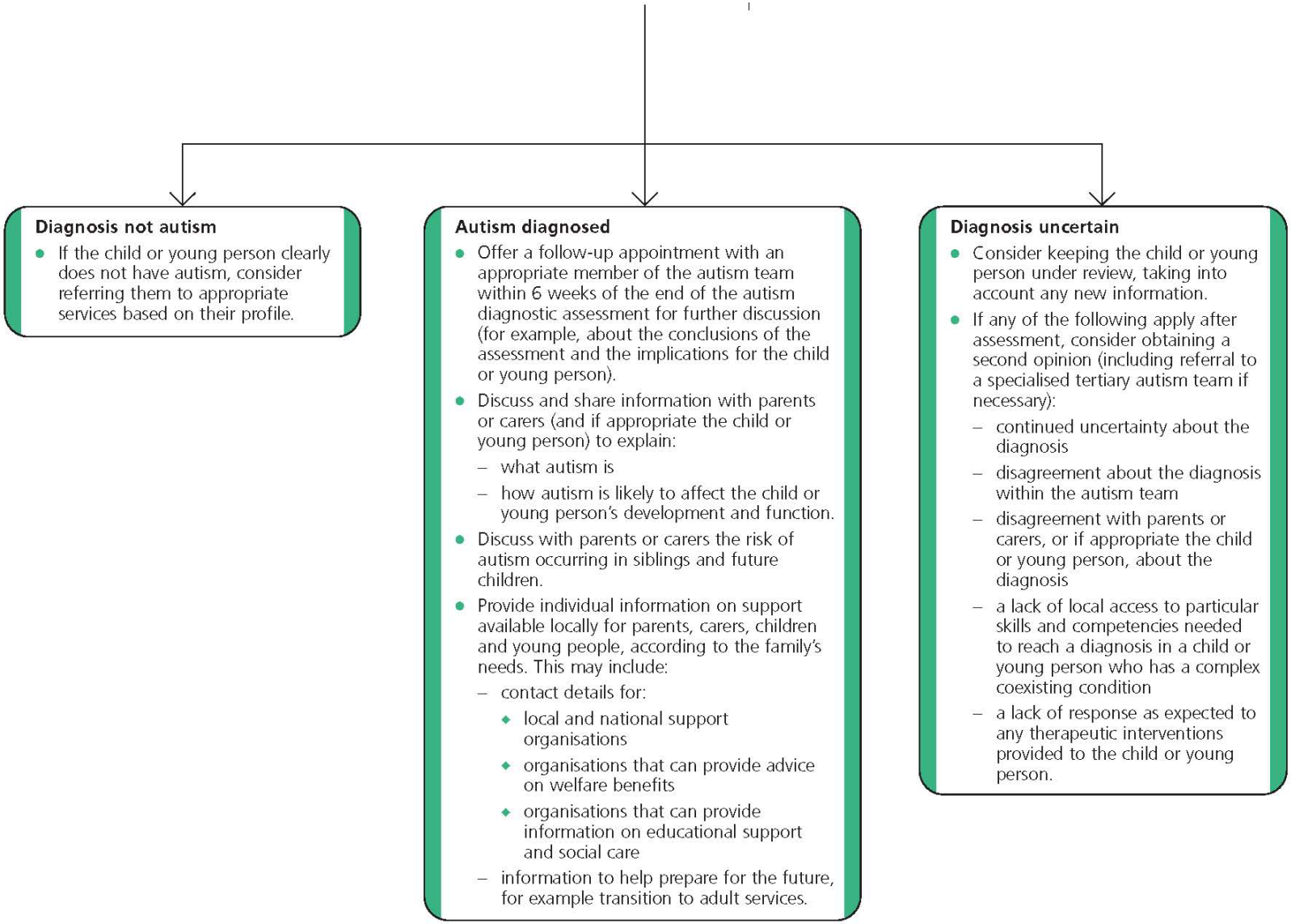
Consider which assessments will be needed to construct a profile, for example:

- intellectual ability and learning style
- academic skills
- speech, language and communication
- fine and gross motor skills
- adaptive behaviour (including self-help skills)
- mental and emotional health (including self-esteem)
- physical health and nutrition
- sensory sensitivities
- behaviour likely to affect day-to-day functioning and social participation
- socialisation skills.

The autism diagnostic assessment

- Include in every autism diagnostic assessment:
  - detailed questions about parent's or carer's concerns (and if appropriate the child's or young person's concerns)
  - details of the child's or young person's experiences of home life, education and social care
  - a developmental history, focusing on developmental and behavioural features consistent with ICD-10 or DSM-IV criteria (consider using an autism-specific tool to gather this information)
  - assessment (through interaction with and observation of the child or young person) of social and communication skills and behaviours, focusing on features consistent with ICD-10 or DSM-IV criteria (consider using an autism-specific tool to gather this information)
  - a medical history, including prenatal, perinatal and family history, and past and current health conditions
  - consideration of differential diagnoses and systematic assessment for conditions that may coexist with autism (see pages 20–21)
  - development of a profile of the child's or young person's strengths, skills, impairments and needs that can be used to create a needs-based management plan, taking into account family and educational context
  - communication of assessment findings to the parent or carer and, if appropriate, the child or young person (see page 12).
- Perform a general physical examination and look specifically for:
  - skin stigmata of neurofibromatosis or tuberous sclerosis using a Wood's light
  - signs of injury, for example self-harm or child maltreatment (see 'Related NICE guidance' on page 22)
  - congenital anomalies and dysmorphic features including macrocephaly or microcephaly.
- Consider differential diagnoses for autism and whether specific assessments are needed to help interpret the autism history and observations (see table 5 on page 20).
- Consider whether the child or young person may have a coexisting condition (see table 6 on page 21), and if suspected carry out appropriate assessments and referrals.
- Do not routinely perform any medical investigations as part of an autism diagnostic assessment, but consider the following in individual circumstances and based on physical examination, clinical judgment and the child or young person's profile:
  - genetic tests, as recommended by your regional genetics centre, if there are specific dysmorphic features, congenital anomalies and/or evidence of intellectual disability
  - electroencephalography if there is suspicion of epilepsy (see 'Related NICE guidance' on page 22).


Diagnosis
If there are discrepancies between reported signs or symptoms and the findings of the autism observation in the clinical setting, consider gathering additional information from other sources and/or carrying out further autism-specific observations in different settings.
Diagnosis
Use information from all sources, together with clinical judgment, to diagnose autism based on ICD-10 or DSM-IV criteria.
Do not rely on any autism-specific diagnostic tool alone to diagnose autism.
Be aware that in some children and young people there may be uncertainty about the diagnosis of autism, particularly in:
– children younger than 24 months
– children or young people with a developmental age of less than 18 months
– children or young people for whom there is a lack of available information about their early life (for example some looked-after or adopted children)
– older teenagers
– children or young people with a complex coexisting mental health disorder (for example ADHD, conduct disorder, a possible attachment disorder), sensory impairment (for example severe hearing or visual impairment), or a motor disorder (such as cerebral palsy).
Be aware that in children and young people with communication difficulties it may be difficult to recognise functional problems or mental health problems.
Consider any potential risk of harm to, and from, the child or young person and take appropriate action.
Be aware that some children and young people will have features of behaviour that are seen in the autism spectrum but do not reach the ICD-10 or DSM-IV diagnostic criteria for definitive diagnosis. Based on their profile, consider referring to appropriate services.
Communicating the results from the autism diagnostic assessment
After the autism diagnostic assessment, discuss the findings, including the profile, sensitively, in person and without delay with the parents or carers (and if appropriate, the child or young person). Explain the basis of conclusions even if the diagnosis of autism was not reached.
Use recognised good practice when sharing a diagnosis with parents, carers, children and young people.
Provide parents or carers (and if appropriate, the child or young person) with a written report of the autism diagnostic assessment. This should explain the findings of the assessment and the reasons for the conclusions drawn.
Share information, including the written report of the diagnostic assessment, with the GP.
With parental or carer consent (and the consent of the child or young person if appropriate), share the profile with key professionals involved in the child's or young person's care, including those in education and social care.
With parental or carer consent and, if appropriate, the consent of the child or young person, make the profile available to professionals in education (for example, through a school visit by a member of the autism team) and, if appropriate, social care. This is so it can contribute to the child or young person's individual education plan and needs-based management plan.


Diagnosis not autism
If the child or young person clearly does not have autism, consider referring them to appropriate services based on their profile.
Autism diagnosed
Offer a follow-up appointment with an appropriate member of the autism team within 6 weeks of the end of the autism diagnostic assessment for further discussion (for example, about the conclusions of the assessment and the implications for the child or young person).
Discuss and share information with parents or carers (and if appropriate the child or young person) to explain:
– what autism is
– how autism is likely to affect the child or young person's development and function.
Discuss with parents or carers the risk of autism occurring in siblings and future children.
Provide individual information on support available locally for parents, carers, children and young people, according to the family's needs. This may include:
– contact details for:
◆ local and national support organisations
◆ organisations that can provide advice on welfare benefits
◆ organisations that can provide information on educational support and social care
– information to help prepare for the future, for example transition to adult services.
Diagnosis uncertain
Consider keeping the child or young person under review, taking into account any new information.
If any of the following apply after assessment, consider obtaining a second opinion (including referral to a specialised tertiary autism team if necessary):
– continued uncertainty about the diagnosis
– disagreement about the diagnosis within the autism team
– disagreement with parents or carers, or if appropriate the child or young person, about the diagnosis
– a lack of local access to particular skills and competencies needed to reach a diagnosis in a child or young person who has a complex coexisting condition
– a lack of response as expected to any therapeutic interventions provided to the child or young person.

2 Development of the guideline

2.1 Introduction

This guideline covers the recognition, referral and diagnosis of children and young people on the autism spectrum from birth up to 19 years. The autism spectrum describes a pattern of behaviour characterised by qualitative differences and impairments in social interaction and communication, together with restricted interests and rigid/repetitive behaviours in children, young people and adults. This is a lifelong condition that can have a profound impact on the child or young person and their family. Co-occurrence with other conditions is common, causing variable impact on the individual across time and in different contexts and an adverse impact on adaptive function. The word 'spectrum' implies a range of behaviours manifest in various combinations and levels of severity.

Diagnosis is the decision-making process that determines if an individual has a disorder or not. 'Disorder' is not an exact term, but it is used here (as in the International Statistical Classification of Diseases and Related Health Problems [ICD-10]) to imply the existence of a clinically recognisable set of symptoms or behaviours associated with distress and with interference with personal functions[1]. Any clinical diagnosis is based on internationally accepted diagnostic criteria described in ICD-10 and the Diagnostic and Statistical Manual of Mental Disorders DSM-IV Fourth Edition (Text Revision) (DSM-IV-TR). Both of these publications use the category 'pervasive developmental disorder (PDD)' to group together diagnoses relating to conditions of the autism spectrum. The terms pervasive developmental disorder and autism spectrum disorder are regarded as conveying the same meaning.

In ICD-10, the diagnostic categories are:

- childhood autism
- atypical autism
- Asperger's syndrome
- other childhood disintegrative disorder
- overactive disorder associated with mental retardation and stereotyped movements
- other pervasive mental disorders and pervasive developmental disorder, unspecified
- Rett syndrome.

In DSM-IV-TR, the diagnostic categories are:

- autistic disorder
- Asperger's disorder
- pervasive developmental disorder not otherwise specified (including atypical autism)
- childhood disintegrative disorder
- Rett disorder.

These terms were used in the search for evidence for this guideline as described in the methodology (see Section 2.6). However, the guideline development group (GDG) felt that the most important sub-categories to highlight were the diagnoses of 'autism' (childhood autism [ICD-10] and autistic disorder [DSM-IV-TR]) because traditionally these are seen as more severe and as having a greater impact on both the individual and those around them than the other sub-categories. Consequently, where the

evidence base included studies of children and young people with childhood autism or autistic disorder, these are presented separately from studies of children and young people across the broader autism spectrum. In the text of this guideline the word 'autism' and the acronym ASD (autism spectrum disorders) are used separately to refer to these specific diagnoses respectively in the section 'Guideline development methodology' (Section 2.6) and the sections 'Overview of evidence', 'Evidence profile' and 'Evidence statement' in each chapter.

While the use of diagnostic criteria and the corresponding terminologies is crucial to the methodology of this evidence based guideline, the GDG recognised that individuals and groups prefer to use a variety of terms, including pervasive developmental disorder, autism spectrum disorder, autistic spectrum condition, autistic spectrum difference and neuro-diversity. In particular, the GDG noted that 'autism' is used to cover all of these terms in recent Department of Health, National Audit Office and Public Accounts Committee documents.

The GDG was acutely aware that the range of possible descriptors, while understandable given the complexity and variance in different autistic behaviours, also presents a risk in terms of confusing readers of this guideline. For this reason, the GDG decided to make its recommendations more accessible to the readership and more suited to reproduction in multiple publications by adopting a terminology that was common to all NICE guidance on this subject. As a result, apart from the evidence methodology, profiles and statements in individual chapters, all subsequent text uses the term 'autism' as synonymous with a diagnosis of 'autism spectrum disorder' (ICD-10 or DSM-IV-TR criteria).

When autism is diagnosed, families and carers and the child or young person themselves can experience a variety of emotions, shock, sadness and concern about the implications of diagnosis for the future, as well a profound sense of relief that others agree with their observations and concerns. At best, diagnosis and the assessment of needs can offer an understanding of why a child or young person is different from their peers. It can open doors to support and services in education, health services and social care, and a route into voluntary organisations and contact with other children and families with similar life experiences.

2.1.1 Prevalence of autism

Once thought to be an uncommon developmental disorder, more recent studies have reported increased measured prevalence rates, so that the minimum prevalence of autism is now regarded as 1% of the child population.[2-4] The factors affecting the rising prevalence are unknown but include changing diagnostic criteria,[5] different ascertainment methods such as dependence on existing registers or a staging approach to recognition and diagnostic assessment, and diagnostic substitution.[6;7] One effect of the rise in reported prevalence has been to increase demand for diagnostic services for children and young people. This has considerable training and resource implications for the NHS.

2.1.2 Onset and course of autism

Core autistic behaviours are typically present in early childhood, although features may not always be manifest until the situational demand changes, for example when starting nursery or school or at transition to secondary school. However, the features of autism may be manifest in different ways at different ages and in any individual they can change over time and vary with maturity, the demand of the environment and any coexisting conditions, even if the core impairments remain. Regression and/or stasis of language and social behaviour is reported in between one-fifth and one-third of children, usually, but not exclusively, in the second year of life, for reasons that are unknown. Later regression to autism after a period of three years of apparently normal development is rare (1.7 per 100,000)[8] and is termed childhood disintegrative disorder (CDD). Self help, continence and mood may all be affected during regression which later is indistinguishable from autism with intellectual disability.

2.1.3 The causes of autism

Autism is a neurodevelopmental and biologically based disorder although the mechanism of causation is unknown. Underlying medical causes are reportedly found in less than 10% of children with autism.[9] There is no specific diagnostic test for autism. Diagnosis is made on the basis of the presence of characteristic behaviours. There is a substantial genetic basis with strong heritability.[10;11] At least 60 different metabolic disorders, neurological disorders and complex chromosome abnormalities have been reported as associated with autism. Potential candidate genes are emerging from the advances

in molecular genetic techniques but current thinking is that autism is a genetically heterogeneous disorder producing phenotypic heterogeneity (differing physical and behavioural characteristics).[12] For families with a child with a diagnosis of autism the likelihood of having another child with autism is greatly increased, making awareness of this an important part of the diagnostic process.

A number of medical conditions are associated with increased risk of autism. Autism is strongly associated with a number of coexisting conditions which have an impact on the wellbeing of the child or young person and their family. Recent studies[13] have shown that approximately 70% of individuals with autism also meet diagnostic criteria for at least one other (often unrecognised) mental and behavioural disorder that is further impairing psychosocial functioning. Intellectual disability (intelligence quotient [IQ] less than 70) co-occurs in approximately 50% of young people with autism[14].

Manifestations of autism are due to both delay in and disorder of typical development and the presence of unusual features of development affecting behaviours in the following areas:

- social and communicative reciprocity – in both initiation of and responsiveness to interpersonal verbal and non-verbal communication and social interaction
- the ability to infer what another person is intending, experiencing or thinking
- creative, imaginative social play and thinking
- cognitive and behavioural flexibility
- the range and intensity of interests and activities
- sensory interests and sensitivities
- emotional reactions to the environment
- self absorption in repetitive behaviours and stereotyped mannerisms
- motor coordination competences.

The autism spectrum thus comprises a range of behaviours that are heterogeneous both in causation and manifestation.

Once thought of as a categorical disorder, so that an individual either definitely did or did not have autism, the concept of continuously distributed traits with no clear diagnostic boundary is a challenge when it comes to deciding the ‘threshold’ for a definite disorder and hence the diagnosis of a disorder. Strengths and weaknesses in the core autistic behaviours of reciprocal social communication skills and rigidity of thinking are now thought to be distributed throughout the general population as traits[15] and found in approximately 5% of the population.[16] Such traits are found more commonly in the families of those with autism[17] and are referred to as the ‘broader autism phenotype’ of the autism spectrum. Intellectual disability, severe language impairments and stereotypes are absent and although features of the broader autism phenotype are evident in early childhood, any impairment may become more manifest over time. Thus, during diagnostic assessment, an individual may be found to have qualitatively similar traits to those of autism but be below the threshold (‘subthreshold’) for a diagnosis of disorder. In such cases, the individual and/or family may still find the information about autism helpful. That individual may or may not have ‘needs’ which will be identified during the ‘profiling assessment’ and support similar to that provided for autism may be helpful.

2.1.4 Why is recognition and diagnosis of autism important?

Autism can have a significant impact upon both the child or young person and their family members. While it is important to recognise that some people with autism will have highly productive and fruitful lives, for others with more severe autism, particularly with associated coexisting conditions, autism is a lifelong, significantly impairing disorder which can have profound effects not only on the individual but also on family members who may require assistance from healthcare, education and social care services for a long time. Children and young people moving into adulthood may experience a social stigma towards their condition and this may have a significant effect on their employment prospects. In the UK the cost of supporting people with autism and the opportunity costs of lost productivity were estimated in 2009 at £28 billion per year.[18]

Recognition and diagnosis of autism is important for children and young people as it leads to the provision of autism-specific support to families and appropriate education, which can in turn lead to more positive outcomes for the individual. Smith et al found that mothers of adolescents and adults with autism experience high levels of distress.[19] Good management of the impact of autism is highly dependent on understanding autism and its commonly associated features and accessing appropriate information and services. An appropriate and timely diagnosis contributes significantly to this process. Levels of understanding of autism among healthcare and other relevant professionals and the availability of services differ greatly from one local area to another and there are reported inequalities of diagnosis in subgroups, such as those with intellectual disability.[2]

2.1.5 What does diagnosis offer the child/young person and their family?

The importance of conveying diagnosis sensitively to families cannot be overstated. Diagnosis can provide parents or carers with a framework for understanding their child and help them to make decisions about which interventions or management strategies to try. However, it is important to acknowledge that, for many families, a diagnosis of autism can be deeply distressing and can take time to accommodate.

For young people themselves, diagnosis may be a relief.

Particular examples of how a diagnosis can enable the child or young person and their family or carers are shown below. These include:

- access to information, services and support
- emotional benefits
- appropriate support from education, healthcare and social care services
- recognition of coexisting conditions.

The quotations from the National Autism Plan for Children, 2003[20] and the National Autistic Society obtained during the development of this guideline highlight the parental viewpoint.

Access to information, services and support

Once autism is diagnosed, parents can more easily access local and national support groups and services, where these are available:

> ‘Ignorance isn’t bliss. You need help as early as possible.’
>
> ‘I now understand how special and unique he is, more so than before.’
>
> ‘Glad I know what he’s got now so I can help him.’
>
> ‘Some health specialists may be reluctant and say ‘we don’t like to label children’. Well, we don’t like to label them as parents either, but we have to. Getting that label is the first step to getting some help and you want to know what it is you are dealing with – you just want to know.’

Emotional benefits

Parents realise they are not to blame for their children’s autism.

> ‘Until we had the diagnosis, we were labelled as neurotic, dysfunctional and unable to cope.’

Appropriate support from education, health and social care services

Before diagnosis, children and young people may be labelled as ‘naughty’ and may be under-achieving, misunderstood and unsupported, as well as anxious and distressed about attending school or excluded from school:

> ‘It is of no benefit to be within the education system without a diagnosis.’

> ‘From the parents’ perspective, the intense distress associated with the diagnosis of autism cannot be taken away. At least the experience can be assisted by a system that works effectively to answer their questions and provide them with the support they need.’

Recognising coexisting conditions

> ‘Because he has other conditions, they couldn’t see the wood for the trees. Everyone was reluctant to double-diagnosis and give him another label.’

2.1.6 The national context and previous guidelines

The health service has a crucial role in recognition and diagnosis of autism. Primary, secondary and tertiary health services are involved in autism throughout the person’s life, both directly and through coordination with other key services and areas, including education, social care, the voluntary sector, work, leisure, housing and transport; in fact, every facet of life. Multi-agency working should aim to be a partnership with the child/young person with autism and their family or carer. Currently, most diagnosis of autism takes place within district health services, although initial recognition may be by parents/carers, teachers, health visitors or other members of the primary health care team. Districts have different referral policies, although, in general, young children will be referred to paediatricians at a child development centre or directly to speech and language therapy services, and older children to paediatricians or child and adolescent mental health services (CAMHS).

Parents, through the National Autistic Society, say that they want clear referral pathways and health professionals who are well trained and knowledgeable about autism. They also want health professionals to work together and with education and social care services to enable the child or young person to gain access to appropriate intervention and education and the family to gain access to support. The parental experience is one of disbelief of their concerns, difficulty in getting a referral and, often, a struggle to get a diagnosis. Their experience is that they have to repeat their story many times to different professionals and that assessments are not coordinated.

While clinical guidance on autism exists in the form of a practice parameter from the USA,[21] national plans from the UK (National Autism Plan for Children [NAP-C])[20] and guidelines from Scotland (Assessment, diagnosis and clinical interventions for children and young people with autism spectrum disorders, Scottish Intercollegiate Guidelines Network [SIGN])[22] and New Zealand (Autism Spectrum Disorders guideline),[23] access to diagnosis in the UK still varies according to where a family lives.

Since NAP-C, there has been an increase in the number of district teams which have a formal autism assessment protocol, rising from 32% in 2001 to 54% in 2007. Of the district teams, 93% (compared with 48% in 2001) are using a multi-disciplinary/multi-agency team approach and 57% have joint clinics with child mental health services (compared with 34% in 2001)[24]. However, the estimated prevalence rates of autism have major resource implications and place a considerable strain on local diagnostic services. Only 49% of district teams were able to complete the diagnostic assessment within 30 weeks in 2007.

In 2009, the Autism Bill was passed. The resulting Autism Act puts a duty on the Secretary of State to develop a strategy for adults with autism, regardless of their level of intellectual ability or disability. The Act sets out several legal requirements for local authorities and/or NHS bodies (including foundation trusts). These include: specialist training for key professionals; autism awareness training for all staff working in health and social care; a clear diagnostic pathway; lead professionals for diagnosis and assessment; transition plans; a named joint senior commissioner; and local commissioning plans. Statutory guidance was published in December 2010.

There is a stated desire on the part of health professionals involved with children and young people for clear, evidence-based guidance on the diagnostic process for autism and guidance on which coexisting conditions should be assessed and which medical investigations should and should not be carried out routinely. Services for children and young people have been critically reviewed by the Kennedy report (Getting it right for children and young people, 2010).[25] Achieving Equity and Excellence for Children[26] outlines the Government proposals for the NHS as applied to children. This promotes shared decision making between families, young people and professionals and an ‘outcomes framework‘ for services that emphasises enhanced quality of life, ensuring a positive experience of health care, recovery from acute episodes of illness and a safe environment for treatment and care. The last point is emphasised

in Chapter 5 of the National Service Framework for Children, Young People and Maternity Services - Core Standards:[27] 'Care will be provided in an appropriate environment that is safe and well suited to the age and development of the child or young person'. This is a particularly important aspect of health care for those with autism of all ages and abilities.

2.1.7 Referral rates and demand for diagnostic services

Prevalence rates in two districts in 2010 suggest that autism is queried in approximately 3% of the population and that 1.5–2% of primary or preschool children are diagnosed with autism. In a district with a birth rate of 5000 per year, this equates to three referrals per week requiring diagnostic assessment and profiling of potential autism by the multidisciplinary team.

2.1.8 Patient-centred care

Treatment and care should take into account the needs and preferences of children, young people and those who care for them. Children and young people with autism and their family/carers should have the opportunity to make informed decisions about their care and treatment in partnership with their healthcare professionals. If children and young people do not have the capacity to make decisions, healthcare professionals should follow the Department of Health's advice on consent (available from www.dh.gov.uk/consent) and the code of practice that accompanies the Mental Capacity Act (summary available from www.publicguardian.gov.uk). In Wales, healthcare professionals should follow advice on consent from the Welsh Assembly Government (available from www.wales.nhs.uk/consent).

If the child or young person is under 16 years, healthcare professionals should follow the guidelines in 'Seeking consent: working with children' (available from www.dh.gov.uk/consent).

Good communication between healthcare professionals and children and young people is essential. It should be supported by written information, ideally evidence based, and tailored to the needs of the child or young person. Information, support, treatment and care should be: available according to need; culturally appropriate; accessible to people with additional needs, such as physical, sensory or intellectual disabilities; and accessible to people who do not speak or read English. Families and carers should also be given the information and support they need.

Care of young people in transition between paediatric and adult services should be planned and managed according to the best practice guidance described in 'Transition: getting it right for young people' (available from www.dh.gov.uk). There is a statutory transition planning process for children with statements of special educational need, beginning in Year 9 of schooling, and a government programme, the Transition Support Programme, which aims to improve the transition process for disabled young people and those with special educational needs (SEN). Adult and paediatric healthcare teams should work jointly to provide assessment and services to young people in transition with autism.

2.2 Aim and scope of the guideline

This clinical guideline concerns the recognition, referral and diagnosis of children and young people on the autism spectrum from birth to 18 years (up to their 19th birthday).

The guideline has been developed with the aim of providing guidance in the following areas:

- Signs and symptoms (features of autism) that should prompt professionals working with children and/or parents or carers to consider autism in a child or young person, including signs and symptoms that should trigger referral for specialist assessment.
- Information requirements from other agencies.
- The components of diagnostic assessment after referral, including:
    - methods of assessing autism
    - diagnostic thresholds for autism
    - assessment of the most common coexisting conditions and differential diagnoses, including other developmental disorders, speech and language disorders, intellectual disabilities and mental health problems

    - clinical evidence for and cost-effectiveness of (that is, which test should be done on whom and for what purpose):
        - biomedical investigations (including sequencing and number of tests)
        - genetic assessments (such as karyotype, fragile x, comparative genomic hybridization [CGH] array)
        - neuroimaging (computed tomography [CT], magnetic resonance imaging [MRI], single photon emission computed tomography [SPECT], positron emission tomography [PET])
        - electroencephalograms (EEGs)
        - metabolic tests.
- The information and day-to-day support (such as a telephone helpline) appropriate for children, young people and parents/carers during the process of referral, assessment and diagnosis of autism.
- Ineffective diagnostic interventions and approaches.

The following areas are specifically excluded from the guideline.

- Population screening or surveillance.
- The basic components of any routine paediatric or mental health assessment not specific to autism.
- The role and competencies of different professions in the recognition and diagnosis of autism.
- Specific models for running a diagnostic service.
- Interventions and ongoing management of autism, including specific therapeutic interventions during diagnosis.
- Reassessment and review of diagnosis.

Further information about the areas that are covered by the guideline is available in the scope of the guideline (reproduced in Appendix A).

2.3 For whom is this guideline intended?

This guideline is of relevance to those who work in or use the National Health Service (NHS) in England and Wales, in particular:

- professionals working with children and young people and/or families and carers in health, education or social care.
- those responsible for commissioning and planning healthcare services, including commissioners, Health Commission Wales commissioners, and public health and trust managers
- children and young people, and their families/carers, going through the referral and diagnosis process for autism.

A version of this guideline for children and young people, their families/carers and the public is available from the NICE website (www.nice.org.uk/CG128) or from NICE publications on 0845 003 7783 (quote reference number N2663).

2.4 Other relevant documents

This guideline is intended to complement other existing and proposed works of relevance, including the following guidance published by NICE.

- 'Attention deficit hyperactivity disorder', NICE clinical guideline 72. Available from http://guidance.nice.org.uk/CG72
- 'Depression in children and young people', NICE clinical guideline 28. Available from http://guidance.nice.org.uk/CG28
- 'Epilepsy', NICE clinical guideline 20. Available from http://guidance.nice.org.uk/CG20
- 'Self-harm', NICE clinical guideline 16. Available from http://guidance.nice.org.uk/CG16
- 'When to suspect child maltreatment', NICE clinical guideline 89. Available from http://guidance.nice.org.uk/CG89
- 'Looked-after children and young people', NICE public health guideline 28. Available from http://guidance.nice.org.uk/PH28

2.5 Who has developed the guideline

The guideline was developed by a multi-professional and lay GDG convened by the National Collaborating Centre for Women's and Children's Health (NCC-WCH). The GDG membership included:

- two psychologists
- two psychiatrists
- three paediatricians
- a health visitor
- a GP
- a speech and language therapist
- an education professional
- two parent/carer members.

NCC-WCH staff provided methodological support for the guideline development process, undertook systematic searches, retrieved and appraised the evidence, developed health economic models and wrote successive drafts of the guideline.

Three external advisors were appointed to the GDG to advise on methodology, medical investigations and genetic testing.

All GDG members' and external advisers' potential and actual conflicts of interest were recorded on declaration forms provided by NICE (summarised in Appendix B). None of the interests declared by GDG members constituted a material conflict of interest that would influence recommendations developed by the GDG.

Organisations with interests in the recognition, referral and diagnosis of autism in children and young people were encouraged to register as stakeholders for the guideline. Registered stakeholders were consulted throughout the guideline development process. The types of organisations eligible to register as stakeholders included:

- national patient and carer organisations that directly or indirectly represent interests of children and young people with autism and their families/carers
- national organisations that represent healthcare professionals who provide services for children and young people with autism and their families/carers
- companies that manufacture preparations and/or products used in the management of autism

- providers and commissioners of health services in England, Wales and Northern Ireland
- statutory organisations such as the Department of Health and the Welsh Assembly Government
- research organisations that have undertaken nationally recognised research in relation to the topics covered in the guideline.

A list of registered stakeholder organisations for this guideline is presented on the NICE website (and in Appendix C).

2.6 Guideline development methodology

This guidance was commissioned by NICE and developed in accordance with the guideline development process outlined in the NICE *Guidelines Manual (2009)* (see www.nice.org.uk/guidelinesmanual). The general approach is outlined below.

Table 2.1 Stages in the NICE guideline development process

Stage
Scoping the guideline (determining what the guideline would and would not cover)
Preparing the work plan (agreeing timelines, milestones, guideline development group constitution, etc)
Forming and running the guideline development group
Developing review questions
Identifying evidence
Reviewing and synthesising evidence
Incorporating health economics
Making group decisions and reaching consensus
Linking guidance to other NICE guidance
Creating guideline recommendations
Writing the guideline
Stakeholder consultation on the draft guideline
Finalising and publishing the guideline (including pre-publication check)
Declaration of interests

In accordance with NICE's Equality Scheme, ethnic and cultural considerations and factors relating to disabilities have been considered by the GDG throughout the development process and specifically addressed in individual recommendations where relevant. Further information is available from: www.nice.org.uk/aboutnice/howwework/NICEEqualityScheme.jsp.

2.6.1 Forming clinical questions and search strategies

The GDG formulated clinical questions (see Appendix D) from the scope and prepared a protocol for each review question (see Appendix E). These formed the starting point for the subsequent evidence reviews. The GDG was supported in the development of the clinical questions and protocols by the NCC-WCH technical team.

Published evidence was identified by systematic searches of the databases (shown below) for the evidence. Reviews of the evidence published from 1990 to 11 October 2010 were undertaken by the

NCC-WCH technical team. A search strategy designed to cover all the autism spectrum disorders was developed in the Medline database before being translated for use in the remaining databases, including Embase, the Cochrane Library Database, PsycInfo and Cinahl. Three educational databases were subsequently searched: ERIC, the British Educational Index and the Australian Educational Index. Studies of children or young people who did not meet the criteria for autism spectrum disorders were excluded from the guideline.

Search strategies combined a combination of MESH headings and keyword searches including abbreviations. Searches were restricted to human studies and English language only; publications in languages other than English were not appraised. Methodological filters were not applied. The strategy was to undertake a broad search to identify all the evidence relating to autism spectrum disorders, rather than individual searches for every clinical question. The results were then sifted into individual questions as outlined below.

There was no systematic attempt to search grey literature (conferences, abstracts, theses and unpublished trials). Hand searching of journals not indexed on the database was not undertaken. Reference lists of included studies or reviews for additional references were not checked. Full details of the systematic searches, including the sources searched and the search strategies, are presented in Appendix F. Although the condition-based search strategy generated a very large set of records, the information scientists considered this was the best method of developing a comprehensive and sensitive strategy in this subject area.

The results of the searches were incorporated into four reference manager databases alphabetised according to author (A-D, E-K, L-R and S-Z). In total there were 47,255 references. Each of these databases were then de-duplicated and weeding was performed to remove references unlikely to contain research data, including book reviews, book chapters and letters. Records not related to the subject area were also screened out at this stage, leaving a total database of 20,633 citations.

Two researchers then conducted a more stringent weeding excluding citations that were not relevant to this guideline (citations dealing with vaccinations, treatments or management of autism spectrum disorders) resulting in 5173 in the database. These citations were screened and allocated to one of the ten clinical questions and the researchers dealing with each question ordered citations for inclusion or exclusion. This resulted in 1215 citations being considered and 899 being ordered for the ten clinical questions.

The electronic searches were re-run in June 2010 and in Oct 2010 and another 5,154 references for weeding were identified. After following the stages outlined above, a total of 48 extra papers were ordered. The final cut-off date for searches was 11 October 2010.

A total of 925 articles were examined in full text and of these 185 papers are included in the guideline.

2.6.2 Reviewing and synthesising the evidence

Evidence relating to clinical effectiveness was reviewed and synthesised according to the Grading of Recommendations Assessment, Development and Evaluation (GRADE) approach (see http://www.gradeworkinggroup.org/index.htm). Evidence profiles were used to summarise the quality of the evidence and the outcome data for each important clinical outcome. The initial quality of evidence was rated according to study design[28;29] (see table 2.2) as advised by NICE during the review process.

Table 2.2 Initial study quality ratings

Quality	Design
High	Randomised controlled trials (RCTs)
Low	Controlled observational studies
Very low	Uncontrolled observational studies

When using data from the cases in a case–control study, the study was classified as 'uncontrolled observational study' rather than 'controlled observational study'.

Checklists were used to quality rate the studies as follows:

- A quality assessment tool for diagnostic accuracy studies (QUADAS)[30] checklist was used for diagnostic accuracy or predictive accuracy studies.
- A Critical Appraisal Skills Programme (CASP) checklist for cohort (items 3, 4, 5, 6 and 7) was used for epidemiological /descriptive studies [available from http://www.casp-uk.net/].
- The NICE checklist for qualitative studies [available from http://www.nice.org.uk/niceMedia/pdf/GuidelinesManualAppendixH.pdf] was used for qualitative studies.

One exception to this was the assessment of uncontrolled observational studies which were all graded as very low quality. It should be noted that the GRADE profile manual was revised during the development of this guideline. However for consistency this guideline has continued to use the version of the manual that was available at the beginning of development (version 3.1) which stated that uncontrolled observational studies should be graded as low quality. As such, the uncontrolled observational studies included in this guideline were not subjected to any quality analysis in accordance and have not been appraised in terms of 'limitations', 'inconsistency' and 'indirectness', as their quality was pre-defined. This has been made explicit in evidence profiles containing uncontrolled observational studies by inserting 'Not used' under each quality criteria heading.

For all other study designs, once study quality was determined they were then downgraded according to the following criteria: limitations, indirectness, inconsistency and imprecision. If one of these criteria could be applied to the study, this was considered to represent some concern, and if two or more criteria could be applied then this was considered as a serious concern. Where criteria could not be used (for example 'inconsistency' if there was only one study) then 'NA' (not applicable) was inserted into the evidence profile below the appropriate heading.

2.6.3 Data extraction and reporting

Quantitative studies

Clinical evidence for individual studies was extracted into evidence tables (see Appendix H) and, where possible, quantitative synthesis (meta-analysis) was carried out. Results from each study are presented in GRADE evidence profiles.

The supporting evidence statements report the outcomes from each evidence profile that met the GDG agreed levels of accuracy (see Section 2.6.4) or prevalence. For reviews of prevalence data, findings were discussed with the GDG and only those variables (based on evidence and consensus) are reported in the evidence statements.

Qualitative studies

Evidence of the views of children, young people and parents/carers of their experience was extracted from individual studies and placed in evidence tables (see Appendix H), and summarised in modified GRADE evidence profiles. In order to best reflect children's and parents' opinions, as well as to avoid the risk of information loss or distortion, themes are reported in the modified GRADE evidence profiles instead of outcomes. These themes are supported by individual verbatim quotations from the included studies. The supporting evidence statements report on the outcomes from each evidence profile.

2.6.4 Methodological approaches

Recognition and assessment tools

The GDG considered the sensitivity and specificity of each sign or symptom, tools to identify an increased likelihood of ASD and assessment tools in assessing diagnostic accuracy as these were the measures most commonly reported in the literature. If these were not reported in relevant publications the reviewers calculated them. The GDG considered that the sensitivity and specificity should be at least 80% with the lower 95% confidence interval estimate above 70%.

The data obtained from included studies are presented, along with a GRADE assessment of the quality of the evidence. Sub group analysis was also undertaken based on the following where the data were available:

- intellectual disability
- preschool (under 5 years) only
- primary school (5–11 years) only
- secondary school (12 years or over) only.

Risk factors, conditions with an increased prevalence of autism/ASD

An odds ratio or relative risk is statistically significant if both the point estimate and lower 95% confidence interval are greater than 1. The GDG agreed a higher threshold for clinical significance (minimally important difference) of 1.25 as the point estimate and lower 95% confidence interval.

For risk factors, the adjusted odds ratios were extracted and pooled where there were sufficient data to do so.

For conditions with an increased prevalence of ASD, the prevalence of ASD in specific conditions was calculated and compared with the prevalence of ASD in the general population in order to calculate unadjusted relative risks. The review adopted general population prevalence rates agreed with the GDG for ASD.[2]

Subgroup analysis by ASD and autism was carried out because it was expected that some coexisting conditions would be more strongly associated with autism than with ASD.

Stability of diagnostic criteria

The stability of diagnoses over time was reported according to the proportion of individuals retaining their diagnosis at the second diagnostic assessment.

Studies were grouped according to age at first diagnosis:

- 24 months or under
- 25–36 months
- 37–48 months
- 49–60 months.

Differential diagnoses

For the purposes of the review, the GDG members agreed ‘important’ should be defined as both the most common differential diagnoses and those differential diagnoses with a high impact for the child and/or family.

However, since there is no standard index to reflect severity of impact, it was not possible to generate an evidence-based list of the highest impact differential diagnoses. The decision was therefore made only to review evidence for the most common differential diagnoses. GDG consensus discussion led to the identification of other differential diagnoses which were added to the list of diagnoses in terms of their clinical importance and likely impact.

The subgroups differed in how the children were selected for inclusion: this depended on the type of clinic a child was referred to and therefore what they were referred for:

- suspicion of ASD
- suspicion of another condition or a more general concern
- positive screening result for ASD.

Data for autism is reported separately from ASD as it is expected that some coexisting conditions would have different prevalence rates for each category and so it would not be appropriate to pool these data.

Coexisting conditions

An initial list (based on the literature reviews) of coexisting conditions (symptoms and diseases) was provided to the GDG members who were asked to identify the most common coexisting conditions from this list and to add to the list if, by consensus, important coexisting conditions were not represented in the evidence. In most cases, only the prevalence of diagnosed disorders is reported. For example, if some studies reported the prevalence of attention deficit hyperactivity disorder (ADHD) symptoms in ASD children but not prevalence of diagnosed ADHD disease, then the prevalence data was not used for meta-analysis. The only three exceptions are: gastrointestinal problems, sleeping problems and intellectual disability.

Medical investigations

There was a risk that study populations might be affected by selection bias. Studies conducted for research purposes often have rigid eligibility criteria (for example coexisting conditions) and as such the findings cannot be generalised to clinical practice samples where additional coexisting conditions are likely to be common. Separate consideration of the above three study types would take account of the risk of bias.

Studies were grouped in the following ways:

- retrospective studies in which the investigations were routinely performed as part of the ASD diagnostic assessment (that is, performed routinely)
- retrospective studies in which the investigations were performed selectively based on clinical judgement
- prospective research studies of the investigations in ASD (that is, performed for research).

The evidence profiles that follow present the percentage of abnormal test results first and then the percentage of children in whom a clinical condition was identified or confirmed by the investigation. The percentage reported in both cases relates to the total number in the studies, whether investigated or not.

The clinical relevance of these outcomes is as follows:

- The percentage of abnormal results is important as these may lead to further investigation for coexisting conditions such as epilepsy or differential diagnoses such as Landau-Kleffner syndrome. This could have consequences both for the individual being investigated and for the use of NHS resources.
- The percentage of children/young people who had a condition (potentially or actually) identified or confirmed by the biomedical investigation is important as this should ensure that all coexisting medical needs are identified and appropriate management can be initiated.

We have also analysed the results of the final outcome (number/percentage of children/young people who had a condition [potentially or actually] identified or confirmed by the biomedical investigation) in an *a priori* subgroup of children with intellectual disability and also in a *post-hoc* subgroup of children with regression. This regression-only subgroup was studied because of the known association of language regression with neurological disorders such as epileptic encephalopathy, specifically Landau–Kleffner syndrome. When these subgroups were analysed we calculated both the prevalence of clinical findings in ASD children with regression and in ASD children without regression. These prevalence

rates were then combined to present an odds ratio (OR) of this risk in ASD children with regression and then in children with intellectual disability.

Overview of evidence, evidence profiles and evidence statements

Where separate evidence profiles are used they are labelled 'autism' and 'ASD'. When used in this context, the term autism means 'childhood autism' as used in ICD-10) and 'autistic disorders' as used in DSM-IV, and the term ASD means all diagnoses in the ICD-10/DSM–IV-TR 'pervasive developmental disorder' category.

If evidence was not available or not considered

If no evidence was identified then the GDG used consensus methodology to answer the question.

2.6.5 Summary statistics used for diagnostic/predictive accuracy

The GDG determined that sensitivity and specificity would be more useful to the users of this guideline than other summary statistics for diagnostic/predictive accuracy that could be calculated (predictive values and/or likelihood ratios). These were calculated using a 'two by two' table(see Table 2.3).

Table 2.3 '2 × 2' table for calculation of diagnostic accuracy parameters

	Reference standard positive	Reference standard negative	Total
Test positive	a (true positive)	b (false positive)	a+b
Test negative	c (false negative)	d (true negative)	c+d
Total	a+c	b+d	a+b+c+d = N (total number of tests in study)

Sensitivity = a/(a+c), specificity = d/(b+d)

When describing the sensitivity and specificity of the different instruments, the GDG defined a point estimate of 0.8 with a lower 95% confidence interval above 0.7 as an acceptable threshold for accuracy. A random effects model was used to calculate heterogeneity across studies as this should be reported in results of test accuracy.[31]

2.6.6 Other summary statistics used

Agreement

Agreement between diagnostic tools and methods are presented as Kappa scores, which may be interpreted as follows:[32]

Table 2.4 Interpretation of Kappa scores

Kappa score	Level of agreement
<0.00	Poor
0.00–0.20	Slight
0.21–0.40	Fair
0.41–0.60	Moderate

Prevalence/incidence/proportional data

Proportions of the population (percentage with 95% confidence intervals) are presented to illustrate: the stability of diagnosis (percentage retaining their diagnosis over time); differential diagnosis (percentage presenting with suspected ASD who are diagnosed with a different condition); and coexisting diagnosis (percentage of the ASD population with the coexisting condition in question).

These are given as pooled percentages with 95% confidence intervals where possible. When there are mitigating factors precluding the pooling of data, results were presented in ranges and an explanation given in the translation for that question. Again, a random effects model was used to pool data as this has been shown to take account of over-dispersion (where the variability in observed data is greater than that expected) where there is heterogeneity.[33] For the purpose of meta-analysis, StatsDirect first transforms proportions into a quantity (the Freeman–Tukey variant of the arcsine square root transformed proportion)[34] suitable for the usual fixed and random effects summaries.[35] The pooled proportion is calculated as the back-transform of the weighted mean of the transformed proportions, using inverse arcsine variance weights for the fixed effects model and DerSimonian–Laird (1986) weights for the random effects model.

2.6.7 Meta-analysis software used

Meta-DiSc software (version 1.4) [http://www.hrc.es/investigacion/metadisc_en.htm]

Stats Direct (Version 2.7.8) [http://www.statsdirect.com/]

2.6.8 Health economics

An economic evaluation aims to integrate data on benefits, ideally in terms of quality adjusted life years (QALYs), harms and cost of alternative options. For a lifelong social communication disorder such as ASD, relevant outcomes for economic evaluation of the diagnostic process are very hard to identify and even more difficult to quantify (see Chapter 10 for a more detailed explanation). For this reason it was anticipated that the health economic analysis for this guideline would be very limited. A health economic plan was agreed which included an economic analysis of specific diagnostic strategies and biomedical tests if robust evidence of diagnostic accuracy could be identified. Due to the lack of evidence identified in the reviews, no economic modelling was undertaken.

Due to the lack of data to develop health economic analysis, descriptions of resource use were gathered from five different ASD diagnostic services around the country of resource use in services that the GDG believed were examples of good current practice; that is, which adhered to many of the important principles highlighted in this guideline including multidisciplinarity, a dedicated ASD team, a clear ASD diagnostic pathway, and good communication and support for children and families during diagnosis. These were written up as service descriptions.

Even though health economic analysis could not be undertaken, every ‘Evidence to recommendation’ includes the GDG’s considerations of the resource use, cost and benefits of specific recommendations. These considerations are not supported by externally verifiable evidence of cost effectiveness but represent the GDG’s views and show how the GDG members weighed up the likely costs and benefits for the decisions they made that had an impact on resource use. The purpose of this is to increase the transparency for the GDG’s recommendations where no evidence could be identified.

2.6.9 Evidence to recommendations

For each clinical question, recommendations are derived using, and linked explicitly to, the evidence that supported them. In the first instance, informal consensus methods are used by the GDG to agree clinical and, where appropriate, cost-effective evidence statements.

Statements summarising the GDG’s interpretation of the clinical and economic evidence and any extrapolation (including economic modelling) from the evidence used to form recommendations were also prepared to ensure transparency in the decision-making process. Recommendations were only made on the basis of expert opinion including consideration of the health economic issues when no evidence was available based on the inclusion criteria specified in the review protocol.

In areas where no substantial evidence was identified, the GDG considered other evidence-based guidelines and consensus statements and then used these with the GDG members’ collective experience to identify good practice. The GDG also identified areas where evidence to answer its clinical questions was lacking completely and used this information to draft recommendations for future research. The GDG did not undertake formal consensus methods, but, in the face of poor evidence or absence of evidence, reached a consensus through discussion during face to face GDG meetings and in subsequent email correspondence. Bias was minimised by ensuring that all voices in the GDG were

heard and contributions listened to. All the GDG members agreed with the recommendations, not just a majority.

The GDG selected the key priorities for implementation by consensus at a GDG meeting based on the following criteria outlined in the NICE *Guidelines Manual 2009*:[36]

- have a high impact on patients' outcomes that are important to patients
- have a high impact on reducing variation in care and outcomes
- lead to a more efficient use of NHS resources
- promote patient choice and equality.

The GDG gave high priority to recommendations that, when implemented, would mean patients reach critical points in the care pathway more quickly.

The GDG formed key research recommendations to address gaps in the evidence.

2.6.10 Stakeholder involvement in the guideline development process

Registered stakeholder organisations were invited to comment on the draft scope of the guideline and on the draft guideline. Stakeholder organisations were also invited to undertake a pre-publication check of the final guideline to identify factual inaccuracies. The GDG carefully considered and responded to all comments received from stakeholder organisations. The comments and responses, which were reviewed independently for NICE by a guidelines review panel, are published on the NICE website [see www.nice.org.uk/CG128].

2.7 Specific considerations for this guideline

For this guideline, the following main outcomes were identified:

- Signs and symptoms of autism
- Specificity and sensitivity of tools to identify an increased likelihood of autism and diagnostic tools
- Yield of medical and genetic tests
- Differential diagnoses
- Coexisting conditions
- Children and young people's views and the views of their parents and carers of the process of referral, assessment and diagnosis, and their support and information needs.

2.8 Schedule for updating the guidance

Clinical guidelines commissioned by NICE are published with a review date 3 years from date of publication. Reviewing may begin earlier than 3 years if significant evidence that affects guideline recommendations is identified sooner.

3 Recognition

Introduction

Prompt recognition of possible autism enables a child or young person and their family to start their journey on the pathway to diagnosis. Signs and symptoms of possible autism will be seen by parents, carers and professionals in education, health and social care, most of whom will not be experts in autism. Some signs and symptoms suggestive of autism may also present in children who are developing typically, or children who go on to receive another non-autism diagnosis.[37;38] This chapter considers the accuracy of specific signs and symptoms that should prompt a parent or professional to consider autism in any setting. It also covers other important considerations related to recognition and the process of referral for assessment which are broader than the clinical question stated below. It addresses: inequalities in recognition; when a healthcare professional should refer for further assessment; and how to ensure children and young people are referred to the right local services at the right time.

Clinical question

(a) What are the signs and symptoms that should prompt a healthcare professional or other professional in any context to think of autism?

(b) When should a child or young person be referred for diagnostic assessment?

3.1 Overview of the evidence

A list of signs and symptoms was compiled by the guideline development group (GDG) taking into account previously published guidelines (Assessment, diagnosis and clinical interventions for children and young people with autism spectrum disorders, Scottish Intercollegiate Guidelines Network 2007 [SIGN];[22] Autism Spectrum Disorders guideline, New Zealand 2008;[23] and National Autism Plan for Children [NAP-C] 2003)[20] and the International Statistical Classification of Diseases and Related Health Problems (ICD-10) and Diagnostic and Statistical Manual of Mental Disorders DSM-IV-TR Fourth Edition (Text Revision) (DSM-IV-TR) diagnostic criteria. Symptoms and signs of autism spectrum disorders (ASD) were identified in four groups of children and young people (preschool children [0–5 years], primary school children [6–11 years], secondary school children [12–19 years] and children and young people with an intellectual disability [all ages]) as signs and symptoms of ASD vary and manifest differently according to age, developmental maturation and cognitive ability. The agreed list of signs and symptoms formed the basis of the literature search.

Nine studies with a total of 490 participants were included in the review. Studies were carried out in the USA[39-45] and the UK[46;47]. All were controlled observational studies with case–control design. Seven studies included children of preschool age[39;41;42;44-47], one was of primary school age children[43] and one included both primary and secondary school age children.[40] None of the studies included solely secondary school children.

One study[44] reported the proportion of children with an intellectual disability. Two studies[39;42] reported mean intelligence quotient (IQ) scores and two studies[40;43] excluded children with IQs of 70 or less. One study[48] reported the IQ range in the sample, two studies[49;50] reported mean IQ scores and five studies[51-57] included children with intellectual disability but did not report prevalence. Four studies[58-61] reported the proportion of children with intellectual disability but not separate outcomes. Three studies[62-65] only recruited children with intellectual disability. Intellectual ability was not reported in the remaining studies.

Further details of the individual studies are presented in evidence tables (see Appendix H, Tables of included studies).

3.2 Evidence profile

The evidence in Table 3.1 is arranged by age group and then by sign or symptom. The evidence statement that comes after the table summarises the evidence in terms of what a specific sign or symptom in isolation tells an observer about the chance of a child with that sign or symptom having ASD.

Table 3.1 Accuracy of signs and symptoms to predict ASD

Diagnostic tool	Quality assessment						Summary of findings			
							Number		Diagnostic accuracy	
	Studies	Design	Limitations	Inconsistency	Indirectness	Quality	ASD	Controls	Sensitivity (95% CI)	Specificity (95% CI)
Pre-school children (0–5 years)										
Failure to perform protodeclarative pointing, gaze monitoring and pretend play[46]	1	Con obs	Some	NA	None	Very low	10	23	100 (100, 100)	100 (100, 100)
Failure to perform protodeclarative pointing or protodeclarative pointing and pretend play[46]	1	Con obs	Some	NA	None	Very low	10	23	100 (100, 100)	70 (51, 88)
No pretend play[47]	1	Con obs	Some	NA	None	Very low	10	19	90 (71, 100)	63 (41, 85)
No functional play[47]	1	Con obs	Some	NA	None	Very low	10	19	40 (10, 70)	84 (68, 100)
No facial concern in response to others distress[47]	1	Con obs	Some	NA	None	Very low	10	19	100 (100, 100)	68 (48, 89)
No attention to distress[42]	1	Con obs	Some	NA	None	Very low	72	39	21 (11, 30)	100 (100, 100)
Atypical use of object[41]	1	Con obs	Some	NA	None	Very low	9	47	78 (51, 100)	77 (64, 88)
Lack of orienting to name[44;45]	2	Con obs	Some	NA	None	Very low	25	76	64 (43, 82)	88 (79, 94)

Diagnostic tool	Quality assessment						Summary of findings			
							Number		Diagnostic accuracy	
	Studies	Design	Limitations	Inconsistency	Indirectness	Quality	ASD	Controls	Sensitivity (95% CI)	Specificity (95% CI)
Primary school children (6–11 years)										
No social play[43]	1	Con obs	Serious	NA	None	Very low	20	37	90 (77, 100)	100 (100, 100)
Social isolation[43]	1	Con obs	Serious	NA	None	Very low	20	37	80 (62, 98)	100 (100, 100)
No respect for personal boundaries[43]	1	Con obs	Serious	NA	None	Very low	20	37	50 (28, 72)	100 (100, 100)
Socially inappropriate behaviour[43]	1	Con obs	Serious	NA	None	Very low	20	37	40 (19, 61)	100 (100, 100)
Unable to follow rules of a game[43]	1	Con obs	Serious	NA	None	Very low	20	37	100 (100, 100)	41 (25, 46)
Doesn't respond to winning/losing a game[43]	1	Con obs	Serious	NA	None	Very low	20	37	100 (100, 100)	46 (30, 62)
Doesn't initiate communication with peers[43]	1	Con obs	Serious	NA	None	Very low	20	37	80 (62, 98)	100 (100, 100)
Doesn't sustain conversation with peers[43]	1	Con obs	Serious	NA	None	Very low	20	37	100 (100, 100)	100 (100, 100)
Gross motor inco-ordination[43]	1	Con obs	Serious	NA	None	Very low	20	37	65 (44, 86)	100 (100, 100)
No functional use of playground equipment[43]	1	Con obs	Serious	NA	None	Very low	20	37	50 (28, 72)	68 (52, 83)

Diagnostic tool	Quality assessment						Summary of findings			
							Number		Diagnostic accuracy	
	Studies	Design	Limitations	Inconsistency	Indirectness	Quality	ASD	Controls	Sensitivity (95% CI)	Specificity (95% CI)
Secondary school children (12–19 years)										
No studies identified for this age-group										
Mixed age groups (primary and secondary school children)										
Repetitive talk about 1 topic[40]	1	Con obs	Some	NA	None	Very low	40	21	83 (71, 94)	86 (71, 100)
Difficulty trying new activities[40]	1	Con obs	Some	NA	None	Very low	40	21	78 (65, 90)	95 (86, 100)
Abnormally obsessional interest[40]	1	Con obs	Some	NA	None	Very low	40	21	70 (56, 84)	100 (100, 100)
Watches same video constantly[40]	1	Con obs	Some	NA	None	Very low	40	21	65 (50, 80)	86 (71, 100)
Insistence on certain routines / rituals[40]	1	Con obs	Some	NA	None	Very low	40	21	53 (37, 68)	95 (86, 100)
Lining objects in rows / patterns[40]	1	Con obs	Some	NA	None	Very low	40	21	50 (35, 56)	90 (78, 100)
Spinning / banging / twiddling[40]	1	Con obs	Some	NA	None	Very low	40	21	48 (32, 63)	95 (86, 100)
Pacing / stereotyped walking[40]	1	Con obs	Some	NA	None	Very low	40	21	60 (45, 75)	100 (100, 100)
Compulsion (contamination / order)[40]	1	Con obs	Some	NA	None	Very low	40	21	50 (35, 66)	86 (71, 100)

Diagnostic tool	Quality assessment						Summary of findings			
							Number		Diagnostic accuracy	
	Studies	Design	Limitations	Inconsistency	Indirectness	Quality	ASD	Controls	Sensitivity (95% CI)	Specificity (95% CI)
Hand / finger mannerisms[40]	1	Con obs	Some	NA	None	Very low	40	21	48 (32, 63)	95 (86, 100)
Vocal / motor tics[40]	1	Con obs	Some	NA	None	Very low	40	21	45 (30, 60)	95 (86, 100)
Sucking objects (eg shirts, pencils)[40]	1	Con obs	Some	NA	None	Very low	40	21	48 (32, 63)	81 (64, 98)
Rocking/ spinning[40]	1	Con obs	Some	NA	None	Very low	40	21	45 (30, 60)	100 (100, 100)
Self-injurious behaviour[40]	1	Con obs	Some	NA	None	Very low	40	21	42 (27, 58)	95 (86, 100)
Intellectual disability										
No studies identified for this group										

CI: Confidence interval; Con obs: Controlled observational (see Methods, Section 2.6.2 for detail); NA: Not applicable (see Methods, Section 2.6.2 for detail)

3.3 Evidence statement

Sensitivity and specificity of signs and symptoms

Pre-school (5 years or under)

Of all the signs and/or symptoms examined for this age group, only the combination of 'protodeclarative pointing, gaze monitoring, pretend play' met the pre-defined levels of diagnostic accuracy (see Methodological approaches, Section 2.6.4). The evidence was of very low quality.

Primary school (6–11 years)

Of all the signs and/or symptoms examined for this age group, only 'no social play' and 'doesn't sustain conversation with others' met the pre-defined levels of diagnostic accuracy. The evidence was of very low quality.

Children and adolescents aged 12–19 years

No studies were identified for signs and symptoms in this age group.

ASD children and adolescents in school (primary or secondary school)

Of all the signs and/or symptoms examined for this age group, only 'repetitive talk about one topic' met the pre-defined levels of diagnostic accuracy. The evidence was of very low quality.

Children and young people with an intellectual disability

No studies were identified for this group

3.4 Evidence to recommendations

Relative value placed on the outcomes considered

When concerns first arise about a child or young person's behaviour or development, the possibility of autism should always be considered. The first National Health Service (NHS) contact may be one of a range of healthcare and other professionals with varied expertise in the recognition of autism. The priority is to avoid the risk of failing to recognise those who do have the condition.

The GDG's view was that the accuracy of a specific sign or symptom did not need to be high at the beginning of the pathway as recognition of the possible signs and symptoms is more important than over-recognition at this stage. A pragmatic decision was made which was to consider only the evidence with both sensitivity and specificity of 80% with a lower 95% confidence interval threshold of no less than 70% (see Methodological approaches, Section 2.6.4).

The decision to refer a child for an autism diagnostic assessment requires careful consideration as this may lead to the diagnostic service becoming quickly overwhelmed. Therefore it was considered that a higher level of accuracy of signs and symptoms would be required for a single sign or symptom (or combination) to lead directly to a decision to refer for further assessment. However, the GDG anticipated that a systematic search of the literature would not identify studies evaluating when to refer for assessment. Therefore no specific threshold for accuracy of a sign or symptom to prompt a direct referral was considered by the GDG.

Trade-off between clinical benefits and harms

The evidence did not directly address possible clinical benefits or harm associated with the recognition of possible autism and the decision to refer to an autism team.

It was the GDG's view that any child or young person presenting with concerns about development or behaviour requires careful evaluation. In some, there may be no real grounds for anxiety and reassurance may be appropriate and helpful. Where there are grounds for concern, a clinical evaluation will be necessary. For many children seen in primary care, referral to a child development centre or speech and language therapy or child and adolescent mental health services (CAMHS) may be considered appropriate. For others, developmental or behavioural disorders observed at nursery or

school might suggest autism. In cases where a healthcare professional has real concern about the possibility of autism, direct referral to the autism team should be offered.

There are benefits in establishing the nature of any developmental or behavioural disorder. Many families and carers find the process helpful, and early recognition can avoid delayed diagnosis. However, the GDG was aware that referral for an autism evaluation might be distressing for parents or carers, or even unacceptable to them and/or the child or young person. For that reason, the GDG emphasised the importance of careful discussion and involvement of the parents, carers and, where appropriate, the child or young person in the process, while keeping the child's or young person's interests central to the decision-making process. Even when children and young people do not have autism, if there are developmental or behavioural concerns, an evaluation of their condition is beneficial as they can be directed to other appropriate pathways.

The GDG recognised that a decision to refer to the autism team might carry with it a risk of possible subsequent incorrect diagnosis of autism. This could have negative consequences for the children, young people and their families. It was therefore important that this guideline should provide recommendations to establish an autism diagnosis as accurately as possible. Overall, however, the GDG considered that this potential harm was outweighed by the benefits of recognition.

Trade-off between net health benefits and resource use

No evidence was identified that addressed the cost effectiveness of recognising signs and symptoms of autism. The GDG consensus was that the use of a table of signs and symptoms and clear criteria for referral would increase referral rates and also improve recognition of those who required assessment, regardless of whether they were eventually diagnosed with an autistic disorder or another condition. If it was decided that the child did not have autism but another differential diagnosis, the initial referral could still lead to earlier identification of the child's other developmental or communication needs, which is likely to be a cost-effective use of resources.

The list of signs and symptoms may also reassure parents and carers that autism is unlikely and reduce unnecessary consultations and cost. The GDG consensus was that if referrals increased, there had to be in place an efficient process of decision-making that is quick, simple and effective at identifying children who should proceed to an autism-specific diagnostic assessment since this is the high cost part of the pathway. It is important that the autism team's decision about who should go on to the assessment is as accurate as possible. Otherwise it could lead to increased waiting times and cost.

The additional benefit of correctly identifying and referring on children with autism needs to be weighed up against the added cost to the NHS and stress to the family of over-assessing children and young people who do not have the condition. There was no data to help the GDG in making its considerations, but the GDG consensus was that the benefits would outweigh the costs.

Quality of evidence

The GDG acknowledged that the evidence for this clinical question was of very low quality. The eight included studies identified only three individual signs of sufficient accuracy in predicting autism. These were: 'no social play', 'does not sustain conversation with others' and 'repetitive talk about one topic'.

The only combination of signs that met the threshold for accuracy was 'protodeclarative pointing, gaze monitoring and pretend play' and this was in the preschool children group only. The age of the population of this study was less than 2 years so it is not clear how generalisable this is to older preschool children.

Although these signs broadly reflected the GDG's clinical experience, they captured only a very small number of the signs and symptoms recognised as being useful for identifying children who have autism at different ages.

No studies were identified that compared the effectiveness of individual signs or symptoms (or combinations) as triggers for referral for an autism diagnostic assessment. Some of the evidence was of no practical use and overall it did not lead to a clinically helpful list of signs and symptoms. Given the poor evidence base, the GDG's recommendations regarding when to refer were therefore based on the GDG's expert view.

Other considerations

Recognition of possible autism

The GDG recognised that consideration should always be given to the child or young person as a whole, looking for combinations of signs and symptoms to identify patterns of behaviour and development. Healthcare professionals consider a range of factors when deciding whether to refer a child for further assessment, such as the setting in which a child is observed, the severity and duration of signs or symptoms that are observed, the impact on the child or young person and their family or carers, who is concerned, the duration of concern, and the presence of signs and symptoms along with risk factors and other information.

The GDG has produced tables (Tables 1–3) that are intended to give the concerned professional or parent/carer a global view of behaviour in social communication and restricted repetitive interests and behaviours that are the features of autism. The GDG is aware that it is not possible to list all the possible permutations of signs and symptoms in a table, so healthcare professionals should not rule out autism if all of these signs and symptoms are not observed.

The tables include signs and symptoms for which there is identified evidence and other signs where there was no identified evidence. The GDG also translated some of the more obscure signs in the evidence into terms which could be readily understood by those who are not experts.

The GDG considered these signs and symptoms to be clinically relevant and easily observable or elicited by professionals working with children. They reflect the core deficits in autism of 'impaired reciprocal social communication and interaction' and 'fixated interests and unusual behaviours'.

Although the features listed in the tables are consistent with autism, the GDG recognised that these features vary from one individual to the next. Healthcare professionals should not dismiss the possibility of autism because certain features are absent or, following a needs-based intervention, the difficulties appear to resolve. Professionals also need to be aware that while the behaviours of autism are pervasive, the manifestations may vary depending upon the situation, including its familiarity, degree of predictability and structure and support. Some children and young people with autism may be verbally able, have good eye contact, smile, play and show affection to family members. School-age children with autism might have normal or even advanced preschool development. Delay in language milestones does not rule out autism although the described unusual features of speech, language understanding and use should be present.

The signs and symptoms presented in the tables are divided into three age and developmental groups (under 5 years, 5–11 years and over 11 years) which correspond with preschool, primary school and secondary school age. This reflects the recognition that signs and symptoms will differ by chronological and developmental ages. The signs and symptoms should therefore be placed in the context of the child or young person's overall development.

The GDG considered whether there were any potential inequality issues in the signs and symptoms of autism. Healthcare and other professionals may have difficulties interpreting behaviour that is different from the norm in children and young people from cultures outside the UK but should not assume that differences in a child's behaviour are due to cultural differences. Professionals need to be self critical about any lack of knowledge of any culture with which they are not familiar. This includes certain child-rearing practices, interpretation of how children play with adults and each other, and the expectations of families and carers about child development.

Language delay associated with autism may be wrongly attributed to difficulties in hearing or in learning English as an additional language. It is important to consider whether the child has problems understanding language in their mother tongue to minimise the risk of overlooking signs of autism.

The GDG's view was that it is always important to take parental concerns seriously in this context, even if they are not shared by others.

The GDG acknowledged that autism is under-diagnosed in children and young people with intellectual disability as the signs and symptoms of autism may be masked. The signs and symptoms need to be considered from the perspective of the intellectual age of the child, rather than their biological age. Some professionals may fail to consider autism because of an existing intellectual disability diagnosis. Furthermore, some undervalue the importance of a diagnosis of autism where there are significant other

intellectual difficulties, as a diagnosis of autism can be seen as an extra burden on the family caring for a child who already has profound difficulties. Consequently, they may wait until the child is older to seek further assessment, or not seek it at all. The GDG's view is that diagnosis of autism in children and young people with intellectual disability is important in providing the right kind of help and support to the child and to the parents or carers.

Children from very deprived backgrounds who have experienced maltreatment or considerable psychosocial disadvantage with multiple carers pose a particular challenge. Professionals need to take care not to assume the signs of autism are due to disruptive or abusive home life, multiple care environments or a parent or carer with mental or physical health problems.

Some of the signs and symptoms of autism have considerable overlap with attachment disorders, a diagnosis that is made more frequently in looked after children. The disorders are not mutually exclusive and a detailed early history may be difficult to obtain to support the differential diagnosis. There is also anecdotal evidence that presentation of signs and symptoms may be more variable in looked after children and that recognition of the signs of autism may be delayed as a consequence of both this and the challenge of providing consistent care to this group of vulnerable children.

Young people in the Criminal Justice System are an additional group where the history of signs and symptoms of autism may not be readily available.

Based on clinical experience, the GDG recognised that, compared with boys, girls with autism were underdiagnosed. In addition, the GDG also considered that autism may be more difficult to recognise in children and young people who had high verbal ability.

Recognition of autism may be difficult in young people presenting at secondary school age. Earlier in the child's life symptoms may be masked through coping strategies. The GDG agreed that four factors commonly prompted initial referral at secondary school age. First, there may be social difficulties when differences in the young person's social behaviour are compared with their peers. These can become more obvious with the increasingly complex social demands of adolescence and with the demands of independence and intimacy. Second, academic difficulties may arise in which the young person may be unable to achieve expectations for which there is no obvious explanation, and their response to increasing educational demands gives rise to concern. Third, there are young people previously thought to have another condition who, with changing behavioural and emotional characteristics, experience a change in their symptoms. It then becomes apparent that the underlying cause was one of undiagnosed autism. Finally, there are situations where previously accepted explanations for the young person's dysfunctional behaviour (such as family or community environment, cultural or demographic fractures) are no longer considered plausible and the diagnosis of autism therefore becomes apparent.

The GDG agreed that if new information becomes available, a previous assessment resulting in a negative diagnosis should not rule out the possibility of autism. The skills required to recognise signs and symptoms of autism and to consider these signs in the context of developmental and chronological age, coexisting conditions, culture and family context and transition between age groups is potentially very difficult. All healthcare and other professionals need to consider their own personal and professional competence and seek advice from an appropriate colleague if in doubt about how to proceed.

It was the experience of members of the GDG that children with autism may have significant developmental delays that have not been previously recognised either by parents or previously involved healthcare professionals.

Concerns about autism should be discussed with the parents or carers and the child or young person, emphasising that there may be many explanations for the perceived behaviour, of which autism is one example.

Deciding to refer children and young people with suspected autism

The GDG considered that children and young people with suspected autism should be referred to an autism team and that there should be a single point of referral to the autism team to simplify the process and ensure equity of access. The existence of a local autism team is central to this guideline. The composition and role of the autism team is discussed in Chapter 5 which covers Diagnostic assessment.

The GDG consensus was that the possibility of autism should always be considered where there are concerns about development or behaviour. If specific concern about autism was raised by anybody who was in direct contact with the child, some form of action is always necessary. If autism is being considered, this should be discussed with the parents/carers and the child or young person. However, it is important in that discussion to emphasise that there may be many explanations for the perceived behaviour and that autism is one of a range of differential diagnoses, including no diagnosis at all.

Discussion about parental concerns requires a high level of professional skill. Sometimes the first concerns might be raised by someone other than parents. In that situation, the GDG emphasised the need for care and sensitivity when raising the concern with an unsuspecting young person, parent or carer. The suggestion of a diagnosis of autism might cause great distress or disbelief. Time is required and the GDG attached importance to the need for the time and opportunity to come to terms with the possibility of autism.

The decision on whether to refer a child or young person for further assessment does not follow a simple algorithm with clearly defined thresholds. In addition to parents and carers, a wide range of people have contact with these children and young people. These include primary healthcare professionals such as health visitors and GPs, nursery nurses and secondary and tertiary healthcare professionals in child health and child and adolescent mental health services (CAMHS), as well as teachers and social workers. The levels of expertise and training among these many individuals regarding development and behaviour, and specifically autism, will vary.

The GDG recognised the complexity of determining whether particular signs and symptoms pointed to a diagnosis of autism and specifically whether they might be explained in other ways. Professionals should use clinical judgement in each case about whether to refer a child or young person for further assessment for autism or for an alternative assessment pathway, or seek advice from more experienced colleagues or the autism team. The GDG agreed that regression of language or social skills without loss of motor skills in a child under 3 years should prompt a direct referral for an autism assessment as there was a high likelihood of autism with this presentation. If regression of language is observed in a child over 3 years, they should be referred to a paediatrician or paediatric neurologist for an initial opinion, even if there are signs and symptoms of autism (a change in social skills in isolation in the older child may indicate a more varied aetiology). These clinicians can refer on to the autism team if necessary. Regression in motor skills indicates the need for a paediatric or paediatric neurology opinion.

At all stages, re-entry into the autism pathway is possible. For example, if a healthcare professional had concerns regarding development or behaviour but did not think the signs and/or symptoms were suggestive of autism, they should consider referring to another appropriate service. If, following referral, concerns then arise about autism, re-referral for an autism-specific diagnostic assessment could be arranged. In the event that there are only minor concerns about autism, healthcare professionals should consider regular review.

The decision to refer to the autism team should be considered on the basis of signs or symptoms, but should also take into account the range, number, severity, duration, pervasiveness and impact of the signs and symptoms. Special attention should be paid to the level of parental concern about the child or young person. Decisions should take into account the presence of any known risk factors for autism, for example the presence of an intellectual disability, a sibling with autism or a history of extreme prematurity.

Where the signs and symptoms are not sufficient to prompt an immediate referral, the GDG agreed that a healthcare professional should consider a period of watchful waiting as signs and symptoms may change with maturity. However, if the parent or carer or the professional remains concerned, then the referral decision should be reconsidered.

The GDG recognised the importance of the parents/carers readiness for, and acceptance of the need for, referral to an autism team. Parents and carers, and, where appropriate, children and young people, should be in agreement with the plan to refer. If they are not yet ready to accept the need for referral, the child or young person should be reviewed after an appropriate time period. Seeking advice from a more experienced colleague or the autism team could be helpful where there is disagreement between children, young people, parents and professionals about whether to refer.

The referral letter should contain all relevant information from parents, carers and professionals about observed or reported signs or symptoms, relevant history and developmental milestones, as well as the

results of any assessments, if known. This should reduce delays in initiating the autism diagnostic assessment to collect this data and avoids the need for repetitious assessments and information gathering.

There should be an identified autism team with named individuals to which professionals can refer from any NHS service. The function and the composition of the autism team are addressed in Chapter 5 which discusses diagnostic assessment.

The autism strategy group

The GDG consensus was that improving the efficiency and the cost effectiveness of recognition and referral for an autism assessment also requires a wider, strategic approach at a local level. A local multiagency autism strategy group should be in place with a lead professional who is responsible for the local autism pathway. The autism strategy group should have the responsibility for:

- planning local autism services and ensuring that they are widely understood
- ensuring local autism protocols for referral and transition to adult services are followed
- leading multi-agency and multiprofessional training to improve early recognition of autism
- maintaining a database and auditing the service
- enhancing the ethos of multiprofessional working (identified as a priority in the scope of this guideline).

The autism strategy group should be made up of named commissioners and named managerial and clinical representatives from child health, mental health services, education, social care, parent/carer/service users and the voluntary sector including, where appropriate, the criminal justice system.

Recommendations

Number	Recommendation
1	A local autism multi-agency strategy group should be set up, with managerial, commissioner and clinical representation from child health and mental health services, education, social care, parent and carer service users, and the voluntary sector.
2	The local autism strategy group should appoint a lead professional to be responsible for the local autism pathway for recognition, referral and diagnosis of children and young people. The aims of the group should include: • improving early recognition of autism by raising awareness of the signs and symptoms of autism through multi-agency training (see tables 1–3) • making sure the relevant professionals (healthcare, social care, education and voluntary sector) are aware of the local autism pathway and how to access diagnostic services • supporting the smooth transition to adult services for young people going through the diagnostic pathway • ensuring data collection and audit of the pathway takes place.
8	Provide a single point of referral for access to the autism team.
11	Consider the possibility of autism if there are concerns about development or behaviour, but be aware that there may be other explanations for individual signs and symptoms.
12	Always take parents' or carers' concerns and, if appropriate, the child's or young person's concerns, about behaviour or development seriously, even if these are not shared by others.

13 When considering the possibility of autism and whether to refer a child or young person to the autism team, be critical about your professional competence and seek advice from a colleague if in doubt about the next step.

14 To help identify the signs and symptoms of possible autism, use tables 1–3. Do not rule out autism if the exact features described in the tables are not evident; they should be used for guidance, but do not include all possible manifestations of autism.

15 When considering the possibility of autism, be aware that:

- signs and symptoms should be seen in the context of the child's or young person's overall development
- signs and symptoms will not always have been recognised by parents, carers, children or young people themselves or by other professionals
- when older children or young people present for the first time with possible autism, signs or symptoms may have previously been masked by the child or young person's coping mechanisms and/or a supportive environment
- it is necessary to take account of cultural variation, but do not assume that language delay is accounted for because English is not the family's first language or by early hearing difficulties
- autism may be missed in children or young people with an intellectual disability
- autism may be missed in children or young people who are verbally able
- autism may be under-diagnosed in girls
- important information about early development may not be readily available for some children and young people, for example looked-after children and those in the criminal justice system
- signs and symptoms may not be accounted for by disruptive home experiences or parental or carer mental or physical illness.

16 When considering the possibility of autism, ask about the child or young person's use and understanding of their first language.

17 Do not rule out autism because of:

- good eye contact, smiling and showing affection to family members
- reported pretend play or normal language milestones
- difficulties appearing to resolve after a needs-based intervention (such as a supportive structured learning environment)
- a previous assessment that concluded that there was no autism, if new information becomes available.

18 Discuss developmental or behavioural concerns about a child or young person with parents or carers, and the child or young person themselves if appropriate. Discuss sensitively the possible causes, which may include autism, emphasising that there may be many explanations for the child's or young person's behaviour.

19 Be aware that if parents or carers or the child or young person themselves have not suspected a developmental or behavioural condition, raising the possibility may cause distress, and that:

- it may take time for them to come to terms with the concern
- they may not share the concern.

20 Take time to listen to parents or carers and, if appropriate, the child or young person, to discuss concerns and agree any actions to follow including referral.

21 Refer children younger than 3 years to the autism team if there is regression in language or social skills.

22 Refer first to a paediatrician or paediatric neurologist (who can refer to the autism team if necessary) children and young people:

- older than 3 years with regression in language
- of any age with regression in motor skills.

23 Consider referring children and young people to the autism team if you are concerned about possible autism on the basis of reported or observed signs and/or symptoms (see tables 1–3). Take account of:

- the severity and duration of the signs and/or symptoms
- the extent to which the signs and/or symptoms are present across different settings (for example, home and school)
- the impact of the signs and/or symptoms on the child or young person and on their family
- the level of parental or carer concern and, if appropriate, the concerns of the child or young person
- factors associated with an increased prevalence of autism (see table 4)
- the likelihood of an alternative diagnosis.

24 If you have concerns about development or behaviour but are not sure whether the signs and/or symptoms suggest autism, consider:

- consulting a member of the autism team who can provide advice to help you decide if a referral to the autism team is necessary
- referring to another service. That service can then refer to the autism team if necessary.

25 Be aware that tools to identify children and young people with an increased likelihood of autism may be useful in gathering information about signs and symptoms of autism in a structured way but are not essential and should not be used to make or rule out a diagnosis of autism. Also be aware that:

- a positive score on tools to identify an increased likelihood of autism may support a decision to refer but can also be for reasons other than autism
- a negative score does not rule out autism.

26 When referring children and young people to the autism team, include in the referral letter the following information:

- reported information from parents, carers and professionals about signs and/or symptoms of concern
- your own observations of the signs and/or symptoms.

27 When referring children and young people to the autism team, include in the referral letter the following information, if available:

- antenatal and perinatal history
- developmental milestones
- factors associated with an increased prevalence of autism (see table 4)
- relevant medical history and investigations
- information from previous assessments.

28 Explain to parents or carers and, if appropriate, the child or young person, what will happen on referral to the autism team or another service.

29 If you do not think concerns are sufficient to prompt a referral, consider a period of watchful waiting. If you remain concerned about autism, reconsider your referral decision.

30 If the parents or carers or if appropriate, the child or young person, prefer not to be referred to the autism team, consider a period of watchful waiting. If you remain concerned about autism, reconsider referral.

31 If a concern about possible autism has been raised but there are no signs, symptoms or other reasons to suspect autism, use professional judgment to decide what to do next.

Using tables 1–3

The signs and symptoms in tables 1–3 are a combination of delay in expected features of development and the presence of unusual features, and are intended to alert professionals to the possibility of autism in a child or young person about whom concerns have been raised. They are not intended to be used alone, but to help professionals recognise a pattern of impairments in reciprocal social and communication skills, together with unusual restricted and repetitive behaviours.

Table 1 Signs and symptoms of possible autism in preschool children (or equivalent mental age). See 'Using tables 1–3' on page 62.

Social interaction and reciprocal communication behaviours

Spoken language

- Language delay (in babble or words, for example less than ten words by the age of 2 years)
- Regression in or loss of use of speech
- Spoken language (if present) may include unusual:
    - non-speech like vocalisations
    - odd or flat intonation
    - frequent repetition of set words and phrases ('echolalia')
    - reference to self by name or 'you' or 'she/he' beyond 3 years
- Reduced and/or infrequent use of language for communication, for example use of single words although able to speak in sentences

Responding to others

- Absent or delayed response to name being called, despite normal hearing
- Reduced or absent responsive social smiling
- Reduced or absent responsiveness to other people's facial expressions or feelings
- Unusually negative response to the requests of others (demand avoidant behaviour)
- Rejection of cuddles initiated by parent or carer, although may initiate cuddles themselves

Interacting with others

- Reduced or absent awareness of personal space, or unusually intolerant of people entering their personal space
- Reduced or absent social interest in others, including children of his/her own age – may reject others; if interested in others, may approach others inappropriately, seeming to be aggressive or disruptive
- Reduced or absent imitation of others' actions
- Reduced or absent initiation of social play with others, plays alone
- Reduced or absent enjoyment of situations that most children like, for example, birthday parties
- Reduced or absent sharing of enjoyment

Eye contact, pointing and other gestures

- Reduced or absent use of gestures and facial expressions to communicate (although may place adult's hand on objects)
- Reduced and poorly integrated gestures, facial expressions, body orientation, eye contact (looking at people's eyes when speaking) and speech used in social communication
- Reduced or absent social use of eye contact assuming adequate vision
- Reduced or absent joint attention shown by lack of:
    - gaze switching
    - following a point (looking where the other person points to – may look at hand)
    - using pointing at or showing objects to share interest

Ideas and imagination

- Reduced or absent imagination and variety of pretend play

Unusual or restricted interests and/or rigid and repetitive behaviours

- Repetitive 'stereotypical' movements such as hand flapping, body rocking while standing, spinning, finger flicking
- Repetitive or stereotyped play, for example opening and closing doors
- Over-focused or unusual interests
- Excessive insistence on following own agenda
- Extremes of emotional reactivity to change or new situations, insistence on things being 'the same'
- Over or under reaction to sensory stimuli, for example textures, sounds, smells
- Excessive reaction to taste, smell, texture or appearance of food or extreme food fads

Table 2 Signs and symptoms of possible autism in primary school children (aged 5–11 years or equivalent mental age). See 'Using tables 1–3' on page 62.

Social interaction and reciprocal communication behaviours

Spoken language

- Spoken language may be unusual in several ways:
  - very limited use
  - monotonous tone
  - repetitive speech, frequent use of stereotyped (learnt) phrases, content dominated by excessive information on topics of own interest
  - talking 'at' others rather than sharing a two-way conversation
  - responses to others can seem rude or inappropriate

Responding to others

- Reduced or absent response to other people's facial expression or feelings
- Reduced or delayed response to name being called, despite normal hearing
- Subtle difficulties in understanding other's intentions; may take things literally and misunderstand sarcasm or metaphor
- Unusually negative response to the requests of others (demand avoidant behaviour)

Interacting with others

- Reduced or absent awareness of personal space, or unusually intolerant of people entering their personal space
- Reduced or absent social interest in people, including children of his/her own age – may reject others; if interested in others, may approach others inappropriately, seeming to be aggressive or disruptive
- Reduced or absent greeting and farewell behaviours
- Reduced or absent awareness of socially expected behaviour
- Reduced or absent ability to share in the social play or ideas of others, plays alone
- Unable to adapt style of communication to social situations, for example may be overly formal or inappropriately familiar
- Reduced or absent enjoyment of situations that most children like

Eye contact, pointing and other gestures

- Reduced and poorly integrated gestures, facial expressions and body orientation, eye contact (looking at people's eyes when speaking), and speech used in social communication
- Reduced or absent social use of eye contact assuming adequate vision
- Reduced or absent joint attention shown by lack of:
  - gaze switching
  - following a point (looking where the other person points to – may look at hand)
  - using pointing at or showing objects to share interest

Ideas and imagination

- Reduced or absent flexible imaginative play or creativity, although scenes seen on visual media (for example, television) may be re-enacted
- Makes comments without awareness of social niceties or hierarchies

Table 2 continued on next page

Table 2 (continued) Signs and symptoms of possible autism in primary school children (aged 5–11 years or equivalent mental age). See 'Using tables 1–3' on page 62.

Unusual or restricted interests and/or rigid and repetitive behaviours

- Repetitive 'stereotypical' movements such as hand flapping, body rocking while standing, spinning, finger flicking
- Play repetitive and oriented towards objects rather than people
- Over-focused or unusual interests
- Rigid expectation that other children should adhere to rules of play
- Excessive insistence on following own agenda
- Extremes of emotional reactivity that are excessive for the circumstances
- Strong preferences for familiar routines and things being 'just right'
- Dislike of change, which often leads to anxiety or other forms of distress (including aggression)
- Over or under reaction to sensory stimuli, for example textures, sounds, smells
- Excessive reaction to taste, smell, texture or appearance of food or extreme food fads

Other factors that may support a concern about autism

- Unusual profile of skills or deficits (for example, social or motor coordination skills poorly developed, while particular areas of knowledge, reading or vocabulary skills are advanced for chronological or mental age)
- Social and emotional development more immature than other areas of development, excessive trusting (naivety), lack of common sense, less independent than peers

Table 3 Signs and symptoms of possible autism in secondary school children (older than 11 years or equivalent mental age). See 'Using tables 1–3' on page 62.

Social interaction and reciprocal communication behaviours

Spoken language

- Spoken language may be unusual in several ways:
  - very limited use
  - monotonous tone
  - repetitive speech, frequent use of stereotyped (learnt) phrases, content dominated by excessive information on topics of own interest
  - talking 'at' others rather than sharing a two-way conversation
  - responses to others can seem rude or inappropriate

Interacting with others

- Reduced or absent awareness of personal space, or unusually intolerant of people entering their personal space
- Long-standing difficulties in reciprocal social communication and interaction: few close friends or reciprocal relationships
- Reduced or absent understanding of friendship; often an unsuccessful desire to have friends (although may find it easier with adults or younger children)
- Social isolation and apparent preference for aloneness
- Reduced or absent greeting and farewell behaviours
- Lack of awareness and understanding of socially expected behaviour
- Problems losing at games, turn-taking and understanding 'changing the rules'
- May appear unaware or uninterested in what other young people his or her age are interested in
- Unable to adapt style of communication to social situations, for example may be overly formal or inappropriately familiar
- Subtle difficulties in understanding other's intentions; may take things literally and misunderstand sarcasm or metaphor
- Makes comments without awareness of social niceties or hierarchies
- Unusually negative response to the requests of others (demand avoidant behaviour)

Eye contact, pointing and other gestures

- Poorly integrated gestures, facial expressions, body orientation, eye contact (looking at people's eyes when speaking) assuming adequate vision, and spoken language used in social communication

Ideas and imagination

- History of a lack of flexible social imaginative play and creativity, although scenes seen on visual media (for example, television) may be re-enacted

Unusual or restricted interests and/or rigid and repetitive behaviours

- Repetitive 'stereotypical' movements such as hand flapping, body rocking while standing, spinning, finger flicking
- Preference for highly specific interests or hobbies
- A strong adherence to rules or fairness that leads to argument
- Highly repetitive behaviours or rituals that negatively affect the young person's daily activities
- Excessive emotional distress at what seems trivial to others, for example change in routine
- Dislike of change, which often leads to anxiety or other forms of distress including aggression
- Over or under reaction to sensory stimuli, for example textures, sounds, smells
- Excessive reaction to taste, smell, texture or appearance of food and/or extreme food fads

Other factors that may support a concern about autism

- Unusual profile of skills and deficits (for example, social or motor coordination skills poorly developed, while particular areas of knowledge, reading or vocabulary skills are advanced for chronological or mental age)
- Social and emotional development more immature than other areas of development, excessive trusting (naivety), lack of common sense, less independent than peers

3.5 Research recommendations

Number	Research recommendation
RR 1	Does training professionals to recognise signs and symptoms of autism lead to earlier assessment of needs and earlier diagnosis (and by implication reduce morbidity/improve health outcomes) among children and young people with suspected autism compared with no training?

Why this is needed

Successful training of healthcare professionals in the Netherlands has been shown to improve their ability, confidence and skills in identifying children or young people who need an autism diagnostic assessment. A fully trained workforce can identify the number of children or young people with autism and provide accurate information both for planning individual care and at a strategic level for planning appropriate service provision.

If training improves earlier recognition and referral, this could be of particular benefit to at-risk groups for which there is evidence that autism is currently under-diagnosed, such as girls, and children and young people:

- with parents of lower educational level
- with English as an additional language
- with sensory impairments
- with intellectual disability.

Before extending training to a wider population, it is important to better understand its effectiveness in terms of age, number of children and young people at referral, and time between parents' concerns and autism diagnosis.

Importance to 'patients' or the population

Successful training of HCPs has been shown to improve the ability/confidence/skills of professionals to identify children who require an autism assessment. This will benefit patients and families by reducing the currently well-documented delay between families' expressing concerns and access to an autism diagnostic assessment.

Improved early recognition will increase the rates of appropriate referrals and thus reduce the rates of inappropriate referrals throughout the autism pathway. It will also lead to earlier access to appropriate educational provision, targeted treatment and support services for child and family. This should improve outcome by maximizing opportunities for skills development and adaptive learning, and reduce the risk of abnormal non-adaptive behaviours becoming entrenched and the development of secondary behavioural problems.

Relevance to NICE guidance

The GDG has identified, as a high priority research area, the need to investigate firstly whether training HCPs improves speed of referral and access to diagnosis and secondly the impacts on referred children, their families and service providers.

Findings will inform future update of this key guideline recommendation.

Relevance to the NHS

Increasing the skills, expertise and confidence of HCPs in recognising and appropriately referring children for an autism diagnostic assessment should reduce the age of referral for assessment and diagnosis, promote prompt access to relevant services, reduce the rates of false positives (causing parents unnecessary anxiety and inappropriate use of resources) and false negatives (leading to delay starting early interventions).

Access to appropriate interventions as early as possible should enhance the autism child/young person's skills and reduce the burden of secondary behaviour and mental health problems with the potential to reduce the overall financial and resource burden on the family, the NHS and other service providers.

In addition, a fully-trained workforce can identify the number of children with autism and provide accurate information for planning both for an individual's personalised care and at a strategic level for the planning of appropriate service provision.

National priorities

The Autism Act (2009) and the Statutory Guidance (2010) require specific training for health and social care professionals in awareness and understanding of autism to ensure that staff working with adults are better equipped to make appropriate referrals for assessment and diagnosis. This requirement also applies to HCPs working with children and adolescents.

Current evidence base

The GDG acknowledges the importance of timely diagnosis in the light of current emerging evidence that early interventions can positively alter developmental trajectories for children with autism.

The GDG is not aware of any UK research data to inform this recommendation. One European study has reported that the introduction of an early detection programme (using HCP training) reduced the mean age of diagnosis in the experimental region compared to the 'control' district.

Equality

If training improves earlier recognition and referral this could be of particular benefit to those at–risk groups where there is evidence that autism is currently under diagnosed. such as girls and children

- of parents of lower educational level
- with English as an additional language
- with sensory impairments
- with intellectual disability

Feasibility

Yes- this research could be carried out using existing clinical services to assess the impact of the introduction of an autism specific training programme in certain districts compared to clinical services where the additional training was not available ('control' service) in equivalent districts (using a purposive sampling strategy). The work would take 3-5 years to complete.

The outcomes should include:

- age at referral
- numbers of referrals
- time between parents' concerns and autism diagnosis
- rates of positive and 'false positives' referrals according to the final diagnosis
- rates of identified co-morbid problems
- discriminative referrals
- demand on educational, therapeutic and support services
- profile of satisfaction of referred families and HCPs making the referrals

No ethical issues were identified.

Other comments

Training of HCPs is a key GDG recommendation based on best practice. However it is important to investigate the implications for diagnostic and treatment services in particular any potential adverse consequences that new autism training for HCPs might have on:

- HCPs' threshold of clinical concern
- existing referral practice
- need for triage
- identification of children before parents express concerns

Changing HCP practice might have unexpected consequences such as a potential increase in numbers of children with short-lived non-specific problems being referred into local autism diagnostic care pathways, with inevitable knock-on implications for waiting lists and provision of appropriate educational, clinical and support services.

4 Following referral

Introduction

This chapter describes the stage following referral to the autism team of a child or young person with signs and symptoms suggestive of autism. At this phase of the clinical pathway a decision has to be made on what further assessment is required. The autism team that has received the referral usually requires more information to determine what type of assessment should be initiated. This is important as there are a number of other conditions that can present with similar signs and symptoms. This chapter considers the information that should be gathered to assist with making a decision on what type of assessment is required. Information may include responses to tools to identify an increased likelihood of autism: these are sometimes used when a concern is first raised about autism to determine the likelihood that a child or young person will turn out to have a diagnosis of autism. Information from other sources may also be gathered. It is often not clear to parents and carers what all of this information is for and it is not clear to professionals how to use this information to determine the next steps in the diagnostic process.

The first section in this chapter considers the use of tools to identifiy an increased likelihood of autism. The second section looks at risk factors for autism in two specific groups: the general population and children with identified coexisting conditions. It considers whether these risk factors are of practical use in making decisions about who to refer, and whether to proceed to assessment. The final section considers information from other sources, such as schools and other agencies, that may help to make the decision whether to proceed to an autism-specific assessment, and includes recommendations on when to proceed to an autism-specific diagnostic assessment.

Clinical questions

In children with suspected autism (based on signs and symptoms) what information assists in the decision to refer for a formal autism diagnostic assessment?

a) Are there tools to identify an increased likelihood of autism that are effective in assessing the need for specialist autism assessment?

b) What information about the child and family increases the likelihood of a diagnosis of autism and would assist in the decision to refer for a formal autism diagnostic assessment?

- risk factors (part 1)
- conditions with an increased risk of autism (part 2)

c) What information from other sources is useful as contextual information: for example information about how the child functions in different environments such as school and home, social care reports (e.g. for looked after children) and information from other agencies?

4.1 Overview of the evidence: tools to identify an increased likelihood of autism spectrum disorders (ASD)

In total, nine studies were included in the review. These studies were carried out in Australia,[66;67] Canada,[68;69] Sweden,[70;71] the UK[72] and the USA[73;74]. Five of the studies included children of preschool age[67-69;73;74] and one of primary school age[73]. No study included children of secondary school age only. Three studies included mixed preschool and primary school age children[66;70;72] and two included all age groups.[71;73] All studies were uncontrolled observational in design.

One study[67] reported intellectual disability and one study[73] reported mean intelligence quotient (IQ) scores. Three studies reported the proportion of children with intellectual disability, but not separate outcome data. Intellectual ability was not reported in the remaining studies.

Five studies examined the Social Communication Questionnaire (SCQ)[66;68;69;73;74], two the Modified Checklist for Autism in Toddlers (M-CHAT),[68;74] two the Autism Behavior Checklist (ABC)[71;72] and one each the Developmental Behaviour Checklist – Early Screen (DBC-ES)[67] and the Autism Spectrum Screening Questionnaire (ASSQ).[70]

Details of the individual studies are presented in evidence tables (see Appendix H, Tables of included studies).

4.2 Evidence profiles: tools to identify an increased likelihood of ASD

The accuracy of each instrument in predicting later diagnosis of ASD is reported in Table 4.1. The evidence is first presented for children of all age groups and then in subgroups by age group and by intellectual disability. The quality assessment does not report the individual studies' limitations, inconsistencies or indirectness because all studies are uncontrolled observational studies (see Guideline development methodology, Section 2.6.2).

Table 4.1 Predictive accuracy of tools to identify an increased likelihood of ASD

Diagnostic tool (score)	Quality assessment						Summary of findings			
							Number of participants		Diagnostic accuracy	
	Studies	Design	Limitations	Inconsistency	Indirectness	Quality	ASD	Non-ASD	Sensitivity (95% CI)	Specificity (95% CI)
All studies										
SCQ (≥15)[66;68;69;73;74]	5	Uncon obs	Not used	Not used	Not used	Very low	590	365	71 (67, 75)	62 (57, 67)
M-CHAT (≥2 of 6)[68;74]	2	Uncon obs	Not used	Not used	Not used	Very low	95	43	74 (64, 82)	42 (27, 68)
ABC-Teacher (≥67)[71;72]	2	Uncon obs	Not used	Not used	Not used	Very low	11	103	46 (17, 77)	96 (90, 99)
ASSQ (Teacher, ≥22)[70]	1	Uncon obs	Not used	Not used	Not used	Very low	21	88	71 (52, 91)	91 (85, 97)
ASSQ (Parent, ≥19)[70]	1	Uncon obs	Not used	Not used	Not used	Very low	21	88	62 (41, 83)	90 (83, 96)
DBC-ES (cut-off: 11)[67]	1	Uncon obs	Not used	Not used	Not used	Very low	142	65	83 (77, 89)	48 (35, 60)
Pre-school children (5 years and under)										
SCQ (cut-off: 15)[68;73;74]	3	Uncon obs	Not used	Not used	Not used	Very low	232	127	69 (63, 75)	61 (52, 69)
M-CHAT (≥2 of 6)[68;74]	2	Uncon obs	Not used	Not used	Not used	Very low	143	117	74 (64, 82)	57 (41, 72)
ASSQ	No study met the inclusion criteria for this review									
DBC-ES (cut-off: 11)[67]	1	Uncon obs	Not used	Not used	Not used	Very low	142	65	83 (77, 89)	48 (36, 60)
Primary school children (6–11 years)										
SCQ (cut-off: 15)[69;73]	2	Uncon obs	Not used	Not used	Not used	Very low	200	166	69 (62, 75)	62 (54, 70)
M-CHAT	No study met the inclusion criteria for this review									

Diagnostic tool (score)	Quality assessment						Summary of findings			
							Number of participants		Diagnostic accuracy	
	Studies	Design	Limitations	Inconsistency	Indirectness	Quality	ASD	Non-ASD	Sensitivity (95% CI)	Specificity (95% CI)
ASSQ	No study met the inclusion criteria for this review									
DBC-ES	No study met the inclusion criteria for this review									
Secondary school children (12 years and over)										
SCQ (cut-off: 15)	No study met the inclusion criteria for this review									
M-CHAT	No study met the inclusion criteria for this review									
ASSQ	No study met the inclusion criteria for this review									
DBC-ES	No study met the inclusion criteria for this review									
Children with intellectual disability										
SCQ (cut-off: 15)[73]	1	Uncon obs	Not used	Not used	Not used	Very low	205	52	80 (75, 86)	69 (57, 82)
M-CHAT	No study met the inclusion criteria for this review									
ASSQ	No study met the inclusion criteria for this review									
DBC-ES	No study met the inclusion criteria for this review									

SCQ: Social Communication Questionnaire; M-CHAT; Modified Checklist for Autism in Toddlers; ABC: Autism Behavior Checklist; ASSQ: Autism Spectrum Screening Questionnaire

DBC-ES: Developmental Behavior Checklist – Autism – Early Screen

CI: confidence interval; Uncon obs: Uncontrolled observational (see Methods, Section 2.6.2 for detail)

4.3 Evidence statements: tools to identify an increased likelihood of ASD

Sensitivity and specificity of tools to identifiy an increased likelihood of ASD

Only studies examining the SCQ, M-CHAT, ABC, ASSQ and DBC-ES met the inclusion criteria for this review. No evidence was identified for other tools to identify an increased likelihood of ASD instruments, such as:

- Autism – Tics, ADHD and other coexisting conditions (ATAC)
- Baby and Infant Screen for Children with Autism Traits (BISCUIT)
- Brief Infant-Toddler Social and Emotional Assessment (BITSEA)
- Childhood Asperger Syndrome Test (CAST)
- Children's Communication Checklist (CCC)
- Infant/Toddler Checklist of Communication and Language Development (CHECKLIST)
- Child Symptom Inventory – 4 (CSI-4)
- Early Childhood Inventory – 4 (ECI-4)
- Early Screening of Autistic Traits (ESAT) questionnaire
- Early Social Communication Scale (ESCS)
- Gilliam Asperger's Disorder Scale (GADS)
- Infant/Toddlers Checklist (ITC)
- Krug Asperger's Disorder Index (KADI)
- MacArthur Communicative Development Inventories (MCDI)
- Parental Concerns Questionnaire (PCQ)
- Scale of Pervasive Developmental Disorder in Mentally Retarded Persons (PDD-MRS)
- Pervasive Developmental Disorder Rating Scale (PDDRS)
- Pervasive Developmental Disorder Screening Test (PDDST)
- Repetitive Behavior Scale (RBS)
- Screen for Social Intervention (SSI)
- Strengths and Difficulties Questionnaire (SDQ)
- Social Responsiveness Scale (SRS)
- Screening Tool for Autism in Two-year-olds (STAT)
- Young Autism and other developmental disorders Checkup Tool (YACHT-18).

All studies

No instruments met the pre-defined acceptable levels for predictive accuracy (see Methodological approaches, Section 2.6.4). The evidence was of very low quality

Preschool children (5 years and under)

None of the instruments examined for this age group met the pre-defined levels of diagnostic accuracy. The evidence was of very low quality.

Primary school children (6–11 years)

None of the instruments examined for this age group met the pre-defined levels of diagnostic accuracy. The evidence was of very low quality.

Secondary school children (12–19 years)

No studies were identified for signs and symptoms in this age group.

Children with intellectual disability

None of the instruments examined for this age group met the pre-defined levels of diagnostic accuracy. The evidence was of very low quality.

4.4 Evidence to recommendations: tools to identify an increased likelihood of autism

Relative value placed on the outcomes considered

The same threshold for the predictive accuracy of tools to identifiy an increased likelihood of autism was agreed throughout the guideline (see Methodological approaches, Section 2.6.4). This threshold was 80% sensitivity and specificity with a lower 95% confidence interval threshold of 70%.

Trade-off between clinical benefits and harms

In principle, accurate instruments can improve early recognition of children requiring further assessment. They may also increase the confidence of professionals making referrals and provide reassurance to parents and carers that a referral is needed or that it is not.

However, the use of tools for the recognition of autism might inappropriately reduce professional confidence in making judgements. This could, in theory, increase the number of unnecessary referrals and diagnostic assessments if used incorrectly.

The GDG's view was that these instruments are not essential but may be useful in gathering information about signs and symptoms in a structured way. A positive score on a tool to identify an increased likelihood of autism can support decisions but other factors are important to determine whether to proceed to an autism-specific assessment (see Evidence to recommendations, Sections 4.8, 4.12 and 4.16, further on in this chapter).

None of the instruments met the predefined level of accuracy specified by the GDG for identifying children with autism.

Trade-off between net health benefits and resource use

No evidence was identified that considered the costs and benefits of using these instruments to support decisions.

Tools to identifiy an increased likelihood of autism may increase the amount of clinic time required for each child (including the time to interpret and communicate the results of these instruments) or decrease the amount of time by focussing structured discussion of signs and symptoms. On the other hand, useful information gathered in this way may reduce the number of unnecessary referrals for further assessment, which is the costliest part of the autism pathway.

The GDG's view was that autism-specific instruments are not essential, but may be useful in gathering information about signs and symptoms. A positive score on an instrument may support a decision to refer, but factors other than the use of one of these tools would be very important in determining whether to proceed to an autism diagnostic assessment.

Using these instruments requires training and experience. Achieving this level of competency requires resources, both in startup costs of training and time to analyse the results.

Quality of evidence

The evidence considered a limited number of tools currently in use in the NHS. Five studies were identified in the review for SCQ, two studies for M-CHAT, and only one each for the other tools. The studies were considered to be of very low quality and none of reported adequate levels of accuracy. Sub-group analysis was performed and none of the instruments was sufficiently accurate in any of the predefined age groups.

The evidence base regarding tools to identify an increased likelihood of autism was very limited and the accuracy insufficient. Therefore the GDG did not recommend any specific instrument for identifying children and young people who should be referred for autism diagnostic assessment.

Other considerations

The GDG accepted that tools to identify an increased likelihood of autism can help to identify signs and symptoms of autism in a structured way which may be useful. However, the scores from such tools should not be relied upon. If such a tool is employed to gather information, the associated score results should not be relied upon to decide on referral since they are insufficiently accurate. If a tool has been used in any way, information, including the scores resulting from the responses, should accompany any referral as additional information to the team receiving the referral.

Recommendations

Number	Recommendation
25	Be aware that tools to identify children and young people with an increased likelihood of autism may be useful in gathering information about signs and symptoms of autism in a structured way but are not essential and should not be used to make or rule out a diagnosis of autism. Also be aware that: • a positive score on tools to identify an increased likelihood of autism may support a decision to refer but can also be for reasons other than autism • a negative score does not rule out autism.

4.5 Overview of the evidence: risk factors

The evidence was reviewed in two parts. The first review identified risk factors for autism or ASD in the general population. The second review sought evidence on the prevalence of ASD or autism in a child or young person with any of the eight disorders that the GDG believed to be associated with an increased prevalence of ASD.

Subgroup analysis by ASD and autism was carried out because it was expected that some coexisting conditions would be more strongly associated with autism than with ASD.

Eighteen studies were included in the review. All were controlled observational studies and were carried out in Australia,[75-77] Denmark,[78-81] Sweden[82;83] and the USA.[84-92]

Two of the studies included children of preschool age,[77;90] one of primary school age[87] and one of secondary school age.[89] Ten studies included mixed preschool and primary school age children[79-86;88;92] and two studies included all age groups.[75;91] Two studies included adults: the age range for one study[78] was 1–24 years with a mean of 7.7 years; while the age range for the other study[76] was 5–20 years, with mean age unknown.

Only three studies[84;87;90] reported the proportion of children with intellectual disability, but no separate outcome data for each intelligence quotient (IQ) group level were provided. Intellectual ability was not reported in the remaining studies.

Further details of the individual studies are presented in evidence tables (see Appendix H, Tables of included studies).

4.6 Evidence profiles: risk factors

This section reports the evidence of accuracy of risk factors in predicting later diagnosis of ASD. The data are presented for all studies.

The evidence for autism is reported separately from ASD as it was expected that the predictive value of risk factors would be different for each category so it would not be appropriate to pool these data.

Tables 4.2 and 4.3 present the evidence on the adjusted relative risk (RR) or odds ratio (OR) for risk factors for autism and ASD separately.

Table 4.2 Adjusted relative risk or odds ratio for risk factors for autism

Factors	Quality assessment						Summary of findings		
	Studies	Design	Limitations	Inconsistency	Indirectness	Quality	Number of participants		Adjusted OR/RR (95%CI)
							ASD	Non-ASD	
Familiar or parental factors									
Maternal age over 40 years[88]	1	Con obs	None	NA	None	Low	12,159	4,935,776	Adj OR 1.51 (1.35, 1.70)
Mother's race (black)[84;90]	2	Con obs	None	Not used	None	Low	4957	3,498,470	Adj OR 1.66 (1.48, 1.85)
Paternal age over 40 years[88]	1	Con obs	None	NA	None	Low	12,159	4,935,776	Adj OR 1.36 (1.26, 1.47)
Perinatal or neonatal factors									
Birthweight under 2500 g[77;80]	2	Con obs	None	Not used	None	Low	655	90,358	Adj OR 2.15 (1.47, 3.15)
Prematurity (under 37 weeks)[77]	1	Con obs	None	NA	None	Low	182	85,628	Adj OR 2.3 (1.5, 3.7)
Admission to neonatal intensive care unit[80]	1	Con obs	None	NA	None	Low	461	461	Adj OR 1.8 (1.3, 2.7)
Male gender[77;84;90]	3	Con obs	None	Not used	None	Low	5439	3,584,098	Adj OR 4.28 (4.02, 4.57)
Serum bilirubin test undertaken[81]	1	Con obs	None	NA	None	Low	461	461	Adj OR 3.7 (1.3, 10.5)
Hypertonic/hyper-reflexive/jittery[81]	1	Con obs	None	NA	None	Low	461	461	Adj OR 6.7 (1.5, 29.7)
Pregnancy-related factors									
No studies found for this analysis									
Environmental factors									
No studies found for this analysis									

Con obs: Controlled observational (see Methods, Section 2.6.2 for detail); NA: Not applicable (see Methods, Section 2.6.2 for detail); Adj: adjusted; OR: odds ratio; RR: Relative risk

Table 4.3 Adjusted relative risk or odds ratio for risk factors for ASD

Factors	Quality assessment						Summary of findings		
	Studies	Design	Limitations	Inconsistency	Indirectness	Quality	Number of participants		Adjusted OR/RR (95% CI)
							ASD	Non-ASD	
Familiar or parental factors									
Sibling history of autism[79]	1	Con obs	None	NA	None	Low	818	942,836	Adj RR 22.27 (13.09, 37.90)
Sibling history of ASD[79]	1	Con obs	None	NA	None	Low	818	942,836	Adj RR 13.40 (6.93, 25.92)
Parental history of schizophrenia-like psychosis [78]	1	Con obs	None	NA	None	Low	698	17,450	Adj RR 3.44 (1.48, 7.95)
Parental affective disorder[78]	1	Con obs	None	NA	None	Low	698	17,450	Adj RR 2.91 (1.65, 5.14)
Parental history of other mental and behavioural disorder diagnosis [78]	1	Con obs	None	NA	None	Low	698	17,450	Adj RR 2.85 (2.20, 3.69)
Paternal age 40–49 years[89]	1	Con obs	None	NA	None	Low	110	132,161	Adj OR 5.75 (2.65, 12.46)[a]
Paternal age 31–35 years[82]	1	Con obs	None	NA	None	Low	1227	30,693	Adj OR 1.7 (1.3, 2.1)[b]
Paternal age 36–40 years[82]	1	Con obs	None	NA	None	Low	1227	30,693	Adj OR 1.8 (1.4, 2.4)[b]
Paternal age 41–50 years[82]	1	Con obs	None	NA	None	Low	1227	30,693	Adj OR 1.9 (1.4, 2.5)[b]
Paternal age 50 years or older[82]	1	Con obs	None	NA	None	Low	1227	30,693	Adj OR 2.7 (1.5, 4.8)[b]

Factors	Quality assessment						Summary of findings		
	Studies	Design	Limitations	Inconsistency	Indirectness	Quality	Number of participants		Adjusted OR/RR (95% CI)
							ASD	Non-ASD	
Maternal history of neurotic/personality disorders [82]	1	Con obs	None	NA	None	Low	1227	30,693	Adj OR 1.7 (1.3, 2.2)
Parental mental and behavioural disorder diagnosis[82]	1	Con obs	None	NA	None	Low	1227	30,693	Adj OR 1.7 (1.5, 2.0)
Perinatal or neonatal factors									
Multiple birth defects[75;92]	2	Con obs	None	Not used	None	Low	882	2548	Adj OR 2.73 (1.37, 5.42)
Prematurity (under 28 weeks)[87]	1	Con obs	None	NA	None	Low	1251	253,347	Adj OR 2.5 (1.6, 3.9)
Prematurity (under 35 weeks)[78]	1	Con obs	None	NA	None	Low	595	14,875	Adj OR 2.45 (1.55, 3.86)
Any birth defects[75;92]	2	Con obs	None	Not used	None	Low	882	6380	Adj OR 1.7 (1.31, 52.20)
Male gender[87]	1	Con obs	None	NA	None	Low	1251	253,347	Adj OR 4.2 (3.7, 4.9)
Pregnancy-related factors									
Threatened abortion at before 20 weeks[76]	1	Con obs	None	NA	None	Low	465	1313	Adj OR 2.09 (1.32, 3.32)
Elective caesarean[76]	1	Con obs	None	NA	None	Low	465	1313	Adj OR 1.83 (1.32, 2.54)

Factors	Quality assessment						Summary of findings		
	Studies	Design	Limitations	Inconsistency	Indirectness	Quality	Number of participants		Adjusted OR/RR (95% CI)
							ASD	Non-ASD	
Environmental factors									
Residing in capital city[79]	1	Con obs	None	NA	None	Low	818	942836	Adj RR 2.05 (1.67, 2.51)
Residing in capital city suburb[79]	1	Con obs	None	NA	None	Low	818	942836	Adj RR 1.67 (1.35, 2.06)

[a] reference group 15–29 years

[b] reference group 25 years or younger

Con obs: Controlled observational (see Methods, Section 2.6.2 for detail); NA: Not applicable (see Methods, Section 2.6.2 for detail); Adj: adjusted; OR: odds ratio; RR: Relative risk

4.7 Evidence statements: risk factors

Low quality evidence demonstrated the following risk factors for autism or ASD to be clinically and statistically important (see Methodological approaches, Section 2.6.4):

- sibling history of autism
- sibling history of another ASD
- parental history of schizophrenia-like psychosis
- parental history of affective disorder
- parental history of another mental and behavioural disorders
- maternal age older than 40 years
- paternal age between 40 and 49 years (ASD)
- paternal age older than 40 years (autism)
- birthweight less than 2500 g
- prematurity under 35 weeks
- admission to a neonatal intensive care unit
- presence of birth defects
- presence of multiple birth defects
- male gender
- threatened abortion at less than 20 weeks
- residing in a capital city
- residing in suburb of a capital city.

4.8 Evidence to recommendations: risk factors

See section 4.12.

4.9 Overview of the evidence: conditions with an increase risk of ASD

The GDG selected the following conditions they considered in clinical practice to have a higher than normal prevalence of ASD and these conditions were included in the review.

- intellectual disability,
- fragile X
- tuberous sclerosis
- neonatal encephalopathy / epileptic encephalopathy (including infantile spasms)
- cerebral palsy
- Down's syndrome
- muscular dystrophy
- neurofibromatosis
- fetal alcohol syndrome.

Sub-group analysis by ASD and autism was carried out because it was expected that some coexisting conditions would be more strongly associated with autism than with ASD. Prevalence of autism in a coexisting condition is only reported if data are not available for ASD.

Twenty-eight studies were included in the review. These were from Australia,[93] Canada,[94;95] Iceland,[54-56] Italy,[96] the Netherlands,[58;61] the UK,[52;53;64;65;97;98] the USA,[48;49;51;57;59;62;99-103] Sweden[63] and Turkey.[60] Three studies had multinational samples. All were uncontrolled observational studies.

Three of the studies included children of preschool age[52;59;99] and one of primary school age.[61] No study included children of secondary school age only. Two studies included mixed preschool and primary school age children;[49;101] two studies included mixed primary and secondary school age;[93;94] and seven studies included all age groups.[53;58;60;64;65;98;102] Ten studies included adults (age over 19 years).[48;50;54-57;62;63;100;104] Age was not reported for the remaining studies.

Details of individual studies are presented in evidence tables (see Appendix H, Tables of included studies).

4.10 Evidence profiles: conditions with an increased prevalence of ASD

Table 4.4 reports prevalence and unadjusted relative risks for autism and Table 4.5 reports the same data for children with ASD.

Table 4.4 Conditions with an increased prevalence of autism

Coexisting conditions	Quality assessment						Summary of findings			
	Studies	Design	Limitations	Inconsistency	Indirectness	Quality	Autism	Non-autism	Prevalence (range, %)	Unadj RR (range)
Intellectual disability[60;95]	2	Uncon obs	Not used	Not used	Not used	Very low	161	1076	10.9–27.9	31.3–99.1
Fragile X[103]	1	Uncon obs	Not used	Not used	Not used	Very low	4	13	24	79
Tuberous sclerosis[96]	1	Uncon obs	Not used	Not used	Not used	Very low	7	7	50	256
Neonatal encephalopathy / epileptic encephalopathy / infantile spasms	No studies were identified for this disease.									
Cerebral palsy	No studies were identified for this disease.									
Down's syndrome	No studies were identified for this disease.									
Muscular dystrophy[105]	1	Uncon obs	Not used	Not used	Not used	Very low	2	22	8	23
Neurofibromatosis	No studies were identified for this disease.									
Fetal alcohol syndrome	No studies were identified for this disease.									

Uncon obs: Uncontrolled observational (see Methods, Section 2.6.2 for detail); RR: Relative risk; Unadj: unadjusted

Table 4.5 Conditions with an increased prevalence of ASD

Coexisting conditions	Quality assessment						Summary of findings			
	Studies	Design	Limitations	Inconsistency	Indirectness	Quality	ASD	Non-ASDs	Prevalence (range, %)	Unadj RR (range)
Intellectual disability[58;61;64;65]	4	Uncon obs	Not used	Not used	Not used	Very low	341	2208	8–17	7–17
Fragile X[48-50,101]	4	Uncon obs	Not used	Not used	Not used	Very low	95	129	30–60	37 –130
Tuberous sclerosis[52;53;59;97]	4	Uncon obs	Not used	Not used	Not used	Very low	72	66	36–79	48–322
Neonatal encephalopathy / epileptic encephalopathy / infantile spasms[54-56;93]	2	Uncon obs	Not used	Not used	Not used	Low	25	346	4–14	4–14
Cerebral palsy[60]	1	Uncon obs	Not used	Not used	Not used	Very low	19	107	15–15	15–15
Down's syndrome[51;62;98;99;102]	5	Uncon obs	Not used	Not used	Not used	Very low	91	829	6–15	5–15
Muscular dystrophy[63;100;104]	3	Uncon obs	Not used	Not used	Not used	Very low	38	528	3–37	3–50
Neurofibromatosis[57]	1	Uncon obs	Not used	Not used	Not used	Very low	3	71	4–4	4–4
Fetal alcohol syndrome [94]	1	Uncon obs	Not used	Not used	Not used	Very low	6	617	1–1	1–1

Uncon obs: Uncontrolled observational (see Methods, Section 2.6.2 for detail); RR: Relative risk; Unadj: unadjusted

4.11 Evidence statements: conditions with an increased prevalence of ASD

ASD is observed more frequently in children with the following coexisting conditions than in the general population:

- intellectual disability (prevalence of ASD: 8–27.9%)
- fragile X (prevalence of ASD: 24–60%)
- tuberous sclerosis (prevalence of ASD: 36–79%)
- neonatal encephalopathy/epileptic/encephalopathy/infantile spasms (prevalence of ASD: 4–14%)
- cerebral palsy (prevalence of ASD: 15%)
- Down's syndrome (prevalence of ASD: 6–15%)
- muscular dystrophy (prevalence of ASD: 3–37%)
- neurofibromatosis (prevalence of ASD: 4–8%)

The quality of the evidence was very low in all studies.

4.12 Evidence to recommendations: risk factors and conditions with an increased prevalence of autism

Relative value placed on the outcomes considered

In relation to potential risk factors among the general population and prevalence of a coexisting condition, the GDG agreed that an odds ratio or relative risk above 1.25 signified a clinically important cutoff.

Trade-off between clinical benefits and harms

The healthcare professional's level of concern about a child or young person with signs and symptoms of autism and the need for an autism-specific assessment is informed by identifying risk factors.

No harms are thought to be caused by identifying risk factors in children with signs and symptoms of autism.

The first search identified evidence of risk factors in all children and young people. The second search looked for evidence about other conditions with a higher prevalence which should prompt healthcare professionals to consider autism to be more likely in a child or young person. These are conditions that are rare in the general population but that have a strong association with autism. This information is important to support diagnostic assessment, especially where diagnosis is not straightforward.

Trade-off between net health benefits and resource use

No economic evidence was identified. The GDG's view is that identifying the risk factors and coexisting conditions with a higher prevalence of autism is likely to be cost effective, given the time taken to obtain information on risk factors and coexisting conditions and the value of that information in identifying children and young people with autism.

Quality of evidence

The quality of the evidence was very low. The GDG did not feel able to rely on the evidence alone to make its recommendations. Where the evidence concurred with the GDG members' clinical experience and where identification of specific risk factors was practical, they were added to the final list.

Other considerations

The list of risk factors identified in the evidence on the general population was condensed by the GDG in to a list of risk factors that are sufficiently common or important to be of practical use in clinical decision-making. The list of coexisting conditions was also developed using GDG expert opinion. The GDG's view was that factors associated with autism and coexisting conditions with a higher prevalence of autism should be systematically considered as part of a diagnostic assessment. Professionals should raise their level of concern when risk factors are present along with signs and symptoms suggestive of autism. However, the GDG agreed that no risk factor or coexisting condition in isolation necessitates a referral for an autism-specific diagnostic assessment.

The GDG considered there was good evidence that parental mental health disorder, specifically schizophrenia-like psychosis and affective disorder, are risk factors for autism. The GDG considered that autism might be missed in child or young person with a parent with a mental health disorder because an alternative explanation for maladaptive behaviour might be assumed, such as an attachment disorder.

Sodium valporate can be used in pregnancy to treat epilepsy. There is growing clinical awareness of the long-term effects on the foetus of maternal use of sodium valporate in pregnancy. Long-term effects include delayed development and, in some cases, autism. For this reasons, the use of sodium valporate in pregnancy was included as a factor to be considered in history-taking for autism.

The GDG noted from the evidence the link between prematurity (less than 35 weeks) and autism and has included this in the table of risk factors.

Although male gender is a known risk factor, the GDG view was that it was important to recognise that autism does occur in girls and there is anecdotal evidence that autism may be under-recognised in girls of normal range of intellectual ability.

There is evidence of a link between site of residence and increased prevalence rates for autism. The GDG thought that this could be partially explained by proximity to specialist diagnostic and treatment centres. Also, despite identifying it in the evidence, the GDG did not consider it clinically plausible that maternal psoriasis would be a useful risk factor for autism. Therefore, site of residence and maternal psoriasis were excluded from the final list of risk factors.

Evidence was identified for eight conditions with an increased prevalence and related risk of autism. The GDG considered that the presence of any of these conditions in a child or young person with symptoms and/or signs suggestive of autism should be taken into account and should strengthen concerns about possible autism.

This list of conditions associated with autism is not exhaustive: other less common conditions, for example genetic syndromes, may also be strongly associated with autism.

Recommendations

Number	Recommendation
23	Consider referring children and young people to the autism team if you are concerned about possible autism on the basis of reported or observed signs and/or symptoms (see tables 1–3). Take account of: • the severity and duration of the signs and/or symptoms • the extent to which the signs and/or symptoms are present across different settings (for example, home and school) • the impact of the signs and/or symptoms on the child or young person and on their family • the level of parental or carer concern and, if appropriate, the concerns of the child or young person • factors associated with an increased prevalence of autism (see table 4) • the likelihood of an alternative diagnosis.

27 When referring children and young people to the autism team, include in the referral letter the following information, if available:

- antenatal and perinatal history
- developmental milestones
- factors associated with an increased prevalence of autism (see table 4)
- relevant medical history and investigations
- information from previous assessments.

35 When deciding whether to carry out an autism diagnostic assessment, take account of the following, (unless the child is under 3 years and has regression in language or social skills – see recommendation 33):

- the severity and duration of the signs and/or symptoms
- the extent to which the signs and/or symptoms are present across different settings (for example, home and school)
- the impact of the signs and/or symptoms on the child or young person and on their family or carer
- the level of parental or carer concern, and if appropriate the concerns of the child or young person
- factors associated with an increased prevalence of autism (see table 4)
- the likelihood of an alternative diagnosis.

Table 4 Factors associated with an increased prevalence of autism

- A sibling with autism
- Birth defects associated with central nervous system malformation and/or dysfunction, including cerebral palsy
- Gestational age less than 35 weeks
- Parental schizophrenia-like psychosis or affective disorder
- Maternal use of sodium valproate in pregnancy
- A learning (intellectual disability)
- Attention deficit hyperactivity disorder
- Neonatal encephalopathy or epileptic encephalopathy, including infantile spasms
- Chromosomal disorders such as Down's syndrome
- Genetic disorders such as fragile X
- Muscular dystrophy
- Neurofibromatosis
- Tuberous sclerosis

4.13 Overview of the evidence: information from other sources

It was expected that no studies would be available since no empirical study could address this type of question: clinical trials, observational studies and qualitative studies would not be helpful since gathering information from other sources cannot be definitively linked to an ASD-specific outcome. Therefore the GDG decided to use consensus methodology to answer this question. No evidence was reviewed for this question.

4.14 Evidence profile: information from other sources

No systematic search of the evidence was undertaken.

4.15 Evidence statement: information from other sources

No systematic search of the evidence was undertaken.

4.16 Evidence to recommendations: information from other sources

Relative value placed on the outcomes considered

A literature search was undertaken: however, the GDG did not anticipate that there would be any published evidence that addressed this issue. Therefore specific outcomes were not defined for this question.

Trade-off between clinical benefits and harms

Given the lack of evidence, the GDG discussed the purpose and value of gaining additional information following referral to the autism team.

Since autism can affect a child or young person's function across varied settings, it was important to have available adequate information from different contexts. Disorders other than autism can present with similar signs and symptoms, so the availability of such information at this stage is helpful both in determining who should proceed to an autism-specific diagnostic assessment and as a contribution to that diagnostic assessment. Information could usefully be obtained from preschool and school placements and from other professionals, especially since assessments may already have been undertaken, such as a speech and language, hearing or educational assessment.

The GDG did not identify harms to the child or the family in gathering information. In conjunction with other information it may increase the proportion of children who are referred appropriately for assessment and reduce waiting times for those who most need it.

Trade-off between net health benefits and resource use

The GDG considered whether gathering information is likely to represent a net cost or saving to the NHS. No evidence was identified, although it was recognised that obtaining information uses up professional and administrative time. The clinical experience of the GDG is that information gathering is often poorly managed, takes too long to coordinate and increases waiting times. The GDG consensus is that a coordinated system for collecting information and reports from agencies that have had recent contact with the child or young person and their family or carer would speed up decision-making, reduce waiting times and avoid unnecessary referrals, and therefore is likely to lead to a cost-effective improvement.

The GDG members were aware of good practice around the country where coordination is already in place and where professionals have the appropriate information at the point of deciding the best pathway for a child or young person. A coordinated approach to information gathering should be integral to the recognition, referral and diagnosis of autism in any service in the NHS, however it is configured.

Quality of evidence

No evidence was identified for this question, and no evidence for the best way to collect information from schools was found, although the GDG is aware that different services use different semi-structured tools to gather information.

Other considerations

On receipt of a referral a decision needs to be made whether to proceed with an autism-specific diagnostic assessment or whether another type of assessment is required. The GDG consensus is that the decision should be made by the autism team either in a referral meeting or by an individual member of the autism team, depending on the clinical presentation and the need for multidisciplinary consideration. (For a description of the role of the autism team, see the evidence to recommendations section in Chapter 5 on Diagnostic assessment).

The considerations for deciding whether to proceed to an autism-specific assessment are the same as those used to decide whether to refer to the autism team: a review of the signs and symptoms, and their severity, pervasiveness, impact and context. Signs and symptoms of autism with regression of language or social skills in a child of under 3 years is strongly associated with a diagnosis of autism unless there are other clinical signs suggesting an alternative medical disorder which may require a different assessment pathway. In a child over 3 years with regression of language and social skills a medical opinion should be sought in the first instance. Subsequent referral can be made to the autism team as necessary.

Once the decision for an autism diagnostic assessment has been made, this should be arranged without delay and should start within 3 months of the initial referral to the autism team. At the same time, results of previous assessments should be obtained including results of vision and hearing tests. A school or preschool report or a report from a home educator should also be requested following consent from the parent/carer as this contributes important information to the diagnostic assessment and profiling of needs. Home or school video recordings, where available, may be helpful.

An efficient process for collecting and reviewing such information is important in avoiding delay and repetitious requesting of information at different points through the autism pathway.

If there is insufficient information to make a decision to proceed to an autism-specific diagnostic assessment, additional information, such as the results of previous assessments and/or school or preschool reports, or an initial face-to-face assessment with an appropriate professional may be helpful in clarifying the likely problem and what further assessments are needed.

Parental or carer consent should be sought, or, where appropriate, consent from the child or young person, in gathering information from other sources outside the health service to enhance parental/carer support and transparency in the process.

The autism team should not delay putting into place appropriate support while gathering information if it is thought to be necessary based on the information already available to the team. Support should be based on the needs of the child or young person once they are known and not the final diagnosis.

Recommendations

Number	Recommendation
32	When a child or young person is referred to the autism team, at least one member of the autism team should consider whether to carry out: • an autism diagnostic assessment and/or • an alternative assessment.
33	Carry out an autism diagnostic assessment if there is regression in language or social skills in a child younger than 3 years.
34	Refer first to a paediatrician or paediatric neurologist (if this has not already happened) children or young people: • older than 3 years with regression in language • of any age with regression in motor skills. The paediatrician or paediatric neurologist can refer back to the autism team if necessary.
35	When deciding whether to carry out an autism diagnostic assessment, take account of the following, (unless the child is under 3 years and has regression in language or social skills – see recommendation 33): • the severity and duration of the signs and/or symptoms • the extent to which the signs and/or symptoms are present across different settings (for example, home and school)

- the impact of the signs and/or symptoms on the child or young person and on their family or carer
- the level of parental or carer concern, and if appropriate the concerns of the child or young person
- factors associated with an increased prevalence of autism (see table 4)
- the likelihood of an alternative diagnosis.

36 If there is insufficient information to decide whether an autism diagnostic assessment is needed, gather any available information from healthcare professionals. With consent from parents or carers and, if appropriate, the child or young person, seek information from schools or other agencies.

37 If there is uncertainty about whether an autism diagnostic assessment is needed after information has been gathered (see recommendation 36), offer a consultation to gather information directly from the child or young person and their family or carers.

38 Once it has been decided to carry out an autism diagnostic assessment, with consent from parents or carers (and the child or young person if appropriate):

- seek a report from the preschool or school if one has not already been made available
- gather any additional health or social care information, including results from hearing and vision assessments.

39 Avoid repeated information gathering and assessments by efficient communication between professionals and agencies.

40 Start the autism diagnostic assessment within 3 months of the referral to the autism team.

4.17 Research recommendations: information from other sources

Number	Research recommendation
RR 2	Does routine additional information from educational settings (such as nursery or school) improve accuracy in diagnosing autism among children or young people up to the age of 19 compared with signs and symptoms alone?

Why this is needed

The term autism includes conditions primarily characterised by difficulties in social reciprocity, social communication and social understanding, along with rigid and repetitive ways of thinking and behaving. Diagnostic accuracy may be improved by interpreting information about how the child or young person presents in social settings away from the home and immediate family.

Nurseries or schools are the most obvious settings from which such information may be collected. However, the degree to which information from teachers and schools helps in accurate diagnosis has not been well tested.

Importance to 'patients' or the population

Parents commonly request that information from different sources/settings be used in making a diagnosis preferring a 'holistic' approach to their child's assessment.

Collecting information from multiple sources, as part of the autism diagnostic

assessment, would also negate the need for sequential assessments in different settings.

Care should be taken to request informed consent before information is collected as some parents/young people may not wish concerns to be shared.

Relevance to NICE guidance

The NCC-WCH 2011 guidance recommends that there should be a local autism strategy group with representation from education.

An educational psychologist is also named as a member of the core autism diagnostic team.

Relevance to the NHS

Improving diagnostic accuracy may result in cost saving for the NHS by reducing the need for re-assessments and by standardizing diagnostic practice across the UK.

The resulting closer links with educational organizations could facilitate better use of resources and help target appropriate management be it in healthcare or educational setting.

National priorities

This is also a national priority area in the Special Education Needs Green Paper (clause 13) that describes the need for a joint education, health and social care plan for children and young people with an SEN by 2014.

The Autism Act (2009) and the Statutory Guidance (2010) have highlighted autism as a national priority for the NHS and social care.

Current evidence base

There is little systematic research comparing routine use of school/preschool information before or subsequent to diagnostic assessment

Equality

Children being home-schooled are often under-diagnosed unless attempts are made to collect information from other sources in these cases.

Feasibility

A prospective randomized controlled trial of additional information from another setting alongside an autism diagnostic assessment in a single district compared with an autism diagnostic assessment alone in a second matched district.

Time needed 36 months

Outcomes to include –

- time taken to diagnosis
- number of children diagnoses with autism
- number of coexisting conditions identified
- number of children with a differential diagnosis
- cost-effectiveness of additional assessments
- acceptability/satisfaction with diagnostic process

Other comments

No other comments

5 Diagnostic assessment

Introduction

The purpose of a diagnostic assessment is to establish whether or not the developmental and behavioural concerns about the child or young person can be attributed to autism or an alternative diagnosis. It is also intended to provide a profile of the child or young person's strengths, skills impairments and needs. Such a profile can inform their future needs-based management plan.

This chapter considers all aspects of the autism-specific diagnostic assessment. It provides recommendations on the core elements of the assessment, including the autism team, the information that should be gathered to develop a profile of the child or young person, and any specific assessments, including a physical examination.

The first sections look at the evidence relating to autism-specific diagnostic tools and the information required to interpret the findings of such tools. It covers the accuracy of diagnostic tools compared with the International Statistical Classification of Diseases and Related Health Problems (ICD-10) and Diagnostic and Statistical Manual of Mental Disorders DSM-IV-TR Fourth Edition (Text Revision) (DSM-IV-TR), the accuracy of other assessment tools to assist interpretation of the autism-specific diagnostic tools, agreement between the tools, agreement between single clinician and panel of clinicians in the diagnosis of autism spectrum disorders (ASD) or autism according to DSM-IV-TR criteria, and the stability of ICD-10 and DSM-IV-TR criteria.

The next sections consider how the diagnosis should be communicated. The purpose of this section is to make recommendations about how best to communicate a diagnosis of autism to children, young people, parents and carers, based on available autism-specific evidence.

The last part of the chapter considers the actions that should be taken when there is continued diagnostic uncertainty and when to refer for another opinion. For some children and young people the completion of a diagnostic assessment will result in a conclusion that they do not have autism. These children and young people leave the autism pathway but will almost always require further assessment and management. However, this is beyond the scope of this guideline.

Clinical questions

What should be the components of the diagnostic assessment? When should they be undertaken, in what subgroups and in what order?

- assessment tools specific to autism: for example Autism Diagnostic Interview and Autism Diagnostic Interview – Revised (ADI/ADI-R), Developmental, Dimensional and Diagnostic Interview (3di), Diagnostic Interview for Social and Communication Disorders (DISCO), Autism Diagnostic Observation Schedule (ADOS), Gilliam Autism Rating Scale (GARS)
- other assessment tools that help the interpretation of the specific autism tools and ratings scales (for example ADI, 3di, DISCO, ADOS, Gilliam Autism Rating Scale): such as an assessment of intellectual ability or an assessment of receptive and expressive language.

How should information be integrated to arrive at diagnosis?

- Is the diagnostic assessment more accurate and reliable when performed by a multidisciplinary team or a single practitioner?
- What is the stability of an autism diagnosis over time?
- What is the agreement of an autism diagnosis across different diagnostic tools?

How should the findings of the diagnostic assessment be communicated to children and young people, and their families/carers?

What actions should follow assessment for children and young people who are not immediately diagnosed with autism?

5.1 Overview of the evidence: accuracy of assessment tools

Eleven studies were included in the review. ADI/ADI-R was examined in ten studies,[48;73;106-113] ADOS in nine studies,[48;73;106;107;109-113] 3di in a single study[114] and GARS in a single study.[110] One study examined a combination of ADI/ADI-R and ADOS.[73] All were uncontrolled observational studies. No study examining DISCO met the pre-defined inclusion criteria. The studies were carried out in Australia,[107] Greece,[111] the Netherlands,[106] the UK[114] and the USA.[48;73;108-110;112;113]

One study reported on intellectual disability.[107] Three studies reported mean IQ scores but the proportion of children with intellectual disability was not reported.[73;107;111] Only one sub-group analysis by age group for preschool children (under 5 years) was possible. Data for school age children (5–11 years) and adolescents (over 12 years) was not available.

Details of individual studies are presented in evidence tables (see Appendix H, Tables of included studies).

5.2 Evidence profiles: accuracy of assessment tools

The evidence is presented below in two GRADE profiles reporting the diagnostic accuracy (sensitivity and specificity) of diagnostic tools compared to recognised diagnostic criteria and the quality of the evidence. The data are reported in four groups of children and young people:

- preschool children (0–5 years)
- primary school children (6–11 years)
- secondary school children (12–19 years)
- children and young people with an intellectual disability (all ages).

The evidence for autism is reported separately from ASD as it was expected that assessment tools would have different levels of accuracy for each category so it would not be appropriate to pool these data.

Table 5.1 represents the accuracy for diagnosing autism and Table 5.2 the accuracy in diagnosing ASD.

Table 5.1 Accuracy of diagnostic tools in diagnosing autism compared to ICD-10 or DSM-IV-TR criteria

Diagnostic tool	Quality assessment						Summary of findings			
							Number		Diagnostic accuracy	
	Studies	Design	Limitations	Inconsistency	Indirectness	Quality	Cases	Controls	Sensitivity (%) (95% CI)	Specificity (%) (95% CI)
All studies										
ADI/ADI-R[48;73;106-113]	10	Uncon obs	Not used	Not used	Not used	Very low	716	871	84 (81, 86)	67 (64, 71)
3di	No study met the inclusion criteria for this review									
GARS	No study met the inclusion criteria for this review									
DAWBA	No study met the inclusion criteria for this review									
PIA	No study met the inclusion criteria for this review									
DISCO	No study met the inclusion criteria for this review									
ADOS[48;73;106;107;109-113]	9	Uncon obs	Not used	Not used	Not used	Very low	716	871	91 (89, 94)	75 (72, 80)
ADI/ADI-R + ADOS[73]	1	Uncon obs	Not used	Not used	Not used	Very low	274	297	85 (81, 89)	87 (83, 91)
Subgroup analysis – children with intellectual disability										
ADI/ADI-R[107]	1	Uncon obs	Not used	Not used	Not used	Very low	120	89	77 (68, 84)	70 (59, 79)
3di	No study met the inclusion criteria for this review									
GARS	No study met the inclusion criteria for this review									
DAWBA	No study met the inclusion criteria for this review									
PIA	No study met the inclusion criteria for this review									

Diagnostic tool	Quality assessment						Summary of findings			
							Number		Diagnostic accuracy	
	Studies	Design	Limitations	Inconsistency	Indirectness	Quality	Cases	Controls	Sensitivity (%) (95% CI)	Specificity (%) (95% CI)
DISCO	No study met the inclusion criteria for this review									
ADOS[107]	1	Uncon obs	Not used	Not used	Not used	Very low	120	89	85 (77, 91)	89 (80, 95)
ADI/ADI-R + ADOS[73]	1	Uncon obs	Not used	Not used	Not used	Very low	274	297	85 (81, 89)	87 (83, 91)
Subgroup analysis – pre-school children (5 years or under)										
ADI/ADI-R[107-109;112;113]	5	Uncon obs	Not used	Not used	Not used	Low	290	308	80 (75, 84)	77 (72, 82)
3di	No study met the inclusion criteria for this review									
GARS	No study met the inclusion criteria for this review									
DAWBA	No study met the inclusion criteria for this review									
PIA	No study met the inclusion criteria for this review									
DISCO	No study met the inclusion criteria for this review									
ADOS[107;109;112;113]	4	Uncon obs	Not used	Not used	Not used	Low	290	308	89 (84, 93)	76 (70, 82)
ADI/ADI-R + ADOS[73]	1	Uncon obs	Not used	Not used	Not used	Very low	274	297	85 (81, 89)	87 (83, 91)
Subgroup analysis – primary school children (6–11 years)										
No study met the inclusion criteria for this review										
Subgroup analysis – secondary school children (12 years or over)										
No study met the inclusion criteria for this review										

ADI: Autism Diagnostic Interview; ADI-R: Autism Diagnostic Interview – Revised; 3di: Developmental, Dimensional and Diagnostic Interview; GARS: Gilliam Autism Rating Scale; DAWBA: Development and Well-Being Assessment; PIA: Parent Interview for Autism; DISCO: Diagnostic Interview for Social and Communication Disorders; ADOS: Autism Diagnostic Observation Schedule

CI: confidence interval; Uncon obs: Uncontrolled observational (see Methods, Section 2.6.2 for detail)

Table 5.2 Accuracy of diagnostic tools in diagnosing ASD compared to ICD-10 or DSM-IV-TR criteria

Diagnostic tool	Quality assessment						Summary of findings			
							Number		Diagnostic accuracy	
	Studies	Design	Limitations	Inconsistency	Indirectness	Quality	Cases	Controls	Sensitivity % (95% CI)	Specificity % (95% CI)
All studies										
ADI/ADI-R [48;73;106;107;109-113]	9	Uncon obs	Not used	Not used	Not used	Very low	1009	471	78 (77, 82)	71 (66, 75)
3di[114]	1	Uncon obs	Not used	Not used	Not used	Very low	27	33	100 (100, 100)	94 (86, 100)
GARS[110]	1	Uncon obs	Not used	Not used	Not used	Very low	56	19	39 (27, 52)	Not calculable
DAWBA	No study met the inclusion criteria for this review									
PIA	No study met the inclusion criteria for this review									
DISCO	No study met the inclusion criteria for this review									
ADOS[48;73;106;107;109-113]	9	Uncon obs	Not used	Not used	Not used	Very low	1009	471	87 (85, 89)	73 (69, 76)
ADI/ADI-R + ADOS[73]	1	Uncon obs	Not used	Not used	Not used	Very low	274	297	83 (79, 87)	86 (81, 92)
Subgroup analysis – children with intellectual disability										
ADI/ADI-R[107]	1	Uncon obs	Not used	Not used	Not used	Very low	143	66	73 (65, 80)	77 (65, 87)
3di	No study met the inclusion criteria for this review									
GARS	No study met the inclusion criteria for this review									
DAWBA	No study met the inclusion criteria for this review									
PIA	No study met the inclusion criteria for this review									

Diagnostic tool	Quality assessment						Summary of findings			
							Number		Diagnostic accuracy	
	Studies	Design	Limitations	Inconsistency	Indirectness	Quality	Cases	Controls	Sensitivity % (95% CI)	Specificity % (95% CI)
DISCO	No study met the inclusion criteria for this review									
ADOS[107]	1	Uncon obs	Not used	Not used	Not used	Very low	143	66	76 (68, 83)	94 (85, 98)
ADI/ADI-R + ADOS[73]	1	Uncon obs	Not used	Not used	Not used	Very low	274	297	83 (79, 87)	86 (81, 92)
Subgroup analysis – pre-school children (5 years or under)										
ADI/ADI-R[107;109;112;113]	4	Uncon obs	Not used	Not used	Not used	Very low	382	186	70 (65, 74)	77 (71, 83)
3di	No study met the inclusion criteria for this review									
GARS	No study met the inclusion criteria for this review									
DAWBA	No study met the inclusion criteria for this review									
PIA	No study met the inclusion criteria for this review									
DISCO	No study met the inclusion criteria for this review									
ADOS[107;109;112;113]	4	Uncon obs	Not used	Not used	Not used	Very low	382	186	84 (79, 87)	77 (71, 82)
ADI/ADI-R + ADOS[73]	1	Uncon obs	Not used	Not used	Not used	Very low	274	297	83 (79, 87)	86 (81, 92)
Subgroup analysis – primary school children (6–11 years)										
No study met the inclusion criteria for this review										
Subgroup analysis – secondary school children (12 years or over)										
No study met the inclusion criteria for this review										

ADI: Autism Diagnostic Interview; ADI-R: Autism Diagnostic Interview – Revised; 3di: Developmental, Dimensional and Diagnostic Interview; GARS: Gilliam Autism Rating Scale; DAWBA: Development and Well-Being Assessment; PIA: Parent Interview for Autism; DISCO: Diagnostic Interview for Social and Communication Disorders; ADOS: Autism Diagnostic Observation Schedule

CI: confidence interval; Uncon obs: Uncontrolled observational (see Methods, Section 2.6.2 for detail)

5.3 Evidence statement: accuracy of assessment tools

Evidence for autism

Only studies examining ADI/ADI-R, ADOS and ADI/ADI-R plus ADOS met the pre-defined levels of accuracy for this review (see Methodological approaches, Section 2.6.4). No data was identified for 3di, DISCO, DAWBA, PIA and GARS. Studies examining the Childhood Autism Rating Scale (CARS) were excluded.

In all studies only the combination of ADI/ADI-R and ADOS met the pre-defined levels of accuracy. For intellectual disability only ADOS and the combination of ADI/ADI-R and ADOS meet the pre-defined levels of accuracy. For pre-school children (5 years or under) only ADOS and the combination of ADI/ADI-R and ADOS met the pre-defined levels of accuracy. In all cases the evidence was of very low quality.

No studies were identified for primary school children (6–11 years) or for secondary school children (12 years or over).

Evidence for ASD

Only 3di and the combination of ADI/ADI-R and ADOS met the pre-defined levels of diagnostic accuracy for all studies. For intellectual disability only the combination of ADI/ADI-R and ADOS met the pre-defined levels of accuracy. For pre-school (5 years or under) only the combination of ADI/ADI-R and ADOS meet the pre-defined levels of accuracy. In all cases the evidence was of very low quality.

No studies were identified for primary school children (6–11 years) or secondary school children (12 years or over).

5.4 Evidence to recommendations: accuracy of assessment tools

See Section 5.20.

5.5 Overview of the evidence: agreement between assessment tools

After reviewing the evidence on the accuracy of diagnostic tools, it was evident that the studies were of very low quality. For that reason, evidence comparing the agreement between tools was not examined.

5.6 Evidence profiles: agreement between assessment tools

No evidence.

5.7 Evidence statement: agreement between assessment tools

No evidence.

5.8 Evidence to recommendations: agreement between assessment tools

See section 5.20.

5.9 Overview of the evidence: other assessment tools to assist interpretation of the autism-specific diagnostic tools

No evidence was identified on the effectiveness of specific tools in assisting a diagnosis alongside another ASD specific tool. .

5.10 Evidence profiles: other assessment tools to assist interpretation of the autism-specific diagnostic tools

No evidence.

5.11 Evidence statement: other assessment tools to assist interpretation of the autism-specific diagnostic tools

No evidence.

5.12 Evidence to recommendations: other assessment tools to assist interpretation of the autism-specific diagnostic tools

See Section 5.20.

5.13 Overview of evidence: agreement between a single clinician and a panel of clinicians when making a diagnosis

The agreement between diagnoses by a single clinician and a diagnostic team are reported as Kappa scores. Kappa scores may be interpreted as shown in Table 5.3:[32]

Table 5.3 Interpretation of Kappa scores

Kappa score	Level of agreement
< 0%	Poor
0–20%	Slight
21–40%	Fair
41–60%	Moderate
61–80%	Substantial
81–100%	Almost perfect (high agreement)

Only one study carried out in Canada was included in the review.[115] It was an uncontrolled observational design and was low quality. The study sample included a mix of age groups from preschool children to adults.

Details of the included study are presented in evidence tables (see Appendix H, Tables of included studies).

5.14 Evidence profile: agreement between a single clinician and a panel of clinicians when making a diagnosis

Table 5.4 reports the agreement (Kappa statistic) between single versus a panel of clinicians in diagnosing ASD.

Table 5.4 Agreement between single clinician and panel of clinicians to diagnose ASD, autism or non-ASD according to DSM-IV-TR criteria

Diagnosis	Quality assessment						Summary of findings		
							Agreement		
	Studies	Design	Limitations	Inconsistency	Indirectness	Quality	Number	Age (months)	Kappa (%)
ASD[115]	1	Uncon obs	Not used	Not used	Not used	Very low	143	29–482	55%
Autism[115]	1	Uncon obs	Not used	Not used	Not used	Very low	143	29–482	56%
Non-ASD[115]	1	Uncon obs	Not used	Not used	Not used	Very low	143	29–482	81%

Uncon obs: Uncontrolled observational (see Methods, Section 2.6.2 for detail)

5.15 Evidence statement: agreement between a single clinician and a panel of clinicians when making a diagnosis

One study reported agreement between a single clinician and a panel of clinicians to diagnose ASD, autism or atypical autism. Agreement was moderate for ASD and autism.

Agreement between a single clinician and panel of clinicians considering a non-spectrum diagnosis was almost perfect.

The quality of the evidence was very low.

5.16 Evidence to recommendations: agreement between a single clinician and a panel of clinicians when making a diagnosis

See section 5.20.

5.17 Overview of the evidence: stability of ICD-10 and DSM-IV-TR criteria

Studies were grouped according to age at first diagnosis: 24 months or under, 25–36 months, 37–48 months and 49–60 months. These subgroups were adopted because using a single category of preschool (children under 5 years) would not provide reliable evidence on diagnostic stability. Data are reported, when available, for autism, ASD and no spectrum diagnosis as these are the three options for children assessed for ASD.

Thirteen studies were included in the review. These studies were carried in Canada,[116] the Netherlands,[117] the UK[118-120] and the USA.[108;109;121-126] All were uncontrolled observational studies and were graded as very low quality.

Children received their first diagnosis at 24 months or under in four studies,[119;121 118;126] and at 25–36 months in nine studies.[108;109;116;117;120;122-125] No studies examined diagnosis at either 37–48 months or 49–60 months. DSM-IV-TR was used in nine studies[109;116;117;121-126] to examine stability while ICD-10 was examined in five studies.[108;118-120]

Details of the included studies are presented in the evidence tables (see Appendix H, Tables of included studies).

5.18 Evidence profiles: stability of ICD-10 and DSM-IV-TR criteria

Table 5.5 reports the proportion of children, by age, who retain a diagnosis of autism, ASD and non-ASD (non spectrum) using either the ICD-10 or DSM-IV-TR criteria.

Table 5.5 Stability of diagnostic criteria over time (by age at first diagnostic assessment)

Diagnostic criteria	Quality assessment						Summary of findings			
							Diagnosis at Time 2			
	Studies (N)	Design	Limitations	Inconsistency	Indirectness	Quality	Age (months)	Autism % (95% CI)	ASD % (95% CI)	Non-ASD % (95% CI)
Stability if diagnosed at 24 months or under										
Autism										
DSM-IV-TR [121;126]	2 (64)	Uncon obs	Not used	Not used	Not used	Very low	35.9 ± 3.8 to 46.9 ± 7.7	80.8 (64.1, 93.1)	19.2 (6.9, 35.9)	0
ICD-10[118;119]	2 (35)	Uncon obs	Not used	Not used	Not used	Very low	42–85.4 ±8.5	83.9 (70.5, 93.8)	13.4 (4.5, 26.0)	3.8
Other ASD										
DSM-IV-TR [121;126]	2 (24)	Uncon obs	Not used	Not used	Not used	Very low	35.9 ± 3.8 to 46.9 ± 7.7	12.6 (1.8, 31.0)	87.4 (69.0, 98.2)	0
ICD-10[119]	1 (3)	Uncon obs	Not used	Not used	Not used	Very low	42	33.3	66.7	0
Non-spectrum										
DSM-IV-TR [121;126]	2 (32)	Uncon obs	Not used	Not used	Not used	Very low	35.9 ± 3.8 to 46.9 ± 7.7	3.6	12.5 (1.7, 31.0)	85.8 (72.3, 95.3)

Diagnostic criteria	Quality assessment						Summary of findings			
							Diagnosis at Time 2			
	Studies (N)	Design	Limitations	Inconsistency	Indirectness	Quality	Age (months)	Autism % (95% CI)	ASD % (95% CI)	Non-ASD % (95% CI)
ICD-10[119]	1(34)	Uncon obs	Not used	Not used	Not used	Very low	42	0	26.7	73.5
Stability if diagnosed at 25–36 months										
Autism										
DSM-IV-TR [109;116;117;122;123;125]	6(260)	Uncon obs	Not used	Not used	Not used	Very low	45 ± 6.4 to 112.8 ± 15.6	75.1 (62.4, 85.9)	16.7 (10.2, 24.6)	10.1 (3.1, 20.6)
ICD-10[108;120]	2 (32)	Uncon obs	Not used	Not used	Not used	Very low	45.8 ± 5.3 to 53	85.4 (71.8, 95.1)	11.4 (3.1, 24.1)	6.3
Other ASD										
DSM-IV-TR [109;116;117;122;123;125]	6(100)	Uncon obs	Not used	Not used	Not used	Very low	45 ± 6.4 to 112.8 ± 15.6	31.2 (13.0, 53.1)	34.7 (26.0, 44.0)	32.5 (15.9, 51.9)
DSM-IV-TR[124a]	1 (73)	Uncon obs	Not used	Not used	Not used	Very low	53.7 ± 7.9	82.2		17.8
ICD-10[108;120]	1 (3)	Uncon obs	Not used	Not used	Not used	Very low	45.8 ± 5.3 to 53	67	33	0
Non-spectrum										
DSM-IV-TR [109;116;117;125]	4 (142)	Uncon obs	Not used	Not used	Not used	Very low	53 ± 8 to 112.8 ± 15.6	0	10.5 (0.1, 35.1)	92.8 (77.4, 99.8)

Diagnostic criteria	Quality assessment						Summary of findings			
							Diagnosis at Time 2			
	Studies (N)	Design	Limitations	Inconsistency	Indirectness	Quality	Age (months)	Autism % (95% CI)	ASD % (95% CI)	Non-ASD % (95% CI)
DSM-IV-TR[124a]	1 (17)	Uncon obs	Not used	Not used	Not used	Very low	53.7 ± 7.9	0		100
ICD-10[108;120]	2 (15)	Uncon obs	Not used	Not used	Not used	Very low	45.8 ± 5.3 to 53	14.3	0	83.7 (63.1, 96.9)
Stability if diagnosed at 37–48 months										
Autism										
No studies met the inclusion criteria for this analysis										
Other ASD										
No studies met the inclusion criteria for this analysis										
Non-spectrum										
No studies met the inclusion criteria for this analysis										
Stability if diagnosed at 49–60 months										
Autism										
No studies met the inclusion criteria for this analysis										
Other ASD										
No studies met the inclusion criteria for this analysis										
Non-spectrum										
No studies met the inclusion criteria for this analysis										

[a] This study combined autism and other ASD into one category

CI: confidence interval; Uncon obs: Uncontrolled observational (see Methods, Section 2.6.2 for detail)

5.19 Evidence statement: stability of ICD-10 and DSM-IV-TR criteria

The evidence for all age groups was very low quality.

Children aged under 24 months at first diagnostic assessment using ICD-10/DSM-IV-TR

All children, except a single case (1%), diagnosed as having autism based on ICD-10/DSM-IV-TR retained that initial diagnosis at the second assessment at least 12 months later.

All children diagnosed as having another ASD based on ICD-10/DSM-IV-TR retained that initial diagnosis at the second assessment at least 12 months later.

However, of children under 24 months who were thought not to have any ASD, 41% were found to have an ASD at the second assessment at least 12 months later.

Children aged 25 to 36 months at first diagnostic assessment using ICD-10/DSM-IV-TR

The majority of children (95%) diagnosed as having autism based on ICD-10/DSM-IV-TR retained that initial diagnosis at the second assessment at least 12 months later.

The majority of children (84%) diagnosed as having another ASD based on ICD-10/DSM-IV-TR retained that initial diagnosis at the second assessment at least 12 months later.

No child thought not to have an ASD was found to have ASD at the second assessment at least 12 months later.

Children aged 37 to 48 months at first diagnostic assessment using ICD-10/DSM-IV-TR

No studies were identified for this analysis.

Children aged 49 to 60 months at first diagnostic assessment using ICD-10/DSM-IV-TR

No studies were identified for this analysis.

5.20 Evidence to recommendations for sections 5.1–5.19

Relative value placed on the outcomes considered

The outcomes for the diagnostic tools were their accuracy and the agreement between different tools. The outcome for the multidisciplinary team versus single clinician was also accuracy. The same threshold for accuracy was used throughout the guideline (see Methodological approaches, Section 2.6.4).

Trade-off between clinical benefits and harms

Autism-specific diagnostic tools

All studies addressing diagnostic tool accuracy were very low quality. Where there was evidence, significant variation in accuracy (used alone or in combination) was reported. Evidence was not identified for some of the instruments (see below).

The combination of ADI/ADI-R and ADOS was accurate in diagnosing autism in preschool children and children with an intellectual disability. 3di was accurate in diagnosing autism. However, the GDG considered that since the study reported 100% sensitivity, it did not accurately reflect clinical practice.

The GDG considered that the clinical benefits of using these tools remained uncertain, even for combinations and sub-groups that reached the GDG's threshold for clinical accuracy.

The GDG acknowledged that both an autism-specific semi-structured interview and observation were beneficial in providing a systematic framework for information-gathering to assist the diagnostic assessment.

The GDG also recognised possible harms in the use of the scores derived from diagnostic tools which may provide a false diagnosis of autism and false reassurance.

Overall, therefore, the GDG recommended the use of a semi-structured interview and observation for systematic information-gathering but did not recommend any specific published tool.

Multidisciplinary assessment versus single practitioner assessment

Only one study was identified. It reported moderate agreement between an individual healthcare professional and a multidisciplinary team in making a diagnosis, but it was a low quality study. In practice, a diagnosis can be made by a single experienced healthcare professional. However, the label of autism does not constitute a complete diagnostic assessment and a profile of the child or young person's strengths and weaknesses is also essential. This requires a multidisciplinary team which has the skills to undertake the assessments necessary for profiling.

Stability of diagnosis using ICD-10 and DSM-IV as diagnostic criteria

The evidence indicates that diagnosis is reliable when made using ICD-10 and DSM-IV-TR criteria across different age groups. The diagnoses should be reached in a consistent way across the National Health Service (NHS) to reduce professional disagreements which can delay the process. The most effective approach is to use the ICD-10/DSM-IV-TR criteria with expert clinical judgement. This is not always done in routine practice, with individual healthcare practitioners and teams making diagnoses based on judgement alone. This leads to varying diagnostic thresholds for autism across the health service and possible inequality in access to appropriate services.

Trade-off between net health benefits and resource use

There are cost implications for the use of additional assessments, including royalties, printing and clinical time and training.

There is insufficient evidence that one tool is better than another: however, the GDG considered that clinical benefits justify the resource use.

Training in the use of diagnostic tools enhances competence. The GDG was aware of evidence published in 2010 in the UK which reported that training of local autism teams in the diagnosis of autism can reduce the time spent waiting for a diagnostic assessment.[127]

The GDG's view was that the value of a multidisciplinary team undertaking the assessment outweighed the additional costs when compared with assessment by an individual clinician working alone because of the value of profiling.

There was no published evidence identified that reported the cost effectiveness of monitoring, reviewing or referring children who are not immediately diagnosed. The costs associated with this are: the time required for professionals to make contact with other professionals and agencies; and the cost of referral to a tertiary team. The assumption is that appropriate tertiary referral is likely to improve the effectiveness of care for complex diagnostic cases.

Quality of evidence

Accuracy of diagnostic tools used in isolation

Overall, the studies on the accuracy of the diagnostic tools were all very low quality with the exception of two sub-group analyses on preschool children (ADI/ADI-R and ADOS) which were rated low quality.

Most of the evidence looked at ADI/ADI-R, which included studies reporting sub-group analyses of children with intellectual disability and preschool children. No studies reported acceptable levels above the minimum threshold.

ADOS was not accurate overall (sensitive or specific). However, one study included children with an *a priori* intellectual disability and ADOS was accurate for this subgroup. However, this was only one study and the reasons why ADOS should be more accurate for this group of children is not clear.

ADOS was also accurate for preschool children (age under 5 years). No studies were identified for the other two age groups. Only one study was identified that considered the accuracy of 3di and GARS but the results could be interpreted from this limited, very low quality evidence.

No evidence was identified for the accuracy of DISCO.

Prediction of autism using a combination of ADOS and ADI/ADI-R was good although the quality was rated very low. The evidence reported that 85% of children were correctly identified as having autism using ADI/ADI-R plus ADOS and 81% of children were correctly identified as not having autism. When these instruments were evaluated on their own, the power to correctly identify children who did not have autism improved but they were not as good at identifying children who had autism.

Overall, the evidence supporting the use of autism-specific diagnostic tools, either individually or in combination, was poor. The GDG's view was that consideration should be given to their use as a structured means of gathering information from interviews and observation.

Assessments to interpret the autism assessment

No evidence was identified for the routine use of additional assessments.

Multidisciplinary assessment versus single practitioner assessment

The only study identified had a small sample size and the analysis has not been replicated in other studies.

ICD-10 and DSM-IV-TR as diagnostic criteria

Selection bias could have had an impact on the data on stability of diagnosis using ICD-10/DSM-IV-TR reported in these studies. However, the GDG did not consider this to be so overwhelmingly important as to undermine the recommendation to use these criteria to diagnose autism.

Other considerations

Core elements of the autism diagnostic assessment

The GDG consensus is that every autism-specific diagnostic assessment should include the following core elements: a detailed enquiry into the specific concerns raised; a medical history; experiences of home life, education and social care; and a history and observation focussing on the developmental and behavioural features specified in the ICD-10 and DSM-IV-TR autism criteria. This core information might be sufficient to establish a diagnosis of autism where the diagnosis is straightforward.

If a child has undergone a special educational needs (SEN) assessment, this should be considered as it may be another important source of information.

For young people at the time of transition, good practice is to involve professionals from adult services in the diagnostic assessment, even where there is intellectual disability, because it supports the specific needs of the young person and their family and enhances communication between services.

The GDG considered that the diagnostic assessment should include assessments to develop a profile of individuals' strengths, needs, skills and impairments. The profile will be individually determined. A member of the autism team needs to decide which assessments are necessary to construct the profile for each child or young person. This will depend on the child's or young person's age and what specific information has already been gathered prior to the diagnostic assessment. The assessments for profiling may include the following:

- intellectual ability and learning style
- academic skills
- speech language and communication
- fine and gross motor skills
- adaptive behaviour (includes self help skills)
- socialisation skills
- mental and emotional health including self esteem, physical health and nutrition
- sensory hyper- and hyposensitivities
- behaviour likely to affect participation in life experiences, future support and management.

A physical examination should be undertaken in all children and young people. Findings from the physical examination may be useful to consider coexisting conditions or whether there are physical signs suggestive of a causative condition (a condition strongly associated with autism which could help determine a diagnosis of autism). Attention should be focussed on identifying the skin stigmata of neurofibromatosis or tuberous sclerosis (Wood's light) or self injury, as well as congenital anomalies and dysmorphic features including micro and macrocephaly. The examination should also look for signs of physical injury, such as self harm or maltreatment. Where there is a concern arising from the examination about injury, other published NICE guidance on self harm and maltreatment should be followed.

The GDG agreed that for children and young people with communication difficulties, it may be difficult to recognise physical and mental health problems. Additional effort should be made to assess these concerns that are important to the child and family.

The GDG also recommended that after the autism diagnostic assessment, the potential risk to and from the child or young person arising from their profile should be considered.

Reaching a diagnosis of autism

The GDG's view was that, based on the evidence that indicates that diagnosis is reliable when made using ICD-10 and DSM-IV-TR criteria across different age groups, the autism team should use the ICD or DSM criteria for diagnosis. Diagnosis may be made by a single practitioner where they have the skills and expertise to do this. However, it is the view of the GDG that profiling the skills, strengths, impairments and needs of a child or young person requires a multidisciplinary approach. Therefore a practitioner cannot undertake a full autism diagnostic assessment single-handed.

The evidence for diagnostic tools does not support the use of a single tool to arrive at a diagnosis. Information from all sources gathered prior to and during the diagnostic assessments should be considered to arrive at a diagnosis as the GDG's view is that this is a more reliable basis for reaching the right conclusion. In addition, specific assessments may be required to help in the interpretation of the autism-specific interviews and observations, as well as to consider differential diagnoses during the diagnostic assessment (see Chapter 6).

The GDG recognised that, even after completion of the assessment, it is not always possible to achieve diagnostic certainty. The lack of information on early life experiences may be a barrier to diagnostic uncertainty in older teenagers or in looked after children and young people. Also, there is evidence that false negative diagnosis of autism may occur in up to 25% of children under 24 months, but this estimate is reported in a very low quality study. Nevertheless, based on their clinical experience, the GDG members agreed that diagnosis in children under 24 months may be difficult because of the developmental changes in early life. Assessment and diagnosis are also more difficult in children whose developmental age is less than 18 months, Individuals with complex mental health disorders are sometimes difficult to assess and this may lead to diagnostic uncertainty. Healthcare professionals undertaking a diagnostic assessment should be aware of these potential challenges.

Some children and young people will have features of behaviour on the autism spectrum, but do not reach the threshold for definitive diagnosis. A failure to establish a clear diagnosis is distressing to families and carers. However, as part of the diagnostic assessment, an individual will have undergone a thorough assessment of their strengths, skills, impairments and needs (profiling) and this will enable the autism team and the parents/carers to determine the support that the child or young person and their family or carers will need. The diagnostic assessment will have provided benefit even where there is continued diagnostic uncertainty. Where the diagnostic assessment leads to a definitive diagnosis of no autism, the autism team should consider referral to other appropriate services as determined by the needs of the child identified by the assessment. Good communication about what will happen next will be important for these families (see Section 5.25).

The GDG's clinical experience is that girls are under-diagnosed although this issue was not addressed in the systematic review of the evidence.

The autism team

The GDG consensus is that central to the diagnostic pathway there should be a dedicated multiprofessional group working together to carry out the diagnostic assessment, as outlined in the

scope of the guideline. The team should recognise each other and be recognised locally as the group of professionals in a local area who are responsible for diagnosing autism.

The autism team should include experienced, named healthcare professionals skilled in undertaking all aspects of the autism diagnostic assessment and profiling. The core members of the autism team should include a paediatrician and/or a child and adolescent psychiatrist, a speech and language therapist and a clinical and/or education psychologist. This is because, in the GDG's view, the skills of these professionals is required to undertake the minimum requirements of an autism diagnostic assessment and profile of strengths skills, impairments and needs. However, the GDG recognised that a wider group of professionals is often involved in the assessment and profile of children and young people referred for assessment, including assessment of comorbidities and profiling, and that this varies across England and Wales. The recommendations explicitly state that if a paediatrician or a psychiatrist is not in the core autism team, then the team should have regular access to these professionals. Similarly, the GDG recognised that both educational and clinical psychologists have skills that are relevant to diagnosing autism, and that these skills are different. Therefore, they have recommended that if a clinical or educational psychologist is not a core member of the team, then the core team should have regular access to someone with these skills. The autism team core members should also be complemented by professionals in occupational therapy as they need to be available to contribute to the profiling assessments.

The recommendations reflect the need for flexibility across the NHS in how the autism team is configured and where it is located. The constituency of the autism team needs to be determined by local need. The recommendations identify the core membership of professionals required to undertake autism diagnostic assessments but do not exclude any professional group from membership of the autism team or contribution to the autism diagnostic assessment.

Members of the autism team will be clinicians who may have other roles and be members of other teams in child health, child and adolescent mental health services (CAMHS) and or education and social care, but membership of the autism team should be a dedicated role for this group of professionals. They will have special training and competence in the diagnostic assessment of autism and will consider all referrals for autism-specific diagnostic assessment and undertake all components of the diagnostic assessment. Within this general approach, a variety of models of service provision can exist.

The autism team should also have access to other healthcare professionals not within the team. These other professionals support the team where their additional skills are required to carry out the assessments for children with coexisting conditions that make assessment very complex, such as severe visual and hearing impairments, motor disorders such as cerebral palsy, severe intellectual disability and complex language disorders where diagnosis requires highly specialist skills. Additional support may also be required for looked after children and young people where a detailed developmental and medical history is difficult to obtain. If this expertise is not available to the team, referral is warranted (see Section 5.29).

The autism team should provide advice to non-expert professionals regarding referral as a means of ensuring that the right children and young people are referred to the autism team. They should also decide on the assessment needs of any child or young person who is referred, be skilled at communicating with children, young people and families and share information with them about the diagnostic process and other services available to them. Clear communication allays fears and promotes good understanding between professionals and families, as well as acceptance of the findings of the diagnostic assessment.

Not all professionals in the autism team need to be involved in the diagnostic process for every child or young person. The GDG recognises that while a very experienced healthcare professional could undertake some aspects of the assessment single-handedly (such as ADI/ADI-R and ADOS), a wider range of expertise is required to undertake the other aspects of assessments in order to develop a comprehensive profile of the child or young person which the GDG considers to be best practice within the diagnostic assessment.

Recommendations

Number	Recommendation
3	In each area a multidisciplinary group (the autism team) should be set up. The core membership should include a: • paediatrician and/or child and adolescent psychiatrist • speech and language therapist • clinical and/or educational psychologist.
4	The autism team should either include or have regular access to the following professionals if they are not already in the team: • paediatrician or paediatric neurologist • child and adolescent psychiatrist • educational psychologist • clinical psychologist • occupational therapist.
5	Consider including in the autism team (or arranging access for the team to) other relevant professionals who may be able to contribute to the autism diagnostic assessment. For example, a specialist health visitor or nurse, specialist teacher or social worker.
6	The autism team should have the skills and competencies to: • carry out an autism diagnostic assessment • communicate with children and young people with suspected or known autism, and with their parents and carers, and sensitively share the diagnosis with them.
7	Autism team members should: • provide advice to professionals about whether to refer children and young people for autism diagnostic assessments • decide on the assessment needs of those referred or when referral to another service will be needed • carry out the autism diagnostic assessment • share the outcome of the autism diagnostic assessment with parents and carers, and with children and young people if appropriate • with parent or carer consent and, if appropriate, the consent of the child or young person, share information from the autism diagnostic assessment directly with relevant services, for example through a school visit by an autism team member • offer information to children, young people and parents and carers about appropriate services and support.
9	The autism team should either have the skills (or have access to professionals that have the skills) needed to carry out an autism diagnostic assessment, for children and young people with special circumstances including: • coexisting conditions such as severe visual and hearing impairments, motor disorders including cerebral palsy, severe intellectual disability, complex language disorders or complex mental health disorders • looked-after children and young people.
10	If young people present at the time of transition to adult services, the autism team should consider carrying out the autism diagnostic assessment jointly with the adult autism team, regardless of the young person’s intellectual ability.

44 Include in every autism diagnostic assessment:

- detailed questions about parent's or carer's concerns and, if appropriate, the child's or young person's concerns
- details of the child's or young person's experiences of home life, education and social care
- a developmental history, focusing on developmental and behavioural features consistent with ICD-10 or DSM-IV criteria (consider using an autism-specific tool to gather this information)
- assessment (through interaction with and observation of the child or young person) of social and communication skills and behaviours, focusing on features consistent with ICD-10 or DSM-IV criteria (consider using an autism-specific tool to gather this information)
- a medical history, including prenatal, perinatal and family history, and past and current health conditions
- a physical examination (see recommendation 45)
- consideration of the differential diagnosis (see recommendation 46)
- systematic assessment for conditions that may coexist with autism (see recommendation 54)
- development of a profile of the child's or young person's strengths, skills, impairments and needs that can be used to create a needs-based management plan (see recommendation 47), taking into account family and educational context.
- communication of assessment findings to the parent or carer and, if appropriate, the child or young person (see recommendation 60).

45 Perform a general physical examination and look specifically for:

- skin stigmata of neurofibromatosis or tuberous sclerosis using a Wood's light
- signs of injury, for example self-harm[iv] or child maltreatment[v]
- congenital anomalies and dysmorphic features including macrocephaly or microcephaly.

47 Consider which assessments are needed to construct a profile for each child or young person, for example:

- intellectual ability and learning style
- academic skills
- speech, language and communication
- fine and gross motor skills
- adaptive behaviour (including self-help skills)
- mental and emotional health (including self-esteem)
- physical health and nutrition
- sensory sensitivities
- behaviour likely to affect day-to-day functioning and social participation
- socialisation skills.

49 Use information from all sources, together with clinical judgment, to diagnose autism based on ICD-10 or DSM-IV criteria.

50 Do not rely on any autism-specific diagnostic tool alone to diagnose autism.

51 Be aware that in some children and young people there may be uncertainty about the diagnosis of autism, particularly in:

- children younger than 24 months
- children or young people with a developmental age of less than 18 months

[iv] 'Self-harm: the short-term physical and psychological management and secondary prevention of self-harm in primary and secondary care' (NICE clinical guideline 16). Available from www.nice.org.uk/guidance/CG16
[v] See 'When to suspect child maltreatment' (NICE clinical guideline 89). Available from www.nice.org.uk/guidance/CG89

- children or young people for whom there is a lack of available information about their early life (for example some looked-after or adopted children)
- older teenagers
- children or young people with a complex coexisting mental health disorder (for example ADHD, conduct disorder, a possible attachment disorder), sensory impairment (for example severe hearing or visual impairment), or a motor disorder such as cerebral palsy.

52 Be aware that some children and young people will have features of behaviour that are seen in the autism spectrum but do not reach the ICD-10 or DSM-IV diagnostic criteria for definitive diagnosis. Based on their profile, consider referring to appropriate services.

53 If the outcome of the autism diagnostic assessment clearly indicates that the child or young person does not have autism, consider referring them to appropriate services based on their profile.

55 Be aware that in children and young people with communication difficulties it may be difficult to recognise functional problems or mental health problems.

58 During the autism diagnostic assessment, consider any potential risk of harm to, and from, the child or young person and take appropriate action.

5.21 Research recommendations

Number	Research recommendation
RR 3	Do additional assessments (for IQ, language ability and motor ability) improve accuracy in diagnosing autism among preschool children (younger than 5 years) compared with signs and symptoms alone?

Why this is needed

Current NHS practice varies widely with regard to the proportion of children having an autism diagnostic assessment who also routinely undergo assessments of IQ, language and motor abilities.

As a consequence we do not know whether such assessments aid more accurate diagnosis of autism. This is particularly important if a differential or coexisting diagnostic decision is called for and/or if there may be specific management implications.

Studies may prove valuable to parents in terms of explaining some of the child's behaviours, leading to more targeted and informed support for the child, parents and the wider family.

Importance to 'patients' or the population

Improved diagnostic accuracy (including differential diagnosis and coexisting conditions) would lead to

- improved acceptability and satisfaction
- increased support for the child and family
- early interventions which may improve later functioning

Relevance to NICE guidance

This guideline recommends that the autism diagnostic assessment should include a profile of needs that can be used to create a needs-based management plan. This guideline also recommends that clinical staff consider which assessments are needed to inform this profile and also whether specific assessments are necessary to help the interpretation of the autism history and observations.

Most research to date has focused on an assessment of needs after a diagnosis has been reached. Few, if any studies, have examined which assessments should be part of a routine assessment of needs in an autism context, nor on the value of the information obtained from these assessments.

Further research would lead to a stronger evidence base to inform key decision-makers as to whether an earlier assessment of needs is appropriate or not when this guideline is updated. .

Relevance to the NHS

Improving the effectiveness of the diagnostic process would result in cost saving for the NHS by reducing the need for re-assessments and by standardising diagnostic practice across the UK.

National priorities

The Autism Act (2009) and the Statutory Guidance (2010) have highlighted autism as a national priority for the NHS and social care.

Current evidence base

It has been seen as 'good practice' to assess a child's needs during the diagnostic assessment but this has not yet been evaluated in a formal study.

Equality

Children with speech and language disorders, intellectual disability or impaired mobility have long been regarded as a 'disadvantaged' group needing extra diagnostic care and support.

Feasibility

A prospective randomised controlled trial of assessing IQ, speech and language and motor ability alongside an autism diagnostic assessment in a single community child health district compared with an autism diagnostic assessment alone in a second matched district.

Time needed 36 months

Outcomes to include –

- time taken to diagnosis
- number of children diagnosed with autism
- number of coexisting conditions identified
- number of children with a differential diagnosis
- cost-effectiveness of additional assessments
- parental acceptability / satisfaction with diagnostic process

Other comments

There is no consensus on which tools to use to measure speech and language, IQ or motor ability. However the GDG agreed that the assessor should be qualified to carry out their particular assessment.

5.22 Overview of the evidence: communicating diagnosis to the family

Nine studies were included in the review.[128-136] They were all carried out in the UK and they were all uncontrolled observational in design. Three studies used a questionnaire to solicit information,[129;132;133] four studies used interviews,[128;130;134;136] one study used both questionnaire and interview [131] and one study used a focus group.[135] All studies reported the views/experiences parents of children with ASD. No studies reported on children's or young people's responses.

The authors of one study summarised the views of participants but did not report verbatim quotes but we have retained this as it reported themes not covered in the other studies.[136]

5.23 Evidence profile: communicating diagnosis to the family

Table 5.6 summarises examples identified in the evidence of good and poor practice in the communication of an autism diagnosis, and parents' expectations of how a diagnosis should be communicated to them.

Table 5.6 Examples of good and poor practice in the communication of ASD diagnosis

Examples	Study quality						Supporting quotes from parents
	Number of studies	**Study design**	**Limitations**	**Inconsistency**	**Indirectness**	**Quality**	
Good practice							
A multidisciplinary team who listened to parents' views[129]	1	Uncon obs*	Not used	Not used	Not used	Very low	*'Diagnosis for my son was made by a senior Clinical Medical Officer, a Behavioural psychologist and a Speech and Language Therapist when he was four and half years old. (It) involved a day-long series of tests and detailed information from myself and my husband. We were invited to a 'feedback' with the above people present and were asked what we thought was wrong with our son and then we were told he had autism. We were glad that P. had a diagnosis'*
Providing family with a clear and quick diagnosis result[132]	1	Uncon obs	Not used	Not used	Not used	Very low	*'Why couldn't someone have spotted his autism earlier?... We look forward to the future in a much more positive and reassuring way because of the diagnosis. Life is much more relaxed and obviously understandable.'*
Poor practice							
Professionals' reluctance to give a diagnosis[134]	1	Uncon obs	Not used	Not used	Not used	Very low	*'Whenever I have asked anyone for a definite diagnosis I have been told it is wrong to label children and a diagnosis isn't important. No one has used the word autism unless I force the issue – then they look shifty!'*
Told there is "nothing wrong" with a child [130]	1	Uncon obs	Not used	Not used	Not used	Very low	*'At the beginning we thought perhaps it's Fragile X gene. This doctor did not know what I was doing, he said it was me who had the problem. We were told that she would never speak. They kept saying to me: perhaps she is probably deaf. I said that she was not because she could hear everything, she was not deaf because she had speech. You were called a liar. We went to the doctor time and time again, and they said no, there is nothing wrong with the child. The GP wrote in the medical records: her mother is neurotic, because he thought, she is off the wall this woman.'*

Examples	Study quality						Supporting quotes from parents
	Number of studies	Study design	Limitations	Inconsistency	Indirectness	Quality	
Delay in diagnosis[132]	1	Uncon obs	Not used	Not used	Not used	Very low	*'The whole process is far too slow and seems to depend on the parents' persistence in pushing for a diagnosis. Months seem to go by waiting for appointment after appointment. This really prolongs the agony of what is, inevitably in any case, a painful process.'*
Professionals' reluctance to give a diagnosis of ASD[132]	1	Uncon obs	Not used	Not used	Not used	Very low	*'I was fed up with professional pussyfooting around, afraid to say the dreaded word 'autism'. It seems that the very word autistic is taboo.'*
Inadequate explanation as to how a diagnosis was reached [128]	1	Uncon obs	Not used	Not used	Not used	Very low	*'when I got an assessment of him (my son) from them (the professionals), really I just took it with a pinch of salt, I didn't take it very seriously because I thought the people that are writing about him (…) they didn't get to see the real Brian, I knew that they were seeing just the surface.'*
Inadequate response to queries during assessment[128]	1	Uncon obs	Not used	Not used	Not used	Very low	*'You just didn't get any feedback (…) that was frustrating to me, because it was like, why the bloody hell can't you tell me what's going on here? [laughs] this is my child that I'm bringing to you.'*
Did not involve parents in the decision-making process[128]	1	Uncon obs	Not used	Not used	Not used	Very low	*'They (professionals) know all the facts and all the details and they perhaps decide right we'll give you that fact, just one fact and perhaps not necessarily give you all the options to weigh up, I don't know, perhaps it's better [laughs] it's very complicated.'*

Examples	Study quality						Supporting quotes from parents
	Number of studies	Study design	Limitations	Inconsistency	Indirectness	Quality	
Giving people an impression that professionals have power and control over the parents[128]	1	Uncon obs	Not used	Not used	Not used	Very low	*If I had said anything, as I felt I should have done at the time but didn't have the bottle to do it, I was thinking if I say anything, will that make them horrible to Adam? Will that make them against him? Will that affect a report on him? So you don't.'*
No prior warning of ASD before the disclosure of ASD[133]	1	Uncon obs	Not used	Not used	Not used	Very low	*'More time and information should be given to parents at diagnosis. I was informed of the diagnosis and told I would be seen by the family services worker in a month. That was it. Not explanation. No hope. It was obvious that they knew what diagnosis they were likely to make prior to the play session but I had no prior warning. No one had the decency to tell me what might be wrong. At that point I needed to believe there was a future and I was appalled at the way I was treated. I should have had counselling there and then and lots of information given to me.*
Lack of information about the condition when conveying the diagnosis [135]	1	Uncon obs	Not used	Not used	Not used	Very low	*'I don't feel I came away knowing anything about autism'*
Inappropriate manner when conveying the diagnosis[135]	1	Uncon obs	Not used	Not used	Not used	Very low	*'The manner in which the diagnosis was given to us would have been, I suppose, in one sense, quite cold and calculating, it sort of accounted this is the problem, that's it, goodbye'*
Delay in diagnosis[135]	1	Uncon obs	Not used	Not used	Not used	Very low	*'All you get is delay, after delay, after delay'*

Examples	Study quality						Supporting quotes from parents
	Number of studies	Study design	Limitations	Inconsistency	Indirectness	Quality	
Parents' expectations – how should diagnosis be communicated							
Reassure parents that there are things they can do[133]	1	Uncon obs	Not used	Not used	Not used	Very low	*'I believe that when parents are told during diagnostic assessment that their child is autistic, they should be reassured that there are things they can do, e.g., Lovaas, PECS, change of diet, to make a huge difference. Obviously don't mislead them to think these things are a cure, but don't lead them to believe that the future is bleak, and doom and gloom, as I was.'*
Offer more than just the diagnosis[131]	1	Uncon obs	Not used	Not used	Not used	Very low	*'The people that we went to, I think are very good at diagnosing, but I don't think that they really thought about the outcomes. They were thinking about the diagnosis right now and what this child had. …[They] mentioned absolutely nothing about what we could look for down the road with him and I don't even think that was on their minds at that point.'*
Open-mindedness[135]	1	Uncon obs	Not used	Not used	Not used	Very low	*'a general openness all round'*
Provide written reports, especially of assessment[136]	1	Uncon obs	Not used	Not used	Not used	Very low	The study authors reported participants views in summary only, without supporting quotes
Involve parents in discussion after the assessment, as this would help parents to understand professional 'findings'[136]	1	Uncon obs	Not used	Not used	Not used	Very low	The study authors reported participants views in summary only, without supporting quotes

Examples	Study quality						Supporting quotes from parents
	Number of studies	Study design	Limitations	Inconsistency	Indirectness	Quality	
Talk to parents as 'equals', use language that can be understood and is not technical[136]	1	Uncon obs	Not used	Not used	Not used	Very low	The study authors reported participants views in summary only, without supporting quotes
Take more opportunities to discuss the child's progress with the individual professionals (e.g. individual reports should be discussed)[136]	1	Uncon obs	Not used	Not used	Not used	Very low	The study authors reported participants views in summary only, without supporting quotes
Only have professionals present who have involvement with the child[136]	1	Uncon obs	Not used	Not used	Not used	Very low	The study authors reported participants views in summary only, without supporting quotes
Interview parents without the child being present[136]	1	Uncon obs	Not used	Not used	Not used	Very low	The study authors reported participants views in summary only, without supporting quotes

Examples	Study quality						Supporting quotes from parents
	Number of studies	Study design	Limitations	Inconsistency	Indirectness	Quality	
Assess the child separately[136]	1	Uncon obs	Not used	Not used	Not used	Very low	The study authors reported participants views in summary only, without supporting quotes
Know who is going to be present to prepare questions to ask[136]	1	Uncon obs	Not used	Not used	Not used	Very low	The study authors reported participants views in summary only, without supporting quotes
Do not make a telephone call to parents to inform them of an appointment[136]	1	Uncon obs	Not used	Not used	Not used	Very low	The study authors reported participants views in summary only, without supporting quotes
See the child in various settings[136]	1	Uncon obs	Not used	Not used	Not used	Very low	The study authors reported participants views in summary only, without supporting quotes
Make appointments less formal; allow parents more time to ask questions[136]	1	Uncon obs	Not used	Not used	Not used	Very low	The study authors reported participants views in summary only, without supporting quotes

*Uncon obs: Uncontrolled observational study, such as case series.

5.24 Evidence statements: communicating diagnosis to the family

All the evidence was graded as very low quality.

Poor practice

Two studies provided evidence of poor practice in communicating with families. Examples of poor practice were:

- professionals' reluctance to give a diagnosis (two studies)
- incorrect diagnosis
- delay in diagnosis (two studies)
- no reply to parents' queries during assessment
- not involving parents in the decision-making process
- giving people an impression that professionals have power and control over the parents
- not providing parents with necessary information (two studies), such as how they reached the diagnosis
- no prior warning of autism before the disclosure of autism.
- inappropriate manner when conveying diagnosis.

Good practice

Six studies provided evidence of good practice. Examples of good practice were:

- multidisciplinary team that listens to parents' views
- provision of a clear and quick diagnosis result.

Parents' expectations

Three studies provided evidence of good practice. Examples of parents' expectations were:

- involving parents in decision-making process
    - involving parents in discussion after the assessment, as this would help parents to understand professional 'findings'
    - make appointments less formal; allow parents more time to ask questions
- providing written reports and opportunities for discussion
    - provide written reports, especially of the assessment
    - parents should have more opportunities to discuss the child's progress with the individual professionals; for example individual reports should be discussed
- other
    - talk to parents as 'equals'; use language that can be understood and is not technical
    - only have professionals present who have involvement with the child
    - interview parents without the child being present
    - assess the child separately
    - more individualised professional involvement outside the clinic
    - do not make a telephone call to parents to inform them of an appointment
    - see the child in various settings
    - open-mindedness

- letting the parents know who is going to be present to prepare questions to ask
- reassure parents there are things they can do.

5.25 Evidence to recommendations: communicating diagnosis to the family

Relative value placed on the outcomes considered

The GDG focused on the evidence for good practice and poor practice by healthcare and other professionals. They also considered expectations of children, young people and their families and carers when receiving the diagnosis.

Trade-off between clinical benefits and harms

Evidence showed that professionals can be reluctant to give a diagnosis for fear of labelling the child where the diagnosis is unclear. This can prevent children and young people accessing services and support. It can lead to additional anxiety about a child or young person's difficulties, which can hinder understanding and appropriate management. Confirming a diagnosis was described in the evidence as a relief to parents.

Evidence also suggested that the diagnostic process works best: when parents and carers participate as equal partners; where explanatory language is not technical; where there are opportunities to contribute; and where there is written information about the diagnosis and its implications. Confidence in the diagnosis is increased when a multidisciplinary team is involved.

Parents value opportunities to receive explanations of the diagnostic process (including timescales), discuss the diagnosis and its implications, and obtain guidance and information about possible interventions. The GDG was aware that some information of this kind is already available, such as the Early Support materials produced by the Department for Education.

Some parents reported that receiving the diagnosis could be a debilitating experience, and that they valued being gently prepared for it and the discussion handled in a sensitive way. Some of these parents stated they would have benefited from counselling at the time of diagnosis.

Where no definitive diagnosis is reached, some families and carers may have problems processing complex and distressing verbal information, particularly when they were expecting a definitive diagnosis. Therefore they should receive written reports as well as information in a face-to-face meeting with members of the assessment team.

Trade-off between net health benefits and resource use

No specific resource use issues were identified by the GDG for this question.

Quality of evidence

The evidence identified was qualitative, based on small scale studies, all from the UK. It reported the views of parents only and the quality was very low. The GDG did not consider this evidence was sufficiently robust to lead to recommendations for the NHS, but it provided an overview of the range of views and concerns raised by people when receiving their diagnosis. Many of the reported views were familiar to the GDG, both as parents and professionals.

Other considerations

The evidence did not identify views from parents and carers on the optimum time for initiating discussion about the possibility of autism with parents and carers. The GDG consensus is that the benefits of early preparation outweigh the stress associated with naming the condition. This discussion should take place as early as possible, with clinical judgement deciding exactly when this should be. The GDG agreed that it was important to include the child or young person when communicating the diagnosis of autism.

There was no evidence on how the discussion about the diagnosis should be conducted other than the importance of giving ample time to it. Feeling rushed may increase parents' and carers' anxiety and may reduce their ability to take in complex information about the diagnosis.

Communicating the diagnosis raises complex feelings in those caring for children with autism. These include relief that a diagnosis has been reached, as well as stress and anxiety. Concerns may also arise from relatives about whether they themselves should be assessed for autism.

Where a definitive diagnosis cannot be reached for a child or young person, or where it is determined they do not have autism, families' and carers' concerns may focus on what will happen next and whether they will be left on their own to cope after the assessment.

Healthcare professionals should be aware that the process of reaching a diagnosis may have been lengthy, and that parents and carers may have lived with a child or young person with extremely challenging behaviour without a diagnosis during that time. They need to follow the lead of the parents and carers listening to them in order to judge the speed at which the information is provided as well as the depth and quantity of information provided in any consultation and should provide an opportunity for families and carers to respond.

Taking account of these considerations, the GDG made recommendations specifically emphasising the need to involve parents and carers and, where appropriate, the child or young person, explaining the diagnostic process and its conclusions, engaging in face-to-face discussion soon after the completion of the autism-specific diagnostic assessment and explaining what will happen next, regardless of whether the assessment reached a firm diagnosis or not.

For children and young people with a definitive diagnosis of autism, the GDG's view was that there should be a discussion with them and their parents/carers about what autism means and how it can affect development and function. In addition, the risk of autism occurring in future siblings should be discussed briefly with the parents only, but this should not be dealt with in detail at this time, as the GDG consensus was that this would be too much information to take in on first learning of the diagnosis. A detailed written report of the assessment should be prepared with the evidence for its conclusions. This should be shared with parents and carers and, where appropriate, the child or young person. It should also be shared with the child's or young person's GP and with appropriate consent from either the parent or carer, or the child or young person, with key professionals in education and social care to enable a needs-based management plan to be developed based on the profile of strengths, skills, impairments and needs.

A follow-up appointment to explain what will happen next and any subsequent assessments should take place within 6 weeks of the end of the diagnostic assessment to address families' concerns once they have had time to adjust to the diagnosis.

Recommendations

Number	Recommendation
43	Discuss with the parents or carers and, if appropriate, the child or young person, how information should be shared throughout the autism diagnostic assessment, including communicating the outcome of the assessment. Take into account, for example, the child or young person's age and ability to understand.
60	After the autism diagnostic assessment discuss the findings, including the profile, sensitively, in person and without delay with the parents or carers and, if appropriate, the child or young person. Explain the basis of conclusions even if the diagnosis of autism was not reached.
61	Use recognised good practice when sharing a diagnosis with parents, carers, children and young people.

62 For children and young people with a diagnosis of autism, discuss and share information with parents or carers and, if appropriate, the child or young person, to explain:

- what autism is
- how autism is likely to affect the child or young person's development and function.

63 Provide parents or carers and, if appropriate, the child or young person, with a written report of the autism diagnostic assessment. This should explain the findings of the assessment and the reasons for the conclusions drawn.

64 Share information, including the written report of the diagnostic assessment, with the GP.

65 With parental or carer consent and, if appropriate, the consent of the child or young person, share information with key professionals involved in the child's or young person's care, including those in education and social care.

67 For children and young people with a diagnosis of autism, offer a follow-up appointment with an appropriate member of the autism team within 6 weeks of the end of the autism assessment for further discussion (for example about the conclusions of the assessment and the implications for the child or young person).

68 For children and young people with a diagnosis of autism, discuss with parents or carers the risk of autism occurring in siblings and future children.

5.26 Overview of the evidence: actions that should follow assessment for children and young people who are not immediately diagnosed

It was expected that no studies would be available to answer this question since no empirical research evidence could address this type of question. Clinical trials, observational studies or qualitative studies would not be helpful since no specific intervention can be definitively linked to an ASD-specific outcome. No evidence was reviewed for this question.

5.27 Evidence profile: actions that should follow assessment for children and young people who are not immediately diagnosed

No systematic search of the evidence was undertaken.

5.28 Evidence statement: actions that should follow assessment for children and young people who are not immediately diagnosed

No systematic search of the evidence was undertaken.

5.29 Evidence to recommendations: actions that should follow assessment for children and young people who are not immediately diagnosed

Relative value placed on the outcomes considered

The outcome of interest is the welfare of the child or young person for whom there is continued diagnostic uncertainty. No specific outcomes were predefined for this question as it was anticipated that there would be no evidence addressing this question.

Trade-off between clinical benefits and harms

Referral for a second opinion could be beneficial where there is diagnostic uncertainty or disagreement about the diagnosis within the autism team, or where there is a continued lack of agreement between professionals and parents or carers. A referral may also be required following a failure to respond as expected to any therapeutic interventions being provided, since this suggests some added complexity that may be beyond the expertise of the autism team.

There is also benefit in referral where there is a specific condition or problem other than autism that requires expertise beyond the multidisciplinary team. Referral is also warranted where the autism team does not have access to the necessary expertise to make a diagnosis in a child with a complex coexisting condition or where a child or young person fails to respond as expected to autism-specific support and interventions. Skills to diagnose a child or young person in these circumstances could not be expected to be available in every autism team.

Referral to a more expert team may speed up a definitive diagnosis and profile leading to implementation of the appropriate interventions and support.

The GDG's view was that there is always benefit in agreeing a plan with parents and carers for every child or young person who is not immediately diagnosed because of the risk of missing important changes in signs and symptoms that would warrant further assessment. In the interim, needs-based interventions should be provided.

The GDG's consensus was that there may be benefit in undertaking observations of the child or young person in different settings if no definitive diagnosis has been reached but that this does not have to happen for every child or young person. Such observations should take place in a variety of settings and healthcare professionals should listen to parents and carers about how the child behaves in different settings to determine the observation that would provide the most useful information, for example school, nursery, other social settings or the home.

The GDG did not identify any potential harm in putting in place a plan to refer or monitor children not immediately diagnosed with autism.

Trade-off between net health benefits and resource use

No evidence of the cost effectiveness of referral was identified. The potential costs are the additional time required for professionals to make contact with other healthcare professionals involved with the care of the child or young person and agencies outside the NHS. The GDG did not put a figure on the costs as there were no data on the proportion of children not diagnosed with autism who would require referral or monitoring.

There may be savings as a result of greater acceptance by families of the lack of a clear diagnosis of autism. The welfare of the child may also improve as a result of referral to a more expert team or enhanced monitoring over time, although the scale of these savings could not be estimated. It is the GDG's view that referral and enhanced monitoring of children with an uncertain diagnosis is likely to be a cost-effective use of NHS resources.

Quality of evidence

No evidence was identified that addressed this question.

Other considerations

None.

Recommendations

Number	Recommendation
48	If there are discrepancies during the autism diagnostic assessment between reported signs or symptoms and the findings of the autism observation in the clinical setting, consider: • gathering additional information from other sources and/or • carrying out further autism specific observations in different settings, such as the school, nursery, other social setting or at home.
56	If there is uncertainty after the autism diagnostic assessment about the diagnosis, consider keeping the child or young person under review, taking into account any new information.
57	If any of the following apply after assessment, consider obtaining a second opinion (including referral to a specialised tertiary autism team if necessary): • continued uncertainty about the diagnosis • disagreement about the diagnosis within the autism team • disagreement with parents or carers or, if appropriate, the child or young person, about the diagnosis • a lack of local access to particular skills and competencies needed to reach a diagnosis in a child or young person who has a complex coexisting condition, such as a severe sensory or motor impairment or mental health problem • a lack of response as expected to any therapeutic interventions provided to the child or young person.

6 Differential diagnosis

Introduction

Many neurodevelopmental, mental and behavioural disorders may present with symptoms that suggest the possibility of autism but which are not autism. These can be described as the differential diagnoses of autism. It is essential to consider the differential diagnoses at each stage of the autism pathway: when the possibility of autism first arises and consideration is being given to referral to an autism team (see Chapter 3 on Recognition); when the autism team is considering whether to proceed with an autism-specific diagnostic assessment (see Chapter 4 on Following referral); when undertaking an autism diagnostic assessment; and when considering the diagnosis on completion of the assessment (see Chapter 5 on Diagnostic assessment).

If there are concerns about a child's or young person's development or behaviour, and especially if the possibility of autism has been raised, parents, carers and the child or young person may be anxious to know without delay what the nature of the problem may be. It is important to establish an accurate diagnosis, whether that is autism or an alternative condition. An inaccurate diagnosis of autism may result in the use of an inappropriate treatment strategy and may cause anxiety and distress to the child or young person and their parents/carers. This chapter addresses the most important disorders to be considered in children and young people presenting with possible autism and how they may be differentiated from autism. A differential diagnosis may also be a coexisting condition (see Chapter 7 on coexisting conditions).

Clinical question

(a) What are the most important differential diagnoses of autism?

(b) What features observed during diagnosis reliably differentiate other conditions from autism?

6.1 Overview of the evidence: identifying differential diagnoses

Nineteen studies were included in this review. These studies were carried out in the Australia,[66;67;137] Canada,[138] Germany,[139] Israel,[140] Italy,[141] Japan,[142] Norway,[143] Sweden,[70;144] the Netherlands,[145;146] the USA,[73;74;108;147] and the UK.[148;149] All were uncontrolled observational studies and were graded as very low quality.

Eight of the studies were in a preschool population,[67;74;108;140;142;145;147;149] and one study was in primary school age children[148:] there were no studies in secondary school age children. Five used a mixed population of preschool and primary school age children,[66;137;138;141;144] two used a mixed population of primary and secondary school age children[70;146] and three included children or young people of all ages.[73;139;143]

Only one study reported the range of intelligence quotient (IQ).[146] Four studies reported mean IQ scores but the proportion of children with intellectual disability was not reported. [73;137;139;147] Four studies reported the proportion of children with intellectual disability but no separate outcomes were provided for each IQ group.[67;70;140;143] Intellectual ability was not reported in the remaining studies.

6.2 Evidence profile: identifying differential diagnoses

Table 6.1 reports the prevalence of each differential diagnosis in children with suspected autism.

Table 6.2 shows the prevalence of each differential diagnosis in children with suspected autism spectrum disorders (ASD).

The conditions are reported under five categories identified by the guideline development group (GDG). Limitations, inconsistencies and indirectness are not reported in the table because the quality is very low.

The evidence for autism is reported separately from ASD as it was expected that some differential diagnoses would have different prevalence rates for each category and so it would not be appropriate to pool these data. Subgroup analyses are reported in relevant evidence profiles and evidence statements.

Table 6.1 Prevalence of alternative diagnoses in children with suspected autism

	Quality assessment						Summary of findings	
							Number	Prevalence
	Studies (N)	Design	Limitations	Inconsistency	Indirectness	Quality		Pooled % (95% CI)
All studies								
Mental and behavioural disorders								
Behaviour problem[144]	1 (12)	Uncon obs	Not used	Not used	Not used	Very low	1	8
ADHD[144]	1 (12)	Uncon obs	Not used	Not used	Not used	Very low	1	8
Emotional difficulties	No studies have been identified.							
Neurodevelopmental problems								
Language problem	No studies have been identified.							
Developmental disorder/delay[108;144]	2 (42)	Uncon obs	Not used	Not used	Not used	Very low	3	6 (1, 15)
Medical or neurological								
Rett syndrome[108]	1 (30)	Uncon obs	Not used	Not used	Not used	Very low	3	10
Motor problem[108]	1 (30)	Uncon obs	Not used	Not used	Not used	Very low	3	3
Other								
Abuse/neglect	No studies have been identified.							
Subgroup analysis: children referred on suspicion of autism only								
Mental and behavioural disorders								
Behaviour problem[144]	1 (12)	Uncon obs	Not used	Not used	Not used	Very low	1	8
ADHD[144]	1 (12)	Uncon obs	Not used	Not used	Not used	Very low	1	8

	Quality assessment						Summary of findings	
							Number	Prevalence
	Studies (N)	Design	Limitations	Inconsistency	Indirectness	Quality		Pooled % (95% CI)
Neurodevelopmental								
Developmental disorder/delay[108;144]	2 (42)	Uncon obs	Not used	Not used	Not used	Very low	3	6 (1, 15)
Medical or neurological								
Rett syndrome[108]	1 (30)	Uncon obs	Not used	Not used	Not used	Very low	3	10
Motor problem[108]	1 (30)	Uncon obs	Not used	Not used	Not used	Very low	1	3
Other								
Abuse/neglect	No studies have been identified.							
Subgroup analysis: children referred for developmental problems								
No study met the inclusion criteria for this review								
Subgroup analysis: children referred for behavioural problems								
No study met the inclusion criteria for this review								
Subgroup analysis: children referred with positive ASD screening results								
No study met the inclusion criteria for this review								

CI: confidence interval; Uncon obs: Uncontrolled observational (see Methods, Section 2.6.2 for detail)

Table 6.2 Prevalence of alternative diagnoses in children with suspected ASD

	Quality assessment						Summary of findings	
							Number	Prevalence
	Studies (N)	Design	Limitations	Inconsistency	Indirectness	Quality		Pooled % (95% CI)
All studies								
Mental and behavioural disorders								
Behaviour problem[70;74]	2 (192)	Uncon obs	Not used	Not used	Not used	Very low	61	24 (1, 80)
ADHD[73;139;141;142;145;146;148]	7 (1052)	Uncon obs	Not used	Not used	Not used	Very low	112	14 (6, 24)
Emotional difficulties[73;139;143]	3 (755)	Uncon obs	Not used	Not used	Not used	Very low	33	6 (2, 10)
Neurodevelopmental								
Language problem[66;67;73;74;137;139-141;143;145;147;149]	12 (1726)	Uncon obs	Not used	Not used	Not used	Very low	447	21 (5, 43)
Developmental disorder/delay[66;67;70;73;74;138;139;142;143;145;147-149]	13 (1754)	Uncon obs	Not used	Not used	Not used	Very low	255	15 (8, 23)
Medical or neurological								
Down's syndrome[73]	1 (580)	Uncon obs	Not used	Not used	Not used	Very low	18	3
Foetal alcohol syndrome[73]	1 (580)	Uncon obs	Not used	Not used	Not used	Very low	18	3
Motor problem[74]	1 (82)	Uncon obs	Not used	Not used	Not used	Very low	2	2
Other								

	Quality assessment						Summary of findings	
							Number	Prevalence
	Studies (N)	Design	Limitations	Inconsistency	Indirectness	Quality		Pooled % (95% CI)
Abuse/neglect[148]	1 (50)	Uncon obs	Not used	Not used	Not used	Very low	13	26
Subgroup analysis: children referred on suspicion of ASD only								
Mental and behavioural disorders								
ADHD[73;139;141;144]	3 (795)	Uncon obs	Not used	Not used	Not used	Very low	49	6 (2, 13)
Behaviour problem[74]	1 (82)	Uncon obs	Not used	Not used	Not used	Very low	3	4
Emotional difficulties[73;139]	2 (730)	Uncon obs	Not used	Not used	Not used	Very low	29	4 (3, 6)
Selective mutism[74]	1 (82)	Uncon obs	Not used	Not used	Not used	Very low	1	1 (1, 1)
Neurodevelopmental								
Language problem[73;74;137;139;141;147]	6 (985)	Uncon obs	Not used	Not used	Not used	Very low	73	9 (3, 17)
Developmental disorder/delay[73;74;139;147]	4 (883)	Uncon obs	Not used	Not used	Not used	Very low	39	5 (3, 6)
Medical or neurological								
No study met the inclusion criteria for this review								
Other								
No study met the inclusion criteria for this review								

	Quality assessment						Summary of findings	
							Number	Prevalence
	Studies (N)	Design	Limitations	Inconsistency	Indirectness	Quality		Pooled % (95% CI)
Subgroup analysis: children referred for developmental problems								
Mental and behavioural disorders								
Emotional difficulties[143]	1 (25)	Uncon obs	Not used	Not used	Not used	Very low	4	16
Neurodevelopmental								
Language problem[66;67;140;143]	4 (636)	Uncon obs	Not used	Not used	Not used	Very low	349	41 (2, 89)
Developmental disorder/delay[66;67;138;143]	4 (587)	Uncon obs	Not used	Not used	Not used	Very low	164	28 (21, 36)
Medical or neurological								
No study met the inclusion criteria for this review								
Other								
No study met the inclusion criteria for this review								
Subgroup analysis: children referred for behavioural problems								
Mental and behavioural disorders								
Behaviour problem[70]	1 (110)	Uncon obs	Not used	Not used	Not used	Very low	58	53
ADHD[146]	1 (115)	Uncon obs	Not used	Not used	Not used	Very low	40	35
Neurodevelopmental								

	Quality assessment						Summary of findings	
							Number	Prevalence
	Studies (N)	Design	Limitations	Inconsistency	Indirectness	Quality		Pooled % (95% CI)
Developmental disorder/delay[70]	1 (110)	Uncon obs	Not used	Not used	Not used	Very low	31	28
Medical or neurological								
No study met the inclusion criteria for this review								
Other								
No study met the inclusion criteria for this review								
Subgroup analysis: children referred with positive ASD screening results								
Mental and behavioural disorders								
ADHD[142;145;148]	3 (142)	Uncon obs	Not used	Not used	Not used	Very low	23	17 (11, 23)
Tourette syndrome[148]	1 (50)	Uncon obs	Not used	Not used	Not used	Very low	2	4
Neurodevelopmental								
Language problem[145;149]	2 (105)	Uncon obs	Not used	Not used	Not used	Very low	25	24 (17, 33)
Developmental disorder/delay[142;145;148;149]	4 (174)	Uncon obs	Not used	Not used	Not used	Very low	21	12 (6, 19)
Medical or neurological								
No study met the inclusion criteria for this review								

	Quality assessment						Summary of findings	
							Number	Prevalence
	Studies (N)	Design	Limitations	Inconsistency	Indirectness	Quality		Pooled % (95% CI)
Other								
Abuse/neglect[148]	1 (50)	Uncon obs	Not used	Not used	Not used	Very low	13	26

ADHD: attention deficit hyperactivity disorder

CI: confidence interval; Uncon obs: Uncontrolled observational (see Methods, Section 2.6.2 for detail)

6.3 Evidence statements: identifying differential diagnoses

All evidence was graded as very low quality.

Evidence for autism

All studies

Mental and behavioural disorders

Evidence on two diagnoses (ADHD and a behaviour problem) of children and young people with suspected autism was identified. One study reported the prevalence of ADHD and one reported the prevalence of behaviour problems. The prevalence for both was 8%.

Neurodevelopmental problems

Evidence on only one diagnosis (developmental disorder/delay)] was identified. The pooled prevalence was 6% (95% confidence interval [CI] 1, 15).

Medical or neurological problems

Only one study was found that looked at medical or neurological problems and this reported on two diagnoses: Rett syndrome and motor problems. The prevalence was 10% and 3% respectively.

Studies of children referred on suspicion of autism only

Mental and behavioural disorders

Evidence was identified for two diagnoses (a behaviour problem and ADHD). One study reported the prevalence of a behaviour problem and one ADHD. The prevalence for each was 8%.

Neurodevelopmental problems

Evidence on diagnosis of developmental disorder/delay was identified in two studies. The pooled prevalence was 6% (95% CI 1, 15).

Medical or neurological problems

Only one study was found that reported on two diagnoses (Rett syndrome and motor problems). The prevalence was 10% and 3% respectively.

Studies of children and young people referred for developmental problems only

No study met the inclusion criteria for this review.

Studies of children and young people referred for behavioural problems only

No study met the inclusion criteria for this review.

Studies of children and young people referred for positive screening results only

No study met the inclusion criteria for this review.

Evidence for ASD

Complete analysis: all studies

Mental and behaviour disorders

The prevalence of six diagnoses (behaviour problems, ADHD, emotional difficulties, Tourette syndrome, selective mutism and attachment disorder) were identified from evidence. Only data of the most prevalent differential diagnoses (behaviour problem, ADHD and emotional difficulties) are reported here.

Two studies reported the prevalence of behaviour problems in children and young people suspected of having ASD, seven on ADHD and three on emotional difficulties. The pooled prevalence was 24% (95% CI 1, 80), 14% (95% CI 6, 24) and 6% (95% CI 2, 10) respectively.

Neurodevelopmental problems

The prevalence of three diagnoses (a language problem, developmental disorder/delay and disintegrative disorder) was identified from evidence. Only data on the most prevalent differential diagnosis (language problem and developmental disorder/delay) are reported here.

Twelve studies reported on the prevalence of a language problem in children and young people suspected of having ASD and 13 on developmental disorder/delay. The pooled prevalence was 21% (95% CI 5, 43) and 15% (95% CI 8, 23), respectively.

Medical or neurological problems

The prevalence of three diagnoses were identified from evidence. One study reported on the prevalence of Down's syndrome and fetal alcohol syndrome and one on the prevalence of motor problems. The prevalence was 3%, 3% and 2%, respectively.

Other

One diagnosis was identified that did not fit the other categories, which was abuse/neglect. The study reported a prevalence of 26%.

Studies of children referred on suspicion of ASD only

Mental and behaviour disorders

The prevalence of six diagnoses (ADHD, behaviour problem emotional difficulties, Tourette syndrome, selective mutism and attachment disorder) was identified from evidence. Only data of the most prevalent diagnoses are reported here.

Three studies were identified that reported on ADHD, one on a behaviour problem, two on emotional difficulties and one on selective mutism. The pooled prevalence for ADHD and emotional difficulties was 6% (95% CI 2, 13) and 4% (95% CI 3, 6) respectively. The prevalence of the behaviour problem and selective mutism was 4% and 1%, respectively.

Neurodevelopmental problems

The prevalence of three diagnoses (a language problem, developmental disorder/delay and disintegrative disorder) was identified from evidence. Only data of the most prevalent differential diagnoses are reported here.

Six studies were identified that reported on a language problem, while four studies reported on developmental disorder/delay. The pooled prevalence was 9% (95% CI 3, 17) and 5% (95% CI 3, 6), respectively.

Studies of children referred on suspicion of developmental problems only

Mental and behaviour disorders

Evidence showed the prevalence of emotional difficulty was 16%.

Neurodevelopmental problems

The prevalence of four neurodevelopmental diagnoses was identified from evidence. Only data of the most prevalent differential diagnosis are reported here.

Four studies were identified that reported on a language problem in children and young people referred for developmental problems, and four on developmental disorder/delay. The pooled prevalence was 41% (95% CI 2, 89) and 28% (95% CI 21, 36), respectively.

Studies of children referred on suspicion of behavioural problems only

Mental and behaviour disorders

The prevalence of only two diagnoses was identified from evidence. One study reported on the prevalence of a behaviour problem in children and young people referred for a behaviour problem, and one on ADHD. The prevalence was 53% and 35%, respectively.

Neurodevelopmental problems

Only prevalence data for developmental disorder/delay was identified from evidence and this reported specifically on the prevalence of emotional difficulties, which was 28%.

Studies of children referred for positive screening results only

There were four studies looking at children referred after a positive result in a screening test for ASD. They each used a different screening test: Early Screening of Autistic Traits (ESAT), Young Autism and other developmental disorders Checkup Tool (YACHT-18), Checklist for Autism in Toddlers (CHAT) and Autism Spectrum Screening Questionnaire (ASSQ).

Mental and behaviour disorders

The prevalence of two diagnoses (ADHD and Tourette syndrome) was identified from evidence.

Three studies reported on the prevalence of ADHD and one on Tourette syndrome. The pooled prevalence for ADHD was 17% (95% CI 11, 23) and the prevalence of Tourette syndrome was 4%.

Neurodevelopmental problems

The prevalence of two diagnoses (a language problem and developmental disorder/delay) was identified from evidence.

Two studies reported on the prevalence of a language problem and four on developmental disorder/delay. The pooled prevalence was 24% (95% CI 17, 33) and 12% (95% CI 6, 19), respectively.

Other

One study reported the prevalence of abuse/neglect, which it reported as 26%.

6.4 Evidence to recommendations: identifying differential diagnoses

See section 6.8.

6.5 Overview of the evidence: identifying features that differentiate ASD from other conditions

No studies were identified.

6.6 Evidence profiles: identifying features that differentiate ASD from other conditions

No evidence.

6.7 Evidence statements: identifying features that differentiate ASD from other conditions

No evidence.

6.8 Evidence to recommendations: identifying features that differentiate autism from other conditions

Relative value placed on the outcomes considered

The GDG identified two outcomes to measure whether a condition is 'important' in the differential diagnosis of autism:

- the prevalence of that condition in children and young people with signs and symptoms considered suggestive of autism
- the severity of the condition.

However, there is no standard index to reflect impact, so the systematic review focussed on conditions with the highest prevalence only.

Trade-off between clinical benefits and harms

The GDG considered that identifying other conditions in the differential diagnosis of autism was an essential element of the autism-specific diagnostic assessment.

The benefit is the accurate and early recognition of alternative conditions, leading to earlier appropriate management. For example, treatment of epileptic encephalopathy might alleviate language regression and avoid ineffective treatment regimens.

The potential harm includes distress to the child or young person and/or their family or carer on being informed of another diagnosis which might be of greater concern to them than a diagnosis of autism, for example a condition associated with significant morbidity or mortality. Nevertheless, the GDG consensus was that the advantages of accurate diagnosis outweighed any disadvantages.

Trade-off between net health benefits and resource use

No evidence was identified and a health economic analysis could not be undertaken for this question due to the lack of baseline data. The costs and benefits of identifying other diagnoses during the assessment were considered by the GDG. The view was that, although there would be an additional cost associated with establishing an alternative diagnosis to autism (resources to undertake clinical review and any testing), this was likely to be cost effective compared with missing important differential diagnoses in children and young people.

Quality of evidence

Few studies were identified on the prevalence of other conditions and the quality of the evidence was low. No studies were identified that reported the severity of alternative conditions identified in children with signs and symptoms.

The grouping of conditions into categories leads to some difficulties in comparing outcomes across the available studies. Sub-group analysis by ‘reason for referral’ reduced heterogeneity. But as the confidence intervals around the prevalence estimates were very wide, interpretation of the data was difficult.

The GDG was concerned about bias in these studies due to pre-selection of samples and missing sample recruitment information. Therefore the GDG believed they did not provide credible and clinically relevant evidence on important alternative conditions. It was difficult to interpret the findings for clinical practice.

Other considerations

The GDG recognised the importance of the differential diagnosis for any individual with a developmental or behavioural concern, including those in whom autism is suspected.

The evidence produced results that were not useful in clinical practice. For example, studies of ‘abuse/neglect’ included information about attachment disorder. The GDG chose to develop a more clinically relevant list of conditions based both on the evidence and the GDG members’ knowledge and experience. The final list does not reflect the reported prevalence of the condition in the included studies as these data were not sufficiently robust but it does reflect the wide expertise of the GDG. It takes account of the prevalence data and also the severity and impact on quality of life. The list should facilitate accurate and timely recognition of conditions with a similar presentation to autism.

The GDG also developed advice on how to differentiate between alternative diagnoses with similar features (see Appendix K). The table in Appendix K is designed to enhance the implementation of the recommendation to take account of alternative conditions as part of the differential diagnosis of autism and throughout the autism pathway. For each condition the key clinical features are specified. The table shows the way that each condition typically differs from autism along with the assessments and investigations that should be undertaken. It highlights the relevant components of each assessment that contribute to the process of differentiation. The table is not the result of a systematic review of the literature but the GDG took note of the studies available in the evidence in which differentiating features were reported.

The GDG acknowledged the difficulties in differential diagnosis, as the mental and behavioural disorders and developmental disorders can, and frequently do, coexist with autism. Attachment disorders present particular challenges. In looked after children, early developmental history, which is crucial in autism diagnosis, may be difficult to obtain: re-examination over time in a different environment may clarify a diagnosis that is often dependent on experienced clinical judgement. Expertise may be required for cases such as severe hearing and visual impairment in recognising what signs and symptoms can be attributed to the sensory impairment and what falls outside that attribution. In these situations, access to expertise and tertiary opinion from other professionals is warranted.

Conditions such as epilepsy are more common in children and young people with autism and require specific treatment. Epileptic encephalopathy is a particular clinical concern if there is a history of regression of developmental skills. This has led to concern among clinicians about how to decide what tests should be done. A careful history is required, as social and language stasis and/or regression with features of autism without motor impairment or other physical features in a child under three years is typical of the regression that occurs in approximately a third of cases of autism. Language regression in a child of over three years should be referred for a medical opinion. Late autistic regression after apparently normal development (childhood disintegrative disorder [CDD]) typically includes cognitive regression, regression of bowel and bladder control and behaviour symptoms of distress and overactivity.

A child with physical symptoms and signs including seizures requires further investigation beyond the scope of this guideline.

Language delay, cognitive delay, impaired motor coordination or behavioural concerns are all common presentations of autism but are also all common neurodevelopmental problems and disorders in their own right. There is often an overlap of symptoms and individual test scores by themselves (for example language or motor coordination test scores) may not differentiate these conditions. However, the process of a professional with expertise doing such tests and considering the diagnostic features of autism will help make an accurate diagnosis.

Intellectual disability is one of the conditions that coexists most commonly with autism and is a difficult differential diagnosis in a young child. The evidence shows that the validity of the autism-specific tools for eliciting the history from an informant is limited below a mental age of 18 months (see Chapter 5). Autism diagnosis is often delayed in those with intellectual disability but distinguishing the way that a child with autism learns and communicates has important implications for future management. The particular features of coexisting autism in a child with intellectual disability may suggest an aetiological diagnosis for the intellectual disability, for example fragile X (see Chapter 7 on Coexisting conditions).

Finally, the GDG considered that disorders associated with psychosis, including schizophrenia and bipolar disorder, might be potentially important in the differential diagnosis of autism in some individuals.

In order to indentify the important differential diagnoses in each individual child or young person who has an autism diagnostic assessment, specific assessments may be required, if not already undertaken. These assessments may also help to interpret the findings of the autism-specific interview and observations (see Chapter 5).

Recommendations

Number	Recommendation

46	Consider the following differential diagnoses for autism and whether specific assessments are needed to help interpret the autism history and observations:
	• Neurodevelopmental disorders:
	  ○ specific language delay or disorder
	  ○ intellectual disability or global developmental delay
	  ○ developmental coordination disorder (DCD).
	• Mental and behavioural disorders:
	  ○ attention deficit hyperactivity disorder (ADHD)
	  ○ mood disorder
	  ○ anxiety disorder
	  ○ attachment disorders
	  ○ oppositional defiant disorder (ODD)
	  ○ conduct disorder
	  ○ obsessive compulsive disorder (OCD)
	  ○ psychosis.
	• Conditions in which there is developmental regression:
	  ○ Rett syndrome
	  ○ epileptic encephalopathy.
	• Other conditions:
	  ○ severe hearing impairment
	  ○ severe visual impairment
	  ○ maltreatment
	  ○ selective mutism.

7 Assessment of coexisting conditions

Introduction

This chapter focuses on the coexisting conditions that any healthcare professional should think about when a child or young person is undergoing an autism diagnostic assessment.

There are a number of disorders or diagnoses that co-occur in autism at higher than expected rates and these are referred to as coexisting conditions. This differentiates them from other common health problems and conditions that affect other children and young people. They may also, in some instances, be regarded as risk factors (see Chapter 4, Following referral) and may also be differential diagnosis (see chapter 6, Differential diagnosis). The reasons why some disorders co-occur more commonly in people with autism is not well understood.

Coexisting conditions may either be treatable in their own right or may influence the long-term outcome for the child or young person. When there is a focus on the diagnosis of autism, it is possible to neglect other diagnosable conditions. The most important coexisting conditions are those that occur most frequently, have a high impact on present quality of life, or may impact on the future development of the child or young person.

Clinical question

Which are the common coexisting conditions that should be considered as part of assessment?

- neurodevelopmental: speech and language problems, intellectual disability, coordination, learning difficulties in numeracy and literacy
- mental and behavioural disorders, such as attention deficit hyperactivity disorder (ADHD), obsessive compulsive disorder (OCD), anxiety, depression, Tourette, tic disorders
- medical or neurological problems such as functional gastrointestinal problems, tuberous sclerosis, neurofibromatosis.

7.1 Overview of the evidence

A list of possible coexisting conditions and symptoms to include in the review was agreed with the guideline development group (GDG).

In total, 38 studies were included in the review. All of the studies were uncontrolled observational in design and were graded as very low quality. The studies were carried out in Brazil,[150] Canada,[151] Czech Republic,[152] Finland,[153;154] France,[155-157] Italy,[158-160] Israel,[161] Netherlands,[162] Japan,[163;164] Portugal,[165] Sweden,[166] the UK,[167-171] the USA,[172-185] Turkey[186] and Venezuela.[187] One study was conducted in both Europe and the USA.[188]

One study included children of preschool age[179] and three studies included primary school age children.[158;177;184] No study included children of secondary school age only. Seven studies included mixed preschool and primary school age children;[151;156;166;167;172;185;187] 13 studies included mixed primary and secondary school age children;[150;154;155;157;159;162;165;168;171;174-176;178] and 12 studies included all age groups.[152;153;160;161;164;169;170;173;180;182;183;186] Two studies included adults (age over 19 years).[181;188] Age was not reported in the remaining studies.

Only one study reported mean intelligence quotient (IQ) scores but the proportion of children with intellectual disability was not reported.[178] Fourteen studies reported the proportion of children with intellectual disability but no separate outcome was provided for each IQ group.[152;153;156;157;163;165;168;169;176;181;184-186;188] One study only included children with intellectual disability[160] while three studies excluded children with intellectual disability.[151;154;166] Intellectual ability was not reported in the remaining studies.

Details of the individual studies are presented in evidence tables (see Appendix H, Tables of included studies).

Given the number of coexisting conditions reported in the evidence tables, the evidence statements only summarise the data for the most common conditions.

7.2 Evidence profiles

Table 7.1 summarises the data for each common coexisting condition in children and young people with autism and table 7.2 summarises the data for children and young people with autism spectrum disorders (ASD). The data for autism has been separated from the data for ASD as it was expected that some coexisting conditions would have different prevalence rates for each category and so it would not be appropriate to pool these data.

Table 7.1 Prevalence of each coexisting condition in children or young people with autism

Coexisting condition	Quality assessment						Summary of findings	
							Number	Prevalence
	Studies (N)	Design	Limitations	Inconsistency	Indirectness	Quality	Cases	(Pooled, 95% CI)
Mental and behavioural disorders								
ADHD[150;176]	2 (117)	Uncon obs	Not used	Not used	Not used	Very low	43	41 (21, 63)
Self-injurious behaviour[156]	1 (222)	Uncon obs	Not used	Not used	Not used	Very low	109	49
Anxiety[176]	1 (101)	Uncon obs	Not used	Not used	Not used	Very low	63	62
ODD[176]	1 (86)	Uncon obs	Not used	Not used	Not used	Very low	6	7
Tic	No studies were identified.							
OCD[176]	1 (94)	Uncon obs	Not used	Not used	Not used	Very low	35	37
Depression[176]	1 (109)	Uncon obs	Not used	Not used	Not used	Very low	14	13
Seizures[153]	1 (187)	Uncon obs	Not used	Not used	Not used	Very low	34	18
Tourette syndrome	No studies were identified.							
Conduct disorder	No studies were identified.							
Neurodevelopmental								
Intellectual disability[153;156-158;163;169;176;184;185]	9 (2032)	Uncon obs	Not used	Not used	Not used	Very low	1618	76 (61, 89)

Coexisting condition	Quality assessment						Summary of findings	
							Number	Prevalence
	Studies (N)	Design	Limitations	Inconsistency	Indirectness	Quality	Cases	(Pooled, 95% CI)
Medical or neurological								
Cerebral palsy[153;157;170;185]	4 (1371)	Uncon obs	Not used	Not used	Not used	Very low	63	5 (4, 6)
Sleep problem[161;175;184]	3 (397)	Uncon obs	Not used	Not used	Not used	Very low	146	37 (11, 68)
Gastrointestinal problem[167]	1 (96)	Uncon obs	Not used	Not used	Not used	Very low	3	3
Epilepsy[153;156-158;169;170;185]	7 (1710)	Uncon obs	Not used	Not used	Not used	Very low	342	24 (8, 46)
A motor problem[153]	1 (187)	Uncon obs	Not used	Not used	Not used	Very low	25	13
Vision deficits[153;157;185]	3 (1348)	Uncon obs	Not used	Not used	Not used	Very low	65	7 (0, 26)
Auditory deficits[153;157;185]	3 (1348)	Uncon obs	Not used	Not used	Not used	Very low	29	3 (0, 9)

CI: confidence interval; Uncon obs: Uncontrolled observational (see Methods, Section 2.6.2 for detail)

Table 7.2 Prevalence of each coexisting condition in children with ASD

Coexisting condition	Quality assessment						Summary of findings	
							Number	Prevalence (Pooled, 95% CI)
	Studies (N)	Design	Limitations	Inconsistency	Indirectness	Quality	Cases	
Mental and behavioural disorders								
ADHD[154;162;171;173;174;177;183]	7 (3373)	Uncon obs#	Not used	Not used	Not used	Very low	1182	45 (24, 67)
Self-injurious behaviour[156]	No studies have been identified.							
Anxiety[151;154;162;171;177;178;183]	7 (2952)	Uncon obs	Not used	Not used	Not used	Very low	357	27 (10, 49)
ODD[154;162;171;177;183]	5 (2862)	Uncon obs	Not used	Not used	Not used	Very low	342	23 (6, 47)
Tic[154;159;171;173;177;180]	6 (2348)	Uncon obs	Not used	Not used	Not used	Very low	248	19 (2, 47)
OCD[162;171;177;180]	4 (2346)	Uncon obs	Not used	Not used	Not used	Very low	61	8 (2, 17)
Depression[151;154;162;171;177;178]	6 (2469)	Uncon obs	Not used	Not used	Not used	Very low	58	9 (3, 19)
Tourette syndrome[159;171;180]	3 (226)	Uncon obs	Not used	Not used	Not used	Very low	15	12 (2, 28)
Conduct disorder[154;162;171;177]	4(2379)	Uncon obs	Not used	Not used	Not used	Very low	17	3 (0, 9)
Neurodevelopmental								
Intellectual disability[152;160;165;168;172;177;181;186;188]	9 (3683)	Uncon obs	Not used	Not used	Not used	Very low	1256	65 (38, 87)

Coexisting condition	Quality assessment						Summary of findings	
							Number	Prevalence (Pooled, 95% CI)
	Studies (N)	Design	Limitations	Inconsistency	Indirectness	Quality	Cases	
Medical or neurological								
Cerebral palsy[152;155;177;179]	4 (2791)	Uncon obs	Not used	Not used	Not used	Very low	91	5 (1, 13)
Sleep problem[154;160;166]	3 (113)	Uncon obs	Not used	Not used	Not used	Very low	64	61 (31, 88)
Gastrointestinal problems[182]	1 (100)	Uncon obs	Not used	Not used	Not used	Very low	62	62
Epilepsy[152;155;164;165;177;179;187;188]	8 (4734)	Uncon obs	Not used	Not used	Not used	Very low	922	15 (7, 26)
Seizures[172;179;181]	3 (791)	Uncon obs	Not used	Not used	Not used	Very low	47	5 (2, 9)
A motor problem[152;155;168]	3 (499)	Uncon obs	Not used	Not used	Not used	Very low	113	25 (0, 75)
Vision deficits[152;177;187]	3 (2615)	Uncon obs	Not used	Not used	Not used	Very low	77	6 (0, 21)
Auditory deficits[152;155;177;180]	4 (2530)	Uncon obs	Not used	Not used	Not used	Very low	84	8 (1, 20)

CI: confidence interval; Uncon obs: Uncontrolled observational (see Methods, Section 2.6.2 for detail)

7.3 Evidence statements

Evidence for autism

All evidence was graded as very low quality.

Mental and behaviour disorders

Prevalence data for 12 conditions were identified: ADHD, adjustment disorder, an aggression problem, anxiety, an attention problem, bipolar disorder, depression, emotionally reactivity, OCD, ODD, self-injurious behaviour and somatic complaints syndrome. Only studies examining the prevalence of the most common conditions are reported here.

The pooled prevalence of ADHD was 41% (95% confidence interval [CI] 21, 63). The prevalence for self-injurious behaviour was 49%, for anxiety 62%, for ODD 7%, for OCD 37%, for depression 13% and for seizures 18%.

Neurodevelopmental conditions

Prevalence data for three conditions were identified: language problems, intellectual disability, regression and restricted interest. Only studies examining the prevalence of intellectual disability are reported here.

The pooled prevalence for intellectual disability was 76% (95% CI 61, 89).

Medical or neurological conditions

Prevalence data for 15 conditions were identified: auditory deficits; epilepsy; gastrointestinal problems; chromosomal abnormalities; congenital disorder; genetic disorder; motor impairment; obesity (body mass index more than [BMI] 95th centile); perinatal condition; sleep problem; vision deficits; cerebral palsy; seizures; hydrocephalus and meningitis. Only studies examining the prevalence of cerebral palsy, sleep problems, gastrointestinal problems, epilepsy, motor problems, vision deficits and auditory deficits are reported here.

The pooled prevalence of cerebral palsy was 5% (95% CI 4, 6), for sleep problems it was 37% (95% CI 11, 68), for epilepsy it was 24% (95% CI 8, 46), for vision deficits it was 7% (95% CI 0, 26) and for auditory deficits was 3% (95% CI 0, 9). The prevalence for motor problems and gastrointestinal problems was 13% and 3% respectively.

Evidence for ASD

Mental and behavioural disorders

Prevalence data was identified for 13 conditions: ADHD; adjustment/reactive attachment/post-traumatic stress disorder; anxiety; behaviour problem; bipolar disorder; conduct disorder; depression; mutism; OCD; oppositional defiant disorder (ODD); psychotic disorder; tic; and Tourette syndrome. Only studies examining the prevalence of ADHD, anxiety, ODD, tic, OCD, depression, Tourette syndrome and conduct disorder are reported here.

The pooled prevalence in children with ASD for the different conditions was:

- ADHD: 45% (95% CI 24, 67)
- anxiety: 27% (95% CI 10, 49)
- ODD: 23% (95% CI 6, 47)
- tics: 19% (95% CI 2, 47)
- OCD: 8% (95% CI 2, 17)
- depression: 9% (95% CI 3, 19)
- Tourette syndrome: 12% (95% CI 2, 28)
- conduct disorder: 3% (95% CI 0, 9).

Neurodevelopmental conditions

Prevalence data were identified for four conditions: communication disorders; language problem; intellectual disability; and regression. Only the nine studies examining the prevalence of intellectual disability are reported here.

The pooled prevalence for intellectual disability was 65% (95% CI 38, 87).

Medical or neurological conditions

Prevalence data were identified for 17 conditions: cerebral palsy; hydrocephalus; asthma; auditory deficits; chromosomal abnormalities; congenital disorder; epilepsy; seizures; febrile convulsions; gastrointestinal problems; genetic disorder; mitochondrial respiratory chain disorder; motor impairment; obesity (BMI more than the 95th centile); sleep problem; vision deficits; and elimination disorder. Only studies examining the prevalence of cerebral palsy, epilepsy, seizures, gastrointestinal problems, sleep problem, motor problem, vision deficits and auditory deficits are reported here.

The pooled prevalence for the conditions was:

- cerebral palsy: 5% (95% CI 1, 13)
- sleep problems: 61% (95% CI 31, 88)
- epilepsy: 15% (95% CI 7, 26)
- seizures: 5% (95% CI 2, 69)
- motor problems: 25% (95% CI 0, 75)
- vision deficits: 6% (95% CI 0, 21)
- auditory deficits: 8% (95% CI 1, 20).

The prevalence for gastrointestinal problems was 62%.

7.4 Evidence to recommendations

Relative value placed on the outcomes considered

The GDG agreed specific criteria for whether a disease or symptom should be considered a coexisting condition with autism. The conditions listed had to have at least one of the following characteristics:

- a documented prevalence rate of the condition in children and young people with autism higher than that for the general population
- likely to benefit from appropriate intervention(s)
- likely to have an important impact on quality of life.

The GDG also considered the ease of diagnosis, defined as diagnostic accuracy, and the cost effectiveness of treatment of the condition if identified.

Trade-off between clinical benefits and harms

The identification of important coexisting conditions was of clinical benefit because it may affect how a child is cared for in all aspects of the diagnostic process and subsequent management and support. Systematic enquiry into coexisting conditions should be part of any clinical assessment of a child or young person with suspected or confirmed autism because there are various known conditions associated with autism that, if not recognised, can impact on the welfare of the child or young person. Identification of other disorders in a child with suspected or confirmed autism contributes to an understanding of the individual's profile of strengths and weaknesses and informs intervention. Some conditions require specific medical intervention or modification of the overall treatment strategy. It might also lead to the identification of other family members with the condition and have implications for genetic counselling.

The available evidence shows that a wide range of disorders and symptoms can co-occur in children and young people with autism. The GDG took into consideration the possible harm associated with assessing a child or young person for coexisting conditions, which includes prolonging the autism-specific diagnostic assessment. Looking for coexisting conditions in addition to autism could cause distress to the child or young person and to their parents or carers. In all stages of the autism pathway, the risk of such difficulties can be alleviated by good communication and close involvement of the child or young person and their parents or carers in the process. The GDG considered that, overall, the potential benefits of early identification of coexisting conditions outweigh the possible harms.

Trade-off between net health benefits and resource use

Clinical assessment to find evidence of a coexisting condition may significantly increase the time required for a clinical assessment of a child or young person with suspected autism. Given the possible benefits of recognising coexisting conditions, the GDG considered this likely to be a cost-effective use of a healthcare professional's time. However, additional assessments for coexisting conditions is only cost effective if the additional cost (including assessments undertaken on individuals who turn out not to have the condition) can be justified by the health benefit of early identification and management. No evidence to support or refute the cost effectiveness of early identification of coexisting conditions was identified.

However, the GDG's consensus was that use of healthcare resources to look for rare conditions in individuals without clinical manifestations to suggest their presence could not be justified. Furthermore, assessing a child or young person for coexisting conditions for which no useful treatment existed should not be undertaken since there is no health improvement from such an assessment. All the conditions on the list of coexisting conditions agreed by the GDG are important because either there are specific treatments of proven efficacy or they require support and management with clinically important benefits to the individual. The GDG considered that identifying important coexisting conditions and undertaking further assessments of these conditions on the basis of clinical judgement was likely to be a cost-effective use of NHS resources.

Quality of evidence

Where there were multiple studies identified for one condition or symptom, the prevalence estimates vary widely. This reflects both differences in the populations studied and variation in the ways in which coexisting conditions were identified. The evidence on prevalence summarised in the literature is highly variable and is not exhaustive.

There were insufficient studies overall and a lack of replication of findings across studies, as well as under-reporting of important coexisting conditions. The GDG was unable to judge how comparable the studies were with each other and whether they reflected usual clinical practice in the UK. In certain cases (for example intellectual disability) the pooled prevalence statistic was in conflict with the clinical experience of GDG members, although in this particular case they also noted that the confidence intervals for all children with ASD (as opposed to autism) were wide and therefore that the true value would lie within this range.

Other considerations

The term used for a condition in the table is taken directly from the literature except where the GDG considered a more generic term was appropriate. For example, 'mood disorder' is an interpretation by the GDG of the evidence for depression and genetic disorders instead of genetic abnormalities. The terms 'seizure' and 'epilepsy' are also used here, although other terms are used in the studies.

The consensus of the GDG was that, when assessing a child or young person with suspected or confirmed autism, the healthcare professional should always consider the possibility of a coexisting condition and should undertake an appropriate systematic clinical enquiry with this in mind. This should identify the presenting problem and any relevant history.

The GDG noted that the communication difficulties associated with autism might increase the risk of coexisting conditions going undetected. For example, functional mental health difficulties might be overlooked. The GDG recommended that particular attention be given to information from other sources (including direct observation of the child or young person) and in different settings.

The GDG was aware that healthcare professionals have raised the possibility of eating disorders being a coexisting condition with autism, but at the current time the evidence is not strong enough and the clinical view within the GDG was that this should not be listed as a coexisting condition that should be systematically looked for.

Recommendations

Number	Recommendation

54	Consider whether the child or young person may have any of the following as a coexisting condition, and if suspected carry out appropriate assessments and referrals:
	• Mental and behaviour problems and disorders:
	  ○ ADHD
	  ○ anxiety disorders and phobias
	  ○ mood disorders
	  ○ oppositional defiant behaviour
	  ○ tics or Tourette syndrome
	  ○ OCD
	  ○ self-injurious behaviour.
	• Neurodevelopmental problems and disorders:
	  ○ global delay or intellectual disability
	  ○ motor coordination problems or DCD
	  ○ academic learning problems, for example in literacy or numeracy
	  ○ speech and language disorder.
	• Medical or genetic problems and disorders:
	  ○ epilepsy and epileptic encephalopathy
	  ○ chromosome disorders
	  ○ genetic abnormalities, including fragile X
	  ○ tuberous sclerosis
	  ○ muscular dystrophy
	  ○ neurofibromatosis.
	• Functional problems and disorders:
	  ○ feeding problems, including restricted diets
	  ○ urinary incontinence or enuresis
	  ○ constipation, altered bowel habit, faecal incontinence or encopresis
	  ○ sleep disturbances
	  ○ vision or hearing impairment.

8 Medical investigations

Introduction

Autism is a clinical syndrome in which the diagnosis is based on the presence of certain developmental and/or behavioural features. A number of disorders are known to occur more frequently in those with autism than in the general population (see Chapter 7 on Coexisting conditions). Some of these coexisting conditions might, when present, be considered as causative of autism.

In this chapter, consideration is given to the role of medical investigations that may identify causal conditions, specifically electroencephalography (EEG), brain-imaging techniques (magnetic resonance imaging [MRI], computed tomography [CT]), and blood and urine laboratory tests including genetic investigations.

One difficulty is the proper interpretation of abnormal results. For several of the investigations, an 'abnormal result' may not point to a specific, recognised disorder and may not have implications for treatment. In the case of EEG, abnormalities may occur more frequently in children and young people with autism than in the general population, but there may be no evidence of epilepsy. Furthermore, there is no standardised definition of what constitutes an 'abnormal' EEG; leading to possible reporting variation between studies. Consideration needed to be given to the benefit or otherwise of EEG as part of the diagnostic assessment for epilepsy. Likewise, minor structural abnormalities that may be reported in brain imaging are not necessarily associated with a recognised disorder or any clinical consequences. As with EEGs, there is no standardised method for agreeing on what constitutes an abnormal scan and this may cause variations in reporting.

Various genetic disorders are known to occur with markedly increased frequency in autism, for example fragile X syndrome and tuberous sclerosis. Recently, genetic investigations have revealed additional abnormalities that occur more commonly in those with autism but are not associated with a known syndrome. The situation is further complicated in relation to genetics, where in some cases gene variants may increase the risk of autism but individually confer a very small risk, while in other instances genetic abnormalities may play a major causal role. Identification of the latter group of genetic abnormalities might be important in genetic counselling.

There is substantial variability in the type and extent of genetic investigations undertaken. Furthermore, this is a field where technology is changing rapidly and new techniques are able to identify more subtle abnormalities than could be detected in earlier studies. However, a challenge of identifying more subtle abnormalities is that their clinical importance as a cause of autism is often more uncertain.

The review of the evidence is divided into two sections: data identifying abnormal results in children or young people with autism according to the International Statistical Classification of Diseases and Related Health Problems (ICD-10) and Diagnostic and Statistical Manual of Mental Disorders DSM-IV-TR Fourth Edition (Text Revision) (DSM-IV-TR) diagnostic criteria or autism spectrum disorders (ASD); and data identifying children or young people with a condition identified by a biomedical investigation.

Clinical question

What should be the components of the diagnostic assessment?

- biomedical investigations for diagnosis of autism, for example electroencephalography (EEG), brain scan, genetic tests, counselling; investigations for associated medical conditions.

8.1 Overview of the evidence

All studies were uncontrolled observational in design.

EEG

Twenty-four studies (in 26 articles) examined the use of EEG in children or young people with autism or ASD: these were from Italy,[158;189-192] Brazil,[193;194] Canada,[195;196] the Czech Republic,[152;197] Israel,[198;199] the UK,[200] Japan,[164;201] India,[202] Turkey[186;203] and the USA,[204-210] In six studies EEGs were routinely used[158;189;195;196;198;199;204] while in three studies the EEG was performed based on clinical judgement.[193;194;205;206] In the remaining 15 studies EEGs were investigated for research purposes.[152;164;186;190-192;197;200-203;207-210] One of these studies excluded children with a history of seizures:[200] all other studies did not report excluding children on the basis of clinical epilepsy.

Eight studies examined EEGs in children or young people with autism.[158;164;191;199;200;202;207;210] Five of these studies included children with regression[158;191;199;200;207] and two studies included children with intellectual disability.[158;191]

Twenty-four studies dealt with EEGs in children or young people with ASD.[152;186;189;190;192-198;201;203-206;208;209] Six of the studies included children with regression[152;192;197;198;208;209] (one compared those with language regression alone with those with both autistic and language regression)[208] and two studies included children with intellectual disability.[197;211]

Brain scans

Magnetic resonance imaging (MRI)

Ten studies with a total of 888 participants examined the use of magnetic resonance imaging (MRI) in children or young people with an ASD. The studies were from the UK,[200] Italy,[189] France,[212] USA,[204-206] India,[202] Israel,[199] Canada[195;196] and Turkey.[186] In two studies all participants were scanned;[189;204] in five studies scans were performed based on clinical judgement[195;196;199;200;205;206] and in three studies scans were investigated for research purposes.[186;202;212]

Four studies examined the results of MRI scans in children or young people with autism.[199;200;202;212] Two studies included children or young people with regression[199;200] and one study included children with intellectual disability.[212]

Six studies (from seven articles) examined MRI in children or young people with ASD.[186;189;195;196;204-206] No studies reported subgroup analyses for either regression or intellectual disability.

Computed tomography (computed axial tomography [CAT]/CT/positron emission tomography [PET]/single photon emission computed tomography [SPECT])

Five studies with a total of 359 participants examined use of computed tomography in children or young people with an ASD. These studies were from Brazil,[193;194] Canada,[195;196] Israel,[199] India[202] and the USA.[206] In four studies scans were performed based on clinical judgement.[193-196;199;206] One study investigated computed tomography for research purposes.[202]

Two studies examined computed tomography in children or young people with autism.[199;202] One study included children or young people with regression.[199] No studies reported on subgroups with intellectual disability.

Three studies (from five articles)[193-196;206] examined computed tomography in children or young people with ASD. No studies reported subgroup analyses for either regression or intellectual disability.

Metabolic tests

Twelve studies (from 14 articles) from the USA,[204-206] Italy,[158;189] Israel,[199] Portugal,[165] the Czech Republic,[152] France,[212] UK, [213] Canada[195;196] and Brazil[193;194] examined the use of metabolic tests in children or young people with ASD. One study was for research purposes.[213] In six studies all participants were tested,[158;165;189;193;194;204;212] while in another five studies tests were performed based on clinical judgement.[152;195;196;199;205;206] Three studies did not report the specific tests used.[189;195;196;204]

Two studies reported screening for inborn errors of metabolism but provided no further details.[152;193;194] One study reported that the metabolic determination included determining the levels of ammonia, amino acids, lactic acid and pyruvic acid in blood as well as organic acids in urine.[199] Another study reported metabolic tests to look for amino acid and organic acid disorders, oligosaccharides and

mucopolysaccharides, purine and pyrimidine disorders, creatine metabolism abnormalities and congenital glycosylation diseases.[165] A third study screened serum and urinary amino acids.[158] A fourth used urine/plasma inborn error screening.[205] A fifth study examined plasma amino acids and urine organic acids.[206] The final study examined plasma and urine amino and organic acid analysis, urine glycoaminoglycans quantitation, urine oligosaccharides, purine and pyrimidine analysis and creatine guanidoacetate urine analysis.[212]

Three studies examined metabolic testing in children and young people with autism.[158;199;212] One study included children and young people with regression.[199] No studies reported on subgroups with intellectual disability.

Nine studies (from 11 articles) examined metabolic tests in children and young people with ASD.[152;165;165;189;193-195;204-206;213;214] No studies reported subgroup analyses for either regression or intellectual disability.

Blood tests

Four studies from the USA[204;215] and Italy[158;216] examined the use of various blood tests in children or young people with ASD. In one study participants' complete blood count and blood chemistry was obtained[158] while in a second study serum uric acid levels were obtained.[204] In the remaining two studies participants were tested for serum immunoglobulin E (IgE) or for mycoplasma, chlamydia pneumoniae and human herpesvirus 6 (HHV-6) for research purposes.[215;216]

Two studies examined blood tests in children and young people with autism[158;216] and two studies examined blood tests in children and young people with ASD.[204;215] No studies reported subgroup analyses for either regression or intellectual disability.

Urine tests

Two studies from the USA[204] and Finland[153] examined the use of urine tests in children and young people with ASD. All participants were routinely tested in two studies,[153;204] and no studies were identified for children tested on clinical judgement or on a research basis. One study did not report on the test used[153] while the other examined uric acid levels.[204]

A single study examined urine tests in children and young people with autism[153] and another study[204] examined urine tests in children and young people with ASD. Neither study reported subgroup analyses for either regression or intellectual disability.

Genetic tests

Fifteen studies from Brazil,[193;194;217] Canada,[195;196;218] Finland,[153] France,[188] Israel,[199] Italy,[189;190] Taiwan[219] and the USA[181;204;205;220;221] examined genetic tests. Genetic investigations were carried out as part of routine testing in three studies.[153;189;204] Five studies reported on testing on clinical judgement[195;196;199;205;218;220] and seven studies reported on testing for research purposes.[181;188;190;193;194;217;219;221] The tests used were either not reported or were reported as:

- 17p11 fluorescence in situ hybridization (FISH)[204],
- array comparative genomic hybridization (CGH-array)[206]
- chromosomal microarray[181]
- chromosome[206]
- chromosome 15[204]
- cytogenetic analysis[193;194;220;222]
- DNA[165;181;223]
- FISH[205;217]
- molecular analysis[217]
- folic acid starvation / southern blot analysis[199]
- fragile X[224]
- G banded chromosomes[223]

- G-banded karyotype[181]
- genetic[152;195]
- high resolution banding DNA[189]
- karyotype[193;194;200;218;224]
- molecular cytogenetics[189]
- molecular/genetic[205]
- polymerase chain reaction analysis[217]
- prometaphase chromosomes (Karyotype)[204]
- phosphatase and tensin homolog (PTEN) gene sequencing[206]
- Rett gene sequencing.[206]

Five studies examined genetic tests in children and young people with autism[153;199;219-221] and ten studies (from 12 articles) examined genetic tests in children and young people with ASD.[181;188-190;193-196;204;205;217;218] No studies reported subgroup analyses for either regression or intellectual disability.

8.2 Evidence profiles

Tables 8.1 and 8.2 present the percentage of children or young people with autism or ASD with abnormal results from medical investigations.

Tables 8.3 and 8.4 present the percentage of children or young people with autism or ASD who had a condition identified or confirmed by a medical investigation.

In all tables the results are categorised by the reason the test was performed: routinely, on clinical judgement or as part of a research study.

Table 8.1 Percentage of abnormal results of medical investigations in children or young people with autism

Biomedical investigation	Quality assessment							Summary of findings
	Studies (N)	% of participants tested	Design	Limitations	Inconsistency	Indirectness	Quality	% of total participants in studies with abnormal test results (95% CI)
EEG								
Performed routinely[158;199]	2 (178)	100%	Uncon obs	Not used	Not used	Not used	Very low	11 (6, 63)
Performed based on clinical judgement	No studies were identified.							
Performed for research purposes[164;191;200;202;207;210]	6 (1432)	95.9%	Uncon obs	Not used	Not used	Not used	Very low	47 (20, 76)
MRI								
Performed routinely	No studies were identified.							
Performed based on clinical judgement[199;200]	2 (196)	21.4%	Uncon obs	Not used	Not used	Not used	Very low	0 (0, 1)
Performed for research purposes[202;212]	2 (99)	100%	Uncon obs	Not used	Not used	Not used	Very low	29 (7, 59)
CT/CAT/PET/SPECT								
Performed routinely	No studies were identified.							
Performed based on clinical judgement[199]	1 (132)	27.3%	Uncon obs	Not used	Not used	Not used	Very low	0
Performed for research purposes[202]	1 (22)	100%	Uncon obs	Not used	Not used	Not used	Very low	32

Biomedical investigation	Quality assessment							Summary of findings
	Studies (N)	% of participants tested	Design	Limitations	Inconsistency	Indirectness	Quality	% of total participants in studies with abnormal test results (95% CI)
Metabolic tests								
Performed routinely[158;212]	2 (123)	100.0%	Uncon obs	Not used	Not used	Not used	Very low	0 (0, 2)
Performed based on clinical judgement[199]	1 (132)	40.2%	Uncon obs	Not used	Not used	Not used	Very low	0
Performed for research purposes	No studies were identified.							
Blood tests								
Performed routinely[158]	1 (46)	100.0%	Uncon obs	Not used	Not used	Not used	Very low	0
Performed based on clinical judgement	No studies were identified.							
Performed for research purposes[216]	1 (43)	100.0%	Uncon obs	Not used	Not used	Not used	Very low	21
Urine tests								
Performed routinely[153]	1 (187)	100.0%	Uncon obs	Not used	Not used	Not used	Very low	0
Performed based on clinical judgement	No studies were identified.							
Performed for research purposes	No studies were identified.							

Biomedical investigation	Quality assessment							Summary of findings
	Studies (N)	% of participants tested	Design	Limitations	Inconsistency	Indirectness	Quality	% of total participants in studies with abnormal test results (95% CI)
Genetic tests								
Performed routinely[153].	1 (187)	100.0%	Uncon obs	Not used	Not used	Not used	Very low	12
Performed based on clinical judgement[199;220]	2 (1030)	32.4%	Uncon obs	Not used	Not used	Not used	Very low	3 (2, 4)
Performed for research purposes[219;221]	2 (816)	97.2%	Uncon obs	Not used	Not used	Not used	Very low	5 (1, 27)

EEG: electroencephalography (EEG); MRI: magnetic resonance imaging; CT: Computed tomography; CAT: computed axial tomography; PET: positron emission tomography; SPECT: single photon emission computed tomography

CI: confidence interval; Uncon obs: Uncontrolled observational (see Methods, Section 2.6.2 for detail)

Table 8.2 Percentage of abnormal results of medical investigations in children or young people with ASD

Biomedical investigation	Quality assessment							Summary of findings
	Studies (N)	% of participants tested	Design	Limitations	Inconsistency	Indirectness	Quality	% of total participants in studies with abnormal test results (95% CI)
EEG								
Performed routinely[189;195;196;198;204]	4 (191)	100%	Uncon obs	Not used	Not used	Not used	Very low	7 (0, 25)
Performed based on clinical judgement [193;194;205;206]	3 (356)	43.8%	Uncon obs	Not used	Not used	Not used	Very low	10 (2, 21)
Performed for research purposes [152;186;190;192;197;201;203;208;209]	9 (3154)	99.6%	Uncon obs	Not used	Not used	Not used	Very low	40 (31, 49)
MRI								
Performed routinely[189;204]	2 (117)	100%	Uncon obs	Not used	Not used	Not used	Very low	3 (1, 7)
Performed based on clinical judgement [195;196;205;206]	3 (395)	22.0%	Uncon obs	Not used	Not used	Not used	Very low	2 (0, 8)
Performed for research purposes[186]	1 (81)	100%	Uncon obs	Not used	Not used	Not used	Very low	12
CT/CAT/PET/SPECT								
Performed routinely	No studies were identified.							
Performed based on clinical judgement[193-196;206]	3 (205)	43.9%	Uncon obs	Not used	Not used	Not used	Very low	7 (2, 38)
Performed for research purposes	No studies were identified.							

Biomedical investigation	Quality assessment							Summary of findings
	Studies (N)	% of participants tested	Design	Limitations	Inconsistency	Indirectness	Quality	% of total participants in studies with abnormal test results (95% CI)
Metabolic tests								
Performed routinely[165;189;193;194;204]	4 (322)	100.0%	Uncon obs	Not used	Not used	Not used	Very low	0 (0, 1)
Performed based on clinical judgement [152;165;195;196;205;206]	4 (508)	46.2%	Uncon obs	Not used	Not used	Not used	Very low	2 (0, 6)
Performed for research purposes[213]	1 (56)	100.0%	Uncon obs	Not used	Not used	Not used	Very low	100
Blood tests								
Performed routinely[204]	1 (32)	100.0%	Uncon obs	Not used	Not used	Not used	Very low	3
Performed based on clinical judgement	No studies were identified.							
Performed for research purposes[215]	1 (48)	100.0%	Uncon obs	Not used	Not used	Not used	Very low	58
Urine tests								
Performed routinely[204]	1 (32)	100.0%	Uncon obs	Not used	Not used	Not used	Very low	0
Performed based on clinical judgement	No studies were identified.							
Performed for research purposes	No studies were identified.							

Biomedical investigation	Quality assessment							Summary of findings
	Studies (N)	% of participants tested	Design	Limitations	Inconsistency	Indirectness	Quality	% of total participants in studies with abnormal test results (95% CI)
Genetic tests								
Performed routinely[189;204]	2 (117)	100.0%	Uncon obs	Not used	Not used	Not used	Very low	14 (7, 22)
Performed based on clinical judgement [195;196;205;218]	3 (319)	52.1%	Uncon obs	Not used	Not used	Not used	Very low	4 (1, 8)
Performed for research purposes [181;188;190;193;194;217]	5 (1723)	95.8%	Uncon obs	Not used	Not used	Not used	Very low	11 (3, 23)

EEG: electroencephalography (EEG); MRI: magnetic resonance imaging; CT: Computed tomography; CAT: computed axial tomography; PET: positron emission tomography; SPECT: single photon emission computed tomography

CI: confidence interval; Uncon obs: Uncontrolled observational (see Methods, Section 2.6.2 for detail)

Table 8.3 Percentage of children/young people with autism who had a condition (potentially or actually) identified or confirmed by the biomedical investigation

Biomedical investigation	Quality assessment							Summary of findings
	Studies (N)	% of participants tested	Design	Limitations	Inconsistency	Indirectness	Quality	% of total participants in studies with abnormal test results (95% CI)
EEG								
Performed routinely[158;199]	2 (178)	100%	Uncon obs	Not used	Not used	Not used	Very low	4 (2, 26)
Performed based on clinical judgement	No studies were identified.							
Performed for research purposes[164;191;200;207;210]	5 (1410)	95.8%	Uncon obs	Not used	Not used	Not used	Very low	24 (10, 41)
MRI								
Performed routinely	No studies were identified.							
Performed based on clinical judgement[199;200]	2 (196)	21.8%	Uncon obs	Not used	Not used	Not used	Very low	0 (0, 1)
Performed for research purposes[212]	1 (77)	100.0%	Uncon obs	Not used	Not used	Not used	Very low	0
CT/CAT/PET/SPECT								
Performed routinely	No studies were identified for this analysis							
Performed based on clinical judgement[199]	1 (132)	27.3%	Uncon obs	Not used	Not used	Not used	Very low	0
Performed for research purposes[202]	No studies were identified.							

Biomedical investigation	Quality assessment							Summary of findings
	Studies (N)	% of participants tested	Design	Limitations	Inconsistency	Indirectness	Quality	% of total participants in studies with abnormal test results (95% CI)
Metabolic tests								
Performed routinely[158;212]	2 (123)	100.0%	Uncon obs	Not used	Not used	Not used	Very low	0 (0, 2)
Performed based on clinical judgement[199]	1 (132)	40.2%	Uncon obs	Not used	Not used	Not used	Very low	0
Performed for research purposes	No studies were identified.							
Blood tests								
Performed routinely[158]	1 (46)	100.0%	Uncon obs	Not used	Not used	Not used	Very low	0
Performed based on clinical judgement	No studies were identified.							
Performed for research purposes[216]	1 (43)	100.0%	Uncon obs	Not used	Not used	Not used	Very low	21
Urine tests								
Performed routinely[153]	1 (187)	100.0%	Uncon obs	Not used	Not used	Not used	Very low	0
Performed based on clinical judgement	No studies were identified.							
Performed for research purposes	No studies were identified.							

Biomedical investigation	Quality assessment							Summary of findings
	Studies (N)	% of participants tested	Design	Limitations	Inconsistency	Indirectness	Quality	% of total participants in studies with abnormal test results (95% CI)
Genetic tests								
Performed routinely[153].	1 (187)	100.0%	Uncon obs	Not used	Not used	Not used	Very low	9
Performed based on clinical judgement[199;220]	2 (1030)	32.4%	Uncon obs	Not used	Not used	Not used	Very low	3 (2, 4)
Performed for research purposes[219;221]	2 (816)	97.2%	Uncon obs	Not used	Not used	Not used	Very low	4 (0, 21)

EEG: electroencephalography (EEG); MRI: magnetic resonance imaging; CT: Computed tomography; CAT: computed axial tomography; PET: positron emission tomography; SPECT: single photon emission computed tomography

CI: confidence interval; Uncon obs: Uncontrolled observational (see Methods, Section 2.6.2 for detail)

Table 8.4 Percentage of children/young people with ASD who had a condition (potentially or actually) identified or confirmed by the biomedical investigation

Biomedical investigation	Quality assessment							Summary of findings
	Studies (N)	% of participants tested	Design	Limitations	Inconsistency	Indirectness	Quality	% of total participants in studies with abnormal test results (95% CI)
EEG								
Performed routinely[189;195;196;198;204]	4 (191)	100.0%	Uncon obs	Not used	Not used	Not used	Very low	7 (0, 24)
Performed based on clinical judgement[193;194;205;206]	3 (356)	43.8%	Uncon obs	Not used	Not used	Not used	Very low	4 (1, 11)
Performed for research purposes[152;190;192;197;201;203;208;209]	8 (3073)	99.6%	Uncon obs	Not used	Not used	Not used	Very low	23 (14, 34)
MRI								
Performed routinely[189;204]	2 (117)	100.0%	Uncon obs	Not used	Not used	Not used	Very low	3 (1, 7)
Performed based on clinical judgement[195;196;205;206]	3 (395)	22.0%	Uncon obs	Not used	Not used	Not used	Very low	0 (0, 1)
Performed for research purposes	No studies were identified.							
CT/CAT/PET/SPECT								
Performed routinely	No studies were identified for this analysis							
Performed based on clinical judgement[193-196;206]	3 (205)	43.9%	Uncon obs	Not used	Not used	Not used	Very low	0 (0, 2)
Performed for research purposes[202]	No studies were identified for this analysis							

Biomedical investigation	Quality assessment							Summary of findings
	Studies (N)	% of participants tested	Design	Limitations	Inconsistency	Indirectness	Quality	% of total participants in studies with abnormal test results (95% CI)
Metabolic tests								
Performed routinely[165;189;193;194;204]	4 (322)	100.0%	Uncon obs	Not used	Not used	Not used	Very low	0 (0, 1)
Performed based on clinical judgement[152;165;195;196;205;206]	4 (508)	46.2%	Uncon obs	Not used	Not used	Not used	Very low	1 (0, 6)
Performed for research purposes[213]	1 (56)	100.0%	Uncon obs	Not used	Not used	Not used	Very low	100
Blood tests								
Performed routinely[204]	1 (32)	100.0%	Uncon obs	Not used	Not used	Not used	Very low	3
Performed based on clinical judgement	No studies were identified for this analysis							
Performed for research purposes[215]	1 (48)	100.0%	Uncon obs	Not used	Not used	Not used	Very low	58
Urine tests								
Performed routinely[204]	1 (32)	100.0%	Uncon obs	Not used	Not used	Not used	Very low	0
Performed based on clinical judgement	No studies were identified for this analysis							
Performed for research purposes	No studies were identified for this analysis							

Biomedical investigation	Quality assessment							Summary of findings
	Studies (N)	% of participants tested	Design	Limitations	Inconsistency	Indirectness	Quality	% of total participants in studies with abnormal test results (95% CI)
Genetic tests								
Performed routinely[189;204]	2 (117)	100.0%	Uncon obs	Not used	Not used	Not used	Very low	14 (7, 22)
Performed based on clinical judgement[195;196;205;218]	3 (359)	52.1%	Uncon obs	Not used	Not used	Not used	Very low	3 (1, 7)
Performed for research purposes[181;188;190;193;194;217]	5 (1723)	95.8%	Uncon obs	Not used	Not used	Not used	Very low	10 (2, 24)

EEG: electroencephalography (EEG); MRI: magnetic resonance imaging; CT: Computed tomography; CAT: computed axial tomography; PET: positron emission tomography; SPECT: single photon emission computed tomography

CI: confidence interval; Uncon obs: Uncontrolled observational (see Methods, Section 2.6.2 for detail)

8.3 Evidence statements

Evidence for abnormal results in children or young people with autism or ASD

All evidence was graded as very low quality.

EEG

Where EEG was performed routinely, 11% of children with autism (95% confidence interval [CI] 6, 63) and 7% of children with ASD (95% CI 0, 25) had abnormal results.

Where EEG was performed based on clinical judgement, 10% of children with ASD had abnormal results (95% CI 2, 21). No studies reported EEG based on clinical judgement in children with autism.

When EEG was performed for research purposes, 47% of children with autism (95% CI 20, 76) and 40% of children with ASD (95%CI 31, 49) had abnormal results.

Brain scans

Magnetic resonance imaging (MRI)

Where MRI was performed routinely, 3% of children with ASD had abnormal results (95% CI 1, 7). No studies examined MRI performed routinely on children with autism.

Of studies examining MRI performed on clinical judgement, none of the children with autism and 2% of children with ASD (95% CI 0, 8) had abnormal results.

When MRI was performed for research purposes, 29% of children with autism (95% CI 7, 59) and 12% of children with ASD had abnormal results.

CT/CAT/PET/SPECT

No studies were identified for routinely performed CT/CAT/PET/SPECT.

For CT/CAT/PET/SPECT performed based on clinical judgement, none of children with autism and 7% of children with ASD (95% CI 2, 38) had abnormal results.

For research-based CT/CAT/PET/SPECT, 32% of children with autism received abnormal results. No studies were identified on CT/CAT/PET/SPECT in children with ASD.

Metabolic tests

No abnormal results were identified in routinely performed metabolic tests performed on children with autism or ASD.

For tests performed based on clinical judgement, none of the children with autism and 2% of children with ASD (95% CI 0, 6) had abnormal results.

For research-based metabolic tests, no studies of children with autism were identified. In the one study of children with ASD, 100% of children had abnormal results.

Blood tests

In the one study of routinely performed tests, none of the children with autism and 3% of children with ASD had abnormal results.

No studies were identified for blood tests performed based on clinical judgement.

For research-based blood tests, 21% of children with autism and 58% of children with ASD had abnormal results.

Urine tests

No abnormal results were identified when urine tests were performed routinely in children with autism or ASD.

No studies were identified for urine tests performed based on clinical judgement or research-based urine tests.

Genetic tests

In routinely performed genetic testing, 12% of children with autism and 14% of children with ASD (95% CI 7, 22) had abnormal results.

When tests were ordered on clinical judgement 3% of children with autism (95% CI 2, 4) and 4% of children with ASD (95% CI 1, 8) had abnormal results.

In research-based studies 5% of children with autism (95% CI 1, 27) and 11% of children with ASD (95% CI 3, 23) had abnormal results.

Evidence for conditions identified or confirmed by medical investigation in children or young people with autism or ASD

All evidence was graded as very low quality. Subgroup analysis results are only reported where evidence was identified

EEG

All studies

In routinely ordered EEG, 4% of children with autism (95% CI 2, 26) and 7% of children with ASD(95% CI 0, 24) had a clinical diagnosis identified or confirmed (six had clinical epilepsy, 16 had epilepsy and two had Landau–Kleffner syndrome).

EEG performed based on clinical judgement did not lead to a clinical diagnosis in any of the children with autism but it did in 4% of children with ASD (95% CI 1, 11; six of the children with ASD had clinical epilepsy, two had generalised epileptiform activity, three had unspecified generalised disorganisation and two had unspecified hemispheric disorganisation).

Research-based EEG led to a clinical diagnosis in 24% of children with autism (95% CI 10, 41) and 23% of children with ASD (95% CI 14, 34) (742 had epilepsy, 49 had epileptiform abnormalities, 41 had seizure disorders, 146 had epilepsy/epileptiform abnormalities/seizures and 25 had Landau–Kleffner syndrome).

Subgroup analysis of children with regression

The combined rate of clinical epilepsy in children with autism or ASD was higher in children with regression than in those without regression. There was an increased risk of epilepsy in those with an ASD who regressed (odds ratio [OR] = 1.52, 95% CI 1.10, 2.09).

One study reported that language regression alone had an increased odds ratio of developing seizures (OR = 4.5, 95% CI 1.6, 12.5) compared to language regression with autistic regression.

Subgroup analysis of children with an intellectual disability

Of children with intellectual disability, 22.9% (83 out of 362) had clinical epilepsy compared with 10.3% (4 out of 39) of children with no intellectual disability. Children with intellectual disability had an increased risk of clinical epilepsy in these four studies (OR = 2.45, 95% CI 0.85, 7.13).

MRI

Routinely performed MRI led to a clinical diagnosis in 3% of children with ASD ((95% CI 1, 7; two had macrocrania/partial agenesis of the corpos callosum and one had tuberous sclerosis). No studies were identified for children with autism.

No pathological findings were identified for MRI based on clinical judgement or research-based MRI in children with either autism or ASD.

CT/CAT/PET/SPECT

No studies were identified for routinely performed or research-based CT/CAT/PET/SPECT. No pathological findings have been identified for tests performed based on clinical judgement in either autism or ASD.

Metabolic tests

No clinical findings were identified for routinely performed tests on children with autism or ASD.

Metabolic tests performed based on clinical judgement led to a clinical diagnosis in none of the children with autism and 1% of children with ASD ((95% CI 0, 6; 14 had hyperlactacidemia).

Research-based metabolic tests led to a clinical diagnosis in 100% of children with ASD (56 had indolyl-3-acryloylglycine). There were no studies in children with autism.

Blood tests

Routinely performed blood tests did not lead to a clinical diagnosis in any of the children with autism but did in 3% of children with ASD (one had serum uric acid).

No studies were identified for blood tests based on clinical judgment in either autism or ASD.

Research-based blood tests led to a clinical diagnosis in 21% of children with autism and 58% of children with ASD (28 had mycoplasma, chlamydia pneumoniae or HHV-6 and nine had an IgE test result over 200 Ku/l [kilo international units per litre]).

Urine tests

No studies were identified for urine tests performed based on clinical judgment or for research-based urine tests in children with either autism or ASD. Similarly, no results were found of pathological findings from routinely performed urine tests in children with either autism or ASD.

Genetic tests

Routinely performed genetic tests led to a clinical diagnosis in 9% of children with autism and 14% (95% CI 7, 22) of children with ASD.

Genetic tests performed based on clinical judgement led to a clinical diagnosis in 3% of children with autism (95% CI 2, 4) and in 3% of children with ASD (95% CI 1, 7).

Research-based genetic tests led to a clinical diagnosis in 4% of children with autism (95% CI 0, 21) and 10% of children with ASD (95% CI 2, 24).

(See Appendix H for a full list of clinical diagnoses identified).

8.4 Evidence to recommendations

Relative value placed on the outcomes considered

The GDG agreed that the following were important outcomes:

- If routine testing of those with suspected or confirmed autism identifies one or more unsuspected coexisting conditions.
- If selective testing (based on clinical judgement) of those with suspected or confirmed autism confirms a suspected coexisting condition.
- If routine testing of those with suspected autism identifies an alternative disorder to explain the signs or symptoms and thereby helps to rule out autism.
- If selective testing (based on clinical judgement) of those with suspected autism identifies an alternative disorder to explain the signs or symptoms and thereby helps to rule out autism.

Trade-off between clinical benefits and harms

The evidence considered the yield of a specific test or investigation. The yield of a test is the likelihood of a clinically important outcome being identified or confirmed from an abnormal result. The yield is determined by examining the results of tests carried out in children and young people with confirmed autism. From this evidence, the GDG extrapolated conclusions about the usefulness of these tests in identifying coexisting conditions or an alternative (non-autism) diagnoses in those in whom autism is suspected.

EEG

The usual reason for performing an EEG is to support a diagnosis of epilepsy when this is clinically suspected. Children and young people with autism have an increased risk of epilepsy compared with the general population. Children with autism and either intellectual disability or regression may have even higher rates of epilepsy.

The risk of harm associated with performing an EEG is minimal. However, it is a somewhat time-consuming test, and for some children and young people with autism co-operation may be difficult. It

can also be distressing and in some cases the distress may lead to a lack of cooperation. Without cooperation, the EEG recording may be of poor quality and may be difficult or impossible to interpret.

A proportion of individuals in the general population have EEG abnormalities even though they do not have clinical epilepsy. They do not require anti-convulsant treatment. Several studies have found that children with autism have epileptiform abnormalities in their EEGs but, unless there are clinical manifestations of epilepsy, treatment would not be indicated. Consequently, it follows that an EEG would only be required if epilepsy was suspected based on clinical judgement.

Rarely, but importantly, epileptic encephalopathy may cause regression and this is important to consider in the differential diagnosis of autistic regression. Epileptic encephalopathy in children between 1 and 2 years (the common age for autistic regression) is associated with cognitive regression and often ataxia, unlike autistic regression where the regression preserves motor skills and autistic symptoms are most obvious. Children with the rare epileptic encephalopathy condition known as Landau-Kleffner syndrome usually present at over 3 years. Language regression is the key symptom of Landau–Kleffner syndrome but behavioural symptoms may be present and overt epilepsy may be absent. A diagnosis of epileptic encephalopathy is supported by the finding of an abnormal EEG that worsens during sleep.

Urgent diagnosis and treatment of Landau-Kleffner syndrome is important. The EEG is an essential component in establishing the diagnosis of this condition. The GDG noted that Landau–Kleffner syndrome was rare (0.3%) in studies where an EEG was performed routinely in children and young people believed to have autism based on ICD-10/DSM-IV-TR criteria. In those who undergo EEG selectively based on clinical concerns, the diagnosis of Landau–Kleffner syndrome was even rarer (0.001%). Such a result, where testing after clinical suspicions resulted in fewer cases identified, is unexpected. However, the evidence base is not adequately robust to provide a clear explanation for this finding, other than that it is a chance result given the rarity of the condition.

The GDG's considered view is that usually suspicion of this rare condition arises from clinical assessment and the EEG should only be performed to confirm the suspicion.

Neuroimaging

Cranial computed tomography (CT/CAT/PET/SPECT) or magnetic resonance imaging (MRI) can identify structural abnormalities of the brain. It is usually performed in order to establish a diagnosis on the basis of clinical suspicion. In children and young people with autism certain coexisting conditions might be associated with abnormal brain structure; for example tuberous sclerosis. The GDG considered that, for these coexisting conditions, it was likely there would be clinical suspicion of the disorder and that neuroimaging should be undertaken selectively and only if clinically necessary.

The GDG noted that while there were no studies reporting the yield of routine cranial CT scanning in autism, the yield using MRI (an alternative sensitive imaging technique) was less than 3%. Importantly, among more than 1000 children studied (routinely, selectively or as part of a research protocol) only one child was found to have tuberous sclerosis as an unsuspected condition.

Both procedures have potential harms associated with them. CT scanning is associated with exposure to ionising radiation. Patient cooperation is necessary during these procedures and general anaesthesia may be necessary for MRI.

For these reasons, the GDG concluded that neuroimaging should only be performed in children and young people with suspected or confirmed autism if there were specific clinical reasons to suspect a relevant coexisting or alternative condition, and only if the neuroimaging can confirm a diagnosis or inform its management.

Metabolic and other blood and urine investigations

The GDG considered the evidence regarding the diagnostic yield from metabolic investigation in children and young people with autism. Among more than 600 children studied (routinely, selectively or as part of a research protocol), no cases of a specific metabolic disorder were identified. Only five of 336 children in studies of routine testing had an identified abnormality and in four of these the child had regression. However, it was unclear what tests were used.

The GDG considered evidence regarding routine full blood count and selective measurement of plasma homocysteine measurement and noted that none of the children with autism who were tested had an abnormal result.

The GDG considered the evidence regarding urine testing in children with autism. With routine testing only one of 32 was abnormal; with selective testing no child among 117 tested was found to be abnormal. In a research study, urinary indoyl-3-acryloyglycine levels were not significantly different in children with autism compared with controls. The GDG considered that none of these studies provided evidence to support routine metabolic screening of children with suspected or confirmed autism or the performance of routine blood or urine tests.

There is no evidence of benefit from routine blood testing and there is potential harm in that the tests are often distressing. Blood and urine testing could only be justified in those in whom, based on clinical judgement, specific investigation was needed to look for a suspected coexisting or causative condition.

Genetic investigations

The GDG considered that the identification of clinically significant coexisting genetic conditions was an important objective and a necessary component of the autism-specific diagnostic assessment. A wide range of genetic investigations is available and the sophistication and power of these tests is increasing rapidly.

It is important to identify any genetic disorder that has medical implications for, or a potential impact on the health of, those with autism or on their profile of strengths and weaknesses. In some cases, recognition of such disorders might have important implications for genetic counselling of the wider family. The GDG considered the available evidence and concluded that for many known genetic disorders there are associated recognisable phenotypic abnormalities, such as dysmorphic features, that point to the need to perform genetic investigations. (See Caglayan 2010 for a review of genetic syndromes associated with autism).[225] However, the GDG also noted that some recognised genetic disorders are less likely to have clear physical features, especially at certain times in development, and that a further pointer to a possible genetic origin is the presence of intellectual disability.

Suspicion of a particular genetic disorder helps in the selection of the specific genetic investigations most likely to be informative. Until recently, the genetic tests generally available have been karyotype and specific DNA tests, for example for fragile X. Recently, tests of higher resolution able to detect much smaller regions of imbalance have become available in some laboratories, for example array comparative genomic hybridization (CGH array), a technique for detecting abnormalities of genomic copy number variant (CNV). Those with autism are found to have an increased rate of CNVs. Some appear to be specifically associated with autism; in other cases, the significance of the CNV is unclear and further research is needed. The GDG therefore concluded that genetic testing should not be routinely performed on all children and young people undergoing an autism-specific assessment, but should only be undertaken in those with dysmorphic features and/or intellectual disability. As technology is changing rapidly, the appropriate tests to undertake should be agreed with the regional genetics centre.

Trade-off between net health benefits and resource use

No evidence was identified regarding cost effectiveness in relation to these various biomedical investigations. The GDG considered that, without evidence of clinical and cost effectiveness, routine testing could not be recommended.

The routine use of EEG testing and neuroimaging would have significant resource implications, particularly in relation to EEG technician and radiographer time and the time required for specialist doctors to interpret the results of these investigations. The NICE guideline on epilepsy recommends that an EEG should be performed only to support a diagnosis of clinical epilepsy in children.

Similarly, the GDG considered that, given the low diagnostic yield with metabolic investigations and other blood and urine testing, biomedical investigations are not likely to be cost effective.

Finally, the GDG considered that selective use of appropriate specific genetic investigations in children and young people with clinical features suggesting a genetic disorder is justified on cost-effectiveness grounds because any genetic disorders identified might have important implications for the individual and their family, for example the identification of fragile X.

Quality of evidence

The quality of the evidence in relation to EEG and neuroimaging, metabolic and genetic testing was very low. The GDG noted that studies that identified coexisting conditions gave yields that would be expected in routine practice.

The GDG also noted that in studies where routine testing reports higher yields than clinical judgement, the inclusion of 95% CIs would have been useful information since it is a routine way of reporting imprecision.

Finally, the GDG noted that where the evidence for routine testing for EEG reports a higher rate of abnormal results than clinical judgement, the wide confidence intervals indicate the imprecision of these findings.

Other considerations

Regression of language and social communication and play skills with the signs and symptoms of autism in a child aged 2 years is unlikely to be due to epileptic encephalopathy. However, children under 2 years with certain epileptic syndromes do often regress, usually with more global symptoms and overt epilepsy. Autistic regression in children over 3 years is uncommon. In children aged 3 years or older who present with language regression and who have behaviour problems but are less obviously autistic, and especially in those with fluctuating language loss, Landau-Kleffner syndrome should be considered.

Late autistic regression after apparently normal development (childhood disintegrative disorder [CDD]) typically includes language and social skills regression, cognitive regression, regression of bowel and bladder control and behaviour symptoms of distress and overactivity. Referral to a paediatrician and/or paediatric neurologist is usual and the possibility of epileptic encephalopathy should be investigated. However, the yield of EEG and other tests has, to date, been very small.

At all times, the possibility of epilepsy should be considered in a child with autism as an additional disorder and especially if there is intellectual disability disorder. Onset in the late teenage years is common. The NICE epilepsy guidelines for investigation and management should be followed.

Recommendations

Number	Recommendation
59	Do not routinely perform any medical investigations as part of an autism diagnostic assessment, but consider the following in individual circumstances and based on physical examination, clinical judgment and the child or young person's profile: • genetic tests, as recommended by your regional genetics centre, if there are specific dysmorphic features, congenital anomalies and/or evidence of intellectual disability • electroencephalography if there is suspicion of epilepsy[vi]

8.5 Research recommendations

Number	Research recommendation
RR 4	What is the effectiveness and acceptability of comparative genomic hybridisation (CGH) array compared with current genetic testing in children and young people with identified autism?

Why this is needed

Recent scientific advances have led to the detection of genetic abnormalities that may partly or wholly explain why a child or young person has autism. As the tests become increasingly sophisticated (for example using methods such as CGH array that detect more subtle variations), more genetic abnormalities are being identified, although their causal role in autism is not always clear. Improved detection of genetic causes of autism could increase the precision of genetic counselling for parents of a child or young person with autism and also for the wider family. At present, the yield of abnormal genetic results using CGH array is known to be higher in those with dysmorphic features and/or intellectual disability, but this may extend to the wider autism population with increasing test sophistication. Before extending CGH array testing to a wider population, it is important to have a better understanding of its diagnostic yield. It is also essential to identify any negative consequences that may result from routine testing.

Importance to 'patients' or the population

Genetic syndromes (such as Fragile X, Down's syndrome or tuberous sclerosis) are known to be both risk factors for and common coexisting conditions alongside autism. More recent studies of a new genetic test, CGH array, have identified genetic abnormalities that may also be linked to autism.

The results of these studies may prove valuable to parents in terms of explaining a possible underlying cause of a child's autism leading to more targeted and precise genetically informed counselling for parents and the wider family.

However, genetic testing may have unintended consequences, such as identifying abnormalities in other family members and these could have negative effects on self-perception and family relationships. Predictive genetic testing for other untreatable disorders has had lower than expected uptake. Furthermore, at present, it is not always clear which genetic variants are pathological and which constitute normal variation.

[vi] See 'The epilepsies: the diagnosis and management of the epilepsies in adults and children in primary and secondary care' (NICE clinical guideline 20). Available from www.nice.org.uk/guidance/CG20

Undertaking genetic testing in older children and young people also needs to consider their ability to consent/assent to such testing, as current guidelines for other disorders discourages testing of children where there are no direct clinical implications of test results until children or young people are able to give informed consent themselves.

Relevance to NICE guidance

This guideline recommends genetic tests only be carried out in cases where either dysmorphic features and/or intellectual disability are present, because these are the cases where the rate of genetic abnormalities are definitely increased above general population levels.

Most research to date has focused on the rate and type of definite abnormalities, rather than the impact of testing on children/young people with autism and their families.

Further research using CGH array would lead to a stronger evidence base to inform key decision-makers as to whether wider use of genetic testing is appropriate or not when this guideline is updated. It would also alert HCPs to any negative consequences that might occur as a result.

If wider testing is not appropriate then disinvestment in genetic testing would lead to cost savings and investment elsewhere.

Relevance to the NHS

Currently the number and availability of genetic tests varies across the UK with a resulting inequity in take-up of genetic testing. Furthermore, diagnostic assessment in some settings, e.g., CAMHS, is probably less likely to include genetic testing. The costs of genetic tests (including laboratory costs, interpreting results, clinical time for obtaining consent and feeding back results) could be offset by standardizing and streamlining of genetic testing across the UK, thus ensuring equity of testing and efficiency of services.

National priorities

The Autism Act (2009) and the Statutory Guidance (2010) have highlighted autism as a national priority for the NHS and social care.

Current evidence base

There is strong evidence of a link to autism in up to 80% of known genetic syndromes.

Recent research of CGH array testing has identified many genetic abnormalities (duplications/deletions) that may play an important role in the aetiology of autism but these studies have not been validated by further research.

Equality

Standardizing genetic testing across the UK would lead to improved uptake among the population as a whole including among families living in disadvantaged or rural areas.

Feasibility

A prospective observational study of CGH array testing in all children/young people with autism in one NHS trust compared with routine testing in a second matched NHS trust.

Time needed 24 months

Outcomes to include –

- number of children/young people tested
- number of families refusing testing
- number of genetic abnormalities identified
- number of coexisting conditions identified
- costs (laboratory costs/clinical time)
- acceptability of testing (using qualitative interviews)
- number of parents requesting post-test counselling

Other comments

No other comments

9 Information and support

Introduction

Children and young people with possible autism and their carers need information they can understand and that is relevant to their circumstances. They may also require continuing day-to-day support leading up to and throughout the assessment process. This chapter considers the need for information and support from the point of referral, through assessment, at the point of diagnosis and beyond. It identifies the kinds of day-to-day support that have helped others and makes recommendations about what should be offered during the process. It does not cover specific types of therapeutic management available to children and young people while waiting for a diagnostic assessment as this was outside the scope of the guideline.

Clinical questions

What information do children and young people, and their families/carers, need during the process of referral, assessment and diagnosis of autism?

What kinds of day-to-day, ongoing support (not specific to therapeutic interventions/management of autism) should be offered to children and young people, and their families/carers, during the process of referral, assessment and discussion of diagnosis of autism?

9.1 Overview of the evidence: information during the process of referral, assessment and diagnosis

Four studies are included in the review.[132;133;135;136] These were all carried out in the UK and all were uncontrolled observational in design. Two of the studies used a postal questionnaire (a total of 1350 responses across both studies),[132;133] one study conducted structured interviews with 11 families[136] and one study conducted 15 focus groups involving a total of 70 parents.[135] All studies reported from parents of children with autism. No studies reported on responses of children or young people. The authors of one study summarised the views of participants but did not report verbatim quotes.[136]

No evidence was identified that reported the views of children and young people, or carers who were not also parents.

Details of individual studies are presented in evidence tables (see Appendix H, Table of included studies).

9.2 Evidence profile: information during the process of referral, assessment and diagnosis

Evidence of the views of patients or parents/carers of their experience from individual studies is reported in a modified GRADE evidence profile (see Table 9.1). Themes are supported by individual verbatim quotations from the included studies.

Table 9.1 Examples of information provided during the diagnostic process

Examples	Study quality						Supporting quotes from parents
	Number of studies	Study design	Limitations	Inconsistency	Indirectness	Quality	
Good information							
None identified							
Poor information							
Not providing parents with information about what kinds of help are available[135]	1	Uncon obs	Not used	Not used	Not used	Very low	*'I didn't realize he could have had help'*
Delay in diagnosis[132]	1	Uncon obs	Not used	Not used	Not used	Very low	*'The whole process is far too slow and seems to depend on the parents' persistence in pushing for a diagnosis. Months seem to go by waiting for appointment after appointment. This really prolongs the agony of what is, inevitably in any case, a painful process.'*
Professionals' reluctance to give diagnosis [132]	1	Uncon obs	Not used	Not used	Not used	Very low	*'I was fed up with professional pussyfooting around, afraid to say the dreaded word 'autism'. It seems that the very word autistic is taboo.'*
Information throughout the diagnostic process and at the time of diagnosis[133]	1	Uncon obs	Not used	Not used	Not used	Very low	*'More time and information should be given to parents at diagnosis. I was informed of the diagnosis and told I would be seen by the family services worker in a month. That was it. Not explanation. No hope. It was obvious that they knew what diagnosis they were likely to make prior to the play session but I had no prior warning. No one had the decency to tell me what might be wrong. At that point I needed to believe there was a future and I was appalled at the way I was treated. I should have had counselling there and then and lots of information given to me.'*

Examples	Study quality						Supporting quotes from parents
	Number of studies	Study design	Limitations	Inconsistency	Indirectness	Quality	
Parents' expectations – what kind of information should be provided							
Comprehensive, basic information[132]	1	Uncon obs	Not used	Not used	Not used	Very low	*'It would have helped us considerably if we had been provided, from the start, with a set of leaflets explaining the basic things parents need to know about, such as: statement of Special Educational Needs, respite care, local facilities and support groups, benefits and allowances, such as Disability Living Allowance etc., the roles and responsibilities of the numerous professionals involved, simple definitions of all the relevant terminology, advice on further reading. It took us a long time to find out this sort of information, much of which was gleaned from other parents who had also found things out the hard way.'*
Need for empathy/ reassurance[133]	1	Uncon obs	Not used	Not used	Not used	Very low	*'I believe that when parents are told during diagnostic assessment that their child is autistic, they should be reassured that there are things they can do, e.g., Lovaas, PECS, change of diet, to make a huge difference. Obviously don't mislead them to think these things are a cure, but don't lead them to believe that the future is bleak, and doom and gloom, as I was'*
Explanation of the clinical processes, especially at assessment[136]	1	Uncon obs	Not used	Not used	Not used	Very low	The study authors reported participants views in summary only, without supporting quotes
Written advice on the services available[136]	1	Uncon obs	Not used	Not used	Not used	Very low	The study authors reported participants views in summary only, without supporting quotes
Individualised advice for the child, not for the diagnosis[136]	1	Uncon obs	Not used	Not used	Not used	Very low	The study authors reported participants views in summary only, without supporting quotes

Examples	Study quality						Supporting quotes from parents
	Number of studies	Study design	Limitations	Inconsistency	Indirectness	Quality	
More information on the child's progress and development[136]	1	Uncon obs	Not used	Not used	Not used	Very low	The study authors reported participants views in summary only, without supporting quotes
Generalised information about autism[135]	1	Uncon obs	Not used	Not used	Not used	Very low	*'It would've been helpful just to have a very generalized, not a deep, I don't know I could have coped with loads and loads of leaflets.'*
Information about expectation of challenges/potential for progress for children with autism[135]	1	Uncon obs	Not used	Not used	Not used	Very low	*'I would have benefited from someone coming round…and telling me 'Don't expect this too soon', or 'Don't expect that behaviour''*

Uncon obs: Uncontrolled observational (see Methods, Section 2.6.2 for detail)

9.3 Evidence statement: information during the process of referral, assessment and diagnosis

Good information

No studies were identified that reported examples of good information.

Poor information

Three papers reported evidence of poor information, which was:

- Lack of information about what kind of help is available

Parents' expectations of the kind of information should be provided

Four papers provided evidence about parents' expectation of the kind of information that should be provided. Themes are classified into five groups: information about ASD, information about children with ASD, information about the diagnostic procedure, information about available support and information about available support organisations. Parents expected to be given:

- information about ASD
  - simple definitions of all the relevant terminology
  - advice on further reading.
- information about the diagnostic procedure
  - the roles and responsibilities of the numerous professionals involved
  - explanation of the clinical processes, especially at assessment
- information about children with ASD
  - liaison with education/ the educational special needs process
  - individualised advice about the child,
  - realistic expectations of the challenges that many children with ASD face, as well as the potential for progress and change
  - advice on treatment options available
- information about available support
  - benefits and allowances, such as Disability Living Allowance
  - information about respite care
- information about available support organisations
  - local facilities and support groups.

Parents' expectation of when information should be provided to the family

Only one study included evidence for when information should be provided. Parents of younger children wanted information immediately at the time of diagnosis. The parents of the oldest children suggested that information should be phased over a period of time after the diagnosis.

9.4 Evidence to recommendations: information during the process of referral, assessment and diagnosis

Relative value placed on the outcomes considered

Evidence of 'good information, 'poor information' and 'parent expectations' were identified for this question.

Trade-off between clinical benefits and harms

The evidence identified immediate and longer term benefits of providing accurate, appropriate and sympathetic information to a child or young person and their family or carers. The GDG concluded that children, young people and their families/carers require different kinds of information which needs to be tailored to the child's or young person's biological and developmental age, their current health state and the impact of their condition on their lives and that of their families or carers.

The potential harms were associated with the way that information was given by healthcare professionals. Parents also reported harms due to poor information leading to delays in accessing services and in acquiring a comprehensive understanding of their child. Parents said they needed information about autism, its impact on the child or young person and their family or carers and the availability of local and national services and supports. Parents also asked for a named person that they could contact locally for further information.

Parents wanted information on diagnosis and treatment: they asked for information to be relevant to the individual child or young person, and to include information about what to expect with future developmental milestones. Parents asked for specific information about what would happen next but there were differences in how much information parents wanted at different times .

Only one study asked parents when they wanted information and the responses differed by the age of the child. Parents of older children discussed concerns about managing autism in school and during adolescence, and worries about leaving school. These were not found to be the concerns of parents and carers of younger children with autism.

None of the studies addressed the value of specific types of day-to-day support, such as a telephone helpline. The GDG agreed that it was not possible to make a specific recommendation about which types of day-to-day support should be offered to children throughout the autism pathway given the lack of evidence and the wide range of practice within the National Health Service (NHS).

Trade-off between net health benefits and resource use

The GDG considered that the provision of good quality information, given at the right time and individualised for the specific circumstances of the child or young person, was not an expensive intervention. The evidence suggested that good information could have a positive impact on welfare, both of the child or young person and their parents or carers, with secondary impacts on the wider family. The provision of individualised information is good practice in many child development teams and is a relatively inexpensive means of keeping the family/carers up to date with local resources and information that is directly relevant to their circumstances, such as the child's or young person's age and the severity of impairment. No evidence of cost effectiveness was identified that addressed the value of information in improving quality of life. However, it was the GDG's opinion that sharing information specific to the child or young person was likely to be a good use of NHS resources by supporting the family to seek appropriate help early on and thereby increasing the child's welfare and reducing family stress.

Quality of evidence

The studies reported the views of parents whose children were going through the process of diagnosis. No evidence was identified that reported the views of children and young people, or carers who were not also parents.

Only four studies were identified that addressed this question, all of which came from the UK. They all reported qualitative evidence with small samples of self-selected participants. There was not sufficient

evidence on which to base recommendations for the NHS but the results concurred with the views and experiences of the GDG members and there were no surprising findings.

Other considerations

The GDG agreed that information about the support that is available can be extremely important to children and young people and their families and carers. It provides support, reduces stress and improves quality of life while additional assessments or interventions are continuing. The information should focus on local and national support organisations specific to autism as these services are well set up to provide immediate and long term support to children, young people and their families from the start of the autism diagnostic assessment and beyond. Information should also be provided on organisations that can provide information on welfare benefits and on educational support and social care. The information needs to be up to date and relevant to the specific circumstances of the child or young person. It should also be accessible to people with additional needs, such as physical, sensory or intellectual disabilities, and to people who do not speak or read English.

Young people transferring to adult services require specific support and information relevant to their circumstances. They need information about what will happen next, as well as long term support to prepare for moving into adult services.

Information about the child or young person also needs to be shared with other professionals involved in the care of the child or young person so that everyone is fully informed and can support the child or young person if further assessments are required, and provide continuing support to meet the needs of the child or young person and their family or carers.

Recommendations

Number	Recommendation

68	Provide individual information on support available locally for parents, carers, children and young people with autism, according to the family's needs. This may include:
	• contact details for:
	  ○ local and national support organisations (who may provide, for example, an opportunity to meet other families with experience of autism, or information about specific courses for parents and carers and/or young people)
	  ○ organisations that can provide advice on welfare benefits
	  ○ organisations that can provide information on educational support and social care
	• information to help prepare for the future, for example transition to adult services

9.5 Overview of the evidence: support for children, young people, their families and carers

Four studies were included in the review: three were carried out in the UK[133;135;136] and one in the USA.[226] All were uncontrolled observational in design. One study included structured interviews,[136] one used short, open-ended interviews with five families,[226] one included 15 focus groups with a total of 70 parents[135] and one was a postal questionnaire[133] with a total of 55 responses.

Details of individual studies are presented in the evidence tables (see Appendix H, Table of included studies).

9.6 Evidence profile: support for children, young people, their families and carers

Table 9.2 summarises the qualitative evidence identified in the included studies of good support, poor support and the kinds of support parents would like to receive.

Table 9.2 Examples of support provided during the diagnostic process

Examples	Study quality						Supporting quotes from parents
	Number of studies	Study design	Limitations	Inconsistency	Indirectness	Quality	
Good support							
Involving the school in child's assessment [226]	1	Uncon obs	Not used	Not used	Not used	Very low	*'It is a whole attitude shift and once you make that, things fall into place. I think that's what [VT-] RAP does. It pushes that button that gives people an attitude shift, I know it did for the school team….it made us feel like somebody was coming to our rescue. We dialled 911'*
Involving family in child's assessment [226]	1	Uncon obs	Not used	Not used	Not used	Very low	*'We really felt like we were a part of the team, and somebody was listening to or questions. And while we always knew that a lot of the questions may not have answers, we felt that while there weren't answers there were a lot of people out there who could give us ideas.'*
Making individual team members to become more engaged in supporting children [226]	1	Uncon obs	Not used	Not used	Not used	Very low	*"It was wonderful having the SLP join the consulting team. She is learning, too. She goes right for it. She's a practical minded person and I value her opinion. She finds out if she doesn't know something, and there is good follow-through. Her involvement really benefited us'*
Facilitating a shift in the family's attitudes and behaviours [226]	1	Uncon obs	Not used	Not used	Not used	Very low	*'[VT-RAP] was a complete asset to our son's future. It helped us look at him in terms of how the learns and doesn't learn. We [now] accommodate him instead of him accommodating us.'*
Support from school [135]	1	Uncon obs	Not used	Not used	Not used	Very low	*'And since she's been at the school, they've [teachers] been very helpful, they've taught me a lot about the autism'*

Examples	Study quality						Supporting quotes from parents
	Number of studies	Study design	Limitations	Inconsistency	Indirectness	Quality	
Providing opportunities for families to contact each other [135]	1	Uncon obs	Not used	Not used	Not used	Very low	*'I feel quite lucky, because I did have that group for parents of newly diagnosed children'*
Poor support							
Not providing any support [135]	1	Uncon obs	Not used	Not used	Not used	Very low	*'It's that bad, it's that isolating, and I feel that shoved out of society'*
Lack of immediate help and support in times of crisis [135]	1	Uncon obs	Not used	Not used	Not used	Very low	*'It's still slightly bizarre or surreal in my own mind, because I rang this number, which I thought would be answered immediately, and I was told that I was in a queuing system, could I be patient and wait, while this adolescent was waving a knife in front of me'*
Professionals not always easily contactable[135]	1	Uncon obs	Not used	Not used	Not used	Very low	*'They need to be more available.'*
Little continuity or communication between the various services and authorities involved[135]	1	Uncon obs	Not used	Not used	Not used	Very low	*'I find it very frustrating how social services, health and education…all work very much independently of one another'*

Examples	Study quality						Supporting quotes from parents
	Number of studies	Study design	Limitations	Inconsistency	Indirectness	Quality	
Offering support immediately after communicating the diagnosis[133]	1	Uncon obs	Not used	Not used	Not used	Very low	*'More time and information should be given to parents at diagnosis. I was informed of the diagnosis and told I would be seen by the family services worker in a month. That was it. Not explanation. No hope. It was obvious that they knew what diagnosis they were likely to make prior to the play session but I had no prior warning. No one had the decency to tell me what might be wrong. At that point I needed to believe there was a future and I was appalled at the way I was treated. I should have had counselling there and then and lots of information given to me.'*
Parents' expectations – what kind of support should be provided							
Offer more guidance to help prepare for the future[136]	1	Uncon obs	Not used	Not used	Not used	Very low	The study authors reported participants views in summary only, without supporting quotes
More practical support (e.g. review more frequently, offer intensive one-to-one sessions[136]	1	Uncon obs	Not used	Not used	Not used	Very low	The study authors reported participants views in summary only, without supporting quotes
Offer more support, regardless of level of disability[136]	1	Uncon obs	Not used	Not used	Not used	Very low	The study authors reported participants views in summary only, without supporting quotes
Co-ordinate information better (e.g. share feedback from clinic)[136]	1	Uncon obs	Not used	Not used	Not used	Very low	The study authors reported participants views in summary only, without supporting quotes

Examples	Study quality						Supporting quotes from parents
	Number of studies	Study design	Limitations	Inconsistency	Indirectness	Quality	
Providing parents with support on demand[135]	1	Uncon obs	Not used	Not used	Not used	Very low	*"It should be there all the time, whether you need it or not, before you get to that stage [breaking point]'*
Establishing a more coherent service, involving health, education and social services[135]	1	Uncon obs	Not used	Not used	Not used	Very low	*'Tri-agency alliances are a must'*
Appointing someone as a 'key worker'[135]	1	Uncon obs	Not used	Not used	Not used	Very low	*'Someone who is able to communicate between the agencies'*
Providing parents with respite care[135]	1	Uncon obs	Not used	Not used	Not used	Very low	*'People who would befriend him…like a buddy system, where people would befriend and actually just sort of spend time…and actually take him outside the family environment…It alleviates some of the burden from me and my wife, and particularly my other children.'*

Uncon obs: Uncontrolled observational (see Methods, Section 2.6.2 for detail)

9.7 Evidence statement: support for children, young people, their families and carers

Good support

Two studies provided evidence of good support for families. Example of good support were:

- involving the school and the family in the child's assessment
- providing opportunities to work on social skills (for example supporting them to take turns in a preferred activity or be involved in a specific task in a team game)
- facilitating a shift in the family's attitudes and behaviours
- support from school, such as providing advice, offering placements at school
- providing opportunities for families to have contact with each other.

Poor support

Two studies provided evidence of poor support for families. Examples of poor support were:

- the service did not provide parents with any support
- no provision of emergency or immediate support in times of crisis
- professionals are not always easily contactable
- little continuity or communication between the various services and authorities involved.

Parents' expectations of what kind of support should be provided

Two studies included evidence of parents' expectations of what kind of support should be provided. The parents' expectations were grouped as: 'support for children with autism'; 'support for the family' and 'support for assessment'. Example of what parents expected to be given included;

- support for children with autism
    - offer more support, regardless of level of disability
- support for the family
    - offer more guidance to help prepare for the future
    - provide more educational support
    - provide parents with informative leaflets about children with difficult problems
    - respite
- support for assessment
    - coordinate information better, for example share feedback from the clinic
    - appoint someone as a 'key worker'
    - establish a more coherent service system, involving health, education and social services
    - provide written information on what problems to expect
    - offer support immediately after communicating the diagnosis.

9.8 Evidence to recommendations: support for children, young people, their families and carers

Relative value placed on the outcomes considered

The GDG considered that reports of 'good support, 'poor support and 'parents' expectations' would be the most useful evidence for addressing this question.

Trade-off between clinical benefits and harms

The evidence that was identified for this question was from interviews with parents of children who had been through a diagnostic assessment for autism. It illustrated the views of small groups of parents on what they valued in the support they received and what they would like to be different. The GDG took an overview of this evidence and identified specific ideas and suggestions which it believed could be turned into practical recommendations for the NHS.

The GDG recognised that there were other views expressed in the evidence which were more difficult for individual clinical teams to implement and would require far-reaching and long term changes to the way that services are organised in the NHS. The need for more streamlined data processing to simplify communication between agencies was one such idea. The GDG strongly supports this, but sees it as a part of a wider need to improve communication between agencies and not specific to the needs of families and children with autism.

The GDG's view is that the right support and intervention earlier on could have a very significant impact on the welfare of the child or young person and their family.

One of the important themes reflected in the evidence, and a viewpoint supported by the GDG, is that there should be enhanced communication between the assessment team and the child's educational setting. The GDG members agreed that a visit to the school by a member of the assessment team or having a teacher present during a follow-up meeting with parents and carers after assessment would be a highly beneficial intervention, given the problems that some families have with feelings of isolation and helplessness during and after assessment for autism. For children educated at home, a visit by the autism team to discuss the needs-based management plan is also warranted.

Another theme supported by the GDG is provision of services for the child or young person during the diagnostic process. While waiting for assessment and throughout the process, services should be in place to support the child's or young person's needs. It is outside the remit of this guideline to specify what these services should be. However, the GDG's view is that they should not be delayed pending diagnosis and should be specific to the needs of the child or young person and their family.

The role of a 'key worker' is mentioned in the qualitative evidence. The GDG's view is that a coordinator role is valuable as it provides a link between the autism team and the child or young person and their family/carers. The GDG agreed that this role should be performed by someone within the autism team and this may be different from a generic key worker role. The role of coordinator should include offering support and information during and immediately after a diagnostic assessment.

The GDG concluded that a case coordinator should be appointed from within the autism team once the decision has been reached to proceed to a full diagnostic assessment to support a child or young person through the process. The case coordinator should be the main point of contact about a specific child or young person for parents and carers and for the autism team. This should improve communication between families and professionals undertaking the assessments. The role also includes responsibility for gathering information prior to assessment (although an administrator would be likely to request this information directly from other services) to prevent unnecessary delays in decisions taken by the autism team, which is another source of stress to families. The idea of having an individual responsible for communicating with families is not new to the NHS; for example, the Early Support materials which are already used widely in the NHS promote the use of key workers for those families who are in contact with a large number of different services or agencies.

The evidence suggests that families consistently feel let down by the lack of support and information during the diagnostic assessment. Provision of information about local support services specific to the age of the child or young person and their circumstances should be provided to all children and young

people and their families to improve their quality of life during and after diagnosis. The case coordinator's role also includes keeping the family/carers up to date about assessments and arranging provision of support and information.

Trade-off between net health benefits and resource use

The evidence presented in this review suggests that the provision of support for children, young people and families is a priority for the parents and families of children and young people going through assessment. This is not always seen as the priority for the healthcare professionals undertaking the assessment because of the pressure to reduce waiting times for assessment and to see as many children as possible for assessment. From the point of view of families, the welfare benefits of appropriate support during the process of assessment may mitigate the stress of waiting for a definitive diagnosis. Furthermore, if appropriate support and intervention can be accessed without the need for a definitive diagnosis of autism, then the pressure on professionals to speed up the process of assessment and reduce waiting times are likely to reduce.

There were no health economic studies or externally verifiable data on the costs or outcomes of support for families during diagnosis. It is not possible to make a strong case for this support on the basis of evidence, but it is the GDG's opinion that the experience of assessment is likely to be improved by the early provision of appropriate support and advice to families. It is also the opinion of the GDG that non-therapeutic support is not costly and may reduce unnecessary and inappropriate use of other NHS resources by allowing the family to get advice on how and when to use the services that are already in place.

It was the GDG's view that some of the healthcare resources should be identified to improve communication between health and education agencies, as well as social care and the voluntary sector, involved in the assessment and continuing support of the child or young person who has undergone a diagnosis for autism regardless of the final diagnostic category they are given. It is also their view that the case coordinator role is integral to the team and therefore does not require additional professional time or healthcare resources, but a change in how professional time is used to improve communication and support for families.

The GDG considered that the costs of professional time to liaise with educational colleagues and home educators was likely to be a cost-effective use of resources in both increasing the effectiveness of immediate and continuing support and management and reducing the need for unnecessary consultations as a result of the breakdown of communication between health and education professionals.

Quality of evidence

The quality of the evidence was judged to be very low because the studies were uncontrolled observational in design. The interview data concurred with the views of the GDG and there were no surprising findings.

The limitation of only using qualitative evidence is that the views expressed relate to specific interventions which may not be reproduced widely in the NHS. It may also give too much weight to opinions and views that are not widely shared among parents and carers. However, the consensus of the GDG members was that the views expressed in the evidence reflected the views of many parents and carers going through diagnostic assessment in the NHS.

Other considerations

The consensus of the GDG members is that, once a diagnostic assessment has been completed, regardless of the outcome, a model of enhanced communication between professionals should follow as it has a direct impact on the immediate support for the child or young person, and may set a good pattern for communication between professionals for the long term future. The follow-up visit by a healthcare professional to the educational setting (or home, where a child is educated at home) of the child or young person is already good practice in many parts of the NHS. The visit has a number of goals, the most important of which is ensuring long term agreement between professionals in health and education on how a child's or young person's needs should be met in the immediate and long term future. It is the GDG's view that good communication between professionals is vital in ensuring that the

messages that children, young people, families and carers receive from professionals is helpful and consistent, and that there is effective feedback from families to professionals without the need for a lot of unnecessary repetition. This should also ensure that changes to the child's or young person's circumstances, or those of their family, over time are well understood and incorporated into any management and support strategies across health, education and social care.

Recommendations

Number	Recommendation
41	A case coordinator in the autism team should be identified for every child or young person who is to have an autism diagnostic assessment.
42	The autism case coordinator should: • act as a single point of contact for the parents or carers and, if appropriate, the child or young person being assessed, through whom they can communicate with the rest of the autism team • keep parents or carers and, if appropriate, the child or young person, up-to-date about the likely time and sequence of assessments • arrange the provision of information and support for parents, carers, children and young people as directed by the autism team • gather information relevant to the autism diagnostic assessment (see recommendation 38).
65	With parental or carer consent and, if appropriate, the consent of the child or young person, make the profile available to professionals in education (for example, through a school visit by a member of the autism team) and, if appropriate, social care. This is so it can contribute to the child or young person's individual education plan and needs-based management plan.

10 Service descriptions and resource use

10.1 Introduction

The goal of diagnostic assessment for autism is to identify children who have autism as quickly as possible so that they can access appropriate services and support. It is important that resources are used efficiently and effectively in the recognition and diagnosis of autism because healthcare resources are always scarce. It is important to demonstrate that the recommendations developed for this guideline improve the way in which a diagnosis of autism is arrived at and improves the experience of the process for children, young people, their families and their carers.

As with all health service decision-making, to do more of one thing means doing less of something else where resources are finite. The guideline development group (GDG) has considered the impact of its decisions on resource use at every stage of the pathway, and has made its deliberations explicit in the translations of the evidence to recommendations. These deliberations have not, however, been made on the basis of externally verifiable evidence of cost effectiveness because no evidence could be identified for any of the decision points in the care pathway.

In the end, no health economic modelling was undertaken for this guideline. There are a number of reasons for this, which requires some explanation.

The focus of this guideline is on the recognition and diagnosis of children and young people on the autism spectrum. In order to identify whether a diagnostic intervention (for example an autism-specific diagnostic tool such as Autism Diagnostic Interview – Revised [ADI-R] or Autism Diagnostic Observation Schedule [ADOS]) is likely to be cost effective, it is necessary to understand the consequences of diagnosing autism for the individual and their family/carers in terms of their welfare in the immediate and longer term. There is no clearly identifiable means of expressing 'effectiveness' when considering a behavioural or developmental disorder or condition such as autism. Autism manifests itself in children and young people very differently across the spectrum; both between individuals and within individuals as they grow older. Autism-related disability is very difficult to quantify employing the usual metrics of health economic evaluation (the quality adjusted life year [QALY]) but this is not the only way of measuring health and wellbeing. But the methods of economic evaluation used by NICE require consideration of outcomes in terms of the QALY to allow for explicit comparison of healthcare resource use across different areas of the National Health Service (NHS). For this guideline, an explicit unit of health outcome that could be translated into a QALY could not be identified because of the nature of the condition, either in the literature or by the members of the GDG.

Furthermore, at present there is not enough evidence that a single diagnostic 'test' is sufficient for diagnosing autism. There are developments in genetic testing which may result in a definitive test in the future but the available evidence does not support this. Therefore, an economic model that considered the diagnosis of autism as a comparison between one test and another, or compared with current practice, was not appropriate. Also, the genetic tests which are considered in the guideline are not included in an economic model because they do not diagnose autism. Their purpose is to diagnose other coexisting conditions or identify the cause of autism in children and young people diagnosed with the condition. The value in identifying a cause of autism is not easy to define or measure as it relates to decision-making about future family planning and the value to families of understanding why a child or young person has autism.

An evaluation of biomedical and genetic tests for other conditions is not straightforward either since it would have to consider the effectiveness of identifying and managing conditions other than autism, then consider the alternatives for management of that condition to arrive at a decision about whether it was

cost effective to test children and young people with autism for that condition. The studies that were identified for the clinical review of biomedical tests did not evaluate the effectiveness of a biomedical test in identifying a specific condition, but reported the 'yield' of a test in terms of how many abnormal results were identified. This evidence is one step removed from identifying a specific medical condition. Many of the abnormal results identified in these studies had no clinical significance. Even if the evidence had allowed the GDG to identify the accuracy (sensitivity and specificity) of a test in identifying a specific condition, to review the evidence for treating or managing other conditions in children with autism would have been outside the scope of the guideline.

Finally, the aim of the diagnosis assessment is not only to arrive at a firm diagnosis of autism but also encompasses a far wider assessment of the child or young person's 'profile' of strengths and weaknesses in order to inform future management. The assessment of strengths and weaknesses may require specific assessments, but only in some children and young people. A literature search was not undertaken for this question. It was not possible to conceive a study design that could evaluate the effectiveness of assessments for profiling strengths and weaknesses to inform future management in children and young people with autism. The recommendation is that the autism team members use their expertise and clinical judgement to consider which assessments to proceed with.

These problems in identifying or even conceptualising the type of evidence to inform recommendations are not confined to autism but are somewhat generic in guidelines on developmental/behavioural and mental health conditions in childhood and adolescence. The complexity, both of the condition and of healthcare professionals' decision-making, makes it difficult to carry out research that can directly inform a set of practical healthcare recommendations. Nevertheless, decisions are made every day by individual clinicians and therapists about how to recognise and diagnose autism. The variation in autism diagnostic services across the NHS in the UK (the 'postcode lottery') is a problem which this guideline has sought to address.

The GDG considered carefully how to make recommendations in the absence of evidence of clinical and cost effectiveness. One approach was to make its deliberations about the cost effectiveness of recommendations explicit throughout the guideline, which has been done. The second is to describe what good existing autism diagnostic services look like; that is, services that already follow many, if not all, of the recommendations in the guideline. The purpose is to give an idea of the ways that services might be configured to deliver the quality of care recommended in this guideline. It is not exhaustive, but shows how resources are used and which healthcare professionals are involved in which parts of the diagnostic pathway.

The rest of this chapter describes five services in the NHS which could be seen as examples of good practice in autism diagnostic assessment. The examples also give contextual information about how resources are employed, the pressure points for health services and aspects which might increase or decrease costs for the NHS. The services that are described are real services in the NHS. They include inner city and rural/urban services, hospital- and community-based services and a specialist regional referral unit that accepts referrals from other autism teams for children and young people with especially complex diagnoses. These are not provided as exemplars for service provision in the NHS, but to offer those who wish to set up a new service or to improve their service in line with the current guideline some examples of how this is being done elsewhere.

The descriptions of the services also give examples of how resources can be used in different ways to achieve the same goals. (The data on time taken to complete specific parts of the assessments in Section 10.2 are estimates from one individual clinician working in that service. This data has not been verified by other evidence.) Section 10.3 then provides a systematic resource use analysis to describe how the five services are configured in terms of the way that NHS personnel are deployed to do different kinds of tasks at different stages of the autism diagnostic pathway.

As a whole, this chapter describes:

- how multidisciplinary teams are organised
- the workload of multidisciplinary teams
- how such teams work together and decide which types of assessments and observations are required for different children and young people
- how services are coordinated

- the proportion of children and young people receiving non-core elements of assessment
- how the teams feed back information to families regarding diagnosis and address diagnostic uncertainty
- the support available during the process of diagnosis.

The first section describes how five services are configured, with an estimated average time for each part of the assessment. The average time for assessment is affected by the experience of the teams, their level of integration with and access to other professionals, as well as the type and severity of the behaviours and conditions each team has the experience and ability to assess.

The second part considers resource use, but not the cost of these services. Tariffs for an autism assessment are not published for the NHS. These services are not costed because the resource use is not exhaustive and is based on interviews with only one individual which the GDG did not believe was a sufficiently robust basis on which to derive cost data. A 'bottom up' cost analysis would require data on the costs of staff and the cost of overheads. The mean salary for specific healthcare professionals is published every year for the NHS in a publication called *The Unit Costs of Health and Social Care*. This provides an estimate of the midpoint on a salary scale for different ways of counting how healthcare professionals work, for example cost per contract hour, cost per patient-related hour or per face-to-face patient contract. Generic 'per patient contact' data are reported differently for different professionals, making like for like comparisons difficult. In addition, the GDG was clear that the level of competency and expertise required in an autism team implies healthcare staff costs which are higher than the midpoint on the salary scale. For each individual service, an individual cost analysis could be undertaken, requiring detailed understanding of the time taken to undertake each specific element of the diagnostic assessment. This data is not available for individual teams. For illustration, the GDG was able to provide an estimate for the approximate amount of time taken to perform each task, but this estimate was not considered to be sufficiently robust to be a basis for a cost analysis of an autism assessment for the NHS. For that reason, cost data were not reported for this guideline

10.2 Descriptions of specific autism diagnostic services

The following descriptions of specific services in England and Wales are based on interviews with five GDG members who work in these diagnostic services. In these interviews, the GDG members described the usual components for assessments and the resource use of their services.

10.2.1 Service 1: outer city child development centre

The Social Communication Assessment (SoCA) pathway is one of several care pathways offered by the multidisciplinary child development team. Our referrals come mainly from primary care (GPs and health visitors) and from speech and language therapists working in the community. The remainder come from hospital paediatricians, education (special educational need coordinators [SENCOs] or educational psychologists) and social care. Increasingly, the referrals come on a Common Assessment Framework CAF) form, especially those from health visitors and speech and language therapists (SLTs).

There is a two-stranded assessment service for children with possible autism spectrum disorders in the borough: children under the age of 6 years and older children and young people who have additional significant learning disabilities are seen in the child development centre (CDC) while children over 6 years who do not have learning difficulties are seen by the child and adolescent mental health service (CAMHS). Although the distribution of resources across services means that this system is likely to continue for the foreseeable future, we are working towards a single point of entry for all referrals to the two services, to simplify matters for both referrers and families.

All CDC referrals are discussed at a weekly multidisciplinary referrals meeting which lasts about an hour. Those children whose referrals suggest possible autism are entered directly into the SoCA pathway. Where the information in the referral indicates more isolated problems, such as a specific language disorder or behavioural problems, the referral is passed on to the appropriate single service, such as speech and language therapy or community-based services able to offer behavioural support. If the referral is suggestive of an overall developmental delay, the children are seen in a general child

development team clinic: some of these children may later enter the SoCA pathway if their social communication difficulties become apparent at a later stage.

The core SoCA team comprises a consultant community paediatrician, a SLT, and occupational therapist (OT) and a clinical psychologist. There is also input from an educational psychologist and specialist health visitor, and from the Early Support keyworking service. We have a team meeting once a month to discuss the children who are being, or have been, assessed. Ad hoc meetings are also convened to discuss operational issues.

A letter is sent to the parents of all children entered into the SoCA pathway within a week of the referral being received, along with a leaflet about social communication disorders and information about the assessment process that the child will be offered. This assessment consists of two stages. The first, generic, stage applies to all children on the SoCA pathway. For each of these children we gather information about their general health, hearing, language, motor skills and sensory processing. In practice this entails appointments with a paediatrician (usually a specialist paediatric registrar), an audiologist, an SLT and an OT, although some of these assessments may already have taken place prior to referral and do not then need to be repeated. With parental consent we also request a report from the child's nursery or school, specifically asking for information about their functioning in the classroom setting and their peer relationships. Some children will also be offered a home visit from our specialist health visitor or from a key worker. If the child is already known to the educational psychology service, we also obtain the education psychology report. For those children with significant developmental delay, or those with dysmorphic features, we arrange karyotyping and fragile X assay. Other biomedical investigations, such as further blood tests or imaging, are only arranged after discussion with the consultant if clinically indicated on the basis of the physical and neurological findings.

Once all the reports from the various assessments are available, each child is discussed at the SoCA team meeting, which is attended by all the core professionals and the educational psychologist. The amalgamated information, including general developmental history, medical history and clinical observations from the different settings, is reviewed by the team and compared against ICD-10 criteria. For some children – about a quarter to a third of the total – the diagnosis of autism is clear at this stage. These children's parents are then invited to a feedback clinic with the consultant community paediatrician to discuss the assessments: the diagnosis is explained to the parents and the intervention to be offered is discussed and initiated. For a second, smaller, group of children, it will be equally clear that they do not have autism; these parents are also offered a feedback appointment with either the consultant paediatrician or the specialist health visitor, and the appropriate care pathway put in place.

The remainder of the children do not have a clear-cut diagnosis at the end of this stage and are offered a further, autism-specific diagnostic assessment. This entails a semi-structured interview covering the developmental history and current behaviour, usually using ADI-R, and a standardised, play-based observation of the child's social communication using ADOS. The two components of the assessment are carried out concurrently, usually in one large clinic room, so that the parents are able to observe ADOS while they themselves are being interviewed. ADI-R is usually carried out by the consultant paediatrician and ADOS by one or two other team members (such as the SLT, the OT and/or the clinical psychologist). This part of the clinic takes about 2 hours. The family then have a break of about 45 minutes to 1 hour, while the team members score ADOS and discuss their findings, in conjunction with the previous assessments carried out during the earlier generic stage of the process. The assessors then meet with the family to give immediate feedback, with an explanation of the diagnosis that has been reached and the reasons for this. In a small proportion of cases the diagnosis remains unclear: sometimes we arrange for one or two team members to go to observe the child in school or in a social setting; for others we agree to monitor their progress and to repeat ADOS in a year's time. Very occasionally the child may be referred for a tertiary opinion.

At the end of the generic stage of assessment, some children may appear to have autism but are developmentally too delayed for the autism-specific diagnostic assessment. These children are offered therapeutic intervention and their progress monitored, with a view to offering a formal diagnostic assessment at a later stage.

We aim to complete the initial, generic, assessment within 12 weeks of referral and the diagnostic assessment within a further 6 weeks, but have not been able to meet this target because of a shortage of appropriately skilled and trained professionals. About 100 children a year are referred into the SoCA

pathway; we run a total of seven clinics a month; and one child is seen in each ADOS/ADI-R diagnostic clinic, and two are seen in each ’stage 1 feedback‘ clinic, each appointment being for 1.5 hours.

When the professionals meet immediately after the diagnostic assessment, one of the therapists puts together a list of suggested activities to help the child; these are given to the parents during feedback. The parents are also given written information about autism, translated into other languages where appropriate, and information about the interventions that they will be offered, such as EarlyBird.

Reports are written after the clinics: the professionals type their own sections of each report which are then compiled into one document, including a summary of the relevant background information and information from previous assessments, plus, where applicable, details of the information obtained from ADI-R and the observations made in ADOS. The recommendations already given to the parents are appended to the report. Reports are sent to the parents, GP, health professionals working with the child and educational psychologist. A second copy of the report is given to the parents to share with their child’s school or nursery.

10.2.2 Service 2: Rural/urban multidisciplinary, multiagency team

Referral to specialist community child health services (community paediatricians, paediatric therapists and CAMHS) is via a single point of entry system from primary care, education and social care. Where there are concerns about a child’s social communication skills, they may be referred initially to a variety of services, most commonly speech and language therapy, community paediatrics or CAMHS, or a combination, depending on the referrer’s view of the main presenting problem. Referral meetings take place twice a month. Initial appointments are offered within the service referred to and further assessment and intervention is planned. If there are concerns about possible autism, the initial clinician needs to make additional referrals while supporting the child and family.

To start a diagnostic assessment, there needs to be agreement that this is appropriate between two of the following professionals: a community paediatrician, a speech and language therapist and an educational psychologist (from the local authority). By this stage most children will have a multidisciplinary team (MDT) involved and will be receiving appropriate therapy and school-based interventions. If it is not clear that they should move into a diagnostic assessment, their progress can be monitored and the situation reviewed.

Referral for an autism diagnostic assessment is made with explicit signed consent from both parents (where applicable). A lead professional is identified from among the professionals already involved. The educational psychologist and SLT carry out any further, more specialised assessments. This also involves observation at school or nursery. The community paediatrician completes a structured interview, generally using the Diagnostic Interview for Social and Communication Disorders (DISCO) with the parents. All educational psychologists and most SLTs and community paediatricians take part in these assessments, according to a common approach supported by a toolkit document (which includes the care pathway, expectations of inputs from different professional groups and diagnostic criteria). In the last few years, there have been around 26 of these assessments per year (the population of the area our team covers is 200,000). The average time to complete the autism diagnostic assessment is 18 weeks.

Each professional produces a report which is circulated to those involved in the assessment and given to the parents. When each of the three professionals has completed their contribution, a final review meeting is held. Other professionals who are already involved with the child are also invited, for example the OT or CAMHS professionals. In addition, members of staff from the child’s nursery or school are also invited, although decisions concerning diagnosis are made by the main assessment professionals. Often the meeting is held at the school or nursery to facilitate this. The first part of the meeting is held with professionals only, to review all information on the child and, using ICD-10 criteria, determine whether an autism diagnosis is met. If it is not, then an agreed narrative formulation (one or two sentences) of the child’s difficulties is written. Other coexisting or alternative diagnoses may also be considered.

The outcome of the assessment is fed back to the parents in a one-to-one meeting with the lead professional. The family then join with the professionals to agree a list of strengths and needs of the child and an action plan. The structure of the final review meeting is flexible in order to meet different families’ needs: sometimes the whole meeting happens without the parents, and the outcome is fed

back on a separate occasion (very shortly after the meeting has been held), together with the proposed strengths, needs and action plan, for their views and input. The family is given information about the diagnosis and local autism support services, including voluntary agencies. The notes of the meeting are typed up, together with all the assessment reports and details of how the child met the diagnostic criteria. This forms the final report and is sent to the parents, GP, school and MDT.

If there is uncertainty about the diagnosis, the case will be discussed with the steering group (local expert panel). Occasionally, referrals are made to tertiary services.

10.2.3 Service 3: rural/urban service

The diagnostic service comprises a psychiatrist, a psychologist and an SLT as core, regular members. The multidisciplinary team also has regular input from junior doctors as part of their training and occasional input from nurses specialising in learning disabilities who may carry out some pre-clinic observations.

Referrals come from paediatrics and CAMHS, so the children who have been referred will have already had some autism diagnostic assessment. Referrers are generally seeking further assessment in terms of complex presentation, intellectual disability or a second opinion. Referrals are screened and discussed at our bi-monthly (twice a month) meetings by the psychiatrist and psychologist. The administrator also attends this meeting. If the referral is accepted, and mostly these are, the administrator will set up a clinic appointment and seek further information as deemed appropriate by the psychiatrist and the psychologist. Some referrals come with extensive information, others with less. The SLT is informed of the details of the child or young person and the clinic appointment and she liaises with her colleagues in speech and language therapy to arrange assessment and any intervention.

The multidisciplinary team administrator opens a file and follows up requests for further information. She also contacts the family with an appointment time and further information on the diagnostic assessment and what to expect. Families are advised to bring further information to the clinic appointments, such as recent school reviews and copies of any other reports. Not all families bring further information but when they do this can be very helpful.

On the day of the clinic assessment, the multidisciplinary team meets to review the information before seeing the child/young person and their family. The family and the child/young person meet with all the multidisciplinary team members to introduce everyone and to describe the assessment process. The psychiatrist then conducts an interview with the parents/carers to obtain a developmental history. The psychologist and SLT carry out an ADOS assessment in most cases. They also carry out some assessment of their own based on the information received. The assessment can take approximately 1 to 2 hours. Following the interview and the assessments, these will be scored, rated and discussed. If the outcome of the interview and ADOS clearly indicate autism, the family will be given a diagnosis on the day. If the outcome is less clear, the family will be advised as to the next steps, such as further assessments and/or observations. If autism is clearly not indicated, the family will also be informed of this and similarly provided with advice on any further steps.

The extent of further assessments can range from observation of the child in a school or other setting at break time or free time to assessments of speech, language communication skills and cognitive assessments. Those involving cognitive assessments are the most detailed and far ranging assessments we do.

Once diagnosis has been agreed, the family will have the opportunity to discuss this with one or two multidisciplinary team members. They will be informed of the reason and evidence for diagnosis. They are also given information on local services, support groups, disability living allowance, courses, useful websites and resources. The local Autistic Society has developed a useful, comprehensive handbook which is easily available at a small price to parents. Consent is sought to share information regarding diagnosis with other relevant agencies. Some of the local authorities are able to offer dedicated post-diagnostic intervention and support which has been very useful and a very welcome development. To date all families have consented to this referral following diagnosis.

10.2.4 Service 4: specialist hospital-based service

We receive referrals where there is a clinical query about a diagnosis from a paediatrician or child psychologist or paediatric neurologist who refers for another opinion. Once the referral has been received, we check who will remain involved at the local level as families may be referred from far away. Once a child has reached this level of service, there is certainly something wrong, so we don't want the local service to think that the child and family are no longer under their care. We then send the family an appointment with a questionnaire. No other agencies are involved at this stage. Children are usually over 5 years and the referral could be years after the initial concerns about autism were raised.

An administrator will collect all the information and reports from other agencies and there can be a delay if a number of services have been involved and have not provided a report. We collate information from previous assessments and develop an understanding of the developmental history. A child may have had a range of assessments but many of those assessments will be out of date and will have to be done again at this stage.

The first appointment is 3.5 to 4 hours. We see the parents/carers and the child together. The consultant psychiatrist will attend for 1 hour and a clinical psychologist will attend throughout. There is often a junior doctor and trainee psychologist in attendance. Preparation time is around 1 hour.

The assessment starts with a full family history and a full cognitive assessment and with structured questionnaires, depending on the ability of the child. If the child has a lower cognitive ability, it is a much shorter assessment, so the entire assessment can take 1 to 4 hours depending on this factor.

After that first appointment, there is an MDT meeting a week later for 90 minutes. Four people are usually involved. There are no structured referral criteria as this is a specialist service and all children present with complex features. If we suspect autism, we will suggest the child is given another appointment to do an ADOS or ADI-R. ADI-R can take 2 hours, and ADOS 45 minutes, with half an hour to score. So we have two appointments to complete the assessment overall.

Otherwise, if autism is not suspected, the follow up appointments will depend on the needs of the child. In around 15% of the cases where autism is suspected or where we have reason to believe that behaviour will be different outside the clinic, we will need to do a home or a school visit. Some children are so challenging that they can't come back to clinic, so we have to go off site to complete the assessment. We have to allow 0.5 to 1 day for one or two people to do this (including a trainee).

We have a further MDT meeting for around half an hour. We then feed back to the family verbally at an appointment which takes 1.5 hours. Then we write the reports (psychiatric report plus psychology report) which can take up to 3–4 hours per report. The administrative time required per referral is around 15 hours, which has improved as now we have electronic systems.

The child or young person will have a full cognitive assessment. A full family history is also taken.

10.2.5 Service 5: inner city service

We receive the majority of our referrals from either paediatricians or SLTs. Other referrers include CAMHS, schools and, rarely, GPs.

In response to very long waiting times for diagnostic assessment, we developed a service with a single point of referral with three different types of assessment. The types depend on the level of complexity of the child's presentation described in the referral. There is a referral meeting every 1 or 2 weeks, with the service receiving 25 to 30 referrals per month. The meeting takes 2 hours and 12 to 15 referrals will be discussed. The referral meeting must have a minimum of two people, but ideally there will be a consultant paediatrician, a clinical psychologist and an SLT. For every referral a decision is reached on whether the referral is appropriate and what type of assessment should be carried out and by whom. The decision is based on information on the referral form and reports of any assessments that have already been carried out. Information from the school may be requested at this stage but is not always received. While the child or young person is waiting to be seen, there will be interventions in place based on the child's presenting needs, as well as referral to parent/carer support groups for families where no definitive diagnosis has yet been made but there is a clinical suspicion of autism.

For the least complex children (typically under 5 years) we have developed an observation/interview guideline which may be used by SLTs and paediatricians who are undertaking a communication

assessment or a general developmental assessment. If both of these professionals strongly suspect autism and the child or young person has obvious signs or symptoms, then they will be referred to the autism diagnostic service and if the team agrees with their initial views, one member of the multidisciplinary team will meet the paediatrician and/or SLT. During this meeting they will map the information gained about the child against the ICD-10 criteria for autism while drafting a report. This meeting takes around 1 hour, after which the parents, along with their child, will be invited to come and discuss the diagnosis and then agree a care plan for their child. The parents are meeting healthcare professionals who they already know, which is an advantage. This is only a small percentage of cases, around 5%, and is referred to as a 'type 1' assessment.

For children where the signs and symptoms are not so clear, a 'type 2' assessment is more usual. For these children, an appointment will be arranged to attend the autism diagnostic service. At the consultation, an informal autism-specific history is taken, and a structured, play-based observation (using ADOS) is carried out, typically (for young children under 7 years) with the child and parents in the same room. The healthcare professionals (a paediatrician and an SLT or clinical psychologist) involved in the assessment then meet to discuss whether the child meets the criteria for autism, which takes up to 1 hour. The SLT or clinical psychologist will write up the ADOS results which is used as a summary report and given to the parents on the same day. During this time a nursery nurse is available to support the family in a waiting room if required.

Detailed feedback is then given to the family/carers which is the same as feedback for a type 1 assessment. Information on autism services and contact details are given out. If no blood tests were carried out at the general developmental assessment, then these may be organised after the diagnosis has been communicated to the family/carers, but this usually happens at an earlier stage.

Type 2 assessments are carried out for the majority of the cases referred to the diagnostic service (around 60% of all children and young people).

Type 3 assessments are for more complex cases. The children are usually older (over 7 years) and referrals usually come via the CAMHS service, schools and paediatricians. The professionals involved in these assessments are consultant paediatricians, SLTs and clinical psychologists. We also have a psychiatrist who offers a clinic session once a month for type 3 assessments, so we choose which children are appropriate on her behalf.

At the appointment with the child, we use ADI-R or DISCO to take a formal history from the parent or carer and, at the same time, carry out a detailed clinical assessment with the child in a separate room. The clinical assessment will include all or some of the following: an observation of the child using ADOS; a cognitive assessment; and a speech and language assessment. This can be very demanding on the child, so it may sometimes be necessary to complete the assessments on different days. In addition, some children will require a school-based observation. The school observation can be completed by anyone on the diagnostic team. We do school observations for about half of the children we see for this type of assessment. A school observation will include observing a lesson, then transition into break time and then observing peer relationships in the unstructured environment of the playground. It takes about 1 hour plus travel time. ADOS takes about 45 minutes, the language and cognitive assessments 1 hour each and the formal history typically takes 2.5 hours.

One appointment may be sufficient for the multidisciplinary team to make a diagnosis and give feedback to the child and family. For others this may be different; for example, there may be a longer clinical discussion which can involve consultation with other colleagues so that an immediate diagnosis is not possible or an additional appointment may be needed to complete the assessment.

For all types of assessment, once they have been completed, we write the report for parents that contains all the assessments, a report of the clinical history written by the paediatrician or psychologist and the observation. The report includes recommendations for management including referrals to new services if required. The SLT and psychologist type their own reports, either on the day of assessment or the next day. The paediatricians dictate their report which is also written up the next day. The draft report is sent to parents/carers and is followed up by a face-to-face meeting with parents/carers which lasts about 1 hour. However, it may require a longer meeting or a further follow-up appointment in some cases.

Each diagnostic assessment session is typically 3.5 hours. The ideal is to do five assessments a week, but this can be constrained by the number of doctors who are available.

Administration takes about half a day per child.

All staff and referrers have received training in diagnostic assessment in autism and receive regular training updates in diagnosis.

10.3 Estimating resource use for an autism specific assessment

The resource use estimates reported in the tables below are measured in terms of healthcare professionals' time to complete each task. It does not include the use of advocates or interpreters which are not routinely required by families and professionals. The resources included are:

- time taken to discuss an individual referral
- cost of additional assessments routinely undertaken on all or some children before a decision is taken to do an autism specific assessment
- time taken to prepare for the first appointment, and by whom
- time in face-to-face meetings with the child and the family
- report writing
- multidisciplinary meetings to discuss and agree diagnosis
- follow-up with parents/carers
- further tests and investigations
- further observations of the child/young person (including, in some cases, in nursery/school/home).

The estimate of the time spent on different kinds of activity related to the referral for and diagnostic assessment of autism is based on interviews with five GDG members who work in child development diagnostic teams around the country. These estimates are based on their individual estimates of how long on average it takes to do individual tasks, accepting that these tasks can take a far longer time for some children and young people. Most diagnostic assessments take place in a local child health setting. Some families also have additional diagnostic assessments at a more specialist level.

Based on the service descriptions above, the minimum time required is around 3 to 4 hours to discuss the assessment with the child and family, undertake a clinical history, examine the child (where appropriate) and complete any autism-specific interviews, observations and profiling. Across the five services examined in detail in the previous chapter, this time frame was fairly constant.

Tables 10.1 to 10.5 describe the services in terms of the components of assessment and who undertakes them in each service. The data are taken from discussions with one member of each of these teams and thus represents a snapshot of a service at one moment in time from the perspective of one professional. Some of the descriptions are more detailed than others, based on the estimates provided by the individual GDG members describing their team.

The components of assessment are not all undertaken directly by the autism assessment team. The resource use descriptions include all the components of assessment once a referral has been initiated. Therefore it represents the resource use for a child going through the pathway from referral to diagnosis, including assessments undertaken by professionals outside the autism team rather than resource use for a specific autism team.

Table 10.1 Resource use for service 1

Cost item	Professional	Time or Unit	% children
Main CDC referrals meeting			
	One or two consultant paediatricians	Part of a 1 hour meeting depending on number of referrals	100%
	Specialist HV key working manager	As above	100%
	Educational psychologist	As above	100%
	Administrator	As above	100%
	SLT/OT	As above	100%
Assessments by others	Audiology	½ hour	100%
	SLT – face-to-face contact`	1 hour	100%
Developmental assessment			
	General paediatric – medical and developmental assessment	OP visit, 1 hour	100%
	OT	1 hour	100%
	School report	1 hour	100%
	SENCO		
Administration	Medical secretary	30 minutes	100%
Monthly team meeting	Consultant paediatrician	15 minutes	100%
	Clinical psychologist	15 minutes	100%
	Clinical specialist	15 minutes	
	OT		100%
	Highly specialist SLT	15 minutes	100%
	Educational psychologist	15 minutes	100%
	Specialist health visitor	5 minutes	
Preparation for first autism assessment (note reading)	Community paediatrician + one or two other members of the autism team	20 minutes	100%
Autism-specific diagnostic assessment	Consultant paediatrician	4 hours	70%
	One or two out of SLT/OT/Clinical psychologist	4 hours each	70%
Report writing	Consultant paediatrician	3 hours	70%
	One or two out of SLT/OT and clinical psychologist	2 hours each	70%

Cost item	Professional	Time or Unit	% children
Additional assessments and investigations			
School visit	Consultant paediatrician	3 hours (1 hour travel)	25%
	SLT/OT/Educational psychologist	3 hours (1 hour travel)	25%
Feedback session	Consultant paediatrician plus one other team member	1 hour	
Biomedical tests if clinically indicated	Chromosome	per test	50%
	Fragile X	per test	50%
Follow-up appointment 2 to 4 weeks post diagnosis	Specialist health visitor or key worker (or sometimes lead professional)	1 hour	50%
Follow-up with consultant to review progress after about 6 months	Consultant paediatricians	1 hour	

SLT: speech and language therapist; OT: occupational therapist; SENCO: special educational needs coordinator

Table 10.2 Resource use for service 2

Cost item	Professional	Hours	% children
Administration	Medical secretary	3 hours	
Typical involvement prior to decision to proceed to autism assessment	SLT	2 hours	80%
	Community paediatrician	2 hours	100%
	Educational psychologist	2 hours	100%
Decision to request formal assessment (including time to discuss decision with parents and gain consent to proceed)	Community paediatrician	30 minutes	100%
	Educational psychologist	30 minutes	100%
	SLT	30 minutes	100%
Formal autism assessment	Community paediatrician	8 hours incl admin	100%
	SLT assessment	8 hours incl admin	90%
	OT (if involved)	8 hours incl admin	20%
	Psychologist (education)	8 hours incl admin	95%
	Psychologist (clinical) (if involved)	9 hours incl admin	10%
Final meeting to agree outcome of assessment (located at school/nursery)		Included above (2 hours for each involved professional)	100%
Notes of meeting typed up		included above	
Biomedical tests	Fragile X		20%
	Chromosome		20%

SLT: speech and language therapist; OT: occupational therapist

Incl: including

Table 10.3 Resource use for service 3

Cost item	Professional	Hours	% children
MDT meeting prior to first appointment	Psychiatrist, Psychologist, secretary	1 hour	
Assessments by others prior to the clinic	School / nursery report		100%
	Educational psychologist report		100%
	Community paediatrician	OP clinic	100%
	Psychiatrist		
	SLT assessment	2 hours	80%
	OT/Health visitor/ Nursery/ Social care		25%
Administration	Secretary		100%
Preparation for first appointment	Psychiatrist, Junior doctor	30 minutes	100%
	Psychologist	30 minutes	100%
	SLT	90 minutes	100%
First appointment and formal assessment	Psychiatrist, Junior doctor	2 hours	100%
	Psychologist	2 hours	100%
	SLT	2 hours	100%
Report writing	Psychiatrist, psychologist, SLT	3 hours	
School observation	Psychologist	Half day	60%
Follow-up appointment	Psychiatrist	30 minutes	100%
	Psychologist	30 minutes	100%
Biomedical tests	Chromosomal abnormalities		10%
	Genetics		10%

SLT: speech and language therapist; OT: occupational therapist

Table 10.4 Resource use for service 4

Resource use item	Professional	Hours	% children
Administration	Medical secretary	15 hours	100%
Preparation for first appointment	Consultant psychiatrist	1 hour	100%
	Clinical psychologist	1 hour	100%
First appointment	Consultant psychiatrist	1 hour	100%
	Clinical psychologist	4 hours	100%
	Junior medical doctor	4 hours	100%
	Psychology trainee	4 hours	100%
Decision to request formal autism assessment	Consultant psychiatrist	90 minutes	100%
	Clinical psychologist	90 minutes	100%
	Junior medical doctor	90 minutes	100%
Formal ASD assessment	Clinical psychologist	4 hours	70%
Report writing	Psychiatric report	4 hours	70%
	Psychology report	4 hours	70%
Follow-up appointment	Consultant psychiatrist	90 minutes	70%
	Psychologist	90 minutes	70%
	Junior doctor	90 minutes	70%
	Trainee psychologist	90 minutes	70%
School observation (15%)	Clinical psychologist	1 day	15%
Follow-up MDT meeting	Consultant psychiatrist	30 minutes	100%
	Clinical psychologist	30 minutes	100%
Biomedical tests	CG array		10%

MDT: multi-disciplinary; CG array: comparative genomic hybridisation technique

The service reported in table 10.5 describes a service where children and young people referred to the service are offered a range of assessments based on the information received by the multidisciplinary team

Table 10.5 Resource use for service 5

Cost item	Professional	Time or Unit	% children
Referral meeting	Clinical psychologist	10 minutes	100%
	Consultant paediatrician	10 minutes	100%
	SLT	10 minutes	100%
General developmental assessment	Consultant paediatrician	1 hour	60%
Biomedical tests	Fragile X		10%
	CG array		10%
Communication assessment	SLT	1 hour	60%
Type 1 assessment			
Professional discussion	Consultant paediatrician	1 hour	5%
	SLT	1 hour	5%
Follow-up with parent/carer	Consultant paediatrician	1 hour	5%
Type 2 assessment meeting			
Diagnostic assessment	Paediatrician	3 hours	60%
	SLT/Clinical psychologist	3 hours	60%
MDT meeting	Paediatrician	1 hour	60%
	SLT/Clinical psychologist	1 hour	60%
Follow-up with parent/carer	SLT/Clinical psychologist	1 hour	60%
	Paediatrician	1 hour	60%
Support for the child	Nursery nurse	2 hours	40%
Type 3 assessment			
Diagnostic assessment	Consultant paediatrician/psychiatrist	2.5 hours	35%
	Clinical psychologist	2.5 hours	35%
	SLT	2.5 hours	35%
MDT discussion and report writing	Consultant paediatrician/psychiatrist	3.5 hours	35%
	Clinical psychologist	3.5 hours	35%
	SLT	3.5 hours	35%
Follow-up with parent/carer	Consultant paediatrician/psychiatrist	1 hour	35%
School visit	SLT/Clinical psychologist	1 hour	35%
Administration	SLT/Clinical psychologist	2 hours/half a day	Under 20%

SLT: speech and language therapist

10.4 Conclusion

Across the NHS, diagnostic assessment of autism is undertaken by different healthcare professionals, in different settings and with different kinds of healthcare professional resources. The reported times for assessment may be affected by the experience of the teams, their level of integration with and access to other professionals, as well as their thresholds for diagnosis. This chapter used information from GDG members to describe five autism services operating at different levels of referral within the NHS. They are not representative of all models of services in England and Wales but provide some evidence of the organisational and personnel costs of services that operate in different way to achieve the same aim. The core components are the same.

The purpose of this chapter was to explain the problems in doing any cost-effectiveness analysis for this guideline and to provide an overview of the way that some children's diagnostic services for autism are currently configured around the country. It is compiled from discussions with five individuals, one working in each service. It was not intended to be a fully comprehensive account of all the models of service that exist around the country, but to give a flavour of the ways that services are offered that adhere to many of the clinical and organisational recommendations developed in this guideline.

11 References, abbreviations and glossary

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11.2 Abbreviations

3di	Developmental, Dimensional and Diagnostic Interview
ABAS	Adaptive Behaviour Assessment
ABC	Autism Behavior Checklist
ADHD	attention deficit hyperactivity disorder
ADI-R	Autism Diagnostic Interview – Revised
ADOS	Autism Diagnostic Observation Schedule
ASD	autism spectrum disorders
ASSQ	Autism Spectrum Screening Questionnaire
ATAC	Autism – Tics, ADHD and other coexisting conditions
BISCUIT	Baby and Infant Screen for Children with Autism Traits
BITSEA	Brief Infant-Toddler Social and Emotional Assessment
BMI	body mass index
CAF	Common Assessment Framework
CAMHS	child and adolescent mental health service
CARS	Childhood Autism Rating Scale
CASP	Critical Appraisal Skills Programme
CAST	Childhood Asperger Syndrome Test
CAT	computed axial tomography
CCC	Children's Communication Checklist
CD	conduct disorder
CDC	child development centre
CDD	childhood disintegrative disorder
CGH	comparative genomic hybridization
CHAT	Checklist for Autism in Toddlers
CHECKLIST	Infant/Toddler Checklist of Communication and Language Development
CI	confidence interval
CNV	copy number variant
CSI-4	Child Symptom Inventory-4
CT	computed tomography
DAWBA	Development and Well-Being Assessment
DBC-ES	Developmental Behavior Checklist – Autism – Early Screen
DCD	developmental coordination disorder
DISCO	Diagnostic Interview for Social and Communication Disorders
DSM-IV-TR	Diagnostic and Statistical Manual of Mental Disorders DSM-IV-TR Fourth Edition (Text Revision)
ECI-4	Early Childhood Inventory – 4
EEG	electroencephalography

ESAT	Early Screening of Autistic Traits questionnaire
ESCS	Early Social-Communication Scales
ESSEA	Enhancing the Scientific Study of Early Autism
FISH	fluorescence in situ hybridization
GADS	Gilliam Asperger's Disorder Scale
GARS	Gilliam Autism Rating Scale
GDG	guideline development group
GRADE	Grading of Recommendations Assessment, Development and Evaluation
ICD-10	International Statistical Classification of Diseases and Related Health Problems, Tenth Revision
IgE	immunoglobulin E
IQ	intelligence quotient
ITC	Infant/Toddlers Checklist
KADI	Krug Asperger's Disorder Index
LKS	Landau-Kleffner syndrome
MCDI	MacArthur Communicative Development Inventories
M-CHAT	Modified Checklist for Autism in Toddlers
MDT	multi-disciplinary team
MECP2	methyl CpG binding protein 2 (Rett syndrome)
MRC	Medical Research Council
MRI	magnetic resonance imaging
NA	not applicable
NAP-C	National Autism Plan for Children
NAS	National Autistic Society
NIH	National Institutes of Health
OCD	obsessive compulsive disorder
ODD	oppositional defiant disorder
OT	occupational therapy/therapist
PCQ	Parental Concerns Questionnaire
PDA	pathological demand avoidance
PDD	pervasive development disorder
PDD-MRS	Scale of Pervasive Developmental Disorder in Mentally Retarded Persons
PDDRS	Pervasive Developmental Disorder Rating Scale
PET	positron emission tomography
PIA-CV	Parent Interview for Autism (Clinical Version)
PTEN	phosphatase and tensin homolog
QALY	quality adjusted life year
Q-CHAT	Quantitative Checklist for Autism in Toddlers
QUADAS	quality assessment tool for diagnostic accuracy studies

RBS	Repetitive Behavior Scale
RCT	randomised controlled trial
SCQ	Social Communication Questionnaire
SDQ	Strengths and Difficulties Questionnaire
SEN	special educational needs
SIGN	Scottish Intercollegiate Guideline Network
SLD	specific language delay/disorder
SLT	speech and language therapy/therapist
SPECT	single photo emission computed tomography
SRS	Social Responsiveness Scale
SSI	Screen for Social Intervention
STAT	Screening Tool for Autism in Two-year-olds
YACHT-18	Young Autism and other developmental disorders Checkup Tool

11.3 Glossary

Agreement	The degree to which more than one individual undertaking an assessment or scoring of an instrument agrees with the outcome (diagnosis)
Attention deficit hyperactivity disorder (ADHD)	A developmental disorder with onset in childhood and with impairments in the ability to maintain attention to task combined with impulsive and hyperactive behaviour. Criteria for diagnosis defined in ICD-10 and DSM-IV-TR.
Autism	A neurodevelopmental disorder with onset in childhood characterised by impairments in reciprocal social interaction and social communication, combined with restricted interests and rigid and repetitive behaviours in children, young people and adults. Autism is the term used in this guideline for all autism spectrum disorders (and pervasive developmental disorders) in line with recent Department of Health publications.
Autism spectrum disorders (ASD)	A term used synonymously with pervasive developmental disorder.
Best available evidence	The strongest research evidence available to support a particular guideline recommendation.
Bias	Influences on a study that can lead to invalid conclusions about a treatment or intervention. Bias in research can make a treatment look better or worse than it really is. Bias can even make it look as if the treatment works when it does not. Bias can occur by chance or as a result of systematic errors in the design and execution of a study. Bias can occur at different stages in the research process, for example in the collection, analysis, interpretation, publication or review of research data. For examples see Selection bias, Performance bias, Information bias, Confounding, Publication bias.
Biomedical test	A test carried out on the body or on a sample of body fluids defined by expected norms.
Blinding or masking	The practice of keeping the investigators or subjects of a study ignorant of the group to which a subject has been assigned. For example, a clinical trial in which the participating patients or their doctors are unaware of whether they (the patients) are taking the experimental drug or a placebo (dummy treatment). The purpose of 'blinding' or 'masking' is to protect against bias. See also Double blind study, Single blind study, Triple blind study.
Case–control design	The comparison of cases with and without a particular disorder. See Case–control study.
Case–control study	A study that starts with the identification of a group of individuals sharing the same characteristics (for example people with a particular disease) and a suitable comparison (control) group (for example people without the disease). All subjects are then assessed with respect to things that happened to them in the past, such as things that might be related to the subjects getting the disease that is under investigation. Such studies are also called retrospective as they look back in time from the outcome to the possible causes.
Case report (or case study)	Detailed report on one patient (or case), usually covering the course of that person's disease and their response to treatment.
Case series	Description of several cases of a given disease, usually covering the course of the disease and the response to treatment. There is no comparison (control) group of patients.

CG array	Comparative genomic hybridisation technique: a method of analysing samples for gene duplications and deletions.
Checklist	See Study checklist.
Child and adolescent mental health service	The service specialising in mental health for children and adolescents.
Child development centre	A location housing the facilities for assessment of (usually young) children with developmental problems, sometimes attached to a hospital or separately in the community, and part of the child health services.
Chronological age	The exact age in years and months of a child measured from birth.
Clinical effectiveness	The extent to which a specific treatment or intervention, when used under usual or everyday conditions, has a beneficial effect on the course or outcome of disease compared to no treatment or other routine care. (Clinical trials that assess effectiveness are sometimes called management trials.) Clinical 'effectiveness' is not the same as efficacy which establishes whether a treatment 'works' or not under ideal conditions.
Clinical impact	The effect that a guideline recommendation is likely to have on the treatment, or treatment outcomes, of the target population.
Clinical importance	The importance of a particular guideline recommendation to the clinical management of the target population.
Clinical question	This term is sometimes used in guideline development work to refer to the questions about treatment and care that are formulated in order to guide the search for research evidence. When a clinical question is formulated in a precise way, it is called a focused question.
Clinical trial	A research study conducted with patients which tests out a drug or other intervention to assess its effectiveness and safety. Each trial is designed to answer scientific questions and to find better ways to treat individuals with a specific disease. This general term encompasses controlled clinical trials and randomised controlled trials.
Clinician	A healthcare professional providing patient care, such as a doctor, nurse or physiotherapist.
Cochrane Collaboration	An international organisation in which people find, appraise and review specific types of studies called randomised controlled trials. The Cochrane Database of Systematic Reviews contains regularly updated reviews on a variety of health issues and is available electronically as part of the Cochrane Library.
Cochrane Library	The Cochrane Library consists of a regularly updated collection of evidence-based medicine databases including the Cochrane Database of Systematic Reviews (reviews of randomised controlled trials prepared by the Cochrane Collaboration). The Cochrane Library is available on CD-ROM and the Internet.
Coexisting condition	A disorder which exists in association or together with the index disorder
Cognitive assessment	Assessment of IQ and learning using an intelligence test
Cognitive impairment	A deficit in some aspect of intellectual ability and/or learning
Cohort study	An observational study that takes a group (cohort) of patients and follows their progress over time in order to measure outcomes, such as disease or mortality rates, and make comparisons according to the treatments or interventions that patients received. Thus within the study group, subgroups of patients are identified (from information collected about patients) and these groups are compared with respect to outcome, for

	example comparing mortality between one group that received a specific treatment and one group which did not (or between two groups that received different levels of treatment). Cohorts can be assembled in the present and followed into the future (a 'concurrent' or 'prospective' cohort study) or identified from past records and followed forward from that time up to the present (a 'historical' or 'retrospective' cohort study). Because patients are not randomly allocated to subgroups, these subgroups may be quite different in their characteristics and some adjustment must be made when analysing the results to ensure that the comparison between groups is as fair as possible.
Cohort	A group of people sharing some common characteristic (for example patients with the same disease), followed up in a research study for a specified period of time.
Common Assessment Framework	A systematic questionnaire to record in a standardised way the additional needs that a child may have with the aim of determining how they should be met. It is intended to enable agencies to work together.
Co-morbidity	Co-existence of a disease or diseases in the people being studied in addition to the health problem that is the subject of the study.
Confidence interval	A way of expressing certainty about the findings from a study or group of studies, using statistical techniques. A confidence interval describes a range of possible effects (of a treatment or intervention) that are consistent with the results of a study or group of studies. A wide confidence interval indicates a lack of certainty or precision about the true size of the clinical effect and is seen in studies with too few patients. Where confidence intervals are narrow they indicate more precise estimates of effects and a larger sample of patients studied. It is usual to interpret a '95%' confidence interval as the range of effects within which we are 95% confident that the true effect lies. We have presented this range as two numbers separated by a comma and space e.g. (95% CI 1, 10).
Confounder or confounding factor	Something that influences a study and can contribute to misleading findings if it is not understood or appropriately dealt with. For example, if a group of people exercising regularly and a group of people who do not exercise have an important age difference then any difference found in outcomes about heart disease could be due to one group being older than the other rather than due to the exercising. Age is the confounding factor here and the effect of exercising on heart disease cannot be assessed without adjusting for age differences in some way.
Consensus methodology	The process of agreeing a particular course of action based on the collective views of a body of experts.
Consensus statement	A statement of the advised course of action in relation to a particular clinical topic, based on the collective views of a body of experts.
Control group	A group of patients recruited into a study that receives no treatment, a treatment of known effect or a placebo (dummy treatment) in order to provide a comparison for a group receiving an experimental treatment, such as a new drug.
Controlled observational study	A study to evaluate an intervention or test involving two (or more) groups of participants. One (the experimental group) receives the treatment, test or investigation that is being tested, and the other (the comparison or control group) receives an alternative or no intervention/test. The two groups are followed up to compare differences in outcomes.

Cost–benefit analysis	A type of economic evaluation where both costs and benefits of healthcare treatment are measured in the same monetary units. If benefits exceed costs, the evaluation would recommend providing the treatment.
Cost-effectiveness analysis	A type of economic evaluation comparing the costs and the effects on health of different treatments. Health effects are measured in 'health-related units', for example the cost of preventing one additional heart attack.
Cost effectiveness	Value for money. A specific healthcare treatment is said to be 'cost effective' if it gives a greater health gain than could be achieved by using the resources in other ways.
Cost-minimisation analysis	A form of cost-effectiveness analysis where the treatment alternatives are considered to be equally effective. Where treatments are equally effective the least costly is the most cost effective
Cross-sectional study	The observation of a defined set of people at a single point in time or time period – a snapshot. (This type of study contrasts with a longitudinal study which follows a set of people over a period of time.)
Data set	A list of required information relating to a specific disease.
Decision analysis	The study of how people make decisions or how they should make decisions. There are several methods that decision analysts use to help people to make better decisions, including decision trees.
Declaration of interest	A process by which members of a working group or committee 'declare' any personal or professional involvement with a company (or related to a technology) that might affect their objectivity. For example if their position or department is funded by a pharmaceutical company.
Developmental age	An estimate of the functioning age equivalent of a child.
Diagnosis	The identification of the nature and cause of symptoms in any individual.
Diagnostic study	A study to assess the effectiveness of a test or measurement in terms of its ability to accurately detect or exclude a specific disease.
Differential diagnosis	The conditions that may have similar features to each other and need to be considered in identifying a diagnosis
Disability Living Allowance	A benefit (non-means tested) intended to provide financial support to persons caring for anyone with a disability.
Double blind study	A study in which neither the subject (patient) nor the observer (investigator/clinician) is aware of which treatment or intervention the subject is receiving. The purpose of blinding is to protect against bias.
Echolalia	Frequent repetition of set words and phrases
Economic evaluation	A comparison of alternative courses of action in terms of both their costs and consequences. In health economic evaluations the consequences should include health outcomes.
Economic model	A health economics model is a way of synthesising costs, outcomes, probabilities and decisions for part of a clinical pathway or a whole clinical pathway. They can be useful where decisions about the cost effectiveness of care depend on the effectiveness of multiple combinations of healthcare options (tests, treatment, long term follow-up). Economic models are simplifications of reality representing a complex process. Mathematical and statistical techniques are used to provide decision-makers with information about the likelihood that a decision is cost effective and the impact of changes in one part of the treatment pathway to the overall cost effectiveness of treatment for a specific condition.

Educational psychology service	The educational psychology service provides consultation and advice in relation to the education and development of children and young people. It is a statutory service. Educational psychologists have gained a psychology degree and undertaken postgraduate professional training in educational psychology.
Effectiveness	See Clinical effectiveness.
Efficacy	The extent to which a specific treatment or intervention, under ideally controlled conditions (for example in a laboratory), has a beneficial effect on the course or outcome of disease compared to no treatment or other routine care.
Empirical	Based directly on experience (observation or experiment) rather than on reasoning alone.
Epidemiology	Study of diseases within a population, covering the causes and means of prevention.
Evidence-based clinical practice	Evidence-based clinical practice involves making decisions about the care of individual patients based on the best research evidence available rather than basing decisions on personal opinions or common practice (which may not always be evidence based). Evidence-based clinical practice therefore involves integrating individual clinical expertise and patient preferences with the best available evidence from research
Evidence based	The process of systematically finding, appraising and using research findings as the basis for clinical decisions.
Evidence table	A table summarising the results of a collection of studies which, taken together, represent the evidence supporting a particular recommendation or series of recommendations in a guideline.
Exclusion criteria	See Selection criteria.
Experimental study	A research study designed to test if a treatment or intervention has an effect on the course or outcome of a condition or disease; where the conditions of testing are to some extent under the control of the investigator. Controlled clinical trials and randomised controlled trials are examples of experimental studies.
Experimental treatment	A treatment or intervention (for example a new drug) being studied to see if it has an effect on the course or outcome of a condition or disease.
Fragile X	A condition in which there is a genetic abnormality in the X chromosome associated with intellectual disability, mainly, but not exclusively, in boys.
Generalisability	The extent to which the results of a study hold true for a population of patients beyond those who participated in the research. See also External validity.
Genetic test	A test for genetic disorders which involves examination of an individual's DNA. In the context of autism, it is often used to identify carriers of genes which code for specific coexisting conditions, or genetics sequences believed to be causative of autism.
Global developmental delay	A term used to describe a delay in all aspects of development usually in young children before they are able to complete a standardised test of intellectual ability.
Gold standard	A method, procedure or measurement that is widely accepted as being the best available.

Grading of Recommendations Assessment, Development and Evaluation (GRADE)	A system for grading the quality of evidence and the strength of recommendations that can be applied across a wide range of interventions and contexts.
Grey literature	Reports that are unpublished or have limited distribution, and are not included in bibliographic retrieval systems.
Guideline recommendation	Course of action advised by the guideline development group on the basis of its assessment of the supporting evidence.
Guideline	A systematically developed tool which describes aspects of a patient's condition and the care to be given. A good guideline makes recommendations about treatment and care based on the best research available, rather than on opinion. It is used to assist clinician and patient decision-making about appropriate health care for specific clinical conditions.
Health economics	A branch of economics which studies decisions about the use and distribution of healthcare resources.
Heterogeneity	Lack of homogeneity. The term is used in meta-analyses and systematic reviews when the results or estimates of effects of treatment from separate studies seem to be very different – in terms of the size of treatment effects or even to the extent that some indicate beneficial and others suggest adverse treatment effects. Such results may occur as a result of differences between studies in terms of the patient populations, outcome measures, definition of variables or duration of follow-up.
Hierarchy of evidence	An established hierarchy of study types, based on the degree of certainty that can be attributed to the conclusions that can be drawn from a well-conducted study. Well-conducted randomised controlled trials (RCTs) are at the top of this hierarchy. (Several large statistically significant RCTs which are in agreement represent stronger evidence than one small RCT, for example.) Well-conducted studies of patients' views and experiences would appear at a lower level in the hierarchy of evidence.
Homogeneity	Where the results of studies included in a systematic review or meta analysis are similar and there is no evidence of heterogeneity. Results are usually regarded as homogeneous when differences between studies could reasonably be expected to occur by chance. See also Consistency.
I^2	Statistical indication of the amount of heterogeneity between studies included in a meta-analysis.
In-depth interview	A qualitative research technique. It is a face-to-face conversation between a researcher and a respondent with the purpose of exploring issues or topics in detail. Does not use preset questions, but is shaped by a defined set of topics or issues.
Inconsistency	The unexplained heterogeneity that is not adequately explained by the study investigators arises from inconsistency of results or unexplained heterogeneity
Indirectness	A type of bias that can occur when a comparison of intervention A versus B is not available, but A was compared with C and B was compared with C. Such studies allow indirect comparisons of the magnitude of effect of A versus B.
Information bias	Pertinent to all types of study and can be caused by inadequate questionnaires (for example difficult or biased questions), observer or interviewer errors (for example lack of blinding), response errors (such as lack of blinding if patients are aware of the treatment they receive) and measurement error (for example a faulty machine).

Intellectual disability	A broad concept of mental disability that encompasses mental retardation characterised by significantly impaired cognitive functioning and deficits in adaptive behaviours.
IQ (Intelligence quotient)	An intelligence quotient is a score derived from one of many different standardised tests designed to assess intelligence.
Isolated speech and language delay	A delay in speech or language or both without intellectual impairment or other developmental disorder
Landau–Kleffner syndrome (LKS)	A rare form of epilepsy that only affects children. It is characterised by the sudden or gradual development of aphasia (the inability to understand or express language) and an abnormal brain wave recording (electro-encephalogram [EEG]) affecting the parts of the brain that control comprehension and speech. The disorder usually occurs in children between 5 and 7 years. The main epileptic activity happens during sleep. While many of the affected individuals have seizures, some do not, thus the epileptic activity may not be obvious to others but can be seen in a sleep EEG. The disorder is difficult to diagnose and may be misdiagnosed as autism, hearing impairment, learning disability, attention deficit disorder, learning difficulties or emotional/behavioural problems.
Literature review	A process of collecting, reading and assessing the quality of published (and unpublished) articles on a given topic.
Longitudinal study	A study of the same group of people at more than one point in time. This type of study contrasts with a cross-sectional study which observes a defined set of people at a single point in time.
Looked after children	Children in the care of the local authority.
MECP2 (methyl CpG binding protein 2)	A gene located on the long arm of the X chromosome that provides information for making a protein important in brain development. Mutations in this gene are responsible for most cases of classic Rett syndrome.
Mental retardation	See Intellectual disability.
Methodological quality	The extent to which a study has conformed to recognised good practice in the design and execution of its research methods.
Methodology	The overall approach of a research project; for example the study will be a randomised controlled trial of 200 people over 1 year.
Morbidity	Disease or disability or poor health due to any cause
Mortality	Death.
Multicentre study	A study where subjects were selected from different locations or populations, such as a cooperative study between different hospitals or an international collaboration involving patients from more than one country.
Non-therapeutic support	General support without a therapeutic or healing aim.
Objective measure	A measurement that follows a standardised procedure which is less open to subjective interpretation by potentially biased observers and study participants.
Obsessive compulsive disorder (OCD)	Recurrent obsessional thoughts (ideas, urges or images that are unwanted and often distressing) or compulsive acts (behaviours/actions that have to be carried out repeatedly even if they make no sense).
Observation	A research technique used to help understand complex situations. It involves watching, listening to and recording behaviours, actions, activities and interactions. The settings are usually natural, but they can be laboratory settings, as in psychological research.

Observational study	In research about diseases or treatments, this refers to a study in which nature is allowed to take its course. Changes or differences in one characteristic (such as whether or not people received a specific treatment or intervention) are studied in relation to changes or differences in other(s) (such as whether or not they died), without the intervention of the investigator. There is a greater risk of selection bias than experimental studies.
Odds ratio	Odds are a way of representing probability (such as in betting). In recent years, odds ratios have become widely used in reports of clinical studies. They provide an estimate (usually with a confidence interval) for the effect of a treatment. Odds are used to convey the idea of 'risk' and an odds ratio of 1 between two treatment groups would imply that the risks of an adverse outcome were the same in each group. For rare events the odds ratio and the relative risk (which uses actual risks and not odds) will be very similar. See also Relative risk, Risk ratio.
Oppositional defiant disorder (ODD)	A persistent pattern of markedly defiant, disobedient, provocative behaviour to those in authority, clearly outside the normal range of behaviour for a child of the same age. The individual may blame others for their own mistakes, lose their temper easily and act in an angry, resentful or touchy manner.
Outcome	The end result of care and treatment and/or rehabilitation. In other words, the change in health, functional ability, symptoms or situation of a person, which can be used to measure the effectiveness of care or treatment or rehabilitation. Researchers should decide what outcomes to measure before a study begins; outcomes are then assessed at the end of the study.
P value	If a study is done to compare two treatments then the P value is the probability of obtaining the results of that study, or something more extreme, if there really was no difference between treatments. (The assumption that there really is no difference between treatments is called the 'null hypothesis'.) Suppose the P-value was 0.03 (P = 0.03). What this means is that if there really was no difference between treatments then there would only be a 3% chance of getting the kind of results obtained. Since this chance seems quite low we should question the validity of the assumption that there really is no difference between treatments. We would conclude that there probably is a difference between treatments. By convention, where the value of P is below 0.05 (that is, less than 5%) the result is seen as statistically significant. Where the value of P is 0.001 or less, the result is seen as highly significant. P values tell us whether an effect can be regarded as statistically significant or not. The P value does not relate to how big the effect might be: for this we need the confidence interval.
Pathological demand avoidance	Proposed by Professor Elizabeth Newson, Consultant Psychologist at the University of Nottingham, this is not a diagnosis in ICD-10 or DSM-IV-TR. It is considered to be part of the autism spectrum disorders but individuals with PDA are said to possess superficial social skills and to have a theory of mind, to mimic others and to be much more demand avoidant than those with ASD. They often engage in manipulative, domineering behaviour.
Peer review	Review of a study, service or recommendations by those with similar interests and expertise to the people who produced the study findings or recommendations. Peer reviewers can include professional and/or patient/carer representatives.
Pervasive development disorder	A term used in the ICD-10 and DSM-IV-TR classifications to describe the group of disorders characterised by qualitative abnormalities in reciprocal social interactions and patterns of communication and by restricted

	stereotyped repetitive repertoire of interests and activities pervasive of the individuals functioning in all situations. ASD is the equivalent term used in this guideline in the evidence statements and tables.
Power	See Statistical power.
Prevalence	Prevalence is a statistical concept referring to the number of cases of a disease that are present in a particular population at a given time.
Primary care trust	A primary care trust is an NHS organisation responsible for improving the health of local people, developing services provided by local GPs and their teams and making sure that other appropriate health services are in place to meet local people's needs.
Primary care	Health care delivered to patients outside hospitals. Primary care covers a range of services provided by GPs, nurses and other healthcare professionals, dentists, pharmacists and opticians.
Prognostic factor	Patient or disease characteristics, such as age or coexisting condition, which influence the course of the disease under study. In a randomised trial to compare two treatments, chance imbalances in variables (prognostic factors) that influence patient outcome are possible, especially if the size of the study is fairly small. In terms of analysis these prognostic factors become confounding factors. See also Prognostic marker.
Prognostic marker	A prognostic factor used to assign patients to categories for a specified purpose – for example for treatment or as part of a clinical trial, according to the likely progression of the disease. For example, the purpose of randomisation in a clinical trial is to produce similar treatment groups with respect to important prognostic factors. This can often be achieved more efficiently if randomisation takes place within subgroups defined by the most important prognostic factors. Thus if age was strongly related to patient outcome then separate randomisation schemes would be used for different age groups. This process is known as stratified random allocation.
Prospective study	A study in which people are entered into the research and then followed up over a period of time with future events recorded as they happen. This contrasts with studies that are retrospective.
Protocol	A plan or set of steps which defines appropriate action. A research protocol sets out, in advance of carrying out the study, what question is to be answered and how information will be collected and analysed. Guideline implementation protocols set out how guideline recommendations will be used in practice by the NHS, both at national and local levels.
Publication bias	Studies with statistically significant results are more likely to get published than those with non-significant results. Meta-analyses that are exclusively based on published literature may therefore produce biased results. This type of bias can be assessed by a funnel plot.
Qualitative research	Qualitative research is used to explore and understand people's beliefs, experiences, attitudes, behaviour and interactions. It generates non-numerical data, such as a patient's description of their pain rather than a measure of pain. In health care, qualitative techniques have been commonly used in research documenting the experience of chronic illness and in studies about the functioning of organisations. Qualitative research techniques, such as focus groups and in-depth interviews, have been used in one-off projects commissioned by guideline development groups to find out more about the views and experiences of patients and carers.
Quality adjusted life years (QALYs)	A measure of health outcome which looks at both length of life and quality of life. QALYS are calculated by estimating the years of life remaining for a patient following a particular care pathway and weighting each year with

	a quality of life score (on a 0 to 1 scale). One QALY is equal to 1 year of life in perfect health, or 2 years at 50% health, and so on.
Quantitative research	Research that generates numerical data or data that can be converted into numbers, for example clinical trials or the national Census which counts people and households.
Quasi experimental study	A study designed to test if a treatment or intervention has an effect on the course or outcome of disease. It differs from a controlled clinical trial and a randomised controlled trial in that: a) the assignment of patients to treatment and comparison groups is not done randomly, or patients are not given equal probabilities of selection, or b) the investigator does not have full control over the allocation and/or timing of the intervention, but nonetheless conducts the study as if it were an experiment, allocating subjects to treatment and comparison groups.
Random allocation, randomisation	A method that uses the play of chance to assign participants to comparison groups in a research study, for example by using a random numbers table or a computer-generated random sequence. Random allocation implies that each individual (or each unit in the case of cluster randomisation) being entered into a study has the same chance of receiving each of the possible interventions.
Randomised controlled trial	A study to test a specific drug or other treatment in which people are randomly assigned to two (or more) groups: one (the experimental group) receives the treatment that is being tested, and the other (the comparison or control group) receives an alternative treatment, a placebo (dummy treatment) or no treatment. The two groups are followed up to compare differences in outcomes to see how effective the experimental treatment was. (Through randomisation, the groups should be similar in all aspects apart from the treatment they receive during the study.)
Referral	The process of passing from one service or stage in the health service to another.
Retrospective study	A study that deals with the present/past and does not involve studying future events. This contrasts with studies that are prospective.
Review	Summary of the main points and trends in the research literature on a specified topic. A review is considered non-systematic unless an extensive literature search has been carried out to ensure that all aspects of the topic are covered and an objective appraisal made of the quality of the studies.
Risk assessment	The process of quantifying the probability of a harmful effect.
Risk ratio	Ratio of the risk of an undesirable event or outcome occurring in a group of patients receiving experimental treatment compared with a comparison (control) group. The term relative risk is sometimes used as a synonym of risk ratio.
Safety netting	The provision of support for patients in whom the clinician has some uncertainty as to whether the patient has a self-limiting illness and is concerned that their condition may deteriorate. Safety netting may take a number of forms, such as dialogue with the patient or carer about symptoms and signs to watch for, advice about when to seek further medical attention, review after a set period, and liaising with other healthcare services.
Sample	A part of the study's target population from which the subjects of the study will be recruited. If subjects are drawn in an unbiased way from a particular population, the results can be generalised from the sample to the population as a whole.

Sampling frame	A list or register of names which is used to recruit participants to a study.
Sampling	Refers to the way in which participants are selected for inclusion in a study.
School transitions	The process of moving from one school year to another and particularly from primary to secondary or secondary to further education.
Secondary care	Care provided in hospitals.
Selection bias	Selection bias has occurred if the characteristics of the sample differ from those of the wider population from which the sample has been drawn or there are systematic differences between comparison groups of patients in a study in terms of prognosis or responsiveness to treatment.
Selection criteria	Explicit standards used by guideline development groups to decide which studies should be included and excluded from consideration as potential sources of evidence.
Semi-structured interview	Structured interviews involve asking people pre-set questions. A semi-structured interview allows more flexibility than a structured interview. The interviewer asks a number of open-ended questions, following up areas of interest in response to the information given by the respondent.
Sensitivity	In diagnostic testing, it refers to the chance of having a positive test result given that you have the disease. 100% sensitivity means that all those with the disease will test positive, but this is not the same the other way around. A patient could have a positive test result but not have the disease – this is called a 'false positive'. The sensitivity of a test is also related to its 'negative predictive value' (true negatives) – a test with a sensitivity of 100% means that all those who get a negative test result do not have the disease. To fully judge the accuracy of a test, its specificity must also be considered.
Single blind study	A study in which either the subject (patient/participant) or the observer (clinician/investigator) is not aware of which treatment or intervention the subject is receiving.
Social communication disorder	A descriptive term for a problem in social interaction and social communication but not currently a diagnosis. This may change in DSM-V.
Specificity	In diagnostic testing, it refers to the chance of having a negative test result given that you do not have the disease. 100% specificity means that all those without the disease will test negative, but this is not the same the other way around. A patient could have a negative test result yet still have the disease – this is called a 'false negative'. The specificity of a test is also related to its 'positive predictive value' (true positives) – a test with a specificity of 100% means that all those who get a positive test result definitely have the disease. To fully judge the accuracy of a test, its sensitivity must also be considered.
Standard deviation	A measure of the spread, scatter or variability of a set of measurements. Usually used with the mean (average) to describe numerical data.
Statistical power	The ability of a study to demonstrate an association or causal relationship between two variables, given that an association exists. For example, 80% power in a clinical trial means that the study has a 80% chance of ending up with a P value of less than 5% in a statistical test (that is, a statistically significant treatment effect) if there really was an important difference between treatments (for example 10% versus 5% mortality). If the statistical power of a study is low, the study results will be questionable (the study might have been too small to detect any differences). By convention, 80% is an acceptable level of power. See also P value.

Stereotypes	Repetitive, stereotyped, purposeless movements, actions, body patterns, speech patterns. They include hand flapping, clapping, slapping, fluttering, rocking or facial movements.
Structured interview	A research technique where the interviewer controls the interview by adhering strictly to a questionnaire or interview schedule with preset questions.
Study checklist	A list of questions addressing the key aspects of the research methodology that must be in place if a study is to be accepted as valid. A different checklist is required for each study type. These checklists are used to ensure a degree of consistency in the way that studies are evaluated.
Study population	People who have been identified as the subjects of a study.
Study quality	See Methodological quality.
Study type	The kind of design used for a study. Randomised controlled trial, case–control study and cohort study are all examples of study types.
Subject	A person who takes part in an experiment or research study.
Survey	A study in which information is systematically collected from people (usually from a sample within a defined population).
Syndrome	The frequent co-occurrence of the same signs and/or symptoms constitutes a syndrome.
Systematic error	Refers to the various errors or biases inherent in a study. See also Bias.
Systematic review	A review in which evidence from scientific studies has been identified, appraised and synthesised in a methodical way according to predetermined criteria. May or may not include a meta-analysis.
Systematic	Methodical, according to plan; not random.
Systemic	Involving the whole body.
Target population	The people to whom guideline recommendations are intended to apply. Recommendations may be less valid if applied to a population with different characteristics from the participants in the research study, for example in terms of age, disease state, social background.
Tertiary centre	A major healthcare/medical centre providing complex treatments which receives referrals from both primary and secondary care. Sometimes called a tertiary referral centre. See also Primary care and Secondary care. Mental health services use the terms ‘tiers 1-4, with tier 4 being the equivalent of a tertiary service.)
Triple blind study	A study in which the statistical analysis is carried out without knowing which treatment patients received, in addition to the patients and investigators/clinicians being unaware which treatment patients were getting.
Uncontrolled observational study	A type of study where there is no control group.
Univariate analysis	Analysis of data on a single variable at a time.
Validity	Assessment of how well a tool or instrument measures what it is intended to measure. See also External validity, Internal validity.
Variable	A measurement that can vary within a study, for example the age of participants. Variability is present when differences can be seen between different people or within the same person over time, with respect to any characteristic or feature which can be assessed or measured.

Yield	The outcome of a biomedical test that can suggest clinically relevant findings.

Appendix A Scope

1 NATIONAL INSTITUTE FOR HEALTH AND CLINICAL EXCELLENCE

SCOPE

1 Guideline title

Autism spectrum disorders in children and young people: recognition, referral and diagnosis

1.1 Short title

Autism spectrum disorders in children and young people

2 The remit

The Department of Health has asked NICE: 'to develop a clinical guideline in relation to the initial recognition, referral and diagnosis of autism spectrum disorders in children and adolescents'.

3 Clinical need for the guideline

3.1 Epidemiology

a) Autism spectrum disorders are lifelong neurological conditions. The way they are expressed in individual people will differ at different stages of their lives and in response to interventions. The number of identified cases of children and young people with all disorders in the autism spectrum (which includes autism, Asperger's syndrome and atypical autism) has risen in the past decade. The prevalence for all autism spectrum disorders (ASDs) ranges from 60 per 10,000 to more than 100 per 10,000 in the UK. The prevalence for autism is reported to range from 20 to 40 per 10,000. These numbers have had a significant impact on referrals to diagnostic services.

b) The main areas of functioning affected in people with ASD as defined by the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) are:

- qualitative impairments in social interaction
- qualitative impairments in communication
- restricted, repetitive and stereotyped patterns of behaviour, interests and activities.

c) Other features commonly found are a lack of cognitive and behavioural flexibility; altered sensory sensitivity; sensory processing difficulties, stereotyped mannerisms; emotional dysregulation, and a limited range of interests and activities.

d) These features may be along a continuum from minimal to severe. The presence of features of the autism spectrum may have minimal impact on a person's ability to function in the world, and 'condition' is a more appropriate term than 'disorder'. For a diagnosis of ASD to be made there must be both the presence of impairments (as defined by the World Health Organization) and an impact on the person's functioning.

e) The two major diagnostic classification systems (DSM-IV and ICD-10) use similar but not identical criteria. They both use the term pervasive developmental disorder (PDD), which encompasses autism, Asperger's syndrome and atypical autism (or PDD-NOS [not otherwise specified]). For the purposes of this clinical guideline the term ASD is used instead of PDD because it is more widely understood.

f) Children and young people with ASD are more likely to have associated mental health and medical health problems, other developmental disorders and adaptive impairments. 'Diagnostic overshadowing' means there may be a tendency to overlook symptoms of ASD in these groups and attribute them to being part of an intellectual disability. Children with a diagnosed intellectual disability have been identified as a specific group in which ASD may be under-diagnosed.

3.2 Current practice

a) There is wide variation in rates of identification and referral for diagnostic assessment, waiting times for diagnosis, models of multiprofessional working, assessment criteria, diagnostic practice, and biomedical investigation and genetic counselling for children and young people with features of ASD. These factors contribute to delays in reaching a diagnosis and subsequent access to appropriate services.

b) Healthcare professionals usually make the diagnosis of ASD in a child or young person. By working jointly with social care and educational professionals in a range of environments, healthcare professionals share information regarding the diagnosis and agree on a plan for future support and/or interventions for each child or young person. When the process works well, professionals and carers communicate right from the start, laying the foundation for a long-term understanding between children, carers and the professionals supporting their needs. However, practice varies and in some parts of the country waiting lists for multiprofessional specialist assessment are longer than 2 years.

c) Diagnosis is a process that can have a variable time frame involving different competencies amongst the professionals involved. However, flexibility in approach to diagnosis is not always a feature of current diagnostic assessment in the NHS.

d) The current use of biomedical investigations to rule out other conditions and thresholds for genetic counselling referral varies markedly. Opinion also varies on the value of biomedical investigations in the diagnostic assessment of autism and coexisting conditions.

e) Children and young people with other existing conditions featuring intellectual, physical or sensory disability and/or mental health problems may not be recognised as having symptoms of ASD, and there may be overlaps between a developmental disorder and a coexisting condition. Children's social circumstances (for instance, 'looked after' children) may also affect how quickly features of ASD are recognised.

f) Some of the behaviours that define ASD may also feature in other communication disorders and learning disabilities (such as childhood attachment disorders), as well as being the result of other conditions (such as epilepsy or acquired brain injury) or childhood experiences (such as trauma or maltreatment). Children and young people may be wrongly diagnosed as having a mental illness when they have features of ASD, or, conversely, they may be misdiagnosed with autism when they have another condition. Misdiagnosis can lead to delays in children and young people receiving the care and support that they need.

g) The process and content of information-sharing varies widely, for instance in the provision of information and support for the family while awaiting diagnosis and immediately after.

h) Clinical guidance for diagnosis has been published for the NHS in Scotland: 'Assessment, diagnosis and clinical interventions for children and young people with autism spectrum disorders' (Scottish Intercollegiate Guidelines Network [SIGN 98] 2007). The National Service Framework for Children, Young People and Maternity Services (2004) included an 'Autism exemplar', which described the 'patient journey' of a 3-year-old boy with ASD and built on guidance in the National Autism Plan for Children (NAP-C). The Autistic Spectrum Disorder Strategic Action Plan for Wales (2008) focused on the role of strategic health plans to develop services and interagency cooperation between health and education for children and young people with ASD. The Department of Health published the consultation document 'A better future' (2009) on designing services to improve support for adults with autistic spectrum conditions. The National Audit Office is currently undertaking a study, 'Supporting people with autism through adulthood' focusing particularly on the transition from adolescence to adulthood.

i) This guideline is needed to make services more child and family/supporter centred and to help reduce variation in professional practice by improving initial recognition of the features of ASD and the timing and process of diagnostic assessment to enable longer-term future care.

4 The guideline

The guideline development process is described in detail on the NICE website (see section 6, 'Further information').

This scope defines what the guideline will (and will not) examine, and what the guideline developers will consider. The scope is based on the referral from the Department of Health.

The areas that will be addressed by the guideline are described in the following sections:

4.1 Population

4.1.1 Groups that will be covered

a) Children and young people from birth up to 18 years until their 19th birthday.

b) Specific subgroups of children in whom ASD is known to be less likely to be recognised.
• Children diagnosed with an intellectual disability, because the components of a core diagnosis may be different for children in this group.

4.1.2 Groups that will not be covered

a) Adults (19 and older).

4.2 Healthcare setting

a) Primary, secondary and tertiary care by healthcare professionals who have direct contact with, and make decisions concerning, the care of children and young people.

b) This is an NHS guideline. It will comment on the interface with other services, such as social services and the voluntary sector. But it will not include recommendations relating to services provided exclusively by these agencies, except relating to care provided in those settings by healthcare professionals funded by the NHS. The guideline may include some recommendations for education services, either directly or indirectly, relating to collaborative working with NHS professionals.

4.3 Clinical management

4.3.1 Key clinical issues that will be covered

a) Signs and symptoms (features of ASD) that should prompt professionals working with children and/or parents or carers to consider ASD in a child or young person. These will include signs and symptoms that should trigger referral for specialist assessment.

b) Information requirements from other agencies.

c) The components of diagnostic assessment after referral, including:

- methods of assessing ASD
- diagnostic thresholds for ASD
- assessment of the most common coexisting conditions and differential diagnoses, including other developmental disorders
- speech and language disorders, intellectual disabilities, and mental health problems
- clinical evidence for and cost-effectiveness of (which test should be done on whom and for what purpose):
  - biomedical investigations (including sequencing and number of tests)
  - genetic assessments (such as karyotype, fragile x, comparative genomic hybridization [CGH] array)
  - neuroimaging (computed tomography [CT], magnetic resonance imaging [MRI], single photon emission computed tomography [SPECT], positron emission tomography [PET])
  - electroencephalograms [EEGs]
  - metabolic tests.

d) The information and day-to-day support (such as a telephone helpline) appropriate for children, young people and parents/carers during the process of referral, assessment and diagnosis of ASD.

e) Ineffective diagnostic interventions and approaches.

4.3.2 Clinical issues that will not be covered

a) Population screening or surveillance.

b) The basic components of any routine paediatric or mental health assessment not specific to ASD.

c) The role and competencies of different professions in the recognition and diagnosis of ASD.

d) Specific models for running a diagnostic service.

e) Interventions and ongoing management of ASD, including specific therapeutic interventions during diagnosis.

f) Reassessment and review of diagnosis.

4.4 Main outcomes

a) Diagnostic accuracy of clinical and other features for the recognition of ASD.

b) Diagnostic accuracy of biomedical investigations in ASD.

c) Identification of coexisting conditions.

d) Health-related quality of life, measured in quality-adjusted life years (QALYs) if possible.

e) Children and young people's views and the views of their parents and carers of the process of referral, assessment and diagnosis, and their support and information needs.

f) A clinical pathway that describes the components of an effective diagnostic service, based on an ethos of multiprofessional working.

4.5 Economic aspects

Developers will take into account both clinical and cost-effectiveness when making recommendations involving a choice between alternative diagnostic and biomedical investigations. A review of the economic evidence will be conducted and analyses will be carried out as appropriate. The preferred unit of effectiveness is the QALY and the costs considered will usually only be from an NHS and personal social services (PSS) perspective. Further detail on the methods can be found in 'The guidelines manual' (see 'Further information').

4.6 Status

4.6.1 Scope

This is the final scope.

4.6.2 Timing

The development of the guideline recommendations will begin in September 2009.

5 Related NICE guidance

• When to suspect child maltreatment. NICE clinical guideline 89 (2009). Available from www.nice.org.uk/CG89

• Attention deficit hyperactivity disorder. NICE clinical guideline 72 (2008) Available from www.nice.org.uk/CG72

• Depression in children and young people. NICE clinical guideline 28 (2005). Available from www.nice.org.uk/CG28

6 Further information

Information on the guideline development process is provided in:

• 'How NICE clinical guidelines are developed: an overview for stakeholders', the public and the NHS'
• 'The guidelines manual'.

These are available from the NICE website (www.nice.org.uk/guidelinesmanual). Information on the progress of the guideline will also be available from the NICE website (www.nice.org.uk).

Appendix B Declarations of interest

The guideline development group (GDG) members were asked to declare any possible conflicts of interest which could interfere with their work on the guideline. The interests that were declared are as follows:

Table B.1 GDG members' declarations of interest

GDG member	Interest declared	Type of interest	Decisions taken
Gillian Baird	Published research on autism spectrum disorders (ASD) prevalence and screening, including a total population screening study that informed the work of the national screening committee	Personal, non-pecuniary	NCC-WCH Clinical Co-Director facilitated discussions on related topics while declaration considered. Not considered a conflict of interest by the NCC-WCH/NICE and she chaired all GDG discussions from 29 March 2010
	Involved in the development of the DSM-IV, DSM-V, ICD-10 and ICD-11	Personal, non-pecuniary	Declare and can participate in discussions on all topics
Tony Charman	Published research on recognition, screening tools, diagnostic instruments, interventions and the prevalence of autism	Personal, non-pecuniary	Declare and can participate in discussions on all topics
	Holding office in the following groups and professional bodies: member of the Scientific Advisory board of the charity Research Autism; Chair of the Advisory Group to the All Party Parliamentary Group on Autism; Invited expert on a number of panels convened by the Medical Research Council (MRC) and the National Autistic Society (NAS) in the UK and the National Institutes of Health (NIH) in the USA	Personal, non-pecuniary	Declare and can participate in discussions on all topics
	Involved in the development and testing of Checklist for Autism in Toddlers (CHAT) and Quantitative Checklist for Autism in Toddlers (Q-CHAT) screening instruments	Personal, non-pecuniary	Declare and can participate in discussions on all topics

GDG member	Interest declared	Type of interest	Decisions taken
	European Science Foundation COST (European Cooperation in Science and Technology) Action: Enhancing the Scientific Study of Early Autism (ESSEA); a 'network' grant that involves work on early screening and early intervention amongst other activities.	Non-personal, pecuniary	Declare and can participate in discussions on all topics
	Economic and Social Research Council (ESRC)/MRC grant "The UK 2012 Birth Cohort Study of environment, development, health and wellbeing". Co-Investigator with Carol Dezateux (Principal Investigator) and 23 others.	Non-personal, pecuniary	Declare and can participate in discussions on all topics
	Wellcome Trust grant "Specific language impairment and comorbidity: development over the first three years of schooling". Co-Investigator with Courtenay Norbury (Principal Investigator), Gillian Baird, Emily Simonoff, Andrew Pickles.	Non-personal, pecuniary	Declare and can participate in discussions on all topics
	Autism Education Trust grant (DFE funded). "Outcomes Research". Co-Investigator with Kerstin Wittemeyer (Principal Investigator) and seven others.	Non-personal, pecuniary	Declare and can participate in discussions on all topics
	Autism Education Trust grant (Department for Education [DFE] funded) "What is Good Practice Research in Autism Education?". Principal Investigator. Co-Investigators: Liz Pellicano, Julie Dockrell.	Non-personal, pecuniary	Declare and can participate in discussions on all topics
Diana Howlett	Leads steering group of the North Somerset Autism Strategy Group that endorses a multiagency approach to assessment and diagnosis of ASD. This approach could be changed in light of new guidance.	Personal, non-pecuniary	Declare and can participate in discussions on all topics
Anne Marie McKigney	Involved in small research project to map and evaluate the current diagnostic process used for assessment of ASD in children and young people in Gwent (2010).	Personal, non-pecuniary	Declare and can participate in discussions on all topics
	Member of Aneurin Bevan Health Board Working Party on Assessment and Diagnosis for Autism Spectrum Disorder – 2003. This approach could be changed in light of new guidance.	Personal, non-pecuniary	Declare and can participate in discussions on all topics
	Member of focus group looking at the assessment and diagnosis of children with ASD in Wales, as part of the Welsh Assembly Government ASD Strategic Action Plan.	Personal, non-pecuniary	Declare and can participate in discussions on all topics
Ann Le Couteur	Royalties on sales of Autism Diagnostic Interview paid to Newcastle University (from Western Psychological Services [WPS]).	Non-personal pecuniary	Declare and can participate in discussions on all topics
	Lecture given on Diagnostic Assessment and Interventions and Comorbid Disorders.	Personal non-pecuniary	Declare and can participate in discussions on all topics

GDG member	Interest declared	Type of interest	Decisions taken
	Lecture given on 'Diagnostic Assessment and Interventions and Comorbid Disorders' (Romania, November 2009)	Personal non-pecuniary	Declare and can participate in discussions on all topics
	Lecture given on 'Autism Spectrum Disorders: Assessments and Interventions' (Association for Child and Adolescent Mental Health Emmanuel Millar Lecture and Day Conference, March 2010)	Personal non-pecuniary	Declare and can participate in discussions on all topics
	Moderator Question and Answer Session on 'Meeting the global challenge of screening and diagnosis of autism spectrum disorders' (International Meeting for Autism Research [IMFAR] conference, May 2010)	Personal non-pecuniary	Declare and can participate in discussions on all topics
	Costs for reviewing Autism Diagnostic Interview-Revised (ADI-R) paid to Newcastle University.	Non-personal, pecuniary	Declare and can participate in discussions on all topics
	Holding office in the following groups and professional bodies: Member of Medical Research Council Review of Autism Research (2000-01); National Autism Plan for Children (NAP-C) advisor to National Service Framework Disabled Children External Working Group (2001–2003); Member of the All Party Parliamentary Group on Autism; Member of Dept for Education and Skills Autism Research Co-ordination Group; Member of the Scientific Advisory Committee, Research Autism; External advisor and expert peer reviewer for the Scottish Intercollegiate Guidelines Network ASD guideline (2006-07); External advisor and expert peer reviewer for the New Zealand ASD Guideline (2007-08); Independent Autism expert advisor to the North East Autism Consortium: A multi-agency strategic planning group responsible for the commissioning of services for adults (14 years and over) with ASD; Department of Health Adult Autism Strategy External Reference Group – Member of Health subgroup and Department of Health North of England Stakeholders Group (2008–2010); The UK Brain Bank for Autism & Developmental Disorders Member of Research Advisory Group; Member of National Advisory Board for Transition to Adult Services & Adulthood for Young People with ASC; Patron of the South Tyneside ASD support Group; Patron of the Tyne & Wear Autistic Society.	Personal non-pecuniary	Declare and can participate in discussions on all topics
	Published research on screening tools, diagnostic instruments, interventions and the prevalence of autism.	Personal, non-pecuniary	Declare and can participate in discussions on all topics

GDG member	Interest declared	Type of interest	Decisions taken
Jamie Nicholls	GP tutor for Southend-on-Sea area, a paid post (one session per week) and responsible for arranging the continuing professional education for the primary care practitioners in local area.	Personal, pecuniary	Declare and can participate in discussions on all topics
	Member of the Scientific & Advisory Committee of Research Autism. Given lectures and written educational articles on autism directed mainly towards education in primary care.	Personal, non-pecuniary	Declare and can participate in discussions on all topics
Lorraine Scott	Member of diagnostic Forum In Northern Ireland that aims to develop advice on standards for assessment and diagnosis of ASD.	Personal, non-pecuniary	Declare and can participate in discussions on all topics
Emily Simonoff	Published research on screening tools, diagnostic instruments, interventions and the prevalence of autism.	Personal, non-pecuniary	Declare and can participate in discussions on all topics

Appendix C Registered stakeholder organisations

Below is the list of registered stakeholder organisations as of 13 June 2011. For the most up-to-date list please see the NICE website at http://guidance.nice.org.uk/CG/Wave15/78/SHRegistration/SHList/pdf/English

Autism Diagnosticians Forum Northern Ireland (ADFNI)

Abertawe Bro Morgannwg University (ABMU) Local Health Board

Action for ADHD – Northants

Action for Sick Children

ADDISS

ADHD North West

Adverse Psychiatric Reactions Information Link (APRIL)

Airedale NHS Foundation Trust

Alder Hey Children's NHS Foundation Trust

Alliance Pharmaceuticals Ltd

Ambitious about Autism

Ashton Leigh & Wigan Community Healthcare NHS

Assisted Living South West

Association for Cognitive Analytic (ACAT) Therapy

Association for Continence Advice

Association for Family Therapy and Systemic Practice in the UK (AFT)

Association of Child Psychotherapists

Association of Dance Movement Psychotherapy UK

Association of Directors of Childrens Services

Association of Educational Psychologists

Association of Optometrists

Association of Paediatric Anaesthetists of Great Britain and Ireland

Association of Professional Music Therapists

Association of Psychoanalytic Psychotherapy in the NHS

Association of the British Pharmaceuticals Industry (ABPI)

Autism Centre for Education and Research

Autism Cymru

Autism Education Trust

Autism London
Autism Medical
Autism NI
Autism North East
Autism Outreach
Autism Rights Group Highland
Autism Treatment Trust
Autism West Midlands
Autism-in-Mind
Autistic People Against Neuroleptic Abuse (APANA)
Bangor University
Barnsley Hospital NHS Foundation Trust
Barnsley PCT
Behavior Analyst Certification Board
Belfast Health and Social Care Trust
Berkshire Healthcare NHS Foundation Trust
Betsi Cadwaladr University Health Board
Birmingham Childrens Hospital NHS Foundation Trust
Birmingham City Council
Birmingham Early Intervention Service
BMJ
Bolton Council
Bradford District Care Trust
Bridge College
British Academy of Childhood Disability
British Association for Adoption and Fostering
British Association for Behavioural & Cognitive Psychotherapies (BABCP)
British Association for Community Child Health
British Association for Counselling and Psychotherapy
British Association for Psychopharmacology
British Association of Art Therapists
British Association of Drama Therapists
British Association of Paediatric Urologists
British Association of Play Therapists
British Association of Psychodrama and Sociodrama (BPA)
British Dietetic Association
British Medical Association (BMA)
British National Formulary (BNF)
British Paediatric Mental Health Group

British Paediatric Neurology Association

British Psychodrama Association

British Psychological Society, The

British Society for Human Genetics

British Society of Neuroradiologists

British Society of Paediatric Dentistry

British Society of Paediatric Gastroenterology, Hepatology & Nutrition (BSPGHAN)

Bromley PCT

Brook London

Calderstones Partnerships NHS Foundation Trust

Care Quality Commission (CQC)

Central Lancashire PCT

Cerebra

Child Development Centre

CIS'ters

Citizens Commission on Human Rights

Cleft Lip and Palate Association

Cochrane Devlopmental, Psychosocial and Learning Problems

Coeliac UK

College of Mental Health Pharmacy

College of Occupational Therapists

Community Integrated Care

Connecting for Health

Counselling and Psychotherapy Trust

County Durham PCT

Coventry and Warwickshire Partnership Trust

Department for Communities and Local Government

Department for Education

Department of Health

Department of Health Advisory Committee on Antimicrobial Resistance and Healthcare Associated Infection (ARHAI)

Department of Health, Social Services & Public Safety, Northern Ireland (DHSSPSNI)

Derbyshire Mental Health Services NHS Trust

Dimensions

Disabilities Trust, The

Down Syndrome Education International

Down Syndrome Research Foundation

Down’s Syndrome Association

East London NHS Foundation Trust

Encephalitis Society
European Association for Behaviour Analysis
Experimental Analysis of Behaviour Group, UK & Europe
FACT Kettering
FACT Northampton
Faculty of Dental Surgery
FAS Aware UK
Federation of Ophthalmic & Dispensing Opticians (FODO)
Flintshire County Council
Foundation for People with Learning Disabilities
Gender Identity Research & Education Society
George Eilot Hosptal Trust
George Still Forum (National Paediatric ADHD Interest Group)
Gloucestershire Acute Trust
Gloucestershire Partnership NHS Foundation Trust
Great Ormond Street Hospital for Children NHS Trust
Great Western Hospitals NHS Foundation Trust
Greater Manchester West Mental Health NHS Foundation Trust
Guy's and St Thomas NHS Foundation Trust
Halton & St Helens PCT
Hampshire Partnership NHS Foundation Trust
Hampshire PCT
Harrogate and District NHS Foundation Trust
Healthcare Improvement Scotland
Healthcare Quality Improvement Partnership
Hertfordshire Partnership NHS Trust
Hinwick Hall College
Humber NHS Foundation Trust
Imperial Healthcare
Infermed Ltd
Institute of Psychiatry
International Autistic Research Organisation & Autism Research Ltd
Kent & Medway NHS and Social Care Partnership Trust
Lambeth Community Health
Leeds PCT
Liverpool Community Health
Liverpool PCT Provider Services
London Borough of Southwark
Manchester Children's Hospital Trust

Manchester Community Health

MBB Connections Healthcare

McTimoney Chiropractic Association

Medicines and Healthcare Products Regulatory Agency (MHRA)

Mencap

Mental Health Act Commission

Mental Health Foundation

Mental Health Nurses Association

Mersey Care NHS Trust

Ministry of Defence (MoD)

MK ADHD

Mother and Child Foundation

National Autistic Society

National CAMHS Support Service

National Centre for Young People with Epilepsy, The

National Day Nurseries Association

National Hospital for Neurology & Neurosurgery (NHNN)

National Institute for Mental Health in England

National Offender Management Service

National Patient Safety Agency (NPSA)

National Treatment Agency for Substance Misuse

NCC – Cancer

NCC – Mental Health

NCC – National Clinical Guideline Centre (NCGC)

NCC – Women & Children

Neonatal & Paediatric Pharmacists Group (NPPG)

NETSCC, Health Technology Assessment

NeuroDiversity International (NDI)/NeuroDiversity Self-Advocacy Network (NESAN)

NHS Bath and North East Somerset

NHS Bedfordshire

NHS Bradford & Airedale

NHS Bristol

NHS Buckinghamshire

NHS Camden (Mosaic CAMHS)

NHS Clinical Knowledge Summaries Service (SCHIN)

NHS Direct

NHS Hertfordshire

NHS Isle of Wight

NHS Kirklees

NHS Knowsley
NHS Milton Keynes
NHS Plus
NHS Sefton
NHS Sheffield
NHS Western Cheshire
NORSACA
North East London Mental Health Trust
North Essex Partnership NHS Foundation Trust
North Somerset PCT
North Staffordshire Combined Healthcare NHS Trust
North Tees & Hartlepool NHS Foundation Trust
North Wales NHS Trust
North Yorkshire and York PCT
Northamptonshire County Council
Northern Ireland Regional Genetics Service
Northumberland, Tyne & Wear NHS Foundation Trust
Nottinghamshire Healthcare NHS Trust
Novartis Pharmaceuticals UK Ltd
Optical Confederation, The
Oxford Health NHS Foundation Trust
PAPYRUS (Prevention of Suicides)
Parents' Education as Autism Therapists
Parents Protecting Children UK
Partnerships for Children, Families, Women and Maternity
Patients Council
PDA Contact Group
Peach
Pepenbury
Perigon Healthcare Ltd
Poole and Bournemouth PCT
Portland College
Positively Pregnant
Progress Educational Trust
Public Health Agency
Public Health Wales
Pyramid Educational Consultants
Qbtech Ltd
Queens University Belfast

Research Autism
Ridgeway Partnership
Rotherham NHS Foundation Trust
Royal College of Anaesthetists
Royal College of General Practitioners
Royal College of General Practitioners Wales
Royal College of Midwives
Royal College of Nursing
Royal College of Obstetricians and Gynaecologists
Royal College of Paediatrics and Child Health
Royal College of Pathologists
Royal College of Physicians London
Royal College of Psychiatrists
Royal College of Psychiatrists in Wales
Royal College of Radiologists
Royal College of Speech and Language Therapists
Royal College of Surgeons of England
Royal Pharmaceutical Society of Great Britain
Royal Society of Medicine
Ruskin Mill Educational Trust
Salford Royal Hospitals Foundation NHS Trust
Sandwell PCT
Sanofi-Aventis
School and Public Health Nurses Association
Scottish Centre for Children with Motor Impairments
Scottish Intercollegiate Guidelines Network (SIGN)
Sensory Integration Network
Sheffield Children's NHS Foundation Trust
Sheffield PCT
Sheffield Teaching Hospitals NHS Foundation Trust
Shrewsbury & Telford Hospital NHS Trust
Social Care Institute for Excellence (SCIE)
Solent Healthcare
South Essex Partnership NHS Foundation Trust
South West Autistic Rights Movement
South West Essex PCT
South West London and St Georges Mental Health NHS Trust
South West Wales Home Educators
South West Yorkshire Partnership NHS Foundation Trust

Southampton City PCT
St Andrew's Healthcare
St John's RC School
Staffordshire County Council
Sussex Partnership NHS Foundation Trust
Swansea University
TACT
Talking Mats Research and Development Centre
Tavistock & Portman NHS Foundation Trust
Tees Esk & Wear Valleys NHS Trust
The Autism Centre, Sheffield Hallam University
The National Autistic Society
The Princess Royal Trust for Carers
Triangle
Turning Point
UCLH NHS Foundation Trust
UK Clinical Pharmacy Association (UKCPA)
UK National Screening Committee
UK Young Autism Project
Unite the Union – Community Practitioners' and Health Visitors' Association (CPHVA)
United Kingdom Council for Psychotherapy
University Centre for Excellence in Developmental Disabilities
University of Edinburgh
University of Liverpool
University of Nottingham
University of Ulster
Warrington Primary Care Trust
WASP With Asperger Limited
Welsh Assembly Government
Welsh Scientific Advisory Committee (WSAC)
West Hertfordshire PCT & East and North Hertfordshire PCT
West London Mental Health NHS Trust
West Midlands SHA
Western Cheshire Primary Care Trust
Western Health and Social Care Trust
Whitstone Head Educational (Charitable) Trust Ltd
Wiltshire PCT
Wirral University Teaching Hospital NHS Foundation Trust
Wolfson Neurodisability Service, The

Worcestershire PCT

Wound Care Alliance UK

York Teaching Hospital NHS Foundation Trust

Appendix D Review questions

Chapter 3 Recognition

a) What are the signs and symptoms that should prompt a healthcare professional or other professional in any context to think of autism? (**Question 1a**)

b) When should a child or young person be referred for diagnostic assessment? (**Question 1b**)

Chapter 4 Following referral

In children with suspected autism (based on signs and symptoms) what information assists in the decision to refer for a formal autism diagnostic assessment? (**Question 2**)

a) Are there tools to identify an increased likelihood of autism that are effective in assessing the need for specialist autism assessment? (**Question 2a**)

b) What information about the child and family increases the likelihood of a diagnosis of autism and would assist in the decision to refer for a formal autism diagnostic assessment? (**Question 2b**)

- risk factors (part 1)
- conditions with an increased risk of autism (part 2)

c) What information from other sources is useful as contextual information: for example information about how the child functions in different environments such as school and home,; social care reports (e.g. for 'looked after' children) and information from other agencies? (**Question 2c**)

Chapter 5 Diagnostic assessment

What should be the components of the diagnostic assessment? When should they be undertaken, in what subgroups and in what order? (**Question 3**)

- assessment tools specific to autism: for example Autism Diagnostic Interview and Autism Diagnostic Interview – Revised (ADI/ADI-R), Developmental, Dimensional and Diagnostic Interview (3di), Diagnostic Interview for Social and Communication Disorders (DISCO), Autism Diagnostic Observation Schedule (ADOS), Gilliam Autism Rating Scale (**Question 3a**)
- other assessment tools that help the interpretation of the specific autism tools and ratings scales (for example ADI-R, 3di, DISCO, ADOS, Gilliam Autism Rating Scale): such as an assessment of intellectual ability or an assessment of receptive and expressive language. (**Question 3b**)

How should information be integrated to arrive at a diagnosis? (**Question 5**)

- Is the diagnostic assessment more accurate and reliable when performed by a multidisciplinary team or a single practitioner? (**Question 5a**)
- What is the stability of an autism diagnosis over time? (**Question 5b**)
- What is the agreement of an autism diagnosis across different diagnostic tools? (**Question 5c**)

How should the findings of the diagnostic assessment be communicated to children and young people, and their families/carers? (**Question 6**)

What actions should follow assessment for children and young people who are not immediately diagnosed with autism? (**Question 7**)

Chapter 6 Differential diagnosis

a) What are the most important differential diagnoses of autism? (**Question 4a**)

b) What features observed during diagnosis reliably differentiate other conditions from autism? (Question 4b)

Chapter 7 Assessment of coexisting conditions

Which are the common coexisting conditions that should be considered as part of assessment? (**Question 8**)

- neurodevelopmental: speech and language problems, intellectual disability, coordination, learning difficulties in numeracy and literacy
- mental and behavioural disorders such as attention deficit hyperactivity disorder (ADHD), obsessive compulsive disorder (OCD), anxiety, depression, Tourette, tic disorders
- medical or neurological problems such as functional gastrointestinal problems, tuberosclerosis, neurofibromatosis.

Chapter 8 Medical investigations

What should be the components of the diagnostic assessment?

- biomedical investigations for diagnosis of autism, for example electroencephalography (EEG), brain scan, genetic tests, counselling; investigations for associated medical conditions. (**Question 3c**)

Chapter 9 Information and support

What information do children and young people, and their families/carers, need during the process of referral, assessment and diagnosis of autism? (**Question 9**)

What kinds of day-to-day, ongoing support (not specific to therapeutic interventions/management of autism) should be offered to children and young people, and their families/carers, during the process of referral, assessment and discussion of diagnosis of autism? (**Question 10**)

Appendix E Protocols

See separate file

Appendix F Search strategies

See separate file

Appendix G Excluded studies

See separate file

Appendix H Included studies

See separate file

Appendix I Diagnostic criteria

International Statistical Classification of Diseases and Related Health Problem (ICD-10)

Clinical descriptions and diagnostic guidelines

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F84 Pervasive developmental disorders

This group of disorders is characterized by qualitative abnormalities in reciprocal social interactions and in patterns of communication, and by restricted, stereotyped, repetitive repertoire of interests and activities. These qualitative abnormalities are a pervasive feature of the individual's functioning in all situations, although they may vary in degree. In most cases, development is abnormal from infancy and, with only a few exceptions, the conditions become manifest during the first 5 years of life. It is usual, but not invariable, for there to be some degree of general cognitive impairment but the disorders are defined in terms of behaviour that is deviant in relation to mental age (whether the individual is retarded or not). There is some disagreement on the subdivision of this overall group of pervasive developmental disorders. In some cases the disorders are associated with, and presumably due to, some medical condition, of which infantile spasms, congenital rubella, tuberous sclerosis, cerebral lipidosis, and the fragile X chromosome anomaly are among the most common. However, the disorder should be diagnosed on the basis of the behavioural features, irrespective of the presence or absence of any associated medical conditions; any such associated condition must, nevertheless, be separately coded. If mental retardation is present, it is important that it too should be separately coded, under F70-F79, because it is not a universal feature of the pervasive developmental disorders.

F84.0 Childhood autism

A pervasive developmental disorder defined by the presence of abnormal and/or impaired development that is manifest before the age of 3 years, and by the characteristic type of abnormal functioning in all three areas of social interaction, communication, and restricted, repetitive behaviour. The disorder occurs in boys three to four times more often than in girls.

Diagnostic guidelines

Usually there is no prior period of unequivocally normal development but, if there is, abnormalities become apparent before the age of 3 years. There are always qualitative impairments in reciprocal social interaction. These take the form of an inadequate appreciation of socio-emotional cues, as shown by a lack of responses to other people's emotions and/or a lack of modulation of behaviour according to social context; poor use of social signals and a weak integration of social, emotional, and communicative behaviours; and, especially, a lack of socio-emotional reciprocity. Similarly, qualitative impairments in communications are universal. These take the form of a lack of social usage of whatever language skills are present; impairment in make-believe and social imitative play; poor synchrony and lack of reciprocity in conversational interchange; poor flexibility in language expression and a relative lack of creativity and fantasy in thought processes; lack of emotional response to other people's verbal and nonverbal overtures; impaired use of variations in cadence or emphasis to reflect communicative

modulation; and a similar lack of accompanying gesture to provide emphasis or aid meaning in spoken communication.

The condition is also characterized by restricted, repetitive, and stereotyped patterns of behaviour, interests, and activities. These take the form of a tendency to impose rigidity and routine on a wide range of aspects of day-to-day functioning; this usually applies to novel activities as well as to familiar habits and play patterns. In early childhood particularly, there may be specific attachment to unusual, typically non-soft objects. The children may insist on the performance of particular routines in rituals of a nonfunctional character; there may be stereotyped preoccupations with interests such as dates, routes or timetables; often there are motor stereotypies; a specific interest in nonfunctional elements of objects (such as their smell or feel) is common; and there may be a resistance to changes in routine or in details of the personal environment (such as the movement of ornaments or furniture in the family home).

In addition to these specific diagnostic features, it is frequent for children with autism to show a range of other nonspecific problems such as fear/phobias, sleeping and eating disturbances, temper tantrums, and aggression. Self-injury (e.g. by wrist-biting) is fairly common, especially when there is associated severe mental retardation. Most individuals with autism lack spontaneity, initiative, and creativity in the organization of their leisure time and have difficulty applying conceptualizations in decision-making in work (even when the tasks themselves are well within their capacity). The specific manifestation of deficits characteristic of autism change as the children grow older, but the deficits continue into and through adult life with a broadly similar pattern of problems in socialization, communication, and interest patterns. Developmental abnormalities must have been present in the first 3 years for the diagnosis to be made, but the syndrome can be diagnosed in all age groups.

All levels of IQ can occur in association with autism, but there is significant mental retardation in some three-quarters of cases.

Includes:

- autistic disorder
- infantile autism
- infantile psychosis
- Kanner's syndrome

Differential diagnosis. Apart from the other varieties of pervasive developmental disorder it is important to consider: specific developmental disorder of receptive language (F80.2) with secondary socio-emotional problems; reactive attachment disorder (F94.1) or disinhibited attachment disorder (F94.2); mental retardation (F70-F79) with some associated emotional/behavioural disorder; schizophrenia (F20.-) of unusually early onset; and Rett's syndrome (F84.2).

Excludes: autistic psychopathy (F84.5)

F84.1 Atypical autism

A pervasive developmental disorder that differs from autism in terms either of age of onset or of failure to fulfil all three sets of diagnostic criteria. Thus, abnormal and/or impaired development becomes manifest for the first time only after age 3 years; and/or there are insufficient demonstrable abnormalities in one or two of the three areas of psychopathology required for the diagnosis of autism (namely, reciprocal social interactions, communication, and restrictive, stereotyped, repetitive behaviour) in spite of characteristic abnormalities in the other area(s). Atypical autism arises most often in profoundly retarded individuals whose very low level of functioning provides little scope for exhibition of the specific deviant behaviours required for the diagnosis of autism; it also occurs in individuals with a severe specific developmental disorder of receptive language. Atypical autism thus constitutes a meaningfully separate condition from autism.

Includes:

- atypical childhood psychosis
- mental retardation with autistic features

F84.2 Rett's syndrome

A condition of unknown cause, so far reported only in girls, which has been differentiated on the basis of a characteristic onset, course, and pattern of symptomatology. Typically, apparently normal or near-normal early development is followed by partial or complete loss of acquired hand skills and of speech, together with deceleration in head growth, usually with an onset between 7 and 24 months of age. Hand-wringing stereotypies, hyperventilation and loss of purposive hand movements are particularly characteristic. Social and play development are arrested in the first 2 or 3 years, but social interest tends to be maintained. During middle childhood, trunk ataxia and apraxia, associated with scoliosis or kyphoscoliosis tend to develop and sometimes there are choreoathetoid movements. Severe mental handicap invariably results. Fits frequently develop during early or middle childhood.

Diagnostic guidelines

In most cases onset is between 7 and 24 months of age. The most characteristic feature is a loss of purposive hand movements and acquired fine motor manipulative skills. This is accompanied by loss, partial loss or lack of development of language; distinctive stereotyped tortuous wringing or "hand-washing" movements, with the arms flexed in front of the chest or chin; stereotypic wetting of the hands with saliva; lack of proper chewing of food; often episodes of hyperventilation; almost always a failure to gain bowel and bladder control; often excessive drooling and protrusion of the tongue; and a loss of social engagement. Typically, the children retain a kind of "social smile", looking at or "through" people, but not interacting socially with them in early childhood (although social interaction often develops later). The stance and gait tend to become broad-based, the muscles are hypotonic, trunk movements usually become poorly coordinated, and scoliosis or kyphoscoliosis usually develops. Spinal atrophies, with severe motor disability, develop in adolescence or adulthood in about half the cases. Later, rigid spasticity may become manifest, and is usually more pronounced in the lower than in the upper limbs. Epileptic fits, usually involving some type of minor attack, and with an onset generally before the age of 8 years, occur in the majority of cases. In contrast to autism, both deliberate self-injury and complex stereotyped preoccupations or routines are rare.

Differential diagnosis. Initially, Rett's syndrome is differentiated primarily on the basis of the lack of purposive hand movements, deceleration of head growth, ataxia, stereotypic "hand-washing" movements, and lack of proper chewing. The course of the disorder, in terms of progressive motor deterioration, confirms the diagnosis.

F84.3 Other childhood disintegrative disorder

A pervasive developmental disorder (other than Rett's syndrome) that is defined by a period of normal development before onset, and by a definite loss, over the course of a few months, of previously acquired skills in at least several areas of development, together with the onset of characteristic abnormalities of social, communicative, and behavioural functioning. Often there is a prodromic period of vague illness; the child becomes restive, irritable, anxious, and overactive. This is followed by impoverishment and then loss of speech and language, accompanied by behavioural disintegration. In some cases the loss of skills is persistently progressive (usually when the disorder is associated with a progressive diagnosable neurological condition), but more often the decline over a period of some months is followed by a plateau and then a limited improvement. The prognosis is usually very poor, and most individuals are left with severe mental retardation. There is uncertainty about the extent to which this condition differs from autism. In some cases the disorder can be shown to be due to some associated encephalopathy, but the diagnosis should be made on the behavioural features. Any associated neurological condition should be separately coded.

Diagnostic guidelines

Diagnosis is based on an apparently normal development up to the age of at least 2 years, followed by a definite loss of previously acquired skills; this is accompanied by qualitatively abnormal social functioning. It is usual for there to be a profound regression in, or loss of, language, a regression in the level of play, social skills, and adaptive behaviour, and often a loss of bowel or bladder control, sometimes with a deteriorating motor control. Typically, this is accompanied by a general loss of interest in the environment, by stereotyped, repetitive motor mannerisms, and by an autistic-like impairment of social interaction and communication. In some respects, the syndrome resembles dementia in adult life, but it differs in three key respects: there is usually no evidence of any identifiable organic disease

or damage (although organic brain dysfunction of some type is usually inferred); the loss of skills may be followed by a degree of recovery; and the impairment in socialization and communication has deviant qualities typical of autism rather than of intellectual decline. For all these reasons the syndrome is included here rather than under F00-F09.

Includes:

- dementia infantilis
- disintegrative psychosis
- Heller's syndrome
- symbiotic psychosis

Excludes:

- acquired aphasia with epilepsy (F80.3)
- elective mutism (F94.0)
- Rett's syndrome (F84.2)
- schizophrenia (F20.-)

F84.4 Overactive disorder associated with mental retardation and stereotyped movements

This is an ill-defined disorder of uncertain nosological validity. The category is included here because of the evidence that children with moderate to severe mental retardation (IQ below 50) who exhibit major problems in hyperactivity and inattention frequently show stereotyped behaviours; such children tend not to benefit from stimulant drugs (unlike those with an IQ in the normal range) and may exhibit a severe dysphoric reaction (sometimes with psychomotor retardation) when given stimulants; in adolescence the overactivity tends to be replaced by underactivity (a pattern that is not usual in hyperkinetic children with normal intelligence). It is also common for the syndrome to be associated with a variety of developmental delays, either specific or global. The extent to which the behavioural pattern is a function of low IQ or of organic brain damage is not known, neither is it clear whether the disorders in children with mild mental retardation who show the hyperkinetic syndrome would be better classified here or under F90.-; at present they are included in F90-.

Diagnostic guidelines

Diagnosis depends on the combination of developmentally inappropriate severe overactivity, motor stereotypies, and moderate to severe mental retardation; all three must be present for the diagnosis. If the diagnostic criteria for F84.0, F84.1 or F84.2 are met, that condition should be diagnosed instead.

F84.5 Asperger's syndrome

A disorder of uncertain nosological validity, characterized by the same kind of qualitative abnormalities of reciprocal social interaction that typify autism, together with a restricted, stereotyped, repetitive repertoire of interests and activities. The disorder differs from autism primarily in that there is no general delay or retardation in language or in cognitive development. Most individuals are of normal general intelligence but it is common for them to be markedly clumsy; the condition occurs predominantly in boys (in a ratio of about eight boys to one girl). It seems highly likely that at least some cases represent mild varieties of autism, but it is uncertain whether or not that is so for all. There is a strong tendency for the abnormalities to persist into adolescence and adult life and it seems that they represent individual characteristics that are not greatly affected by environmental influences. Psychotic episodes occasionally occur in early adult life.

Diagnostic guidelines

Diagnosis is based on the combination of a lack of any clinically significant general delay in language or cognitive development plus, as with autism, the presence of qualitative deficiencies in reciprocal social interaction and restricted, repetitive, stereotyped patterns of behaviour, interests, and activities.

There may or may not be problems in communication similar to those associated with autism, but significant language retardation would rule out the diagnosis.

Includes:

- autistic psychopathy
- schizoid disorder of childhood

Excludes:

- anankastic personality disorder (F60.5)
- attachment disorders of childhood (F94.1, F94.2)
- obsessive-compulsive disorder (F42.-)
- schizotypal disorder (F21)
- simple schizophrenia (F20.6)

F84.8 Other pervasive developmental disorders

F84.9 Pervasive developmental disorder, unspecified

This is a residual diagnostic category that should be used for disorders which fit the general description for pervasive developmental disorders but in which a lack of adequate information, or contradictory findings, means that the criteria for any of the other F84 codes cannot be met.

Diagnostic criteria for research

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F84.0 Childhood autism

A. Presence of abnormal or impaired development before the age of three years, in at least one out of the following areas:

(1) receptive or expressive language as used in social communication;

(2) the development of selective social attachments or of reciprocal social interaction;

(3) functional or symbolic play.

B. Qualitative abnormalities in reciprocal social interaction, manifest in at least one of the following areas:

(1) failure adequately to use eye-to-eye gaze, facial expression, body posture and gesture to regulate social interaction;

(2) failure to develop (in a manner appropriate to mental age, and despite ample opportunities) peer relationships that involve a mutual sharing of interests, activities and emotions;

(3) A lack of socio-emotional reciprocity as shown by an impaired or deviant response to other people's emotions; or lack of modulation of behaviour according to social context, or a weak integration of social, emotional and communicative behaviours.

C. Qualitative abnormalities in communication, manifest in at least two of the following areas:

(1) a delay in, or total lack of development of spoken language that is not accompanied by an attempt to compensate through the use of gesture or mime as alternative modes of communication (often preceded by a lack of communicative babbling);

(2) relative failure to initiate or sustain conversational interchange (at whatever level of language skills are present) in which there is reciprocal to and from responsiveness to the communications of the other person;

(3) stereotyped and repetitive use of language or idiosyncratic use of words or phrases;

(4) abnormalities in pitch, stress, rate, rhythm and intonation of speech;

D. Restricted, repetitive, and stereotyped patterns of behaviour, interests and activities, manifest in at least two of the following areas:

(1) an encompassing preoccupation with one or more stereotyped and restricted patterns of interest that are abnormal in content or focus; or one or more interests that are abnormal in their intensity and circumscribed nature although not abnormal in their content or focus.

(2) apparently compulsive adherence to specific, non-functional, routines or rituals;

(3) stereotyped and repetitive motor mannerisms that involve either hand or finger flapping or twisting, or complex whole body movements;

(4) preoccupations with part-objects or non-functional elements of play materials (such as their odour, the feel of their surface, or the noise or vibration that they generate);

(5) distress over changes in small, non-functional, details of the environment.

E. The clinical picture is not attributable to the other varieties of pervasive developmental disorder; specific developmental disorder of receptive language (F80.2) with secondary socio-emotional problems; reactive attachment disorder (F94.1) or disinhibited attachment disorder (F94.2); mental retardation (F70-F72) with some associated emotional or behavioural disorder; schizophrenia (F20) of unusually early onset; and Rett's syndrome (F84.2).

F84.1 Atypical autism

A. Presence of abnormal or impaired development at or after age three years (criteria as for autism except for age of manifestation).

B. Qualitative abnormalities in reciprocal social interaction or in communication, or restricted, repetitive and stereotyped patterns of behaviour, interests and activities (criteria as for autism except that it is not necessary to meet the criteria in terms of number of areas of abnormality).

C. The disorder does not meet the diagnostic criteria for autism (F84.0).

Autism may be atypical in either age of onset (F84.11) or phenomenology (84.12), these two types being differentiated with a fifth character for research purposes. Syndromes that are atypical in both respects should be coded F84.12.

F84.10 Atypicality in age of onset

A. Does not meet criterion A for autism. That is, abnormal or impaired development is evident only at or after age three years.

B. Meets criteria B, C, D and E for autism (F84.0).

F84.11 Atypicality in symptomatology

A. Meets criterion A for autism (i.e. presence of abnormal or impaired development before the age of three years).

B. Qualitative abnormalities in reciprocal social interactions or in communication, or restricted, repetitive and stereotyped patterns of behaviour, interests and activities (criteria as for autism except that it is not necessary to meet the criteria in terms of number of areas of abnormality).

C. Meets criterion E for autism.

D. Does not meet the full criteria B, C and D for autism (F84.0).

F84.12 Atypicality in both age of onset and symptomatology

A. Does not meet criterion A for autism. That is abnormal or impaired development is evident only at or after the age of three years.

B. Qualitative abnormalities in reciprocal social interactions or in communication, or restricted, repetitive and stereotyped patterns of behaviour, interests and activities (criteria as for autism except that it is not necessary to meet the criteria in terms of number of areas of abnormality).

C. Meets criterion E for autism.

D. Does not meet the full criteria B, C and D for autism (F84.0).

F84.2 Rett's syndrome

A. Apparently normal prenatal and perinatal period and apparently normal psychomotor development through the first six months and normal head circumference at birth.

B. Deceleration of head growth between five months and four years and loss of acquired purposeful hand skills between six and 30 months of age that is associated with concurrent communication dysfunction and impaired social interactions and appearance of poorly coordinated/unstable gait and/or trunk movements.

C. Development of severely impaired expressive and receptive language, together with severe psychomotor retardation.

D. Stereotyped midline hand movements (such as hand wringing or washing) with an onset at or after the time that purposeful hand movements are lost.

F84.3 Other childhood disintegrative disorder

A. An apparently normal development up to the age of at least two years. The presence of normal age-appropriate skills in communication, social relationships, play, and adaptive behaviour at age two years or later is required for diagnosis.

B. A definite loss of previously acquired skills at about the time of onset of the disorder. The diagnosis requires a clinically significant loss of skills (and not just a failure to use them in certain situations) in at least two out of the following areas:

(1) expressive or receptive language;

(2) play;

(3) social skills or adaptive behaviour;

(4) bowel or bladder control;

(5) motor skills.

C. Qualitatively abnormal social functioning, manifest in at least two of the following areas:

(1) qualitative abnormalities in reciprocal social interaction (of the type defined for autism);

(2) qualitative abnormalities in communication (of the type defined for autism);

(3) restricted, repetitive and stereotyped patterns of behaviour, interests and activities including motor stereotypies and mannerisms;

(4) a general loss of interest in objects and in the environment.

D. The disorder is not attributable to the other varieties of pervasive developmental disorder; acquired aphasia with epilepsy (F80.6); elective mutism (F94.0); schizophrenia (F20-F29); Rett's syndrome (F84.2).

F84.4 Overactive disorder associated with mental retardation and stereotyped movements

A. Severe motor hyperactivity manifest by at least two of the following problems in activity and attention:

(1) continuous motor restlessness, manifest in running, jumping and other movements of the whole body.

(2) marked difficulty in remaining seated: will ordinarily remain seated for a few seconds at most except when engaged in a stereotypic activity (see criterion B).

(3) grossly excessive activity in situations expecting relative stillness.

(4) very rapid changes of activity, so that in general activities last for less than a minute on end (occasional longer periods on highly favoured activities do not exclude this; and very long periods spent in stereotypic activities can also be compatible with this problem being present at other times).

B. Repetitive and stereotyped patterns of behaviour and activity manifest by at least one of the following:

(1) fixed and frequently repeated motor mannerisms: these may involve either complex movements of the whole body or partial movements such as hand-flapping.

(2) the excessive and non-functional repetition of activities that are constant in form: this may be play with a single object (e.g. running water) or a ritual of activities (either alone or involving other people).

(3) repetitive self-injury.

C. IQ less than 50.

D. An absence of the autistic type of social impairment, i.e. the child must show at least three of the following:

(1) developmentally appropriate use of eye gaze, expression, and posture to regulate social interaction.

(2) developmentally appropriate peer relationships that include sharing of interests, activities, etc.

(3) at least sometimes approaches other people for comfort and affection.

(4) can sometimes share other people's enjoyment. Other forms of social impairment, e.g. a disinhibited approach to strangers, are compatible with the diagnosis.

E. Does not meet diagnostic criteria for autism (F84.0 and F84.1), childhood disintegrative disorder (F84.3) or hyperkinetic disorders (F90.-).

F84.5 Asperger's syndrome

A. A lack of any clinically significant general delay in spoken or receptive language or cognitive development.

Diagnosis requires that single words should have developed by two years of age or earlier and that communicative phrases be used by three years of age or earlier. Self-help skills, adaptive behaviour and curiosity about the environment during the first three years should be at a level consistent with normal intellectual development. However, motor milestones may be somewhat delayed and motor clumsiness is usual (although not a necessary diagnostic feature). Isolated special skills, often related to abnormal preoccupations, are common, but are not required for diagnosis.

B. Qualitative abnormalities in reciprocal social interaction (criteria as for autism).

C. An unusually intense circumscribed interest or restricted, repetitive, and stereotyped patterns of behaviour, interests and activities (criteria as for autism; however it would be less usual for these to include either motor mannerisms or preoccupations with part- objects or non-functional elements of play materials).

D. The disorder is not attributable to the other varieties of pervasive developmental disorder; schizotypal disorder (F21); simple schizophrenia (F20.6); reactive and disinhibited attachment disorder of childhood (F94.1 and .2); obsessional personality disorder (F60.5); obsessive-compulsive disorder (F42).

F84.8 Other pervasive developmental disorders

F84.9 Pervasive developmental disorder, unspecified

This is a residual diagnostic category that should be used for disorders which fit the general description for pervasive developmental disorders but in which a lack of adequate information, or contradictory findings, means that the criteria for any of the other F84 codes cannot be met.

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299.00 Autistic Disorder

A total of six (or more) items from (1), (2), and (3), with at least two from (1), and one from (2) and (3):

(1) qualitative impairment in social interaction, as manifested by at least two of the following:

(a) marked impairment in the use of multiple nonverbal behaviors such as eye-to-eye gaze, facial expression, body postures, and gestures to regulate social interaction

(b) failure to develop peer relationships appropriate to developmental level

(c) a lack of spontaneous seeking to sheer enjoyment, interests, or achievements with other people (e.g. by a lack of showing, bringing, or pointing out objects of interest)

(d) lack of social or emotional reciprocity

(2) qualitative impairments in communication as manifested by at least one of the following:

(a)delay in, or total lack of, the development of spoken language (not accompanied by an attempt to compensate through alternative modes of communication such as gestures or mine)

(b) in individuals with adequate speech, marked impairment in the ability to initiate or sustain a conversation with others

(c) stereotyped or repetitive use of language or idiosyncratic language

(d) lack of varied, spontaneous make-believe play or social imitative play appropriate to developmental level

(3) restricted repetitive and stereotyped patterns of behavior, interests and activities, as manifested by at least one of the following:

(a) encompassing preoccupation with one or more stereotyped and restricted patterns of interest that is abnormal either in intensity or focus

(b) apparently inflexible adherence to specific, nonfunctional routines or rituals

(c) stereotyped or repetitive motor mannerisms (e.g. hand or finger flapping or twisting, or complex whole-body movements)

(d) persistent preoccupation with parts of objects

Delays or abnormal functioning in a least one of the following areas, with onset prior to age 3 years:

(1) social interaction

(2) language is used in social communication, or

(3) symbolic or imaginative play.

The disturbance is not better accounted for by Rett's Disorder or Childhood Disintegrative Disorder.

299.10 Childhood Disintegrative Disorder

A. Apparently normal development for at least the first 2 years after birth as manifested by the presence of age-appropriate verbal and nonverbal communication, social relationships, play, and adaptive behavior.

B. Clinically significant loss of previously acquired skills (before age 10 years) in at least two of the following areas:

(1) expressive or receptive language

(2) social skills or adaptive behavior

(3) bowel or bladder control

(4) play

(5) motor skills

C. Abnormalities of functioning in at least two of the following areas:

(1) qualitative impairment in social interaction (e.g., impairment in nonverbal behaviors, failure to develop peer relationships, lack of social or emotional reciprocity)

(2) qualitative impairments in communication (e.g., delay or lack of spoken language, inability to initiate or sustain a conversation, stereotyped and repetitive use of language, lack of varied make-believe play)

(3) restricted, repetitive, and stereotyped patterns of behavior, interests, and activities, including motor stereotypies and mannerisms

D. The disturbance is not better accounted for by another specific Pervasive Developmental Disorder or by Schizophrenia.

299.80 Asperger's Disorder

(A) Qualitative impairment in social interaction, as manifested by at least two of the following:

(1) marked impairments in the use of multiple nonverbal behaviors such as eye-to-eye gaze, facial expression, body posture, and gestures to regulate social interaction

(2) failure to develop peer relationships appropriate to developmental level

(3) a lack of spontaneous seeking to share enjoyment, interest or achievements with other people, (e.g. by a lack of showing, bringing, or pointing out objects of interest to other people)

(4) lack of social or emotional reciprocity

(B) Restricted repetitive & stereotyped patterns of behavior, interests and activities, as manifested by at least one of the following:

(1) encompassing preoccupation with one or more stereotyped and restricted patterns of interest that is abnormal either in intensity or focus

(2) apparently inflexible adherence to specific, nonfunctional routines or rituals

(3) stereotyped and repetitive motor mannerisms (e.g. hand or finger flapping or twisting, or complex whole-body movements)

(4) persistent preoccupation with parts of objects

(C) The disturbance causes clinically significant impairments in social, occupational, or other important areas of functioning.

(D) There is no clinically significant general delay in language (E.G. single words used by age 2 years, communicative phrases used by age 3 years)

(E) There is no clinically significant delay in cognitive development or in the development of age-appropriate self help skills, adaptive behavior (other than in social interaction) and curiosity about the environment in childhood.

(F) Criteria are not met for another specific Pervasive Developmental Disorder or Schizophrenia

299.80 Pervasive Developmental Disorder Not Otherwise Specified (Including Atypical Autism)

This category should be used when there is a severe and pervasive impairment in the development of reciprocal social interaction associated with impairment in either verbal or nonverbal communication skills or with the presence of stereotyped behavior, interests, and activities, but the criteria are not met for a specific Pervasive Developmental Disorder, Schizophrenia, Schizotypal Personality Disorder, or Avoidant Personality Disorder. For example, this category includes "atypical autism" - presentations that do not meet the criteria for Autistic Disorder because of late age at onset, atypical symptomatology, or subthreshold symptomatology, or all of these.

Appendix J Diagnostic tools[vii]

Autism-specific diagnostic interviews

There are a large number of instruments available to identify autism; these range from self-completion questionnaires to formal diagnostic interview. Although they may have been designed for a specific purpose, from population screening to specific diagnosis, demand has led to their use becoming extended.[227]

There are a number of published autism-specific diagnostic (semi-structured) interviews providing a framework for an autism developmental history. For all these interviews, specific training is required for use in clinical practice (different training requirements are recommended for research use). For the Autism Diagnostic Interview – Revised (ADI-R) training can be undertaken using pre-recorded materials. Attendance at UK-based training courses is required for the Diagnostic Interview for Social and Communication Disorders (DISCO) and the Developmental, Diagnostic and Dimensional interview (3di). For each, the training provides dedicated learning in autism assessments and existing diagnostic practices.

However, there are considerable resource implications for clinical service providers. Once clinical staff have been trained in the use of these tools there are, as with any other specific clinical assessment and/or intervention, implications for service configuration. Trained staff need to be enabled to make full use of their skills, with protected time to undertake the assessments, produce reports and maintain their reliable use of the instrument(s).

The properties of three published interviews are summarised here.

Autism Diagnostic Interview – Revised (ADI-R)

ADI-R is a semi-structured interview to be used with the parent(s) or main carer by a trained assessor. It is designed to provide a framework that examines the whole life of an individual to diagnose whether they have PDD/ASD as defined within the internationally accepted diagnostic systems (International Statistical Classification of Diseases and Related Health Problems [ICD-10] and Diagnostic and Statistical Manual of Mental Disorders DSM-IV-TR Fourth Edition (Text Revision) [DSM-IV-TR]).

ADI-R is a diagnostic instrument that excludes items not of immediate diagnostic value and its revision reduced it to a 96 item interview. It is designed particularly to take a developmental history from parents so that, as well as current behaviours (defined as the last 3 months), there is a substantial focus on the presentation in early childhood. The ADI-R emphasises the need to record descriptions of specific behaviours in the three key domains necessary for a diagnosis of autism (with sections focussing on regression and special skills) and some other relevant clinical behaviours. Over 2–3 hours the trained interviewer allocates each symptom a score that can be used in a well-tested diagnostic algorithm.

The published algorithm provides a threshold for autism/non-autism only. However, the multiplicity of items across the three domains of enquiry allows the separation of autism from general developmental delay/learning disability and other neurodevelopmental disorders.[228] It can be used for individuals with a mental age of 2 years and above. Recently, studies have used the ADI-R to ‘diagnose’ ASD when the child meets criteria for two of the three algorithm domains as opposed to meeting criteria in all three categories necessary for an ADI-R algorithm diagnosis of autism.

[vii] See Section 11.1 for references

Designed originally as a research tool, this internationally recognised interview is available in several languages.

Diagnostic Interview for Social and Communication Disorders (DISCO)

DISCO is a clinical interview schedule designed to consider information about development and behaviour for individuals of all ages and levels of ability for a spectrum of conditions, with a particular emphasis on the triad of impairments used to define autism,[229] including other associated developmental disorders and co-morbid conditions. A set of algorithms and information on developmental skills and atypical behaviours can be derived from the interview but the authors emphasise that these algorithms are not clinical diagnoses.[230;231]

DISCO is a semi-structured interview of the parents/main carers by a specifically trained assessor which takes about 3 hours to complete.

Developmental, Diagnostic and Dimensional interview (3di)

3di is a modular, structured interview that uses a laptop computer to work through a variety of areas with an informant, usually a parent. As well as questions that are specific to autism, it covers other mental states plus demography, family background, developmental history and motor skills.

The whole interview takes about 90 minutes and the computer immediately generates a structured report based on algorithms using a dimensional framework of symptom and diagnostic profiles for autism and common non-autistic co-morbidities. While devised to assess children of normal ability, it has been used across the range of ages and abilities and it has good validity against ADI. Its format lends itself to good reliability with limited interviewer training.[114]

There have been two approaches to abbreviating the face-to-face interview. Parents can complete a pre-interview package of questionnaires which is then entered onto the computer, reducing the face-to-face interview to 45 minutes. In addition, a shortened (53 item) version has been developed and validated against ADI.[232]

Childhood Autism Rating Scale (CARS/CARS-2)

CARS is a 15 item behavioural rating scale developed to identify children with autism as distinct from children with learning/developmental disability without autism. It is a hybrid, collecting information from a variety of people and situations, including reports from parents and teachers alongside school and clinic observations. The child's behaviour is compared with that of a normal child of the same age noting the peculiarity, frequency, intensity and duration of abnormal behaviour. [233]

A new edition includes two rating scales. The standard version (CARS2-ST) is comparable to the original CARS and is for use with young children or those with communication or intellectual difficulties. The 'High Functioning' version (CARS2-HF) is for more able individuals, older than 5 years and verbally fluent. There is also a separate questionnaire for parents/caregivers.

Development and Well-Being Assessment (DAWBA)

DAWBA is a package of questionnaires, interviews and rating techniques designed to generate ICD-10 and DSM-IV-TR psychiatric diagnoses on children and young people aged 5–16 years across the field of mental health. Designed as an epidemiological tool[234] and not autism-specific, it gives reliable diagnoses using a devolved process of psychiatric assessment.

Information about psychiatric symptoms and their impact is collected from parents, teachers and the child or young person either by a computer programme that interviewees complete themselves or by a nonclinical interviewer. Structured questions identify specific areas which can then be explored in greater depth with a mixture of closed and open-ended questions that encourage people to describe the problems in their own words. The different components are brought together by a computer program which gives likely diagnoses that can then be resolved by experienced clinical raters.[235]

Autism diagnostic observational assessment

The guideline development group (GDG) has reviewed one published autism-specific diagnostic observational assessment in detail: the Autism Diagnostic Observation Schedule (ADOS). As with the autism-specific semi-structured interviews, training is required to use ADOS. This training is available from a small number of autism clinical academic centres across the UK (and at other training centres outside the UK).

As with the autism-specific diagnostic interviews, there are resource implications for training in the use of this measure for everyday clinical practice. It is necessary to budget for: test equipment; extended appointment times; coding the assessment and report writing; and attending regular supervision/reliability meetings to ensure maintenance of high quality standardised practice between different professionals working in different settings.

Autism Diagnostic Observational Schedule (ADOS)

ADOS is a widely used, semi-structured, direct assessment of the individual, who may be a child or young person, that uses a combination of standardised play, activities and verbal interview to elicit the symptoms of autism in the three behavioural domains that comprise the ICD-10/DSM-IV-TR criteria for a diagnosis of autism (social-communication; reciprocal social interaction; play, imaginative use of materials and repetitive behaviours).

There are four modules for use with individuals ranging from pre-school children without useful speech through to verbally able adults.[236-238] The choice of module is determined by the level of expressive language. ADOS takes 30–45 minutes to administer and a further 20 minutes to determine the scores on the standardised rating system which are used in the well-researched algorithms.

The algorithms have recently been revised to increase the diagnostic distinction between autism and other disorders. They apply to modules 1 to 3 and summarise the ratings for two domains: social communication behaviour (the social affect domain) and restricted, repetitive behaviour.[239;240] ADOS is available in several languages, but further work may be required to consider particular social and cultural factors.

Professionals will require training to use ADOS and to code observed behaviours. Once trained, regular reliability checks are necessary.[106;236]

The observations made during the administration of ADOS complement information gained from other assessment procedures, such as the developmental history and direct observations in other settings, for example the home, nursery, school and clinic. This assessment provides useful clinical and research information about the child or individual that can inform intervention planning. In addition, although the instrument was originally developed as a diagnostic tool, it has also been used as a research outcome measure.[241-243] The original author and colleagues have reported the development of a severity matrix using ADOS scores which might provide the first example of a tool sufficiently standardised to allow the developmental trajectory of autism to be measured.[244]

Tools to identify an increased likelihood of autism

Gilliam Autism Rating Scale (GARS/GARS-2)

GARS is a 42 item checklist divided into three sections (stereotyped behaviours, communications and social interactions) that derives information from parents. It takes 5–10 minutes to complete and score.

The authors advocate use of GARS as a screening instrument that has been standardised on over 1000 individuals across the USA. However, these claims have not been supported by published research findings, which indicate that the instrument is not sufficiently sensitive to be an effective discriminant of autism.[110;245;246]

Although the revised version is said to show improved validity and reliability, a factor analysis of its standardisation sample did not support its subscale structure.[247]

Parent Interview for Autism – Clinical Version (PIA-CV)

PIA-CV is a 118 item structured interview for parents that was developed to measure change in autism symptomatology and to be used in clinical and research settings: it was not designed as a diagnostic instrument.[248]

The items are subgrouped into 11 domains: social relating, affective responses, imitation, peer interactions, object play, imaginative play, language understanding, non-verbal communication, motoric behaviours, sensory responses and need for sameness. The interview takes 30–45 minutes, during which parents rate their child: the five-point Likert-type scores are then summed to give a total measure for each domain.[249]

Appendix K Differential diagnosis advice for healthcare professionals

The guideline development group (GDG) developed this advice to support the process of differentiating between alternative diagnoses with similar features. For each condition listed, the characteristic, key presenting features are specified. The table also shows the ways in which each condition typically differs from autism. It covers key clinical features and the assessments and investigations that should have formed a part of the child's overall assessment, and highlights the relevant components or outcomes of those assessments that would contribute to the process of differentiation.

Table K.1 Differential diagnosis advice for healthcare professionals

Key presenting features that may overlap with autism	Main features to differentiate from autism	Assessments or investigations to differentiate from autism	Special notes / diagnostic pitfalls
Neurodevelopmental disorders			
Specific language disorder/impairment			
A specific language disorder will present with: • Predominantly impaired use and/or understanding of language • Play and imagination may be delayed • There may be associated impairment of social communication • Beyond the preschool period, there may be an impact on the child's ability to develop and maintain peer friendships	A child with specific language impairment would usually show: • Compensatory development of non-verbal communication • The quality of play and imagination should be normal • Social motivation and cooperative in assessment • Relative strengths in reciprocal social interaction and empathy • A clear positive approach to peer friendships, at least in the preschool years	The pattern of language testing may be helpful: • In specific language impairment: ○ Expressive language can be more impaired than receptive ○ Pattern of responses to tests can often reveal greater problems with grammatical structures than in other areas • In autism:	Autism and speech and language impairment may coexist

Key presenting features that may overlap with autism	Main features to differentiate from autism	Assessments or investigations to differentiate from autism	Special notes / diagnostic pitfalls
	There would usually be an absence of: • Echolalia • Rigid repetitive behaviours • Stereotyped mannerisms • Abnormal responses to sound and other senses • Over focussed intense interests	○ Expressive language can be better than receptive ○ Single word noun vocabulary may be extensive but with impaired abstract concepts ○ Sentence structure can be better than comprehension of paragraphs ○ Cognitive assessment may also be very useful, leading to a profile of the child's skills and deficits, and the balance between verbal and non-verbal abilities ○ Pattern of responses to tests may give an uneven profile across different subtests ○ Use of language may be more limited than capability suggests, for example single words or minimal phrases for needs despite ability to construct sentence or excessive talking that lacks reciprocity	
Intellectual disability/global developmental delay			
Delayed use and understanding of language Delayed or absent play skills	In severe intellectual disability: • The delay is likely to be across all areas of development, with a more	Tests of intellectual/cognitive function will distinguish the generally low cognitive level from the often uneven profile found in autism.	ID can co-occur with autism It is still important to diagnose autism, if present, in a child with a severe overall intellectual impairment as this will

Key presenting features that may overlap with autism	Main features to differentiate from autism	Assessments or investigations to differentiate from autism	Special notes / diagnostic pitfalls
Limited social interactions and peer relationships	even developmental profile on IQ testing • The child would be expected to show more social intent and interest, consistent with developmental level • Imitation present In autism there may be: • Relative strength in areas that do not depend on language and social understanding • More marked impairment of language / communication / play / flexibility • More marked sensory sensitivities and interests In autism with SLD: • IQ profile may be quite evenly delayed but the child is more likely to be aloof / withdrawn / self injurious / ritualistic or to show very challenging behaviour	Tests of adaptive impairment eg Vineland or ABAS may not distinguish since adaptive skills are often much more impaired in autism that would be predicted from the IQ.	influence educational and learning strategies It is also relevant when considering aetiological investigations and genetic counselling. If a child has a severe intellectual disability, the impairment of social communication may not become apparent until later in age than usual, because the latter is related to the child's overall developmental level
Developmental coordination disorder (DCD)			
Clumsiness / poor motor coordination History of delayed motor milestones, (can also be present in ASD but not the majority) Lack of awareness of personal and other's space	In DCD: • Play is normal • Language is not typically delayed or disordered • Good communicative intent • The organisational difficulties and motor planning difficulties are the predominant area of difficulty	Occupational Therapy assessment: there are numerous standardised tools for assessing DCD Observations in school setting: motor and social functioning in playground / classroom	DCD and autism can co-occur Those who receive an early DCD diagnosis because of delayed motor milestones may not have their social impairment recognised until much later

Key presenting features that may overlap with autism	Main features to differentiate from autism	Assessments or investigations to differentiate from autism	Special notes / diagnostic pitfalls
In some, peer relationships are often poor			
Mental and behavioural disorders			
Attention deficit hyperactivity disorder (ADHD)			
Poor attention Impulsive behaviour Increased level of physical activity Butting into other children's games and other adults'/children's conversations Lack of awareness of danger A history of poor social skills and problems with peer relationships	In ADHD: • The child's overactive behaviour is characterised by fidgety, restless behaviour • Inattention and distractibility are relatively pervasive and do not occur only in situations where the child is not interested or motivated • The child understands the rules or social norms, for example putting your hand up in class to get the teacher's attention or answer a question but act impulsively so that they may shout out because they are excited about knowing the answer, or simply because an idea has popped into their mind, irrespective of whether the moment is appropriate • Dangerous behaviour is driven by impulsivity and there is an understanding of the potential dangers • The child is able to demonstrate social reciprocity and appropriate non-verbal communication	Careful developmental history Observation and/or good accounts of the child in different settings, for example home and school, including situations likely to elicit distractibility and disorganised behaviour Specific rating scales for ADHD	ADHD commonly coexists with autism (see Chapter 7 on Coexisting conditions)

Key presenting features that may overlap with autism	Main features to differentiate from autism	Assessments or investigations to differentiate from autism	Special notes / diagnostic pitfalls
	• They do not usually react with marked distress to stimuli to which they are over sensitive. In autism: • Typically the child can be engaged in, or concentrate on, certain subjects or topics for a sustained period if that topic has a particular interest for them (although focus on computer games is common in ADHD) • The child does not understand the social rules and norms, nor why they should conform to such rules; behaviour is very self-directed • The child may not understand common dangers and so act in a dangerous way: this is distinct from the" acting without thinking" seen in a child with ADHD.		
Psychosis			
A psychotic disorder may present with: • Social withdrawal • Lack of friends Young people with ASD may have unusual thought processes and preoccupations that have a surface similarity to psychotic disordered thought and speech, and delusions	Children/young people with a psychotic disorder will not have the early developmental features seen in autism the psychotic symptoms will typically have an onset no earlier than late childhood/early adolescence.	A careful interview and mental state examination, obtaining specific examples, will distinguish between hallucinations and delusions from unusual ideas and concrete interpretation of questions.	Adolescents with autism may deteriorate in their social functioning in a manner similar to that seen in psychotic disorder. Psychotic features may occur as part of a mood disorder as a coexisting condition in ASD.

Key presenting features that may overlap with autism	Main features to differentiate from autism	Assessments or investigations to differentiate from autism	Special notes / diagnostic pitfalls
Young people with ASD are also likely to interpret questions, e.g., 'Do you hear voices when no one is in the room?' literally Both disorders may show abnormal language features, including idiosyncratic words			
Mood disorder			
Depression may present with: • Withdrawn behaviour • Reduced or very limited verbal output • Lack of interest in typical activities for the developmental age	In depression: • Usually an episodic course, with a history of more 'normal' social behaviour (the child can show social interest in activities etc) when not depressed or severely anxious • The change in social functioning should be temporally related to other depressive symptoms. • May not be pervasive: it may be less evident in some settings.	A careful early developmental history is essential as is a mental state examination Elicit accounts of behaviour and/or observation in different settings and semi-structured interviews with the child/young person and parents to elicit the current mental state and any changes that have occurred. Look for any events (loss, trauma, bullying) that may be associated with a change in behaviour and functioning.	At times these disorders can be hard to distinguish on presenting behaviour alone; they may also co-occur (see Chapter 7 on Coexisting conditions)
Anxiety disorder			
Anxiety may be associated with: • Repetitive anxious behaviour (e.g. repetitive questioning or demanding reassurance).	In anxiety: • The repetitive questions etc will usually have an anxious quality e.g. "you won't leave me mummy?" • However, this usually does NOT have a repetitive/stereotyped quality to it, so that questions do not have to be answered in exactly the same way.		

Key presenting features that may overlap with autism	Main features to differentiate from autism	Assessments or investigations to differentiate from autism	Special notes / diagnostic pitfalls
Social phobia may present with: • Social avoidance: 'anticipatory anxiety'	In social phobia: • Typically they are less anxious with people they know. • Anxiety often occurs in situations of public performance where they think they may be judged. for example reading aloud in the classroom, meeting others at parties, changing clothes for PE • They have an interest in and care about the opinions of others in such situations • The characteristic feature is the anxious content, compared with the intensity (and insistent quality) of the repetitive behaviour seen in the child with ASD ("What time is News at Ten?").		
Attachment disorders			
Attachment disorders are of two types: 1. Disinhibited attachment disorder Overfriendly, disinhibited and indiscriminately socially intrusive behaviour - i.e. no evidence of socially appropriate hesitancy or initial shyness with strangers 2. Reactive attachment disorder, emotionally withdrawn behaviour with minimally expressed attachment behaviours to parent/carer eg seeking or responding to comfort.	In children with autism: • Behaviour may lack normal boundaries but this is less likely to be in order to gain social attention. For example: child with autism might treat adult rather like an object- climbing up over an adult to reach something behind the adult rather than climbing onto the strange adult's lap to gain attention -attachment disorder). • Social communicative behaviours such as eye contact are poorly regulated in autism rather than	Developmental and social history is essential. • History of emotional or physical neglect • Physical evidence of abuse / neglect, but may not be easily available. • Careful history taking is essential, and observation of the child with parents; • Information from other professionals e.g. health visitors,	There is an overlap between the behaviour seen in a maltreated child and that seen in a child with attachment disorder. In all cases, consider whether liaison with social care is needed See NICE guidelines on recognition of maltreatment (http://guidance.nice.org.uk/CG89)

Key presenting features that may overlap with autism	Main features to differentiate from autism	Assessments or investigations to differentiate from autism	Special notes / diagnostic pitfalls
Overlapping behaviours with ASD: • Abnormal behaviour at separation and reunion with parent/carer • Limited response to other peoples distress • Children who have experienced deprivation may show self-stimulatory and self-comforting behaviours that are repetitive and stereotyped	avoidant as in emotionally withdrawn attachment. • Children can show behaviours that suggest appropriate separation anxiety but the greeting and farewell behaviour has an unusual quality Children with attachment disorders: • show relatively normal imaginative play (when given access to developmentally appropriate toys) • usually do not show over-intense or unusual interests • may make a lot of rapid progress when exposed to a more nurturing environment, including nursery, school or foster placement	nursery staff. school teachers or social worker is essential Clinical judgement is often the crucial factor in distinguishing between a maltreated child and one with autism In those with continuous 'good parenting', an attachment disorder would be unlikely.	
Oppositional defiant disorder (ODD)			
Oppositional behaviour is common in children with ASD. Children with ODD may have impaired or limited peer relationships Children with ODD may show limited empathy or concern for others including lack of remorse	In ODD: • The child usually understands that their behaviour is undesirable, even unacceptable but they persist with it. • The behaviour often has a deliberate quality • The behaviour may have clear benefits for the child • When children are motivated to alter their behaviour they may do so • Should be able to show evidence of social-communicative	Assessment of the quality of communication and social interaction in situations when the child is enjoying him/herself and not trying to avoid demands	Oppositional behaviours are developmentally normal at times. ODD may coexist in autism as a separate disorder. The oppositional outburst behaviours in autism are likely to be due to a liking for sameness, sensory sensitivities and anxiety, in ODD, such behaviour is likely to be due to a feeling of being overwhelmed with angry upset feeling and feeling thwarted. Pathological demand avoidance (PDA) has been described as a particular subgroup of autism with passive early onset, obsessive behaviours which are

Key presenting features that may overlap with autism	Main features to differentiate from autism	Assessments or investigations to differentiate from autism	Special notes / diagnostic pitfalls
	understanding/ competence so that he/she will have some awareness of the impact of their behaviour. • Does not usually show stereotyped or repetitive behaviour The child with autism: • May have little if any awareness of the impact of their behaviour on others- their prime focus will be exclusively focussing on the behaviour/ interest that they are wanting to pursue • Is often upset when it is pointed out to them they have hurt other people		often person focussed with superficial social skills in whom the most striking feature is refusal to comply (excessive demand avoidance) even to events which the child enjoys. This oppositional behaviour can also be described as ODD.
Conduct disorder (CD)			
Individuals with CD can be described as callous/ unemotional and have limited empathy Individuals with autism may behave in an antisocial manner, particularly if they are annoyed or feel that others have 'broken rules'	Children with conduct disorder: • Show evidence of 'competence' in some areas of their social relationships • Do not have early social communication problems. • Their antisocial behaviour may show evidence of 'theory of mind', i.e., they may use sophisticated strategies to avoid detection. In autism: • The child fails to understand the impact of their behaviour on others • They may become distressed when the impact is explained to them	Observation in different settings and interviews Developmental and social history is essential. Interview child/young person to assess their understanding of their behaviour and their motivation to behave in an antisocial fashion	Conduct disorder with callous/unemotional traits can co-occur with autism

Key presenting features that may overlap with autism	Main features to differentiate from autism	Assessments or investigations to differentiate from autism	Special notes / diagnostic pitfalls
Obsessive compulsive disorder (OCD)			
Obsessive, ritualistic and repetitive behaviour patterns	In OCD: • Onset of symptoms tends to be later than ASD usually after age 4 years • Behaviours may be associated with distress for the child/ young person • Rituals are less likely to be associated with obsessional thinking (the child with autism is not undertaking a ritual to avoid or compensate for obsessional thoughts) • The content of obsessions and rituals is often associated with avoiding harm and magical thinking (If I do this then my mother will be safe) In autism: • The child is unlikely to be upset by their obsessions or rituals (unless they are disrupted) • Routines often relate to a dislike of disrupting a particular pattern of everyday activity, e.g., the way food is served on the plate, which route is taken going to school	Early developmental and social history is important; children with OCD generally have normal social communicative development OCD typically does not start before mid childhood Interviewing child to gain a better account of the behaviour is necessary.	OCD can co-occur with autism
Conditions in which there is developmental regression:			
Rett syndrome			
Regression of developmental skills before or around the first birthday,	Mainly affects girls	Specific diagnostic genetic test, MECP2 mutation, can confirm Rett in most cases.	Those with milder symptoms (i.e. the ones who are more mobile) are more

Key presenting features that may overlap with autism	Main features to differentiate from autism	Assessments or investigations to differentiate from autism	Special notes / diagnostic pitfalls
associated with lack of speech and loss of social communication behaviour Stereotyped hand movements and hyperventilation are common	Motor regression, ataxia, loss of purposeful hand movements and oro-motor skills Fall off of head growth Characteristic "hand-wringing" movements of hands Social interest is a relative strength (i.e. relative to level of cognitive impairment)		likely to have a co-occurring diagnosis of autism. However, diagnosis is still made in the same way in milder cases on motor impairment, hand stereotypies, regression etc (although not all the features may be present) and MECP2.
Epileptic encephalopathy (EE)			
Age of onset and site of electrical activity are critical in type of regression and outcome with epileptic encephalopathy (EE) Broad developmental regression with hyperactivity and social impairment is found in EE in younger children under 2 years Regression of language rather than regression to autism is found in Landau–Kleffner syndrome (LKS) epileptic encephalopathy usually in children over 3 years of age although social withdrawal may be found Overt seizures may not be present Absence seizures may be mistaken for a lack of interest in the child's surroundings	In LKS: • Onset typically between 2 and 7 years old, after a period of typical development • Onset over a period of a few days • Loss of previously acquired words • Loss of understanding of language • Symptoms may fluctuate • Non-verbal communication is preserved • Auditory agnosia: an inability to recognise and interpret environmental sounds • Social interest and play are usually preserved • Absence of mannerisms, rigid behaviour, sensory abnormalities, preoccupations and over focussed interests	History of onset and symptoms Presence of overt epilepsy EEG in EE shows specific findings which worsen in sleep eg localised in LKS to the perisylvian region.	Differentiation from autistic regression may not be easy and specialist assessment is recommended if any concern about epilepsy. See 'The epilepsies: the diagnosis and management of epilepsies in adults and children in primary and secondary care', NICE clinical guideline 20. Available from www.nice.org.uk/guidance/CG20
Other conditions			
Severe visual impairment (blind)			

Key presenting features that may overlap with autism	Main features to differentiate from autism	Assessments or investigations to differentiate from autism	Special notes / diagnostic pitfalls
Behaviours that involve vision are absent: eye gaze, postures, facial expressions, communicative gestures The normal stage of echolalia / repeating others' speech is prolonged in blind children compared to their sighted peers Delayed transition from non-specific babble to meaningful use of objects' names Delayed development of abstract language Delayed development of pretend play and perseveration of sensory based, exploratory play Narrower range of interests compared to sighted children Repetitive mannerisms may be present	Blind children: • Show appropriate social curiosity • Make an effort to communicate • Show social reciprocity • Language development may be delayed but follows a broadly similar pattern to typically developing children • Seek to share information and experiences • More able to generalise their learning and to use environmental cues to expand their understanding • Demonstrate empathy • Usual exploratory play with toys apart from delayed pretend play • Can be interested in new topics by others • Show normal flexibility in life events • Different repetitive mannerisms eg not hand flapping, though may show eye poking and rocking (blindisms)	Competence in assessing blind/severely partially sighted children/young people as the key presenting features need to be assessed relative to typically developing blind children.	Autism and severe visual impairment (especially if due to a brain as opposed to eye disorder) co-occur Joint attention behaviours are visually dependant so other diagnostic features assume greater importance
Severe hearing impairment			
Delayed language development: affects both use and understanding of language Social isolation and awkwardness due to the child not picking up on the usual nuances of social communication	The following are not usually impaired or found in peripheral hearing loss: • Non-verbal communication • Reciprocal communication • Play and imagination • Socially interest and initiation of peer interaction • Rigid repetitive behaviours, stereotyped mannerisms, abnormal	Formal and careful hearing testing is essential - bearing in mind that bright hearing impaired children are very visually alert	Autism can co-occur with hearing impairment

Key presenting features that may overlap with autism	Main features to differentiate from autism	Assessments or investigations to differentiate from autism	Special notes / diagnostic pitfalls
	responses to other senses and over focussed intense interests		
Selective mutism			
Lack of speech, especially in social settings There may be a history of language delay / disorder Anxiety is common, leading to controlling behaviours	History of appropriate quality of communication and social interaction in some circumstances, typically at home, where the child usually talks Normal non-verbal communication Good imaginative play Anxiety may lead to controlling behaviours but not rigid and repetitive behaviours or routines Absence of stereotyped mannerisms, abnormal sensory responses or over focussed intense interests	Observation in different settings	Consider language assessment Autism and selective mutism may coexist

ABAS: adaptive behaviour assessment; ADHD: attention deficit hyperactivity disorder; ASD: autism spectrum disorders; CD: conduct disorder; DCD: developmental coordination disorder
ID: intellectual disability; IQ: intelligence quotient; LKS: Landau–Kleffner syndrome; MECP2: methyl CpG binding protein 2 (Rett syndrome); ODD: oppositional defiant disorder
PDA: pathological demand avoidance; PE: physical education; SLD: specific language disorder