Autism spectrum disorders in children and young people

recognition, referral and diagnosis

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

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FINAL DRAFT for PPC

Contents

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1 Summary of recommendations and care pathway

1.1 Introduction

This guideline covers the recognition, referral and diagnosis of autism spectrum disorders (ASD) in children and young people from birth up to 19 years. ASD is a lifelong disorder that has a great impact on the child or young person and their family or carers. When ASD 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, social care and a route into voluntary organisations and contact with other children and families with similar experiences. All this can improve the life of the child or young person and their family.

The term ASD describes behavioural differences and difficulties with 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 DSM-IV[1] and ICD-10[2] and have a significant impact on function. The term used in ICD-10 and DSM-IV is pervasive developmental disorder (PDD), a term now used synonymously with ASD. This is a behaviourally defined group of disorders, which is heterogeneous in both in causation and manifestation.

The core ASD behaviours are typically present in early childhood, but features 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. ASD is strongly associated with a number of coexisting conditions. Recent studies[3] have shown that approximately 70% of people with ASD 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 ASD[4].

ASD 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[5-7]. This rising prevalence 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 ASD. Levels of understanding of ASD among healthcare and other relevant professionals and availability of services differ greatly from one area to another. In addition,

children and young people with certain co-existing conditions such as intellectual disability are less likely to be diagnosed with ASD, 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 ASD and their family or carers.

This guideline does not cover interventions for ASD 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 ASD

A local ASD 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 ASD strategy group should appoint a lead professional to be responsible for the local ASD pathway for recognition, referral and diagnosis of children and young people. The aims of the group should include: improving early recognition of ASD by raising awareness of the signs and symptoms of ASD through multi-agency training (see tables 1-3)

- improving early recognition of ASD by raising awareness of the signs and symptoms of ASD 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 ASD 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 ASD 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 ASD 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 ASD team, or arranging access for the team to, other relevant professionals who may be able to contribute to the ASD 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 ASD team.

The ASD diagnostic assessment for children and young people

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

Include in every ASD 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 ASD-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 ASD-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 ASD (see recommendation 54)
- developing 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
- communicating assessment findings to the parent or carer and, if appropriate, the child or young person (see recommendation 60).

Consider the following differential diagnoses for ASD and whether specific assessments are needed to help interpret the ASD 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 ASD diagnostic assessment

Make sure the profile is made available to professionals in education and, if appropriate, social care, so it can contribute to the child or young person's individual education plan and needs-based management plan, for example through a school visit by a member of the ASD team. Consent should be obtained from the parents or carers, and the child or young person if appropriate, before information is shared with other agencies.

1.3 Recommendations

ID	Recommendations	See section
	A local pathway for recognition, referral and diagnostic assessment of possible ASD	
1	A local ASD 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 ASD strategy group should appoint a lead professional to be responsible for the local ASD pathway for recognition, referral and diagnosis of children and young people. The aims of the group should include: • improving early recognition of ASD by raising awareness of the signs and symptoms of ASD 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 ASD 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 ASD 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 ASD 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 ASD team, or arranging access for the team to, other relevant professionals who may be able to contribute to the ASD diagnostic assessment, for example, a specialist health visitor or nurse, specialist teacher or social worker.	5.20
6	The ASD team should have the skills and competencies to: • carry out an ASD diagnostic assessment • communicate with children and young people with suspected or known ASD, and with their parents and	5.20

ID	Recommendations	See section
	carers, and sensitively share the diagnosis with them.	
7	ASD team members should: • provide advice to professionals about whether to refer children and young people for ASD diagnostic assessments • decide on the assessment needs of those referred or when referral to another service will be needed • carry out the ASD diagnostic assessment • share the outcome of the ASD 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 ASD diagnostic assessment directly with relevant services, for example by setting up a school visit by an ASD 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 ASD team.	3.4
9	The ASD team should either have the skills (or have access to professionals that have the skills) needed to carry out an ASD diagnostic assessment for children and young people with special circumstances including: • co-existing 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 ASD team should consider carrying out the ASD diagnostic assessment jointly with the adult ASD team, regardless of the young person's intellectual ability.	5.20
	Recognising children and young people with possible ASD	
11	Consider the possibility of ASD 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 ASD and whether to refer a child or young person to the ASD team, be critical about your professional competence and seek advice from a colleague if in doubt about the next step.	3.4

ID	Recommendations	See section
14	To help identify the signs and symptoms of possible ASD, use tables 1–3. Do not rule out ASD 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 ASD.	3.4
15	When considering the possibility of ASD, 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 ASD, signs or symptoms may have previously been masked by the child'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 by early hearing difficulties or because English is not the family's first language • ASD may be missed in children with an intellectual disability • ASD may be missed in children or young people who are verbally able • ASD 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 ASD, ask about the child or young person's use and understanding of their first language.	3.4
17	Do not rule out ASD 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 ASD, 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 ASD, emphasising that there may be many explanations for the child's or young	3.4

ID	Recommendations	See section
	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.	3.4
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 ASD team	
21	Refer children younger than 3 years to the ASD 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 ASD 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 to the ASD team if you are concerned about possible ASD 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 ASD (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 ASD, consider: • consulting a member of the ASD team who can provide advice to help you decide if a referral to the ASD team is necessary • referring to another service. That service can then refer to the ASD team if necessary.	3.4
25	Be aware that ASD-specific screening tools may be useful in gathering information about signs and symptoms of ASD in a structured way but are not essential and should not be used to make or rule out a diagnosis of ASD,	4.4

ID	Recommendations	See section
	and that: • a positive score on a screening instrument may support a decision to refer but can also be for reasons other than ASD • a negative score does not rule out ASD.	
26	When referring to the ASD 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 to the ASD team, include in the referral letter the following information, if available: • antenatal and perinatal history • developmental milestones • factors associated with an increased prevalence of ASD (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.	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 ASD, 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 ASD team, consider a period of watchful waiting. If you remain concerned about ASD, reconsider referral.	3.4
31	If a concern about possible ASD has been raised but there are no signs, symptoms or other reasons to suspect ASD, use professional judgment to decide what to do next.	3.4

ID	Recommendations	See section
	After referral to the ASD team	
32	When a child or young person is referred to the ASD team, at least one member of the ASD team should consider whether to carry out: • an ASD diagnostic assessment **and/or** • an alternative assessment.	4.16
33	Carry out an ASD 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 ASD team if necessary.	4.16
35	When deciding whether to carry out an ASD diagnostic assessment, take account of the following, (unless the child is under 3 years and has regression in language or social skills – see recommendation 32): • 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 when appropriate the concerns of the child or young person	4.16 4.12
	• factors associated with an increased prevalence of ASD (see table 4) • the likelihood of an alternative diagnosis.	
36	If there is insufficient information to decide whether an ASD 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, obtain information from schools or other agencies.	4.16
37	If there is uncertainty about whether an ASD 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 ASD diagnostic assessment: • with consent from parents or carers and, if appropriate, the child or young person, obtain a report from the pre-school or school if one has not already been made available	4.16

ID	Recommendations	See section
	• gather any additional health or social care information that may exist, including results from hearing and vision assessments.	
39	Avoid repeated information gathering and assessments by efficient communication between professionals and agencies.	4.16
	The ASD diagnostic assessment for children and young people	
40	Start the ASD diagnostic assessment within 3 months of the referral to the ASD team.	4.16
41	A case coordinator in the ASD team should be identified for every child or young person who is to have an ASD diagnostic assessment.	9.8
42	The ASD 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 ASD 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 ASD team • gather information relevant to the ASD diagnostic assessment (see recommendation 36).	9.8
43	Discuss with the parents or carers and, if appropriate, the child or young person, how information should be shared throughout the ASD 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 ASD 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 ASD-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 ASD-specific tool to gather this information) • a medical history, including prenatal, perinatal and	5.20

ID	Recommendations	See section
	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 ASD (see recommendation 54) • developing 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 • communicating 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 [i] or child maltreatment[ii] • congenital anomalies and dysmorphic features including macrocephaly or microcephaly.	5.20

46	Consider the following differential diagnoses for ASD and whether specific assessments are needed to help interpret the ASD 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)
		6.8

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

ID	Recommendations	See section
	○ psychosis. • Conditions in which there is developmental regression: ○ Rett syndrome ○ epileptic encephalopathy. • Other conditions: ○ severe hearing impairment ○ severe visual impairment ○ maltreatment ○ selective mutism.	
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
48	If there are discrepancies during the ASD diagnostic assessment between reported signs or symptoms and the findings of the ASD observation in the clinical setting, consider gathering additional information from other sources and/or carrying out further ASD 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 ASD based on ICD-10 or DSM-IV criteria.	5.20
50	Do not rely on any ASD-specific diagnostic tool alone to diagnose ASD.	5.20
51	Be aware that in some children and young people there may be uncertainty about the diagnosis of ASD, 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	5.20

ID	Recommendations	See section
	• 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.	5.20
53	If the outcome of the ASD diagnostic assessment clearly indicates that the child or young person does not have ASD, consider referring 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:
	  ○ 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
		7.4

ID	Recommendations	See section

- 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 ASD diagnostic assessment

56 If there is uncertainty after the ASD 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 ASD team if necessary): 5.29

- continued uncertainty about the diagnosis
- disagreement about the diagnosis within the ASD 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 failure to respond as expected to any therapeutic interventions provided.

58 Consider any potential risk of harm to, and from, the child or young person identified during the ASD diagnostic assessment and take appropriate action. 5.20

Medical investigations

59 Do not routinely perform any medical investigations as part of an ASD diagnostic assessment, but consider the following in individual circumstances and based on physical examination, clinical judgment and the child or young person's profile: 8.4

- 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]

[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

ID	Recommendations	See section
	Communicating the results from the ASD diagnostic assessment	
60	After the ASD 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 ASD 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 ASD, discuss and share information with parents or carers and, if appropriate, the child or young person, to explain: • what ASD is • how ASD 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 ASD 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. With parental or carer consent and, if appropriate, the consent of the child or young person, also share information with key professionals involved in the child's or young person's care, including those in education and social care.	5.25
65	Make sure the profile is made available to professionals in education and, if appropriate, social care, so it can contribute to the child or young person's individual education plan and needs-based management plan, for example through a school visit by a member of the ASD team. Consent should be obtained from the parents or carers, and the child or young person if appropriate, before information is shared with other agencies.	9.8
66	For children and young people with a diagnosis of ASD, offer a follow-up appointment with an appropriate member of the ASD team within 6 weeks of the end of the ASD assessment for further discussion (for example about the conclusions of the assessment and the implications for the child or young person).	5.25
67	For children and young people with a diagnosis of ASD, discuss with parents or carers the risk of ASD occurring in siblings and future children.	5.25
	Information and support for families and carers	
68	Provide individual information on support available locally for parents, carers, children and young people with ASD, according to the family's needs. This may include: • contact details for: o local and national support organisations (who may provide, for example, an opportunity to meet other families with experience of ASD, or information about specific courses for parents and carers and/or young people)	9.4

ID	Recommendations	See section
	○ 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.	

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 ASD 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 ASD: Preschool children (or equivalent mental age). See 'Using tables 1–3' on page 25.

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 and speech used in social communication
- Reduced or absent social use of eye contact (looking at people's eyes when speaking), 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 ASD: Primary school children (aged 5–11 years or equivalent mental age). See 'Using tables 1–3' on page 25.

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 and speech used in social communication
- Reduced or absent social use of eye contact (looking at people's eyes when speaking), 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

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 ASD

- 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 ASD: Secondary school children (over 11 years or equivalent mental age). See 'Using tables 1–3' on page 25.

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 ASD

- 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 ASD

- A sibling with ASD
- Birth defects associated with central nervous system malformation and/or dysfunction, including cerebral palsy
- Gestational age less than 35 weeks
- 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 Care pathway

Recognition and referral

Consider the possibility of ASD if there are concerns about development or behaviour, but be aware that there may be other explanations for individual signs and symptoms.

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.

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

To help identify the signs and symptoms of possible ASD, use tables 1–3. Do not rule out ASD 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 ASD.

When considering the possibility of ASD, 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 ASD, signs or symptoms may have previously been masked by the child'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 by early hearing difficulties or because English is not the family's first language
- ASD may be missed in children with an intellectual disability
- ASD may be missed in children or young people who are verbally able
- ASD 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.

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

Do not rule out ASD 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 ASD, if new information becomes available.

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 ASD, emphasising that there may be many explanations for the child's or young person's behaviour.

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.

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.

Be aware that ASD-specific screening tools may be useful in gathering information about signs and symptoms of ASD in a structured way but are not essential and should not be used to make or rule out a diagnosis of ASD, and that:

- a positive score on a screening instrument may support a decision to refer but can also be for reasons other than ASD
- a negative score does not rule out ASD.

Refer first to a paediatrician or paediatric neurologist, who can refer to the ASD team if necessary, children and young people:

- older than 3 years with regression in language
- of any age with regression in motor skills.the ASD team if necessary

Continued concern about possible ASD?

No → **Exit ASD pathway**

Yes → Explain to parents or carers and, if appropriate, the child or young person, what will happen on referral.

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

Explain to parents or carers and, if appropriate, the child or young person, what will happen on referral.

Consider referring to the ASD team if you are concerned about possible ASD 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 ASD (see table 4)
- the likelihood of an alternative diagnosis.

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

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

Explain to parents or carers and, if appropriate, the child or young person, what will happen on referral.

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

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

Continued concern about possible ASD?

Yes → Explain to parents or carers and, if appropriate, the child or young person, what will happen on referral.

No → **Exit ASD pathway**

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

Exit ASD pathway

When referring to the ASD 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.

When referring to the ASD team, include in the referral letter the following information, if available:

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

General

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

- improving early recognition of ASD by raising awareness of the signs and symptoms of ASD 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 ASD 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 ASD 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 ASD 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 ASD team, or arranging access for the team to, other relevant professionals who may be able to contribute to the ASD diagnostic assessment, for example, a specialist health visitor or nurse, specialist teacher or social worker.

The ASD team should have the skills and competencies to:

- carry out an ASD diagnostic assessment
- communicate with children and young people with suspected or known ASD, and with their parents and carers, and sensitively share the diagnosis with them.

ASD team members should:

- provide advice to professionals about whether to refer children and young people for ASD diagnostic assessments
- decide on the assessment needs of those referred or when referral to another service will be needed
- carry out the ASD diagnostic assessment
- share the outcome of the ASD 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 ASD diagnostic assessment directly with relevant services, for example by setting up a school visit by an ASD team member
- offer information to children, young people and parents and carers about appropriate services and support.

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

The ASD team should either have the skills (or have access to professionals that have the skills) needed to carry out an ASD diagnostic assessment, for children and young people with special circumstances including:

- co-existing 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.

If young people present at the time of transition to adult services, the ASD team should consider carrying out the ASD diagnostic assessment jointly with the adult ASD team, regardless of the young person's intellectual ability.

After referral to the ASD team

When a child or young person is referred to the ASD team, at least one member of the ASD team should consider whether to carry out:

- an ASD diagnostic assessment and/or
- an alternative assessment.

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 ASD team if necessary.

Continued concern about ASD?

Yes

No

Exit ASD pathway

Carry out an ASD diagnostic assessment if there is regression in language or social skills in a child younger than 3 years.

When deciding whether to carry out an ASD diagnostic assessment, take account of the following, (unless the child is under 3 years and has regression in language or social skills – see recommendation 32):

- 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 when appropriate the concerns of the child or young person
- factors associated with an increased prevalence of ASD (see table 4)
- the likelihood of an alternative diagnosis.

Be aware that ASD-specific screening tools may be useful in gathering information about signs and symptoms of ASD in a structured way but are not essential and should not be used to make or rule out a diagnosis of ASD, and that:

- a positive score on a screening instrument may support a decision to refer but can also be for reasons other than ASD
- a negative score does not rule out ASD.

If there is insufficient information to decide whether an ASD 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, obtain information from schools or other agencies.

If there is uncertainty about whether an ASD 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.

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

Once it has been decided to carry out an ASD diagnostic assessment:

- with consent from parents or carers and, if appropriate, the child or young person, obtain a report from the pre-school or school if one has not already been made available
- gather any additional health or social care information that may exist, including results from hearing and vision assessments.

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

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

The ASD 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 ASD 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 ASD team
- gather information relevant to the ASD diagnostic assessment (see recommendation 36).

Discuss with the parents or carers and, if appropriate, the child or young person, how information should be shared throughout the ASD 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.

The ASD diagnostic assessment

Include in every ASD 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 ASD-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 ASD-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 ASD (see recommendation 54)
- developing 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
- communicating assessment findings to the parent or carer and, if appropriate, the child or young person (see recommendation 60).

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
- congenital anomalies and dysmorphic features including macrocephaly or microcephaly.

Consider the following differential diagnoses for ASD and whether specific assessments are needed to help interpret the ASD 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.

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.

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.

If there are discrepancies during the ASD diagnostic assessment between reported signs or symptoms and the findings of the ASD observation in the clinical setting, consider gathering additional information from other sources and/or carrying out further ASD specific observations in different settings, such as the school, nursery, other social setting or at home.

Medical investigations

Do not routinely perform any medical investigations as part of an ASD 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

After the ASD diagnostic assessment

Making a diagnosis

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

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

Be aware that in some children and young people there may be uncertainty about the diagnosis of ASD, 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.

Communicating the results from the ASD diagnostic assessment

Consider any potential risk of harm to, and from, the child or young person identified during the ASD diagnostic assessment and take appropriate action.

After the ASD 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 ASD 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 ASD 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, if appropriate, the consent of the child or young person, also share information with key professionals involved in the child's or young person's care, including those in education and social care.

Make sure the profile is made available to professionals in education and, if appropriate, social care, so it can contribute to the child or young person's individual education plan and needs-based management plan, for example through a school visit by a member of the ASD team. Consent should be obtained from the parents or carers, and the child or young person if appropriate, before information is shared with other agencies.

Not ASD

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

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

Exit ASD pathway

ASD

Information and support for children and young people with ASD

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

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

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

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

Provide individual information on support available locally for parents, carers, children and young people with ASD, 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 ASD, 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.

Unsure

Actions if there is continued uncertainty about the diagnosis of ASD

If there is uncertainty after the ASD diagnostic assessment about the diagnosis, 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 ASD team if necessary):

- continued uncertainty about the diagnosis
- disagreement about the diagnosis within the ASD 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 failure to respond as expected to any therapeutic interventions provided.

2 Development of the guideline

2.1 Introduction

This guideline is concerned with the recognition, referral and diagnosis of autism spectrum disorders (ASD) in children and young people from birth to 19 years. When ASD is diagnosed, families and carers and the child or young person themselves can experience a variety of emotions, shock, sadness, 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, social care and a route into voluntary organisations and contact with other children and families with similar life experiences.

The term 'autism spectrum disorders' (ASD) describes unusual and atypical behaviours in reciprocal social interaction and social communication combined with restricted interests and rigid/repetitive behaviours in children, young people and adults. An autism spectrum disorder (ASD) is diagnosed when these behaviours meet criteria defined in the ICD-10 and the DSM-IV and there is a significant impact on the individual's functional which is pervasive across a range of situations although often variable in level of severity and impact. Co-occurence with other conditions is common causing variable impact to the individual across time and context and an adverse impact on adaptive function. ASDs are thus a range of behaviourally defined disorders and heterogenous both in causation and manifestation. They are lifelong disorders that can have a profound impact on the child, young person and their families.

The term used in ICD and DSM is pervasive development disorder (PDD). The terms PDD and ASD are regarded as conveying the same meaning. The term 'autism spectrum disorders' (ASD) is used throughout this guideline instead of the term 'Pervasive developmental disorder' (PDD).

2.1.1 Prevalence of ASD

Once thought to be an uncommon developmental disorder, more recent studies have reported increased measured prevalence rates such that a minimum prevalence of an autism spectrum disorder is now regarded as 1% of the child population[5-7]. The factors affecting the rising prevalence are unknown but include changing diagnostic criteria[8], ascertainment methods, dependence on existing registers, a staging approach to screening and diagnostic assessment as well as diagnostic substitution[9;10]. One effect of the rising prevalence has been to increase demand for diagnostic services for children and young people of all ages. This has considerable training and resource implications for the NHS.

2.1.2 Onset and course of ASD

The core ASD behaviours are typically present in early childhood although features may not always be manifest until the situational demand changes, for example going to nursery or school or transition to secondary school. However, the features of ASD may be manifest in different ways at different ages and in any individual 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 ASD after a period of three years of apparently normal development is rare (1.7 per 100,000)[11] and is termed childhood disintegrative disorder (CDD). Self help, continence and mood may all be affected during regression which later is indistinguishable from ASD with intellectual disability.

2.1.3 The causes of ASD

ASD 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 ASD[12]. There is no specific diagnostic test for ASD. Diagnosis is made on the basis of the presence of characteristic behaviours. There is a substantial genetic basis with strong heritability[13;14]. At least 60 different metabolic, neurological disorders and complex chromosome abnormalities have been reported as associated with ASD. Potential candidate genes are emerging from the advances in molecular genetic techniques but current thinking is of a genetically heterogenous disorder producing phenotypic heterogeneity (differing physical and behavioural characteristics)[15]. For families with a child with a diagnosis of ASD the likelihood of having another child with ASD 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 ASD. ASD is strongly associated with a number of co-existing conditions which have an impact on the well being of the child, young person and family. Recent studies[3] have shown that approximately 70% of individuals with ASD also meet diagnostic criteria for at least one other (often unrecognised) mental and behavioural disorder that is further impairing psychosocial functioning. Intellectual disability (IQ<70) co-occurs in approximately 50% of young people with ASD[4].

Manifestations of ASD 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 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 co-ordination competences

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 ICD-10) to imply the existence of a clinically recognisable set of symptoms or behaviours associated with distress and with interference with personal functions [2].

The criteria for the diagnosis of a disorder in the autism spectrum (ASD/PDD) which are used in this guideline are those defined in both the ICD-10 and the DSM-IV. Subtypes of PDD/ASD described in ICD-10 and DSM-IV ASD include, atypical autism, Asperger syndrome, disintegrative disorder and 'other' (ICD-10); Asperger Disorder and PDD –not otherwise specified (DSM-IV) as well as Rett syndrome. Both the ICD-10 and DSM-IV are currently undergoing revision. In this guideline the term 'Autism' is used to refer to the subtype 'childhood autism ' in ICD-10 and 'autistic disorder' in DSM-IV. We are using the term autism spectrum disorders (ASD) to include all autistic conditions where the 'disorder' criteria are met and thus a 'diagnosis' is made. The word spectrum implies a range of behaviours manifest in various combinations and levels of severity. Sometimes an individual may have qualitatively similar traits to those of ASD but be below threshold or 'subthreshold' for a diagnosis of ASD. In such cases, the individual and/or family may find the information about a spectrum helpful and support similar to that provided for ASD to be helpful. The term ASD also incorporates the broader system for the young person with ASD – siblings, parents, families, friends and wider communities, including the different services involved.

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 to deciding the 'threshold' for a definite disorder and hence the diagnosis of an ASD. Strengths and weaknesses in the core behaviours outlined above of reciprocal social communication skills and rigidity of thinking are now thought to be distributed throughout the general population as traits[16] and found in approximately 5% of the population[17]. Such traits are found more commonly in the families of those with autism[18]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 ASD but be below threshold ('subthreshold') for a diagnosis of ASD. In such cases, the individual and/or family may find the information about ASD helpful. That individual may or may not have 'needs' which will be identified during the 'profiling assessment' and support similar to that provided for ASD may be helpful.

2.1.4 Why is recognition and diagnosis of ASD important?

ASD can impact significantly upon both the child or young person and their family members. While it is important to recognise that some people with ASD will have highly productive and fruitful lives, for others with more severe ASD, particularly with associated co-existing conditions, ASD is a lifelong significantly impairing disorder with profound effects not only for the individual but on family members who may require assistance from health, education and social care for a long time. Children and young people moving into adulthood may feel a social stigma towards their condition and this may have significant effects on their employment prospects. Current UK costs of supporting people with ASD and the opportunity costs of lost productivity are estimated at £28 billion per year[19]

Recognition and diagnosis of ASD is important for children and young people as it leads to the provision of ASD-specific support to families and more appropriate education which can in turn lead to more positive outcomes for the

individual. Smith et al[20] found that mothers of adolescents and adults with ASD experience high levels of distress. Good management of the impact of an ASD is highly dependent on understanding ASD 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 ASD amongst healthcare and other relevant professionals and availability of services currently differ greatly from one local area to another and there are reported inequalities of diagnosis in subgroups such as those with intellectual disability.[5]

2.1.5 What does diagnosis bring to the child/young person and family?

The importance of conveying diagnosis sensitively to families cannot be overstated. Diagnosis can provide parents/carers with a framework for understanding their child and make decisions about which interventions or management strategies to try. However, it is important to acknowledge that for many families, a diagnosis of ASD can be deeply distressing and takes time to accommodate. For young people themselves, diagnosis may be a relief

Particular examples of how a diagnosis can enable the child, young person and family are shown below. The quotations below from the National Autism Plan for Children, 2003[21] and the National Autistic Society obtained during the process of development of this guideline highlight the parental viewpoint.

Access to information, services and support

Once ASD 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

Before diagnosis, children and young people may be labelled as 'naughty', may be under-achieving, misunderstood and unsupported, 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/ASD 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 co-existing 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 ASD. Primary, secondary and tertiary health services are involved in ASD throughout

the person's life both directly and through coordination with other key services, education, social care, the voluntary sector, work, leisure, housing, transport, in fact every area of life. Multi-agency working should aim to be a partnership with the child/young person with ASDs and their family. Currently, most diagnosis of ASD 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, health professionals that are well trained and knowledgeable about ASD and for health professionals to work together and with education and social care to enable the child to gain access to appropriate intervention and education and the family access to support. The parental experience is 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 assessments are not coordinated.

While clinical guidance on ASD exists; practice parameter from the USA[22], national plans from the UK (National Autism Plan for Children NAP-C)[21] and guidelines from Scotland (Assessment, Diagnosis and Clinical Interventions for Children and Young People with Autism Spectrum Disorders SIGN)[23] and New Zealand (Autism Spectrum Disorders guideline)[24] there remains postcode variation in access to diagnosis in the UK.

Since NAP-C, there has been an increase in the number of district teams who have a formal ASD assessment protocol, 54% in 2007 compared with 32% in 2001, 93% (compared with 48% in 2001) are using a multidisciplinary/multiagency team approach and 57% have joint clinics with child mental health services (compared to 34% in 2001)[25]. However, the current estimated prevalence rates of ASD have major resource implications and place a considerable strain on local diagnostic services. Only 49% were able to complete the diagnostic assessment within 30 weeks in 2007.

In 2009 the Autism Bill was passed becoming the Autism Act which 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) to take forward. These include specialist training for key professionals as well as autism awareness training for all staff working in health and social care; clear diagnostic pathway; lead professionals for diagnosis and assessment; transition plans etc; 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 ASD, guidance on which co-existing 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 2010). Achieving Equity and Excellence for Children and Young People 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 latter point is emphasised in the Children's National Service Framework, Chapter 5 of the Hospital Standards[26] '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 ASDs of all ages and abilities.

2.1.7 Current referral rates and demand for diagnostic services

Current prevalence rates in districts suggest between 1.5 and 2% of primary or preschool children are diagnosed with ASD from a referral percentage of approximately 3% of the population in whom ASD is queried. In a district with a birth rate of 5000 per year, this equates to three referrals per week for query ASD requiring diagnostic assessment and profiling 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 Spectrum Disorders (ASDs), 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, 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 and 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 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 SEN. Adult and paediatric healthcare teams should work jointly to provide assessment and services to young people in transition with ASD.

2.2 Aim and scope of the guideline

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

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

- 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, 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 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.
- 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.
- 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 ASD.
- The role and competencies of different professions in the recognition and diagnosis of ASD.
- Specific models for running a diagnostic service.
- Interventions and ongoing management of ASD, 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 ASD.

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/xxx) or from NICE publications on 0845 003 7783 (quote reference number xxx). [This paragraph will be completed in the final guideline]

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
- 'Depression in children and young people', NICE clinical guideline 28
- 'Epilepsy', NICE clinical guideline 20
- 'Self harm', NICE clinical guideline 16
- 'When to suspect maltreatment', NICE clinical guideline 89
- 'Looked-after children and young people', NICE public health guideline 28

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). 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 ASD 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 ASD and their families/carers.
- national organisations that represent healthcare professionals who provide services for children and young people with ASD and their families/carers.
- companies that manufacture preparations and/or products used in the management of ASD
- 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 to be added at publication).

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 were supported in the development of the clinical question 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 between 1990 to Oct 11th 2010 were undertaken by the NCC-WCH technical team. A search strategy designed to cover all conditions of the Autism Spectrum Disorder 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 including ERIC, the British Educational Index and the Australian Educational Index.

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 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 which that were not relevant to this guideline (citations dealing with vaccinations, treatments or management of ASD) resulting in 5,173 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 1,215 citations being considered and 899 being ordered for the 10 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 11th 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[27;28] (see table 2.2) as advised by NICE during the review process.

Table 2.2 Initial study quality ratings

Quality	Design
High	RCT
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;

- QUADAS[29] checklist was used for diagnostic accuracy or predictive accuracy studies
- CASP checklist for cohort (http://www.phru.nhs.uk/Pages/PHD/resources.htm) (items 3, 4, 5, 6 and 7) was used for epidemiological /descriptive studies
- NICE checklist for qualitative studies (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. They were not subjected to any quality analysis in accordance with the GRADE profile manual at the time of reviewing studies of this type 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 (eg 'Inconsistency' if there was only one study) then 'NA' 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 meet 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 subsequently only those variables (based on evidence and consensus) are reported in the evidence statements.

Qualitative studies

Evidence of the views of children, young people or parents/ carers' experience from individual studies was extracted into evidence tables (see Appendix H) and summarised in modified GRADE evidence profiles. In order to best reflect children and parents' opinions, as well as to avoid the risk of information loss/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, Screening, Assessment tools

The GDG considered the sensitivity and specificity of each sign or symptom, screening instrument 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
- Pre-school (<5 years) only
- Primary school (5 – 11 years) only
- Secondary school (≥12 years) only

Risk factors, Conditions with an increased prevalence of 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 calculate and compared with the prevalence of ASD in the general population in order to calculated unadjusted relative risks. The review adopted general population prevalence rates agreed with the GDG for ASD5.

Sub group analysis by ASD and autism was carried out because it was expected that some co-existing 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,
- 25–36 months,
- 37–48 months
- 49–60 months.

Differential diagnoses

For the purposes of the review, they agreed 'important' should be defined as (a) the most common differential diagnoses and (b) those 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 differ in how the children were selected for inclusion which 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,
- children referred because they had a positive screening result for ASD

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

Co-existing conditions

An initial list (based on the literature reviews) of co-existing conditions (symptoms and diseases) was provided to the GDG who were asked to identify the most common coexisting conditions from this list and to add to this list if, by GDG consensus, important coexisting conditions were not represented in the evidence. In most cases, only the prevalence of diagnosed disorders will be reported. For example, if some studies reported the prevalence of ADHD symptom in ASD children, not diagnosed ADHD disease, then the prevalence data won't be used for meta-analysis. The only three exceptions are: gastrointestinal problems, sleeping problem 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, co-existing conditions) and as such the findings cannot be generalised to clinical practice samples where additional co-existing 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 (i.e. performed routinely)
- Retrospective studies in which the investigations were performed selectively based on clinical judgement

- Prospective research studies of the investigations in ASD (i.e., performed for research)

The evidence profiles that follow present first the percentage of abnormal test results and second, the percentage of 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 also important as these may lead to further investigation for co-existing 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 co-existing 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.

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 as below (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 accuracy30.

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[31]

<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 co-existing diagnosis (percentage of the ASD population with the co-existing 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[32]. For the purpose of meta-analysis, StatsDirect first transforms proportions into a quantity (the Freeman-Tukey variant of the arcsine square root transformed proportion - [33] suitable for the usual fixed and random effects summaries [34]. 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)

StatsDirect (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 condition of social communication 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; multidisciplinarity, a dedicated ASD team and clear ASD diagnostic pathway, 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 they 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 isssues 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 with collective experience to identify good practice. The GDG also identified areas where evidence to answer their 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. Agreement on recommendations was reached by all the GDG members and not 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[35]

- have 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 recommendation 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.

2.7 Specific considerations for this guideline

For this guideline, the following main outcomes were identified:

- Signs and symptoms of ASD
- Specificity and sensitivity of ASD specific screening and diagnostic tools
- Yield of medical and genetic tests
- Differential diagnoses
- Co-existing 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 ASD enables the child and family to start their journey on the pathway to diagnosis. Signs and symptoms of possible ASD will be seen by parents, carers and professionals in education, health and social care, most of whom will not be experts in ASD. Some signs and symptoms suggestive of ASD may also present in children who are typically-developing, or children who go on to receive another non-ASD diagnosis[36;37]. This chapter considers the accuracy of specific signs and symptoms that should prompt a parent or professional to consider ASD in any setting. It also covers other important consideration 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 health care 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 health care professional or other professional in any context to think of ASD?

(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 GDG taking into account previously published guidelines (SIGN 2007, New Zealand 2008 and NAP-C 2003) and the DSM-IV and ICD-10 diagnostic criteria. Symptoms and signs of ASD were identified in four groups of children and young people; pre-school (0-5yrs), primary school (6-11yrs) and secondary school children (12-19yrs), 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 490 participants, in total were included in the review. Studies were carried out in the USA[38-44] and the UK[45;46]. All were controlled observational

studies with case-control design. Seven studies included children of preschool age [38;40;41;43-46], one of primary school age[42] and none were of solely secondary school children. One study included both primary and secondary school age children[39].

One study[43] reported the proportion of children with an intellectual disability (ID). Two studies [41] [38] reported mean IQ scores and two studies[39;42] excluded children with IQ ≤ 70. One study[47] reported the IQ range in the sample, two studies[48;49] reported mean IQ scores and five studies[50-56] included children with ID but did not report prevalence. Four studies[57-60] reported the proportion of children with intellectual disability but not separate outcomes. Three studies[61-64] 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[45]	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[45]	1	Con obs	Some	NA	None	Very low	10	23	100 (100, 100)	70 (51, 88)
No pretend play[46]	1	Con obs	Some	NA	None	Very low	10	19	90 (71, 100)	63 (41, 85)
No functional play[46]	1	Con obs	Some	NA	None	Very low	10	19	40 (10, 70)	84 (68, 100)
No facial concern in response to others distress[46]	1	Con obs	Some	NA	None	Very low	10	19	100 (100, 100)	68 (48, 89)
No attention to distress[41]	1	Con obs	Some	NA	None	Very low	72	39	21 (11, 30)	100 (100, 100)
Atypical use of object[40]	1	Con obs	Some	NA	None	Very low	9	47	78 (51, 100)	77 (64, 88)
Lack of orienting to name[43;44]	2	Con obs	Some	NA	None	Very low	25	76	64 (43, 82)	88 (79, 94)
PRIMARY SCHOOL CHILDREN (6 – 11 YEARS)										
No social play[42]	1	Con obs	Serious	NA	None	Very low	20	37	90 (77, 100)	100 (100, 100)
Social isolation[42]	1	Con obs	Serious	NA	None	Very low	20	37	80 (62, 98)	100 (100, 100)
No respect for personal boundaries[42]	1	Con obs	Serious	NA	None	Very low	20	37	50 (28, 72)	100 (100, 100)
Socially inappropriate behaviour[42]	1	Con obs	Serious	NA	None	Very low	20	37	40 (19, 61)	100 (100, 100)

Unable to follow rules of a game[42]	1	Con obs	Serious	NA	None	Very low	20	37	100 (100, 100)	41 (25, 46)
Doesn't respond to winning/losing a game[42]	1	Con obs	Serious	NA	None	Very low	20	37	100 (100, 100)	46 (30, 62)
Doesn't initiate communication with peers[42]	1	Con obs	Serious	NA	None	Very low	20	37	80 (62, 98)	100 (100, 100)
Doesn't sustain conversation with peers[42]	1	Con obs	Serious	NA	None	Very low	20	37	100 (100, 100)	100 (100, 100)
Gross motor inco-ordination[42]	1	Con obs	Serious	NA	None	Very low	20	37	65 (44, 86)	100 (100, 100)
No functional use of playground equipment[42]	1	Con obs	Serious	NA	None	Very low	20	37	50 (28, 72)	68 (52, 83)
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[39]	1	Con obs	Some	NA	None	Very low	40	21	83 (71, 94)	86 (71, 100)
Difficulty trying new activities[39]	1	Con obs	Some	NA	None	Very low	40	21	78 (65, 90)	95 (86, 100)
Abnormally obsessional interest[39]	1	Con obs	Some	NA	None	Very low	40	21	70 (56, 84)	100 (100, 100)
Watches same video constantly[39]	1	Con obs	Some	NA	None	Very low	40	21	65 (50, 80)	86 (71, 100)
Insistence on certain routines / rituals[39]	1	Con obs	Some	NA	None	Very low	40	21	53 (37, 68)	95 (86, 100)
Lining objects in rows / patterns[39]	1	Con obs	Some	NA	None	Very low	40	21	50 (35, 56)	90 (78, 100)
Spinning / banging / twiddling[39]	1	Con obs	Some	NA	None	Very low	40	21	48 (32, 63)	95 (86, 100)
Pacing / stereotyped walking[39]	1	Con obs	Some	NA	None	Very low	40	21	60 (45, 75)	100 (100, 100)
Compulsion (contamination / order)[39]	1	Con obs	Some	NA	None	Very low	40	21	50 (35, 66)	86 (71, 100)
Hand / finger mannerisms[39]	1	Con obs	Some	NA	None	Very low	40	21	48 (32, 63)	95 (86, 100)
Vocal / motor tics[39]	1	Con obs	Some	NA	None	Very low	40	21	45 (30, 60)	95 (86, 100)
Sucking objects (eg shirts, pencils)[39]	1	Con obs	Some	NA	None	Very low	40	21	48 (32, 63)	81 (64, 98)

Rocking/ spinning[39]	1	Con obs	Some	NA	None	Very low	40	21	45 (30, 60)	100 (100, 100)
Self-injurious behaviour[39]	1	Con obs	Some	NA	None	Very low	40	21	42 (27, 58)	95 (86, 100)

INTELLECTUAL DISABILITY

No studies identified for this group

3.3 Evidence statement

Sensitivity and specificity of signs and symptoms

Pre-school (≤ 5 years)

Of all the sign 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 Methods section 2.6.4). The evidence was of very low quality.

Primary school (6 – 11 years)

Of all the sign 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 sign 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 ASD should always be considered. The first NHS contact may be one of a range of health care and other professionals with varied expertise in the recognition of ASD. The priority is to avoid the risk of failing to recognise those who do actually have the condition. The GDG 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 where both sensitivity and specificity of 80% with a lower 95% confidence interval threshold of no less than 70%. (see Methods section 2.6.4) The decision to refer a child for an ASD 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 ASD and the decision to refer to an ASD team. It was the GDG 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 ASD. In cases where a health care professional has real concern about the possibility of ASD, direct referral to the ASD 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 were aware that referral for an ASD evaluation might be distressing for parents/ carers or even unacceptable to them or the young person themselves. For that reason, the GDG emphasised the importance of careful discussion and involvement of the parents and carers and young people where appropriate in the process while keeping the child and young persons' interests central to the decision making process. Even in children and young people who do not have ASD, 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 ASD Team might carry with it a risk of possible subsequent incorrect diagnosis ASD. 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 ASD 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 ASD. The GDG consensus was that the use of a table of signs and symptoms and clear

	criteria for referral would increase referral rates but also improve recognition of those who required assessment regardless of whether they were eventually diagnosed with ASD or another condition. If it was decided that the child did not have ASD 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 reassure parents and carers that ASD 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 ASD-specific diagnostic assessment since this is the high cost part of the pathway. It is important that the ASD 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 ASD 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 and of these only one for any specific age group. In primary school age children, only the sign 'no social play' and 'does not sustain conversation with others' were accurate in predicting ASD. Only the combination of 'protodeclarative pointing, gaze monitoring and pretend play' met the threshold for accuracy and this was in the preschool children group only. The population of this study was less than two years old 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 ASD at different ages. No studies were identified that compared the effectiveness of individual signs or symptoms (or combinations) as triggers for referral for an ASD 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 ASD** 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 patterms of behaviour and development. Health care 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 produced tables (Tables 4.1 to 4.3) 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 ASD. The GDG is aware that it is not possible to list all the possible permutations of signs and symptoms in a table so health care professionals should not rule out ASD 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 the non-expert. 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 ASD of 'social communication and interaction', and 'fixated interests and unusual behaviours.' Although the features listed in the tables are consistent with ASD, the GDG recognised that these features vary from one individual to the next. Health care professionals should not dismiss the possibility of ASD 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 ASD are pervasive, the manifestations may vary depending upon the situation, its familiarity, degree of predicatability and structure and support. Some children and young people with ASD may be verbally able, have good eye

	contact, smiling, playing and showing affection to family members. School-age children with ASD might have normal or even advanced pre-school development. Delay in language milestones does not rule out ASD although the described unusual features of speech, language understanding and use should be present. The signs and symptoms presented in tables are divided into three age and developmental groups; under 5 years, 5–11 years and over 11 years corresponding with pre-school, 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 ASD. Health care 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. There is need for professionals to be self critical about any lack of knowledge about a culture they are not familiar with. 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 ASD may be wrongly attributed to difficulties in hearing or in learning English as a second or third 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 ASD. The GDG 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 ASD is under diagnosed in children and young people with intellectual disability as the signs and symptoms of ASD 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 ASD because of an existing intellectual disability diagnosis. Furthermore, some undervalue the importance of a diagnosis of ASD where there are significant other intellectual difficulties, as a diagnosis of ASD 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 view is that

	diagnosis of ASD 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 ASD 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 ASD 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 ASD may be delayed as a consequence of 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 ASD may not be readily available. Based on clinical experience the GDG recognised that compared with boys, girls with ASD were underdiagnosed. In addition, the GDG also considered that ASD may be more difficult to recognise in children and young people who had high verbal ability. Recognition of ASD 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 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 diagnosis was one of ASD. Finally, there are situations where previously accepted explanations for the young person's dysfunctional behaviour – family or community environment,

cultural or demographic fractures – are no longer considered plausible, and the diagnosis of ASD therefore becomes apparent.

The GDG agreed if new information becomes available that a previous assessment resulting in a negative diagnosis should not rule out the possibility of ASD. The skills required to recognise signs and symptoms of ASD 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 health care 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 ASD may have significant developmental delays that have not been previously recognised either by parents or previously involved health care professionals.

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

Deciding to refer children and young people with suspected ASD

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

The GDG consensus was that the possibility of ASD should always be considered where there are concerns about development or behaviour. If specific concern about ASD was raised by anybody who was in direct contact with the child some form of action is always necessary. If ASD is being considered, this should be discussed with the parents/carers and the child or young person themselves. However it is important in that discussion to emphasise that there may be many explanations for the perceived behaviour and that ASD 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 ASD 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 ASD And The decision on whether to refer a child 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 the children and young people. These include primary health care 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 level of expertise and training among these many individuals regarding development and behaviour and specifically ASD varies across these individuals. The GDG recognised the complexity of determining whether particular signs and symptoms pointed to a diagnosis of ASD specifically whether they might be explained in other ways. Professionals should use clinical judgement in each individual case about whether to refer a child or young person for further assessment for ASD, refer for an alternative assessment pathway or seek advice from more experienced colleagues or the ASD Team. The GDG agreed that regression of language or social skills without loss of motor skills in a child under three years of age should be referred directly for an ASD assessment as there was a high likelihood of ASD with this presentation. Regression of language in a child over three years of age should be referred to a paediatrician or paediatric neurologist for an initial opinion even if there are signs and symptoms of ASD. [A change in social skills in isolation in the older child may indicate a more varied aetiology]. These clinicians can refer on to the ASD team if necessary. Regression in motor skills indicates the need for a paediatric or paediatric nuerology opinion. At all stages, re-entry into the ASD pathway is possible, for example if a health care professional had concerns regarding development or behaviour but did not think the symptoms and/or symptoms were suggestive of ASD, they should consider referring to another appropriate service. If following referral concerns about ASD arise, re-referral for an ASD-specific diagnostic assessment could be arranged. In the event that they had just minor concerns they should consider regular review. The decision to refer to the ASD 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 to the level of parental concern about the child or young person. They should take into account the presence of any known risk factors for ASD, for example, the presence of an intellectual disability, a sibling with ASD, or history of extreme prematurity.

Where the signs and symptoms are not sufficient to prompt an immediate referral, the GDG agreed that a health care 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 ASD Team. Parents and carers and where appropriate children and young people themselves 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 experience colleague or the ASD 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 ASD diagnostic assessment to collect this data and avoids the need for repetitious assessments and information-gathering.

There should be an identified ASD team with named individuals to which professionals can refer to from any NHS service. The function and the composition of the ASD team are addressed in chapter 5 on Diagnostic Assessment.

The ASD Strategy Group

The GDG consesnsus was that improving the efficiency and the cost-effectiveness of recognition and referral for an ASD assessment also requires a wider, strategic approach at a local level. A local multiagency ASD Strategy Group should be in place with a lead professional who is responsible to the local ASD pathway. The ASD Strategy Group should have the responsibility for: planning local ASD services and ensuring that they are widely

	understood; ensuring local ASD protocols for referral and transition to adult services are followed; leading multiagency and multiprofessional training to improve early recognition of ASD; maintaining a database and auditing the service; and enhancing the ethos of multiprofessional working (identified as a priority in the scope of this guideline). The ASD Strategy Group should be made up of named commissioners and named managerial and clinical representatives from child health, mental health services, education, social care, patent/carer/ service users and the voluntary sector including, where appropriate, the criminal justice system.
Recommendations	1. A local ASD 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 ASD strategy group should appoint a lead professional to be responsible for the local ASD pathway for recognition, referral and diagnosis of children and young people. The aims of the group should include: • improving early recognition of ASD by raising awareness of the signs and symptoms of ASD 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 ASD 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 ASD team. 11. Consider the possibility of ASD 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 ASD and whether to refer a child or young person to the ASD 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 ASD, use tables 1–3. Do not rule out ASD 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 ASD. 15. When considering the possibility of ASD, 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 ASD, signs or symptoms may have previously been masked by the child'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 by early hearing difficulties or because English is not the family's first language • ASD may be missed in children with an intellectual disability • ASD may be missed in children or young people who are verbally able • ASD 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 ASD, ask about the child or young person's use and understanding of their first language. 17. Do not rule out ASD 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 ASD, 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 ASD, 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 ASD team if there is regression in language or social skills.

22. Refer first to a paediatrician or paediatric neurologist, who can refer to the ASD 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 to the ASD team if you are concerned about possible ASD 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 ASD (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 ASD, consider:

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

25. Be aware that ASD-specific screening tools may be useful in gathering information about signs and symptoms of ASD in a structured way but are not essential and should not be used to make or rule out a diagnosis of ASD, and that:

- a positive score on a screening instrument may support a decision to refer but can also be for reasons other than ASD
- a negative score does not rule out ASD.

26. When referring to the ASD 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 to the ASD team, include in the referral letter

	the following information, if available: • antenatal and perinatal history • developmental milestones • factors associated with an increased prevalence of ASD (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. 29. If you do not think concerns are sufficient to prompt a referral, consider a period of watchful waiting. If you remain concerned about ASD, 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 ASD team, consider a period of watchful waiting. If you remain concerned about ASD, reconsider referral. 31. If a concern about possible ASD has been raised but there are no signs, symptoms or other reasons to suspect ASD, 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 ASD 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 ASD: Preschool children (or equivalent mental age). See 'Using tables 1–3' on page 17.

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 and speech used in social communication
- Reduced or absent social use of eye contact (looking at people's eyes when speaking), 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 ASD: Primary school children (aged 5–11 years or equivalent mental age). See 'Using tables 1–3' on page 17.

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 and speech used in social communication
- Reduced or absent social use of eye contact (looking at people's eyes when speaking), 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

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 ASD

- 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 ASD: Secondary school children (over 11 years or equivalent mental age). See 'Using tables 1–3' on page 17.

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 ASD

- 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

PICO research question	Does training professionals to recognise signs and symptoms of ASD lead to earlier assessment of needs and earlier diagnosis (and by implication reduce morbidity/improve health outcomes) among children and young people with suspected ASD 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 ASD diagnostic assessment. A fully trained workforce can identify the number of children or young people with ASD 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 ASD 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 ASD 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 ASD assessment. This will benefit patients and families by reducing the currently well-documented delay between families' expressing concerns and access to an ASD diagnostic assessment. Improved early recognition will increase the rates of appropriate referrals and thus reduce the rates of inappropriate referrals throughout the ASD 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 ASD 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 ASD 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 ASD 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 ASD. 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 ASD 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 ASD 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 ASD 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	Training of HCPs is a key GDG recommendation based on best practice. However it is important to investigate the implications for diagnostic and

comments	treatment services in particular any potential adverse consequences that new ASD 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 ASD 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 ASD team of a child or young person with signs and symptoms suggestive of ASD. At this phase of the clinical pathway a decision has to be made on what further assessment is required. The ASD 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 prior to assist decision-making on what type of assessment is required. Information may include responses to screening instruments which are sometimes used when a concern is first raised about ASD to determine the likelihood that a child or young person will turn out to have a diagnosis of ASD. Information from other sources may also be gathered. It it is often not clear to parents and carers what the 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 screening instruments. The second section looks at risk factors for ASD in two specific groups: the general population and children with identified coexisting conditions. It considers whether these risk factors are of practical use in decision-making 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 ASD specific assessment, and includes recommendations on when to proceed to an ASD specific diagnostic assessment.

Clinical Questions

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

a) Are there screening instruments that are effective in assessing the need for specialist ASD assessment?

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

- part 1. risk factors

- part 2. Conditions with an increased risk of ASD

c) Information from other sources as contextual information: information about how the child functions in different environments such as school and home; social care reports (i.e. 'Looked After' children); other agencies

4.1 Overview of the evidence – Screening tools

In total, 9 studies were included in the review. These studies were carried out in Australia[65;66], Canada[67;68], Sweden[69;70] the UK[71] and the USA[72;73]. Five of the studies included children of preschool age[66–68;72;73] and one of primary school age[72]. No study included children of secondary school age only. . Three studies included mixed pre-school and primary school age children[65;69;71] and two included all age groups[70;72]. All studies were uncontrolled observational in design.

One study[66] reported intellectual disability and one study[72] reported mean 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) [65;67;68;72;73], two the Checklist for Autism in Toddlers – Modified (M-CHAT) [67;73], two the Autism Behavior Checklist (ABC)[70;71] and one each the Developmental Behaviour Checklist – Autism – Early Screen (DBC-ES)[66] and the Autism Spectrum Screening Questionnaire (ASSQ)[69].

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

4.2 Evidence profiles – Screening tools

The accuracy of each screening 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 Methodology chapter). .

Table 4.1 Predictive accuracy of screening instruments

Diagnostic tool	Quality assessment						Summary of findings			
							Number		Diagnostic accuracy	
	Studies	Design	Limitations	Inconsistency	Indirectness	Quality	ASD	Non ASD	Sensitivity (95% CI)	Specificity (95% CI)
ALL STUDIES										
SCQ (≥15)[65;67;68;72;73]	5	Uncon obs	Not used	Not used	Not used	Very low	590	365	71 (67, 75)	62 (57, 67)
M-CHAT (≥2 of 6)[67;73]	2	Uncon obs	Not used	Not used	Not used	Very low	95	43	74 (64, 82)	42 (27, 68)
ABC-Teacher (≥67)[70;71]	2	Uncon obs	Not used	Not used	Not used	Very low	11	103	46 (17, 77)	96 (90, 99)
ASSQ (Teacher, ≥22)[69]	1	Uncon obs	Not used	Not used	Not used	Very low	21	88	71 (52, 91)	91 (85, 97)
ASSQ (Parent, ≥19)[69]	1	Uncon obs	Not used	Not used	Not used	Very low	21	88	62(41, 83)	90 (83, 96)
DBC-ES (cut-off: 11)[66]	1	Uncon obs	Not used	Not used	Not used	Very low	142	65	83 (77, 89)	48 (35, 60)
PRE-SCHOOL CHILDREN (≤ 5 YEARS)										
SCQ (cut-off: 15)[67;72;73]	3	Uncon obs	Not used	Not used	Not used	Very low	232	127	69 (63-75)	61 (52-69)
M-CHAT (≥2 of 6)[67;73]	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)[66]	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)[68;72]	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									
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)										
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)[72]	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								

4.3 Evidence statements – Screening tools

Sensitivity and specificity of screening instruments

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 screening instruments, such as ATAC, BISCUIT, BITSEA, CAST, CCC, CHECKLIST, CSI-4, ECI-4, ESAT, ESCS, GADS, ITC, KADI, MCDI, PCQ, PDD-MRS, PDDRS, PDDST, RBS, SSI, SDQ, SRS, STAT, YACHT-18.

All studies

No screening instruments met the pre-defined acceptable levels for predictive accuracy (see Methods section 2.6.4). The evidence was of very low quality

Pre-school children (≤5 years)

None of the screening 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 screening 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 screening 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 – Screening tools

Relative value placed on the outcomes considered	The same threshold for the predictive accuracy of screening instruments: was agreed throughout the guideline (See Method section 2.6.4): 80% sensitivity and specificity with a lower 95% confidence interval threshold of 70%.
Trade-off between clinical benefits and harms	In principle, accurate screening tools can improve early recognition of children requiring further assessment. They could 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 screening tools 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 screening tools are not essential but may be useful in gathering information about signs and symptoms in a structured way. A positive score on a screening tool can support decisions but other factors are important to determine whether to proceed to an ASD specific assessment (see Evidence to Recommendations sections further on in this chapter). None of the instruments met the predefined level of accuracy specified by the GDG for identifying children with ASD or 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 Screening tools 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 using a screening tool may reduce the number of unnecessary referrals for further assessment which is the costliest part of the ASD pathway. The GDG view was that ASD specific screening tools are not essential but may be useful in gathering information about signs and symptoms. A positive score on a screening instrument may support a decision to refer but factors other than the use of a screening tool would be very important determining whether to proceed to an ASD diagnostic assessment. Using screening tools correctly requires training and experience. Achieving this level of compentancy requires resources, both in start up 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. Only one study for each of the instruments was identified in the review except for the SCQ (five studies) and M-CHAT (2 studies). 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 were sufficiently accurate in any of the predefined age groups. The evidence base regarding screening tools 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 ASD diagnostic assessment.
Other considerations	The GDG accepted that screening tools can help to identify signs and symptoms of ASD in a structured way which may be useful. However, the scores from screening tools should not be relied upon. If a screening tool was employed to gather information, the associated score results should not be relied on to decide on referral since they are insufficiently accurate. However if a screening tool has been used, information including the scores should accompany any referral as additional information to the team receiving the referral.
Recommendations	25. Be aware that ASD-specific screening tools may be useful in gathering information about signs and symptoms of ASD in a structured way but are not essential and should not be used to make or rule out a diagnosis of ASD, and that: • a positive score on a screening instrument may support a decision to refer but can also be for reasons other than ASD • a negative score does not rule out ASD.

4.5 Overview of the evidence - Risk factors

The evidence is reviewed in two parts. The first review identifies 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 co-existing 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[74-76], Denmark[77-80], Sweden[81;82] and the USA[83-91].

Two of the studies included children of preschool age[89 76], one of primary school age[86], and one of secondary school age[88]. Ten studies included mixed pre-school and primary school age children [78-85;87;91] and two studies included all age groups[74;90]. Two studies included adults: the range of age for one study[77] is 1-24 years with a mean 7.7 years; while the range for another study[75] is 5 to 20 y, with mean age unknown.

Only three studies[83;86;89] reported the proportion of children with intellectual disability, but no separate outcome data for each 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 on accuracy of risk factors in predicting later diagnosis of ASD. The data are presented for all studies.

Table 4.2 and Table 4.3 present the evidence on the adjusted relative risk or odds ratio 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	ASD	NON-ASD	Adj OR/RR (95%CI)
FAMILIAR OR PARENTAL FACTORS									
Maternal age > 40 years[87]	1	Con obs	None	NA	None	Low	12159	4935776	adj OR 1.51 (1.35, 1.70)
Mother's race (black)[83;89]	2	Con obs	None	Not used	None	Low	4957	3498470	adj OR 1.66 (1.48, 1.85)
Paternal age > 40 years[87]	1	Con obs	None	NA	None	Low	12159	4935776	adj OR 1.36 (1.26, 1.47)
PERINATAL OR NEONATAL FACTORS									
Birthweight < 2500 g[76;79]	2	Con obs	None	Not used	None	Low	655	90358	adj OR 2.15 (1.47, 3.15)
Prematurity (< 37 weeks)[76]	1	Con obs	None	NA	None	Low	182	85628	adj OR 2.3 (1.5, 3.7)
Admission to neonatal intensive care unit[79]	1	Con obs	None	NA	None	Low	461	461	adj OR 1.8 (1.3, 2.7)
Male gender[76;83;89]	3	Con obs	None	Not used	None	Low	5439	3584098	adj OR 4.28 (4.02, 4.57)
Serum bilirubin test undertaken[80]	1	Con obs	None	NA	None	Low	461	461	adj OR 3.7 (1.3, 10.5)
Hypertonic/hyper-reflexive/jittery[80]	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									

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	ASD	NON-ASD	Adj OR/RR (95%CI)
FAMILIAR OR PARENTAL FACTORS									
Sibling history of autism[78]	1	Con obs	None	NA	None	Low	818	942836	adj RR 22.27 (13.09, 37.90)
Sibling history of ASD[78]	1	Con obs	None	NA	None	Low	818	942836	adj RR 13.40 (6.93, 25.92)
Parental history of schizophrenia-like psychosis [77]	1	Con obs	None	NA	None	Low	698	17450	adj RR 3.44 (1.48, 7.95)
Parental affective disorder[77]	1	Con obs	None	NA	None	Low	698	17450	adj RR 2.91 (1.65, 5.14)
Parental history of other mental and behavioural disorder diagnosis [77]	1	Con obs	None	NA	None	Low	698	17450	adj RR 2.85 (2.20, 3.69)
Paternal age between 40 and 49 years[88]	1	Con obs	None	NA	None	Low	110	132161	adj OR 5.75 (2.65, 12.46) [a]
Paternal age between 31 and 35 years[81]	1	Con obs	None	NA	None	Low	1227	30693	adj OR 1.7 (1.3, 2.1) [b]
Paternal age between 36 and 40 years[81]	1	Con obs	None	NA	None	Low	1227	30693	adj OR 1.8 (1.4, 2.4) [b]
Paternal age between 41 and 50 years[81]	1	Con obs	None	NA	None	Low	1227	30693	adj OR 1.9 (1.4, 2.5) [b]
Paternal age ≥ 50 years[81]	1	Con obs	None	NA	None	Low	1227	30693	adj OR 2.7 (1.5, 4.8) [b]
Maternal history of neurotic/personality disorders [81]	1	Con obs	None	NA	None	Low	1227	30693	adj OR 1.7 (1.3, 2.2)
Parental mental and behavioural disorder diagnosis[81]	1	Con obs	None	NA	None	Low	1227	30693	adj OR 1.7 (1.5, 2.0)
PERINATAL OR NEONATAL FACTORS									
Multiple birth defects[74;91]	2	Con obs	None	Not used	None	Low	882	2548	adj OR 2.73 (1.37, 5.42)
Prematurity (< 28 weeks)[86]	1	Con obs	None	NA	None	Low	1251	253347	Adj OR 2.5 (1.6, 3.9)
Prematurity (< 35 weeks)[77]	1	Con obs	None	NA	None	Low	595	14875	adj OR 2.45 (1.55 , 3.86)
Any birth defects[74;91]	2	Con obs	None	Not used	None	Low	882	6380	adj OR 1.7 (1.31 , 52.20)

Male gender[86]	1	Con obs	None	NA	None	Low	1251	253347	adj OR 4.2 (3.7, 4.9)
PREGNANCY-RELATED FACTORS									
Threatened abortion < 20 weeks[75]	1	Con obs	None	NA	None	Low	465	1313	adj OR 2.09 (1.32, 3.32)
Elective caesarean[75]	1	Con obs	None	NA	None	Low	465	1313	adj OR 1.83 (1.32, 2.54)
ENVIRONMENTAL FACTORS									
Residing in capital city[78]	1	Con obs	None	NA	None	Low	818	942836	adj RR 2.05 (1.67, 2.51)
Residing in capital city suburb[78]	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**

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 Methods 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 > 40 years
- paternal age between 40 and 49 years (ASD)
- paternal age > 40 years (autism)
- birthweight < 2500 g
- prematurity < 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 co-existing 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-nine studies were included in the review. These were from Australia[92], Canada[93;94], Iceland[53-55], Italy[95], the Netherlands[57;60;60], the UK[51;52;63;64;96;97,63;64] the USA[47;48;50;56;58;61;98-102], Sweden[62], and Turkey[59]. Three studies had multinational samples. All were uncontrolled observational studies.

Three [51;58;98] of the studies included children of preschool age and one[60] of primary school age. No study included children of secondary school age only. Two studies[48;100] included mixed pre-school and primary school age children; two [92;93] studies included mixed primary and secondary school age; and seven [52;57;59;63;64;97;101] studies included all age groups. Ten[47;49;53-56;61;62;99;103] studies included adults (age>19 year). 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 ASD

Co-existing conditions	Quality assessment						Summary of findings			
	Studies	Design	Limitations	Inconsistency	Indirectness	Quality	Autism	Non-autism	Prevalence (Range, %)	Unadj RR (Range)
RISK/PREVALENCE OF AUTISM IN CO-EXISTING CONDITIONS										
Intellectual disability[60;94]	2	Uncon obs	Not used	Not used	Not used	Very low	161	1076	10.9 – 27.9	31.3 – 99.1
Fragile X[102]	1	Uncon obs	Not used	Not used	Not used	Very low	4	13	24	79
Tuberous sclerosis[95]	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[104]	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.									

Table 4.5: Conditions with an increased prevalence of ASD

Co-existing conditions	Quality assessment						Summary of findings			
	Studies	Design	Limitations	Inconsistency	Indirectness	Quality	ASD	Non-ASDs	Prevalence (Range, %)	Unadj RR (Range)
RISK/PREVALENCE OF ASD IN CO-EXISTING CONDITIONS										
Intellectual disability[57;60;60;63;64]	4	Uncon obs	Not used	Not used	Not used	Very low	341	2208	8 – 17	7 – 17
Fragile X[47–49,100]	4	Uncon obs	Not used	Not used	Not used	Very low	95	129	30 – 60	37 – 130
Tuberous sclerosis[51;52;58;96]	4	Uncon obs	Not used	Not used	Not used	Very low	72	66	36 – 79	48 – 322
Neonatal encephalopathy / Epileptic encephalopathy / Infantile Spasms[53–55;92]	2	Uncon obs	Not used	Not used	Not used	Low	25	346	4 – 14	4 – 14
Cerebral palsy[59]	1	Uncon obs	Not used	Not used	Not used	Very low	19	107	15 – 15	15 – 15
Down's syndrome[50;61;97;98;101]	5	Uncon obs	Not used	Not used	Not used	Very low	91	829	6 – 15	5 – 15
Muscular dystrophy[62;99;103]	3	Uncon obs	Not used	Not used	Not used	Very low	38	528	3 –37	3 – 50
Neurofibromatosis[56]	1	Uncon obs	Not used	Not used	Not used	Very low	3	71	4 – 4	4 – 4
Fetal alcohol syndrome [93]	1	Uncon obs	Not used	Not used	Not used	Very low	6	617	1 – 1	1 – 1

4.11 Evidence statements – Conditions with an increased prevalence of ASD

ASD or autism is observed more frequently in children with the following co-existing conditions than in the general population:

- Intellectual disability (prevalence of autism/ASD 8% – 27.9%)
- Fragile X (prevalence of autism/ASD 24% – 60%)
- Tuberous sclerosis (prevalence of autism/ASD 36% – 79%)
- Neonatal encephalopathy/epileptic/encephalopathy/infantile spasms (prevalence of autism/ASD 4% – 14%)
- Cerebral palsy (prevalence of autism/ASD 15%)
- Down's syndrome (prevalence of autism/ASD 6% – 15%)
- Muscular dystrophy (prevalence of autism/ASD 3% – 37%)
- Neurofibromatosis (prevalence of autism/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 ASD

Relative value placed on the outcomes considered	In relation to potential risk factors 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 cut off.
Trade-off between clinical benefits and harms	Identifying risk factors informs the health care professional's level of concern about a child or young person with signs and symptoms of ASD and the need for an ASD specific assessment. No harms are thought to be caused by identifying risk factors in children with signs and symptoms of ASD. 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 health care professionals to consider ASD more likely in a chid or young person. These are conditions that are rare in the general population that have a strong association with ASD. 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 view is that identifying the risk factors and coexisting conditions with a higher prevalence of ASD 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 ASD.
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's 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 by GDG expert opinion. The GDG view was that factors associated with ASD and coexisting conditions with a higher prevalence of ASD 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 ASD. However, the GDG agreed that no risk factor or coexisting condition in isolation necessitates a referral for an ASD-specific diagnostic assessment. 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, ASD. For this reasons, the use of sodium valporate in pregnancy was included as a factor to be considered in history-taking for ASD. The GDG noted from the evidence the link between prematurity (less than 35 weeks) and autism or ASD and have 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 ASD does occur in girls and there is anecdotal evidence that ASD 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 ASD. The GDG thought that this could be partially explained by proximity to specialist diagnostic and treatment centres. Despite identifying it in the evidence, the GDG did not consider it clinically plausible that maternal psoriasis would be a useful risk factor for ASD. 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 ASD. The GDG considered that the presence of any of these conditions in a child or young person with symptoms and/or signs suggestive of ASD should be taken account of and strengthen concerns about possible ASD. This list of conditions associated with ASD is not exhaustive, other less common conditions, for example genetic syndromes, may also be strongly associated with ASD.
Recommendations	23. Consider referring to the ASD team if you are concerned about possible ASD on the basis of reported or observed signs and/or symptoms (see tables 1-3). Take account of: • risk factors and conditions with an increased prevalence of ASD (see table 4) 27. When referring to the ASD team, include in the referral letter the following information, if available: • known risk factors and conditions with an increased prevalence of ASD (see table 4) 35. When deciding whether to carry out an ASD diagnostic assessment, take account of the following, (unless the child is under 3 years and has regression in language or social skills – see

	recommendation 32): • known risk factors and conditions with an increased prevalence of ASD (see table 4)

Table 4 Factors associated with an increased prevalence of ASD

- A sibling with ASD
- Birth defects associated with central nervous system malformation and/or dysfunction, including cerebral palsy
- Gestational age less than 35 weeks
- Maternal use of sodium valporate 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

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 or 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 ASD team. Since ASD 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 ASD can present with similar signs and symptoms, so the availability of such information at this stage is helpful in determining who should proceed to an ASD-specific diagnostic assessment and as a contribution to the diagnostic assessment. Information could usefully be obtained from pre-school 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 who have had recent contact with the child, young person and their families and carers would speed up decision-making, reduce waiting times, avoid unnecessary referrals, and therefore 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 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 ASD 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 a full ASD-specific diagnostic assessment or whether another type of assessment is required. The GDG consensus is that the decision should be made by the ASD team either in a referral meeting or by an individual member of the ASD team depending on the clinical presentation and the need for multidisciplinary consideration (for a description of the role of the ASD team, see the evidence to recommendations section in chapter 5 on Diagnostic Assessment). The considerations for deciding whether to proceed to an ASD specific assessment are the same as those used to decide whether to refer to the ASD team: a review of the signs and symptoms, and their severity, pervasiveness, impact and context. Signs and symptoms of ASD with regression of language or social skills in a child of under 3 years, is strongly associated with ASD. Only the presence of other clinical manifestations suggesting an alternative medical disorder requires 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 who can refer to the ASD team as necessary. Once the decision has been made, the diagnostic assessment should be arranged without delay and should start within 3 months of the initial referral to the ASD team. At the same time results of previous assessments should be obtained including results of vision and hearing tests. A school, preschool report or report from a home educator should also be requested following consent from the

	parent/carer as this will be important information contributing to the diagnostic assessment and profiling of needs. Home or school video recordings, where available, may be helpful. Information with regard to vision and hearing tests should be obtained as all this information may help the interpretation of signs and symptoms and later on, in reaching a diagnosis and in profiling. An efficient process for collecting and reviewing such information is important in avoiding delay and repetitious requesting of information at different points through the ASD pathway. If there is insufficient information to proceed to an ASD 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 themselves, in gathering information from other sources outside the health service to enhance parental/carer support and transparency in the process. The ASD 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	32. When a child or young person is referred to the ASD team, at least one member of the ASD team should consider whether to carry out: • an ASD diagnostic assessment and/or • an alternative assessment. 33. Carry out an ASD 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 ASD team if necessary. 35. When deciding whether to carry out an ASD diagnostic assessment, take account of the following, (unless the child is under 3 years and has regression in language or social skills – see recommendation 32): • 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 when appropriate

	the concerns of the child or young person • factors associated with an increased prevalence of ASD (see table 4) • the likelihood of an alternative diagnosis. 36. If there is insufficient information to decide whether an ASD 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, obtain information from schools or other agencies. 37. If there is uncertainty about whether an ASD 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 ASD diagnostic assessment: • with consent from parents or carers and, if appropriate, the child or young person, obtain a report from the pre-school or school if one has not already been made available • gather any additional health or social care information that may exist, including results from hearing and vision assessments. 39. Avoid repeated information gathering and assessments by efficient communication between professionals and agencies. 40. Start the ASD diagnostic assessment within 3 months of the referral to the ASD team.

4.17 Research recommendations – Information from other sources

PICO research question	Does routine additional information from educational settings (such as nursery or school) improve accuracy in diagnosing ASD among children or young people up to the age of 19 compared with signs and symptoms alone?
Why is this needed The ASDs are 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 ASD 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 ASD strategy group with representation from education. An educational psychologist is also named as a member of the core ASD 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 ASD diagnostic assessment in a single district compared with an ASD diagnostic assessment alone in a second matched district. Time needed 36 months Outcomes to include - • time taken to diagnosis • number of children diagnoses with ASD • number of co-existing 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 ASD 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 ASD specific diagnostic assessment. It provides recommendations on the core elements of the assessment; the ASD 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 ASD-specific diagnostic tools and the information required to interpret the findings of such tools. It covers the accuracy of diagnostic tools compared with ICD-10/DSM-IV, the accuracy of other assessment tools to assist interpretation of the ASD-specific diagnostic tools, agreement between the tools, agreement between single clinician and panel of clinicians in the diagnosis of ASD or autism according to DSM-IV criteria, and the stability of ICD-10 and DSM-IV 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 spectrum disorder to children, young people, parents and carers, based on available ASD-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 ASD. These children and young people leave the ASD specific pathway and 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 ASD: e.g. Autism Diagnostic Interview (ADI), Developmental, Dimensional and Diagnostic Interview (3di), Diagnostic Interview for Social and Communication Disorders (DISCO), Autism Diagnostic Observation Schedule (ADOS), Gilliam Autism Rating Scale
- Other assessment tools that help the interpretation of the specific ASD tools and ratings scales (e.g. ADI, 3di, DISCO, ADOS, Gilliam Autism Rating Scale): an assessment of intellectual ability; an assessment of receptive and expressive language etc.

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 ASD diagnosis over time?
- What is the agreement of an ASD 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 ASD?

5.1 Overview of the evidence – Accuracy of assessment tools

Eleven studies were included in the review. The ADI-R was examined in 10 studies[47;72;105-112], the ADOS in 9 studies[47;72;105;106;108-112], the 3di in a single study[113] and the GARS in a single study[109]. One study examined a combination of the ADI-R and the ADOS[72]. All were uncontrolled observational studies. No study examining the DISCO met the pre-defined inclusion criteria. The studies were carried out in Australia[106], Greece[110], the Netherlands[105], the UK[113] and the USA[47;72;107-109;111;112].

One study[106] reported on intellectual disability. Three studies[72;106;110] reported mean IQ scores but the proportion of children with intellectual disability was not reported. Only one sub-group analysis by age group for pre-school (< 5 years)' was possible. Data for school age children (5-11 years) and adolescents (>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: pre-school (0-5yrs), primary school (6-11yrs) and secondary school children (12-19yrs) and children and young people with an intellectual disability (all ages). 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 DSM-IV or ICD-10 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)
ACCURACY IN DIAGNOSING AUTISM										
ALL STUDIES										
ADI-R[47;72;105-112]	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[47;72;105;106;108-112]	9	Uncon obs	Not used	Not used	Not used	Very low	716	871	91 (89, 94)	75 (72, 80)
ADI-R + ADOS[72]	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-R[106]	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									
DISCO	No study met the inclusion criteria for this review									
ADOS[106]	1	Uncon obs	Not used	Not used	Not used	Very low	120	89	85 (77, 91)	89 (80, 95)
ADI-R + ADOS[72]	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)										

ADI-R[106-108;111;112]	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[106;108;111;112]	4	Uncon obs	Not used	Not used	Not used	Low	290	308	89 (84, 93)	76 (70, 82)
ADI-R + ADOS[72]	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)										
No study met the inclusion criteria for this review										

Table 5.2 Accuracy of diagnostic tools in diagnosing ASD compared to DSM-IV or ICD-10 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)
ACCURACY IN DIAGNOSING ASD										
ALL STUDIES										
ADI-R[47;72;105;106;108-112]	9	Uncon obs	Not used	Not used	Not used	Very low	1009	471	78 (77, 82)	71 (66, 75)
3di[113]	1	Uncon obs	Not used	Not used	Not used	Very low	27	33	100 (100, 100)	94 (86, 100)
GARS[109]	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[47;72;105;106;108-112]	9	Uncon obs	Not used	Not used	Not used	Very low	1009	471	87 (85, 89)	73 (69, 76)
ADI-R + ADOS[72]	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-R[106]	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									
DISCO	No study met the inclusion criteria for this review									
ADOS[106]	1	Uncon obs	Not used	Not used	Not used	Very low	143	66	76 (68, 83)	94 (85, 98)
ADI-R + ADOS[72]	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)										
ADI-R[106;108;111;112]	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[106;108;111;112]	4	Uncon obs	Not used	Not used	Not used	Very low	382	186	84 (79, 87)	77 (71, 82)
ADI-R + ADOS[72]	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)										
No study met the inclusion criteria for this review										

5.3 Evidence statement – Accuracy of assessment tools

Evidence for autism

Only studies examining the ADI-R, ADOS and 'ADI-R plus ADOS met the pre-defined levels of accuracy for this review identified those who had ASD and those who did not (see Methods section 2.6.4). No data was identified for the 3di, DISCO, DAWBA, PIA and GARS. Studies examining the CARS were excluded.

All studies: only the combination of ADI-R and ADOS met the pre-defined levels of accuracy. The evidence was of very low quality.

Intellectual disability: only the ADOS and the combination of ADI-R and ADOS meet the pre-defined levels of accuracy. The evidence was of very low quality.

Pre-school (≤5 years) only: only the ADOS and the combination of the ADI-R and the ADOS met the pre-defined levels of accuracy. The evidence was of very low quality.

Primary school (6 – 11 years) only: no studies were identified for this age group.

Secondary school (≥12 years) only: no studies were identified for this age group.

Evidence for ASD

All studies: of all the diagnostic tools examined, only the 3di and the combination of ADI-R and ADOS met the pre-defined levels of diagnostic accuracy. The evidence was of very low quality.

Intellectual disability: only the combination of ADI-R and ADOS met the pre-defined levels of accuracy. The evidence was of very low quality.

Pre-school (≤5 years) only: only the combination of ADI-R and ADOS meet the pre-defined levels of accuracy. The evidence was of very low quality.

Primary school (6 – 11 years) only: no studies were identified for this age group.

Secondary school (≥12 years) only: no studies were identified for this age group.

5.4 Evidence to recommendations – Accuracy of assessment tools

See section 5.20

5.5 Overview of the evidence – Agreement between ASD specific 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 ASD specific tools

No evidence.

5.7 Evidence statement – Agreement between ASD specific tools

No evidence.

5.8 Evidence to recommendations – Agreement between ASD specific tools

See section 5.20

5.9 Overview of the evidence – Other assessment tools to assist interpretation of the ASD-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 ASD-specific diagnostic tools

No evidence.

5.11 Evidence statement – Other assessment tools to assist interpretation of the ASD-specific diagnostic tools

No evidence.

5.12 Evidence to recommendations – Other assessment tools to assist interpretation of the ASD-specific diagnostic tools

See section 5.20

5.13 Overview of evidence – Agreement between single clinician and panel of clinicians to diagnose ASD or autism according to DSM-IV criteria

The agreement between diagnosis by single clinician and a diagnostic team are reported as kappa scores. Kappa scores may be interpreted as follows[31]:

<0%	Poor
0-20%	Slight
21%-40%	Fair
41%-60%	Moderate
61%-80%	Substantial
81%-100%	Almost perfect (high agreement)

Only one study[114] carried out in Canada was included in the review.. It was an uncontrolled observation design and was low quality. The study sample included a mix of age-groups from pre-school 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 single clinician and panel of clinicians to diagnose ASD or autism according to DSM-IV criteria

Table 5.3 reports the agreement (Kappa statistic) between single versus a panel of clinicians in diagnosing ASD.

Table 5.3 Agreement between single clinician and panel of clinicians to diagnose ASD, autism or non-ASD according to DSM-IV criteria

Diagnosis	Quality assessment						Summary of findings		
							Agreement		
	Studies	Design	Limitations	Inconsistency	Indirectness	Quality	Number	Age (months)	Kappa (%)
AGREEMENT BETWEEN SINGLE CLINICIAN VS PANEL OF CLINICIANS									
ASD[114]	1	Uncon obs	Not used	Not used	Not used	Very low	143	29 – 482	.55
Autism[114]	1	Uncon obs	Not used	Not used	Not used	Very low	143	29 – 482	.56
Non-ASD[114]	1	Uncon obs	Not used	Not used	Not used	Very low	143	29 – 482	.81

5.15 Evidence statement – Agreement between single clinician and panel of clinicians to diagnose ASD or autism according to DSM-IV criteria

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 single clinician and panel of clinicians to diagnose ASD or autism according to DSM-IV criteria

See section 5.20

5.17 Overview of the evidence – Stability of ICD-10 and DSM-IV criteria

Studies were grouped according to age at first diagnosis; ≤ 24 months, 25-36 months, 37-48 months and 49-60 months. These subgroups were adopted as using a single category of pre-school (children under 5 years of age) 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 option for children assessed for ASD.

Thirteen studies were included in the review. These studies were carried in Canada[115],Netherlands[116], the UK[117-119] and the USA[107;108;120-125]. All were uncontrolled observational studies and were graded as very low quality.

Children received their first diagnosis at ≤ 24 months in 4 studies[118;120 117;125], between 25 – 36 months in 9 studies[107;108;115;116;119;121-124]. No studies examined diagnosis at either 37 – 48 months or 49 – 60 months. DSM-IV was used in 9 studies[108;115;116;120-125] examined the stability while ICD-10 was examined in 5 studies[107;117-119].

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 criteria

Table 5.4 reports the proportion of children, by age, who retain a diagnosis of autism, ASD and non-ASD (non spectrum) using either the DSM-IV or ICD-10 criteria.

Table 5.4 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										
AUTISM										
DSM-IV[120;125]	2 (64)	Uncon obs	Not used	Not used	Not used	Very low	35.9 ± 3.8 - 46.9 ± 7.7	80.8 (64.1, 93.1)	19.2 (6.9, 35.9)	0
ICD-10[117;118]	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[120;125]	2 (24)	Uncon obs	Not used	Not used	Not used	Very low	35.9 ± 3.8 - 46.9 ± 7.7	12.6 (1.8, 31.0)	87.4 (69.0, 98.2)	0
ICD-10[118]	1 (3)	Uncon obs	Not used	Not used	Not used	Very low	42	33.3	66.7	0
NON-SPECTRUM										
DSM-IV[120;125]	2 (32)	Uncon obs	Not used	Not used	Not used	Very low	35.9 ± 3.8 - 46.9 ± 7.7	3.6	12.5 (1.7, 31.0)	85.8 (72.3, 95.3)
ICD-10[118]	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[108;115;116;121;122;124]	6(260)	Uncon obs	Not used	Not used	Not used	Very low	45 ± 6.4 - 112.8 ± 15.6	75.1 (62.4, 85.9)	16.7 (10.2, 24.6)	10.1 (3.1, 20.6)

ICD-10[107;119]	2 (32)	Uncon obs	Not used	Not used	Not used	Very low	45.8 ± 5.3 – 53	85.4 (71.8, 95.1)	11.4 (3.1, 24.1)	6.3
OTHER ASD										
DSM-IV[108;115;116;121;122;124]	6(100)	Uncon obs	Not used	Not used	Not used	Very low	45 ± 6.4 – 112.8 ± 15.6	31.2 (13.0, 53.1)	34.7 (26.0, 44.0)	32.5 (15.9, 51.9)
DSM-IV[123a]	1 (73)	Uncon obs	Not used	Not used	Not used	Very low	53.7 ± 7.9	82.2		17.8
ICD-10[107;119]	1 (3)	Uncon obs	Not used	Not used	Not used	Very low	45.8 ± 5.3 – 53	67	33	0
NON-SPECTRUM										
DSM-IV[108;115;116;124]	4 (142)	Uncon obs	Not used	Not used	Not used	Very low	53 ± 8 – 112.8 ± 15.6	0	10.5 (0.1, 35.1)	92.8 (77.4, 99.8)
DSM-IV[123a]	1 (17)	Uncon obs	Not used	Not used	Not used	Very low	53.7 ± 7.9	0		100
ICD-10[107;119]	2 (15)	Uncon obs	Not used	Not used	Not used	Very low	45.8 ± 5.3 – 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

5.19 Evidence statement – Stability of ICD-10 and DSM-IV criteria

The evidence for all age groups was very low quality.

Children aged less than 24 months at first diagnostic assessment using ICD-10/DSM-IV

All children, except a single case (1%), diagnosed as having autism based on ICD-10/DSM-IV 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 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 between 25 and 36 months at first diagnostic assessment using ICD-10/DSM-IV

The majority of children (95%) diagnosed as having autism based on ICD-10/DSM-IV 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 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 between 37 and 48 months at first diagnostic assessment using ICD-10/DSM-IV

No studies were identified for this analysis

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

No studies were identified for this analysis

5.20 Evidence to recommendations – Accuracy of assessment tools, agreement between ASD specific tools, other assessment tools to assist interpretation of the ASD-specific diagnostic tools, agreement between single clinician and panel of clinicians to diagnose ASD or autism according to DSM-IV criteria and stability of ICD-10 and DSM-IV criteria.

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 methods section 2.6.4).
Trade-off between clinical benefits and harms	ASD 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-R and ADOS was accurate in diagnosing ASD in pre-school children and children with an intellectual disability. The 3di was accurate in diagnosing ASD. 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 ASD 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 used which may provide a false diagnosis of ASD 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 health care 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 health care professional. However, the label of ASD does not constitute a complete diagnostic assessment and a profile of the child or young persons' 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 and DSM criteria across different age groups. The diagnoses should be reached in a consistent way across the NHS to reduce professional disagreements which can delay the process. The most effective approach is to use the ICD-10/DSM-IV criteria with expert clinical judgement. This is not always done in routine practice, with individual health care practitioners and teams making diagnoses based on judgement alone. This leads to varying diagnostic thresholds for ASD 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; 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 ASD teams in the diagnosis of ASD can reduce the time spent waiting for a diagnostic assessment[126] The GDG 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 just two sub-group analyses on pre-school children (ADI-R and ADOS) which were rated low quality. Most of the evidence looked at 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. The ADOS was not accurate overall (sensitive or specific). However, one study included children with an *a priori* intellectual disability and for this subgroup, the ADOS was accurate. However this was only one study and the reasons why ADOS should be more accurate for this group of children is not clear. The ADOS was also accurate for pre-school children (< 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 respectively but the results could be interpreted from this limited very low quality evidence. No evidence was identified for the accuracy of DISCO. Prediction of ASD using a combination of ADOS and ADI-R was good although the quality was rated very low. The evidence reported that 85% of children were correctly identified as having ASD using ADI-R plus ADOS and 81% of children were correctly identified as not having ASD. When these instruments were evaluated on their own, the power to correctly identify children who did not have ASD improved but they were not as good at identifying children who had ASD.

	Overall the evidence supporting the use of ASD-specific diagnostic tools either individually or in combination was poor. The GDG 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 ASD 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 as diagnostic criteria** Selection bias could have had an impact on the data on stability of diagnosis using ICD/DSM 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 ASD.
Other considerations	**Core elements of the ASD diagnostic assessment** The GDG consensus is that every ASD-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, a history and observation focussing on the developmental and behavioural features specified in the ICD-10 and DSM-IV ASD criteria. This core information might be sufficient to establish a diagnosis of ASD 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 ASD team needs to decide which assessments are necessary to construct the profile for each child or young person. This will depend on the child 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, and 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 ASD which could help determine a diagnosis of ASD). Attention should be focussed on identifying the skin stigmata of neurofibromatosis or tuberous sclerosis (Wood's light) or self injury and congenital anomalies, 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 exam about injury, other recently 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 important concerns to the child and family.

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

Reaching a diagnosis of ASD

The GDG view was that, based on the evidence that indicates that diagnosis is reliable when made using ICD and DSM criteria across different age groups, the ASD team should only diagnose ASD based on ICD or DSM criteria. 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 single practitioner cannot undertake a full diagnostic ASD 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 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 ASD 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 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. Health care 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 ASD Team and the parents/ carers to determine the support that the child or young person and family/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 ASD, the ASD 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 ASD 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 ASD. The ASD team should include experienced, named health care professionals skilled in undertaking all aspects of the ASD diagnostic assessment and profiling. The core members of the ASD team should include a paediatrician and/or a child and adolescent psychiatrist, a speech and language therapist and a clinical and/or education psychologist as, in the GDG's view, the skills of these professionals is required to undertake the minimum requirements of an ASD diagnostic assessment and profile of strengths skills, impairments and needs. However, the GDG recognised that a wider group of professionals is involved in the assessment and profile of children and young people often 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 ASD team, then the team should have regular access to these professionals. Similarly, the GDG recognised that both educational and clinical psychologist have skills that are relevant to diagnosing ASD, 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 ASD 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 ASD team is configured and where it is located. The constituency of the ASD team needs to be determined by local need. The recommendations identify the core membership of professionals required to undertake an ASD diagnostic assessments but do not exclude any professional group from membership of the ASD team or contribution to the ASD diagnostic assessment. Members of the ASD team will be clinicians who may have other roles and be members of other teams in child health, CAMHS and or education and social care but membership of the ASD team should be a dedicated role for this group of professionals. They will have special training and competence in the diagnostic assessment of ASD and will consider all referrals for ASD-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 ASD team should also have access to other health care 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 ASD 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 ASD 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, promotes good understanding between professionals and families as well as acceptance of the findings of the diagnostic assessment. Not all professionals in the ASD team need to be involved in the diagnostic process for every child or young person. The GDG recognise that while a very experienced health care professional could undertake some aspects of the assessment single-handedly (such as the ADI-R and the ADOS), a wider range of expertise is required to undertake the other aspects of assessments to develop a comprehensive profile of the child or young person which the GDG consider to be best practice within the diagnostic assessment.
Recommendations	3. In each area a multidisciplinary group (the ASD 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 ASD 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 ASD team, or arranging access for the team to, other relevant professionals who may be able to contribute to the ASD diagnostic assessment, for example, a specialist health visitor or nurse, specialist teacher or social worker. 6. The ASD team should have the skills and competencies to: • carry out an ASD diagnostic assessment • communicate with children and young people with suspected or known ASD, and with their parents and carers, and sensitively share the diagnosis with them. 7. ASD team members should: • provide advice to professionals about whether to refer children and young people for ASD diagnostic assessments • decide on the assessment needs of those referred or when referral to another service will be needed • carry out the ASD diagnostic assessment • share the outcome of the ASD 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 ASD diagnostic assessment directly with relevant services, for example by setting up a school visit by an ASD team member • offer information to children, young people and parents and carers about appropriate services and support. 9. The ASD team should either have the skills (or have access to professionals that have the skills) needed to carry out an ASD diagnostic assessment, for children and young people with special circumstances including: • co-existing 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 ASD team should consider carrying out the ASD diagnostic assessment jointly with the adult ASD team, regardless of the young person's intellectual ability. 44. Include in every ASD 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 ASD-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 ASD-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 ASD (see recommendation 54) • developing 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 • communicating 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

[iv] 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

[v] See 'When to suspect child maltreatment' (NICE clinical guideline 89). Available from www.nice.org.uk/guidance/CG89

	• socialisation skills. 49. Use information from all sources, together with clinical judgment, to diagnose ASD based on ICD-10 or DSM-IV criteria. 50. Do not rely on any ASD-specific diagnostic tool alone to diagnose ASD. 51. Be aware that in some children and young people there may be uncertainty about the diagnosis of ASD, 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. 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 ASD diagnostic assessment clearly indicates that the child or young person does not have ASD, consider referring 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. Consider any potential risk of harm to, and from, the child or young person identified during the ASD diagnostic assessment and take appropriate action.

5.21 Research recommendations

PICO research question	Do additional assessments (for IQ, language ability and motor ability) improve accuracy in diagnosing ASD among preschool children (younger than 5 years) compared with signs and symptoms alone?

Why is this needed

Current NHS practice varies widely with regard to the proportion of children having an ASD 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 ASD. This is particularly important if a differential or co-existing 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 co-existing 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 ASD 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 ASD 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 ASD 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 ASD 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 ASD diagnostic assessment in a

	single community child health district compared with an ASD diagnostic assessment alone in a second matched district. Time needed 36 months Outcomes to include – • time taken to diagnosis • number of children diagnosed with ASD • number of co-existing 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[127-135]. They were all carried out in the UK. They were all uncontrolled observational in design. Three studies[128;131;132] used a questionnaire to solicit information, four studies[127;129;133;135] used interviews, one study[130] used both questionnaire and interview and the final study[134] used a focus group. All studies reported the views/experiences parents of children with ASD. No studies reported on children or young people's responses.

The authors of one study[135] 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.

5.23 Evidence profile – Communicating diagnosis to the family

Table 5.5 summarises examples identified in the evidence of good and poor practice in the communication of ASD diagnosis, and parents' expectations of how a diagnosis should be communicated to them.

Table 5.5 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[128]	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[131]	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[133]	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 [129]	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.'
Delay in diagnosis[131]	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[131]	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 [127]	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[127]	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[127]	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.'*
Giving people an impression that	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*

professionals have power and control over the parents[127]							*him? Will that affect a report on him? So you don't.'*
No prior warning of ASD before the disclosure of ASD[132]	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 [134]	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[134]	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[134]	1	Uncon obs	Not used	Not used	Not used	Very low	*'All you get is delay, after delay, after delay'*
PARENTS' EXPECTATIONS – how should diagnosis be communicated							
Reassure parents that there are things	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*

they can do[132]							*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[130]	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[134]	1	Uncon obs	Not used	Not used	Not used	Very low	*'a general openness all round'*
Provide written reports, especially of assessment[135]	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'[135]	1	Uncon obs	Not used	Not used	Not used	Very low	The study authors reported participants views in summary only, without supporting quotes
Talk to parents as 'equals', use language that can be understood and is not technical[135]	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)[135]	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[135]	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[135]	1	Uncon obs	Not used	Not used	Not used	Very low	The study authors reported participants views in summary only, without supporting quotes
Assess the child separately[135]	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[135]	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	1	Uncon obs	Not used	Not used	Not used	Very low	The study authors reported participants views in summary only, without supporting quotes

inform them of an appointment[135]							
See the child in various settings[135]	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[135]	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 (2 studies)
- Incorrect diagnosis
- Delay in diagnosis (2 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 (2 studies), such as how they reached the diagnosis
- No prior warning of ASD before the disclosure of ASD.
- 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' expectation

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.

Provide 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 health care and other professionals. They also considered expectations of young people, 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, with 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 were 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 for some, 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 ASD 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 ASD.

	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 ASD. 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 ASD. For children where a definitive diagnosis cannot be reached, or where it is determined they do not have ASD, 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. Health care 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 those listening to judge the speed, depth of information and quantity of information provided in any consultation and provide an opportunity for the family 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 children and young people themselves, explaining the diagnostic process and its conclusions, engaging in face-to-face discussion soon after the completion of the ASD-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 ASD, the GDG view was that there should be a discussion about what ASD means and how it can affect development and function. This discussion should also include a brief discussion the risk of ASD occurring in future children at the first meeting as the GDG consensus was that this might be too much information to take in on first learning 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 GP and with appropriate consent from either the parent or carer or the child or young person themselves, 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 six weeks of the end of the diagnostic assessment to address families' concerns once they have had time to adjust to the diagnosis.
Recommendations	43. Discuss with the parents or carers and, if appropriate, the child or young person, how information should be shared throughout the ASD 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 ASD 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 ASD 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 ASD, discuss and share information with parents or carers and, if appropriate, the child or young person, to explain: • what ASD is • how ASD 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 ASD 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. With parental or carer consent and, if appropriate, the consent of the child or young person, also share information with key professionals involved in the child's or young person's care, including those in education and social care. 66. For children and young people with a diagnosis of ASD, offer a follow-up appointment with an appropriate member of the ASD team within 6 weeks of the end of the ASD assessment for further discussion (for example about the conclusions of the assessment and the implications for the child or young person). 67. For children and young people with a diagnosis of ASD, discuss with parents or carers the risk of ASD 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 with ASD

It was expected that no studies would be available 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 with ASD

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 with ASD

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 with ASD

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; disagreement about the diagnosis within the ASD 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 ASD team. There is also benefit in referral where there is a specific condition or problem other than ASD that requires expertise beyond the multidisciplinary team. Referral is also warranted where the ASD team does not have access to the necessary expertise for a child with a complex co-existing condition and uncertainty arising from a child or young person's failure to respond as expected to ASD specific support and interventions as these skills could not be expected to be available in every ASD team. Referral to a more expert team may speed up the identification of a definitive diagnosis and profile leading to implementation of the appropriate interventions and support. GDG view was that there is always benefit in agreeing a plan with parents and carers for every child or young person 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 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 health care 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 in the home.

	The GDG did not identify any potential harm in putting in place a plan to refer or monitor for children not immediately diagnosed with ASD.
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 health care professionals involved with the care of the child/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 ASD 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 ASD. 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	48. If there are discrepancies during the ASD diagnostic assessment between reported signs or symptoms and the findings of the ASD observation in the clinical setting, consider gathering additional information from other sources and/or carrying out further ASD specific observations in different settings, such as the school, nursery, other social setting or at home. 56. If there is uncertainty after the ASD 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 ASD team if necessary): • continued uncertainty about the diagnosis • disagreement about the diagnosis within the ASD 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 failure to respond as expected to any therapeutic interventions provided.

6 Differential diagnosis

Introduction

Many neurodevelopmental and mental and behavioural disorders may present with symptoms that suggest the possibility of ASD but which are not ASD. These can be described as the differential diagnoses of ASD. It is essential to consider the differential diagnoses at each stage of the ASD pathway – when the possibility of ASD first arises and consideration is being given to referral to an ASD Team (see chapter 3 on Recognition), when the ASD Team is considering whether to proceed with an ASD-specific diagnostic assessment (see chapter 4 on Following referral), when undertaking an ASD 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 or young person's development or behaviour and especially if the possibility of ASD has been raised, parents and carers and the children and young people themselves 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 be ASD or an alternative condition. An inaccurate diagnosis of ASD 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 ASD and how they may be differentiated from ASD. A differential diagnosis may also be a co-existing condition (see chapter 7 on co-existing conditions).

Clinical Question:

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

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

6.1 Overview of the evidence – Identifying differential diagnoses

Nineteen studies were included in this review. These studies were carried out in the Australia[65;66;136], Canada[137], Germany[138], Israel[139], Italy[140], Japan[141], Norway[142], Sweden[69;143], the Netherlands1[44;145], the USA[72;73;107;146] and the UK[147;148]. All were uncontrolled observational and were graded as very low quality.

Eight of the studies[66;73;107;139;141;144;146;148] were in a preschool population, one study[147] in primary school age children and none in secondary school age children. Five used a mixed population of preschool and primary school age children[65;136;137;140;143], two primary and secondary[69;145] while three included children or young people of all ages[72;138;142].

Only one study reported[145] the range of IQ. Four studies[72;136;138;146] reported mean IQ scores but the proportion of children with intellectual disability was not reported. Four studies[66;69;139;142] reported the proportion of children with intellectual disability but no separate outcomes were provided for each IQ group. Intellectual ability was not reported in the remaining studies.

6.2 Evidence profile – Identifying differential diagnoses

Table 6.1 reports the prevalence of each alternative diagnosis in children with suspected ASD. The conditions are reported under five categories identified by the GDG. Limitations, inconsistencies and indirectness are not reported in the table because the quality is very low. Table 6.2 is the prevalence of each differential diagnosis in children with suspected ASD. The evidence for autism is reported separately from ASD as it was expected that some co-existing conditions 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 profile 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)
Prevalence of alternative diagnoses in children with suspected autism								
ALL STUDIES								
Mental and behavioural disorders								
Behaviour problem[143]	1 (12)	Uncon obs	Not used	Not used	Not used	Very low	1	8
ADHD[143]	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[143 107]	2 (42)	Uncon obs	Not used	Not used	Not used	Very low	3	6 (1, 15)
Medical or Neurological								
Rett syndrome[107]	1 (30)	Uncon obs	Not used	Not used	Not used	Very low	3	10
Motor problem[107]	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[143]	1 (12)	Uncon obs*	Not used	Not used	Not used	Very low	1	8
ADHD[143]	1 (12)	Uncon obs	Not used	Not used	Not used	Very low	1	8
Neurodevelopmental								

Developmental disorder/delay[143 107]	2 (42)	Uncon obs	Not used	Not used	Not used	Very low	3	6 (1, 15)
Medical or Neurological								
Rett syndrome[107]	1 (30)	Uncon obs	Not used	Not used	Not used	Very low	3	10
Motor problem[107]	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 DEVELOPEMENTAL 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								

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)
Prevalence of alternative diagnosis in children and young people with suspected ASD								
ALL STUDIES								
Mental and behavioural disorders								
Behaviour problem[69;73]	2 (192)	Uncon obs	Not used	Not used	Not used	Very low	61	24 (1, 80)
ADHD[72;138;140;141;144;145;147]	7 (1052)	Uncon obs	Not used	Not used	Not used	Very low	112	14 (6, 24)
Emotional difficulties[72;138;142]	3 (755)	Uncon obs	Not used	Not used	Not used	Very low	33	6 (2, 10)
Neurodevelopmental								
Language problem[65;66;72;73;136;138-140;142;144;146;148]	12 (1726)	Uncon obs	Not used	Not used	Not used	Very low	447	21 (5, 43)
Developmental disorder/delay[65;66;69;72;73;137;138;141;142;144;146-148]	13 (1754)	Uncon obs	Not used	Not used	Not used	Very low	255	15 (8, 23)
Medical or Neurological								
Down's syndrome[72]	1 (580)	Uncon obs	Not used	Not used	Not used	Very low	18	3
Foetal alcohol syndrome[72]	1 (580)	Uncon obs	Not used	Not used	Not used	Very low	18	3
Motor problem[73]	1 (82)	Uncon obs	Not used	Not used	Not used	Very low	2	2
Other								

Abuse/neglect[147]	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[72;138;140;143]	3 (795)	Uncon obs	Not used	Not used	Not used	Very low	49	6 (2, 13)
Behaviour problem[73]	1 (82)	Uncon obs	Not used	Not used	Not used	Very low	3	4
Emotional difficulties[72;138]	2 (730)	Uncon obs	Not used	Not used	Not used	Very low	29	4 (3, 6)
Selective mutism[73]	1 (82)	Uncon obs	Not used	Not used	Not used	Very low	1	1 (1, 1)
Neurodevelopmental								
Language problem[72;73;136;138;140;146]	6 (985)	Uncon obs	Not used	Not used	Not used	Very low	73	9 (3, 17)
Developmental disorder/delay[72;73;138;146]	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								
SUBGROUP ANALYSIS – CHILDREN REFERRED FOR DEVELOPEMENTAL PROBLEMS								
Mental and behavioural disorders								
Emotional difficulties[142]	1 (25)	Uncon obs	Not used	Not used	Not used	Very low	4	16
Neurodevelopmental								
Language problem[65;66;139;142]	4 (636)	Uncon obs	Not used	Not used	Not used	Very low	349	41 (2, 89)
Developmental disorder/delay[65;66;137;142]	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[69]	1 (110)	Uncon obs	Not used	Not used	Not used	Very low	58	53
ADHD[145]	1 (115)	Uncon obs	Not used	Not used	Not used	Very low	40	35
Neurodevelopmental								
Developmental disorder/delay[69]	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 POSTITIVE ASD SCREENING RESULTS								
Mental and behavioural disorders								
ADHD[141;144;147]	3 (142)	Uncon obs	Not used	Not used	Not used	Very low	23	17 (11, 23)
Tourette syndrome[147]	1 (50)	Uncon obs	Not used	Not used	Not used	Very low	2	4
Neurodevelopmental								
Language problem[144;148]	2 (105)	Uncon obs	Not used	Not used	Not used	Very low	25	24 (17, 33)
Developmental disorder/delay[141;144;147;148]	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								
Other								

Abuse/neglect[147]	1 (50)	Uncon obs	Not used	Not used	Not used	Very low	13	26

6.3 Evidence statements – Identifying differential diagnoses

All evidence was graded as very low quality

Evidence for Autism

All studies

Mental and behavioural disorders

Two diagnoses [ADHD and a behaviour problem] of children and young people with suspected autism were identified from evidence. One study reported the prevalence of ADHD and one behaviour problems. The prevalence for both was 8%.

Neurodevelopmental problems

Only one diagnosis [developmental disorder/delay] was identified from two studies. The pooled prevalence was 6% (95%CI 1, 15).

Medical or Neurological problems

Only two diagnoses [Rett syndrome and motor problems] were identified. One study reported the prevalence of 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

Two diagnoses [a behaviour problem and ADHD] were identified from evidence. One study reported the prevalence of behaviour problem and one ADHD. The prevalence for each was 8%.

Neurodevelopmental problems

Only one diagnosis of developmental disorder/delay was identified from two studies. The pooled prevalence was 6% (95%CI 1, 15).

Medical or Neurological problems

Only two diagnoses [Rett syndrome and motor problems] were identified. 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

All evidence was graded as very low quality

Complete analysis – All studies

Mental and behaviour disorders

Six diagnoses [behaviour problem, ADHD, emotional difficulties, Tourette syndrome, selective mutism and attachment disorder] were identified from

evidence. Only data of the most prevalent differential diagnosis: 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

Three diagnoses [a language problem, developmental disorder/delay and disintegrative disorder] were 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 ASD-suspicious children and young people, and thirteen on developmental disorder/delay. The pooled prevalence was 21% (95%CI 5, 43) and 15% (95%CI 8, 23) respectively.

Medical or neurological problems

Three diagnoses were identified from evidence. One study reported on the prevalence of Downs syndrome, on fetal alcohol syndrome and one on 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

Six diagnoses [ADHD, behaviour problem emotional difficulties, Tourette syndrome, selective mutism and attachment disorder] were identified from evidence. Only data of the most prevalent diagnoses are reported here.

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

Neurodevelopmental problems

Three diagnoses [a language problem, developmental disorder/delay and disintegrative disorder] were identified from evidence. Only data of the most prevalent differential diagnoses are reported here.

Six studies were identified for a language problem, and four 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

Only one diagnosis was identified from evidence, which was emotional difficulty. The prevalence was 16%.

Neurodevelopmental problems

Four neurodevelopmental diagnoses were identified from evidence. Only data of the most prevalent differential diagnosis are reported here.

Four studies were identified for 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

Only two diagnoses were 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 developmental disorder/delay was identified from evidence; . The study reported on the prevalence of emotional difficulties. The prevalence 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 – ESAT, YACHT-18, CAHT and ASSQ.

Mental and behaviour disorders

Two diagnoses [ADHD and Tourette syndrome] were 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

Two diagnoses [a language problem and developmental disorder/delay] were 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. It reported the prevalence of 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 ASD from other conditions

Relative value placed on the outcomes	The GDG identified two outcomes to measure whether a condition is 'important' in the differential diagnosis of ASD: (1) the prevalence of that condition in children and young people with signs and symptoms

considered	considered suggestive of ASD, and (2) 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 ASD was an essential element of the ASD-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, young person or family on being informed of another diagnosis which might be of greater concern to them than a diagnosis of ASD, 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 de novo 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 ASD (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 ASD 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 their 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. The list of conditions reflects the wide expertise of the GDG. It takes account of the prevalence data but also the severity and impact on quality of life. The list should facilitate accurate and timely recognition of conditions with a similar presentation to ASD. The GDG also developed advice on how to differentiate between alternative diagnoses with similar features (Appendix K). The table is designed to enhance the implementation of the recommendation to take account of alternative conditions as part of the differential diagnosis of ASD and throughout the ASD pathway. For each condition the key clinical features are specified. The table shows the way that each condition typically differs from ASD 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, co-exist with ASD. Attachment disorders present particular challenges. In looked after children early developmental history, crucial in ASD 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 from further and tertiary opinion from other professionals is warranted. Conditions such as epilepsy are more common in ASD and require specific treatment. Epileptic encephalopathy is a particular clinical concern if there is a history of regression of developmental skills. It 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 ASD without motor impairment or other physical features in a child under three years is

	typical of the regression in ASD that occurs in approximately a third of cases. 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 or 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, motor incoordination or behavioural concerns are all common presentations of ASD but are also all common neurodevelopmental problems and disorders in their own right. While there is overlap of symptoms and individual test scores by themselves (for example language or motor coordination test scores may not differentiate these conditions), the process of doing such tests and considering the diagnostic features of ASD by a professional with expertise, will help make an accurate diagnosis. Intellectual disorder (ID) is one of the commonest co-existing conditions with ASD and a difficult differential diagnosis in a young child. The evidence shows that the validity of the ASD specific tools for eliciting the history from an informant is limited below a mental age of 18 months (chapter 5). ASD diagnosis is often delayed in those with ID but distinguishing the way that a child with ASD learns and communicates has important implications for future management. The particular features of co-existing ASD in a child with ID may suggest an aetiological diagnosis for the ID, for example Fragile X (see chapter 7 on Co-existing conditions). Finally, the GDG considered that disorders associated with psychosis including schizophrenia and bipolar disorder might be potentially important in the differential diagnosis of ASD in some individuals. In order to indentify the important differential diagnoses in each individual child or young person who has an ASD diagnostic assessment, specific assessments may be required, if not already undertaken. These assessments may also help to interpret the findings of the ASD specific interview and observations (see chapter 5).

Recommendations	46. Consider the following differential diagnoses for ASD and whether specific assessments are needed to help interpret the ASD 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 co-existing conditions

Introduction

This chapter focuses on the co-existing conditions that any health care professional should think about when a child or young person when he/she is undergoing an ASD diagnostic assessment.

There are a number of disorders or diagnoses that co-occur in ASD at higher than expected rates and these are referred to as co-existing conditions. This differentiates them from other common health problems and conditions that effect 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 ASD is not well understood.

Co-existing 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 an ASD, it is possible to neglect other diagnosable conditions. The most important co-existing conditions are those that occur most frequently, have a high impact on present quality of life, or 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 ADHD, 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 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. The studies were carried out in Brazil [149], Canada [150], Czech Republic [151], Finland [152;153], France [154-156], Italy [157-159], Israel [160], Netherlands [161], Japan [162;163], Portugal [164], Sweden [165], the U.K [166-170], the U.S.A [171-184], Turkey [185] and Venezuela [186]. One study was conducted in both Europe and the U.S.A[187]

One study[178] included children of preschool age and three studies[157;176;183] included primary school age. No study included children of secondary school age only. Seven studies[150;155;165;166;171;184;186] included mixed pre-school and primary school age children; thirteen studies[149;153;154;156;158;161;164;167;170;173-175;177] included mixed primary and secondary school; and twelve studies [151;152;159;160;163;168;169;172;179;181;182;185] included all age groups. Two studies [180;187] included adults (age>19). Age was not reported in the remaining studies.

Only one study[177] reported mean IQ scores but the proportion of children with intellectual disability was not reported. Fourteen studies[151;152;155;156;162;164;167;168;175;180;183-185;187] reported the proportion of children with intellectual disability but no separate outcome was provided for each IQ group. One study[159] only included children with intellectual disability while three studies[150;153;165] excluded children with intellectual disability. 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 ASD. The data for autism from ASD has been separated as it was expected that some co-existing 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 co-existing condition in children or young people with autism

Coexisting condition	Quality assessment						Summary of findings	
							Number	Prevalence (Pooled, 95% CI)
	Studies (N)	Design	Limitations	Inconsistency	Indirectness	Quality	Cases	
PREVALENCE OF EACH CO-EXISTING CONDITION IN CHILDREN OR YOUNG PEOPLE WITH AUTISM								
MENTAL AND BEHAVIOURAL DISORDERS								
ADHD[175 149]	2 (117)	Uncon obs	Not used	Not used	Not used	Very low	43	41 (21, 63)
Self-injurious behaviour[155]	1 (222)	Uncon obs	Not used	Not used	Not used	Very low	109	49
Anxiety[175]	1 (101)	Uncon obs	Not used	Not used	Not used	Very low	63	62
ODD[175]	1 (86)	Uncon obs /	Not used	Not used	Not used	Very low	6	7
Tic	No studies were identified.							
OCD[175]	1 (94)	Uncon obs	Not used	Not used	Not used	Very low	35	37
Depression[175]	1 (109)	Uncon obs	Not used	Not used	Not used	Very low	14	13
Seizures[152]	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[152;155-157;162;168;175;183;184]	9 (2032)	Uncon obs	Not used	Not used	Not used	Very low	1618	76 (61, 89)
MEDICAL OR NEUROLOGICAL								
Cerebral palsy[152;156;169;184]	4 (1371)	Uncon obs	Not used	Not used	Not used	Very low	63	5 (4, 6)
Sleep problem[160;174;183]	3 (397)	Uncon obs	Not used	Not used	Not used	Very low	146	37 (11, 68)

Gastrointestinal problem[166]	1 (96)	Uncon obs	Not used	Not used	Not used	Very low	3	3
Epilepsy[152;155–157;168;169;184]	7 (1710)	Uncon obs	Not used	Not used	Not used	Very low	342	24 (8, 46)
A motor problem[152]	1 (187)	Uncon obs	Not used	Not used	Not used	Very low	25	13
Vision deficits[152;156;184]	3 (1348)	Uncon obs	Not used	Not used	Not used	Very low	65	7 (0, 26)
Auditory deficits[152;156;184]	3 (1348)	Uncon obs	Not used	Not used	Not used	Very low	29	3 (0, 9)

Table 7.2 Prevalence of each co-existing 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	
PREVALENCE OF EACH CO-EXISTING CONDITION IN CHILDREN OR YOUNG PEOPLE WITH ASD								
MENTAL AND BEHAVIOURAL DISORDERS								
ADHD[153;161;170;172;173;176;182]	7 (3373)	Uncon obs#	Not used	Not used	Not used	Very low	1182	45 (24, 67)
Self-injurious behaviour[155]	No studies have been identified.							
Anxiety[150;153;161;170;176;177;182]	7 (2952)	Uncon obs	Not used	Not used	Not used	Very low	357	27 (10, 49)
ODD[153;161;170;176;182]	5 (2862)	Uncon obs	Not used	Not used	Not used	Very low	342	23 (6, 47)
Tic[153;158;170;172;176;179]	6 (2348)	Uncon obs	Not used	Not used	Not used	Very low	248	19 (2, 47)
OCD[161;170;176;179]	4 (2346)	Uncon obs	Not used	Not used	Not used	Very low	61	8 (2, 17)
Depression[150;153;161;170;176;177]	6 (2469)	Uncon obs	Not used	Not used	Not used	Very low	58	9 (3, 19)
Tourette syndrome[158;170;179]	3 (226)	Uncon obs	Not used	Not used	Not used	Very low	15	12 (2, 28)
Conduct disorder[153;161;170;176]	4(2379)	Uncon obs	Not used	Not used	Not used	Very low	17	3 (0, 9)
NEURODEVELOPMENTAL								
Intellectual disability[151;159;164;167;171;176;180;185;187]	9 (3683)	Uncon obs	Not used	Not used	Not used	Very low	1256	65 (38, 87)
MEDICAL OR NEUROLOGICAL								

Cerebral palsy[151;154;176;178]	4 (2791)	Uncon obs	Not used	Not used	Not used	Very low	91	5 (1, 13)
Sleep problem[153;159;165]	3 (113)	Uncon obs	Not used	Not used	Not used	Very low	64	61 (31, 88)
Gastrointestinal problems[181]	1 (100)	Uncon obs	Not used	Not used	Not used	Very low	62	62
Epilepsy[151;154;163;164;176;178;186;187]	8 (4734)	Uncon obs	Not used	Not used	Not used	Very low	922	15 (7, 26)
Seizures[171;178;180]	3 (791)	Uncon obs	Not used	Not used	Not used	Very low	47	5 (2, 9)
A motor problem[151;154;167]	3 (499)	Uncon obs	Not used	Not used	Not used	Very low	113	25 (0, 75)
Vision deficits[151;176;186]	3 (2615)	Uncon obs	Not used	Not used	Not used	Very low	77	6 (0, 21)
Auditory deficits[151;154;176;179]	4 (2530)	Uncon obs	Not used	Not used	Not used	Very low	84	8 (1, 20)

7.3 Evidence statements

Evidence for autism

All evidence was graded as very low quality.

Mental and behaviour disorders

Twelve 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% (21, 63). The prevalence for self-injurious behaviour was 49%, for anxiety was 62%, for ODD was 7%, for OCD 37%, for depression was 13% and for seizures the prevalence was 18%.

Neurodevelopmental conditions

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% (61, 89)

Medical or Neurological conditions

Fifteen conditions were identified: Auditory deficits, epilepsy, gastrointestinal problems, chromosomal abnormalities, congenital disorder, genetic disorder, motor impairment, obesity (BMI>95th), perinatal condition, sleep problem, vision deficits, cerebral palsy, seizures, hydrocephalus, 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% (4, 6), for sleep problems was 37% (11, 68), for epilepsy was 24% (8, 46), for vision deficits was 7% (0, 26) and for auditory deficits was 3% (0, 9). The prevalence for motor problems and gastrointestinal problems was 13% and 3% respectively.

Evidence for ASD

Mental and behavioural disorders

Thirteen conditions were identified: ADHD, adjustment/reactive attachment/post-traumatic stress disorder, anxiety, behaviour problem, bipolar disorder, conduct disorder, depression, mutism, OCD, ODD, psychotic disorder, tic, 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 ADHD was 45% (95%CI 24, 67), for anxiety was 27% (95%CI 10, 49), for ODD was 23% (95%CI 6, 47), for tics was 19% (95%CI 2, 47), for OCD was 8% (95%CI 2, 17), for OCD, for depression was 9% (95%CI 3, 19), for Tourette syndrome was 12% (95%CI 2, 28) and for conduct disorder the pooled prevalence was 3% (95%CI 0, 9).

Neurodevelopmental conditions

Four conditions were identified: communication disorders, language problem, intellectual disability, 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

Seventeen conditions were identified: 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>95th), sleep problem, vision deficits, 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 cerebral palsy was 5% (95%CI 1, 13), for sleep problems was 61% (95%CI 31, 88), for epilepsy was 15% (95%CI 7, 26), for seizures was 5% (95%CI 2, 69), for motor problems was 25% (95%CI 0, 75), for vision deficits was 6% (95%CI 0, 21) and for auditory deficits the pooled prevalence was 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 ASD. 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 ASD 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 co-existing 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 ASD because there are various known conditions associated with ASD 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 ASD 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 ASD. The GDG took into consideration the possible harm associated with assessing a child or young person for coexisting conditions which includes prolonging the ASD-specific diagnostic assessment. Looking for co-existing conditions in addition to ASD could cause distress to children and young people and to parents and carers. In all stages of the ASD 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 co-existing condition may increase significantly the time required for a clinical assessment of a child or young person with suspected ASD. Given the possible benefits of recognising coexisting conditions, the GDG considered this likely to be a cost-effective use of a health care 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 consensus was that use of health care 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 co-existing 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 the use of this list as a guide to important coexisting conditions such that undertaking further assessments of the conditions on the list 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 underreporting 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 the GDG 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 GDG consensus was that when assessing a child or young person with suspected or confirmed ASD, the health care professional should always consider the possibility of a co-existing 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 ASD 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 health care professionals have raised the possibility of eating disorders but at the current time, the evidence is not strong enough and the clinical view within the group was that this should be listed as a coexisting condition that should be systematically looked for.

Recommendations	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

ASD 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 ASD than in the general population (see chapter 7 on Co-existing conditions). Some of these co-existing conditions might when present be considered as causative of ASD.

In this chapter, consideration is given to the role of medical investigations that may identify causal conditions, specifically electroencephalography (EEG), brain-imaging techniques (MRI, 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 treatment implications. In the case of EEG, abnormalities may occur more frequently in children and young people with ASD 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 may be reported on brain imaging but that are not necessarily associated with 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 reporting variation.

Various genetic disorders are known to occur with markedly increased frequency in ASD, for example, Fragile X syndrome and tuberous sclerosis. Recently genetic investigations have revealed additional abnormalities that occur more commonly in those with ASD but 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 ASD 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 with ASD 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 ASD 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 or 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 ASD, e.g. 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) from Italy[157;188-191], Brazil[192;193], Canada[194;195], the Czech Republic[151;196], Israel[197;198], the UK[199], Japan[163;200]. India[201], Turkey[185;202] and the USA[203-209] examined the use of EEG in children or young people with autism or ASD. In six studies[157;188;194;195;197;198;203] EEG'S were routinely used; in three studies [192;193;204;205] the EEG was performed based on clinical judgement. In the remaining 15 studies[151;163;185;189-191;196;199-202;206-209] EEG's were investigated for research purposes. One of these studies[199] excluded children with a history of seizures; all other studies did not report excluding on the basis of clinical epilepsy.

Eight studies[157;163;190;198;199;201;206;209] examined EGGs in children or young people with autism. Five of these studies[157;190;198;199;206] included children with regression and two studies[157;190] included children with intellectual disability.

Twenty-four studies dealt with EEGs in children / young people with ASD[151;185;188;189;191-197;200;202-205;207;208]. Six of the studies[151;191;196;197;207;208] included children with regression (one [207] compared those with language regression alone compared to those with both autistic and language regression) and two studies[196;210] included children with intellectual disability.

Brain scans

Magnetic resonance imaging (MRI)

Ten studies from the UK[199], Italy[188], France[211], USA[203-205], India[201], Israel[198], Canada[194;195] and Turkey[185] with a total of 888 participants examined the use of magnetic resonance imaging (MRI) in children or young people with an ASD. In two studies[188;203] all participants were scanned; in five studies[194;195;198;199;204;205] scans were performed based on clinical judgement and in three studies[185;201;211] scans were investigated for research purposes.

Four studies[198;199;201;211] examined MRI in children or young people with autism. Two studies[198;199] included children or young people with regression and one study[211] included children with intellectual disability.

Six studies (from seven articles)[185;188;194;195;203–205] examined MRI in children or young people with ASD. No studies reported subgroup analyses for either regression or intellectual disability.

Computed tomography (CAT/CT/PET/SPECT)

Five studies from Brazil[192;193], Canada[194;195], Israel[198], India[201] and the USA[205] with a total of 359 participants examined use of computed tomography in children or young people with an ASD. In four studies [192–195;198;205] scans were performed based on clinical judgement (N = 337). One study [201] investigated computed tomography for research purposes .

Two studies[198;201] examined computed tomography in children or young people with autism. One study[198] included children or young people with regression and no studies reported on subgroups with intellectual disability.

Three studies (from 5 articles)[192–195;205] 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[203–205], Italy[157;188], Israel[198], Portugal[164], the Czech Republic[151], France[211], U.K [212], Canada[194;195] and Brazil[192;193] examined the use of metabolic tests in children or young people with ASD. One study [212] was for research purposes. In six studies[157;164;188;192;193;203;211], all participants were tested while in another five studies[151;194;195;198;204;205] tests were performed based on clinical judgement. Three studies [188;194;195;203] did not report the specific tests used.

Two studies [151;192;193] reported screening for inborn errors of metabolism but provided no further details. One study [198] 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. Another study[164] 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. A third study [157] screened serum and urinary amino acids. A fourth[204] used urine / plasma inborn error screen. A fifth study [205] examined plasma amino acids and urine organic acids. The final study [211] examined plasma and urine amino and organic acid analysis, urine glycoaminoglycans quantitation, urine oligosaccharides, purine and pyrimidine analysis and creatine guanidoacetate urine analysis.

Three studies[157;198;211] examined metabolic testing in children / young people with autism. One study[198] included children / young people with regression and no studies reported on subgroups with intellectual disability.

Nine studies (from 11 articles) [151;164;164;188;192-194;203-205;212;213] examined metabolic tests in children / young people with ASD. No studies reported subgroup analyses for either regression or intellectual disability.

Blood tests

Four studies from the USA[203;214] and Italy[157;215] examined the use of various blood tests in children or young people with ASD. In one study[157] participants were routinely given a complete blood count and blood chemistry obtained while in a second[203] serum uric acid levels were obtained. In the remaining two studies [214;215] participants with tested for serum IgE or for Mycoplasma, Chlamydia pneumoniae, HHV-6 for research purposes.

Two studies[157;215] examined blood tests in children / young people with autism. No studies reported subgroup analyses for either regression or intellectual disability.

Two studies [203;214] examined blood tests in children / young people with ASD. No studies reported subgroup analyses for either regression or intellectual disability.

Urine tests

Two studies from the USA[203] and Finland[152] examined the use of urine tests in children and young people with ASD. All participants were routinely tested in two studies[152;203], and no studies were identified for children tested on clinical judgement or on a research basis. One study[152] did not report on the test used and the other[203] examined uric acid levels.

A single study[152] examined urine tests in children / young people with autism. This study did not report subgroup analyses for either regression or intellectual disability.

A single study[203] examined urine tests in children / young people with ASD. This study did not report subgroup analyses for either regression or intellectual disability

Genetic tests

Fifteen studies from Brazil[192;193;216], Canada[194;195;217], Finland[152], France[187], Israel[198], Italy[188;189], Taiwan[218] and the USA[180;203;204;219;220]. Genetic investigations were carried out as part of routine testing in three studies[152;188;203]. testing on clinical judgement in 5 studies[194;195;198;204;217;219] and testing for research purposes in seven studies[180;187;189;192;193;216;218;220]. The tests used were reported as follows; 17p11 FISH (fluorescence in situ hybridization)[203], aCGH-array[205], Chromosomal microarray, [180], Chromosome[205], Chromosome 15[203], Cytogenetic

analysis[192;193;219;221], DNA[164;180;222], FISH (fluorescence in situ hybridization[204;216], Molecular analysis[216], Folic acid starvation / Southern Blot analysis[198], Fragile X[223], G banded chromosomes[222], G-banded Karyotype[180], Genetic[151;194], High Resolution Banding DNA[188], Karyotype[192;193;199;217;223], Molecular cytogenetics[188], Molecular/genetic[204], Polymerase chain reaction analysis[216], Prometaphase chromosomes (Karyotype)[203], PTEN gene sequencing[205], Rett gene sequencing[205] or were not reported.

Five studies[152;198;218-220] examined genetic tests in children / young people with autism. No studies reported subgroup analyses for either regression or intellectual disability.

Ten studies (from 12 articles)[180;187-189;192-195;203;204;216;217] examined genetic tests in children / young people with ASD. 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 and 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 (Tables 8.3 and 8.4). 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)	Tested	Design	Limitations	Inconsistency	Indirectness	Quality	Percentage of total in studies including those who did not undergo the investigation (95% CI)
PERCENTAGE OF ABNORMAL RESULTS								
EEG								
Performed routinely[157;198]	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[163;190;199;201;206;209]	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[198;199]	2 (196)	21.4%	Uncon obs	Not used	Not used	Not used	Very low	0 (0, 1)
Performed for research purposes[201;211]	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[198]	1 (132)	27.3%	Uncon obs	Not used	Not used	Not used	Very low	0
Performed for research purposes[201]	1 (22)	100%	Uncon obs	Not used	Not used	Not used	Very low	32
METABOLIC TESTS								
Performed routinely[157;211]	2 (123)	100.0%	Uncon obs	Not used	Not used	Not used	Very low	0 (0, 2)
Performed based on clinical judgement[198]	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[157]	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[215]	1 (43)	100.0%	Uncon obs	Not used	Not used	Not used	Very low	21
URINE TESTS								
Performed routinely[152]	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.							
GENETIC TESTS								
Performed routinely[152].	1 (187)	100.0%	Uncon obs	Not used	Not used	Not used	Very low	12
Performed based on clinical judgement[198;219]	2 (1030)	32.4%	Uncon obs	Not used	Not used	Not used	Very low	3 (2, 4)
Performed for research purposes[218;220]	2 (816)	97.2%	Uncon obs	Not used	Not used	Not used	Very low	5 (1, 27)

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)	Tested	Design	Limitations	Inconsistency	Indirectness	Quality	Percentage of total in studies including those who did not undergo the investigation (95% CI)
PERCENTAGE OF ABNORMAL RESULTS								
EEG								
Performed routinely[188;194;195;197;203]	4 (191)	100%	Uncon obs	Not used	Not used	Not used	Very low	7 (0, 25)
Performed based on clinical judgement[192;193;204;205]	3 (356)	43.8%	Uncon obs	Not used	Not used	Not used	Very low	10 (2, 21)
Performed for research purposes[151;185;189;191;196;200;202;207;208]	9 (3154)	99.6%	Uncon obs	Not used	Not used	Not used	Very low	40 (31, 49)
MRI								
Performed routinely[188;203]	2 (117)	100%	Uncon obs	Not used	Not used	Not used	Very low	3 (1, 7)
Performed based on clinical judgement[194;195;204;205]	3 (395)	22.0%	Uncon obs	Not used	Not used	Not used	Very low	2 (0, 8)
Performed for research purposes[185]	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[192-195;205]	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.							
METABOLIC TESTS								
Performed routinely[164;188;192;193;203]	4 (322)	100.0%	Uncon obs	Not used	Not used	Not used	Very low	0 (0, 1)
Performed based on clinical judgement[151;164;194;195;204;205]	4 (508)	46.2%	Uncon obs	Not used	Not used	Not used	Very low	2 (0, 6)

Performed for research purposes[212]	1 (56)	100.0%	Uncon obs	Not used	Not used	Not used	Very low	100
BLOOD TESTS								
Performed routinely[203]	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[214]	1 (48)	100.0%	Uncon obs	Not used	Not used	Not used	Very low	58
URINE TESTS								
Performed routinely[203]	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.							
GENETIC TESTS								
Performed routinely[188;203]	2 (117)	100.0%	Uncon obs	Not used	Not used	Not used	Very low	14 (7, 22)
Performed based on clinical judgement[194;195;204;217]	3 (319)	52.1%	Uncon obs	Not used	Not used	Not used	Very low	4 (1, 8)
Performed for research purposes[180;187;189;192;193;216]	5 (1723)	95.8%	Uncon obs	Not used	Not used	Not used	Very low	11 (3, 23)

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)	Tested	Design	Limitations	Inconsistency	Indirectness	Quality	Percentage of total in studies including those who did not undergo the investigation (95% CI)
PERCENTAGE OF CHILDREN/YOUNG PEOPLE WITH ASD WHO HAD A CONDITION (POTENTIALLY OR ACTUALLY) IDENTIFIED OR CONFIRMED BY THE BIOMEDICAL INVESTIGATIONS								
EEG								
Performed routinely[157;198]	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[163;190;199;206;209]	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[198;199]	2 (196)	21.8%	Uncon obs	Not used	Not used	Not used	Very low	0 (0, 1)
Performed for research purposes[211]	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[198]	1 (132)	27.3%	Uncon obs	Not used	Not used	Not used	Very low	0
Performed for research purposes[201]	No studies were identified.							
METABOLIC TESTS								
Performed routinely[157;211]	2 (123)	100.0%	Uncon obs	Not used	Not used	Not used	Very low	0 (0, 2)

Performed based on clinical judgement[198]	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[157]	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[215]	1 (43)	100.0%	Uncon obs	Not used	Not used	Not used	Very low	21
URINE TESTS								
Performed routinely[152]	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.							
GENETIC TESTS								
Performed routinely[152].	1 (187)	100.0%	Uncon obs	Not used	Not used	Not used	Very low	9
Performed based on clinical judgement[198;219]	2 (1030)	32.4%	Uncon obs	Not used	Not used	Not used	Very low	3 (2, 4)
Performed for research purposes[218;220]	2 (816)	97.2%	Uncon obs	Not used	Not used	Not used	Very low	4 (0, 21)

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)	Tested	Design	Limitations	Inconsistency	Indirectness	Quality	Percentage of total in studies including those who did not undergo the investigation (95% CI)
PERCENTAGE OF CHILDREN/YOUNG PEOPLE WITH ASD WHO HAD A CONDITION (POTENTIALLY OR ACTUALLY) IDENTIFIED OR CONFIRMED BY THE BIOMEDICAL INVESTIGATIONS								
EEG								
Performed routinely[188;194;195;197;203]	4 (191)	100.0%	Uncon obs	Not used	Not used	Not used	Very low	7 (0, 24)
Performed based on clinical judgement[192;193;204;205]	3 (356)	43.8%	Uncon obs	Not used	Not used	Not used	Very low	4 (1, 11)
Performed for research purposes[151;189;191;196;200;202;207;208]	8 (3073)	99.6%	Uncon obs	Not used	Not used	Not used	Very low	23 (14, 34)
MRI								
Performed routinely[188;203]	2 (117)	100.0%	Uncon obs	Not used	Not used	Not used	Very low	3 (1, 7)
Performed based on clinical judgement[194;195;204;205]	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[192–195;205]	3 (205)	43.9%	Uncon obs	Not used	Not used	Not used	Very low	0 (0, 2)
Performed for research purposes[201]	No studies were identified for this analysis							
METABOLIC TESTS								
Performed routinely[164;188;192;193;203]	4 (322)	100.0%	Uncon obs	Not used	Not used	Not used	Very low	0 (0, 1)

Performed based on clinical judgement[151;164;194;195;204;205]	4 (508)	46.2%	Uncon obs	Not used	Not used	Not used	Very low	1 (0, 6)
Performed for research purposes[212]	1 (56)	100.0%	Uncon obs	Not used	Not used	Not used	Very low	100
BLOOD TESTS								
Performed routinely[203]	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[214]	1 (48)	100.0%	Uncon obs	Not used	Not used	Not used	Very low	58
URINE TESTS								
Performed routinely[203]	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							
GENETIC TESTS								
Performed routinely[188;203]	2 (117)	100.0%	Uncon obs	Not used	Not used	Not used	Very low	14 (7, 22)
Performed based on clinical judgement[194;195;204;217]	3 (359)	52.1%	Uncon obs	Not used	Not used	Not used	Very low	3 (1, 7)
Performed for research purposes[180;187;189;192;193;216]	5 (1723)	95.8%	Uncon obs	Not used	Not used	Not used	Very low	10 (2, 24)

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% (95%CI 6, 63) of children with autism and 7% (95%CI 0, 25) of children with ASD had abnormal results.

Where EEG was performed based on clinical judgement 10% (95%CI 2, 21) of children with ASD had abnormal results. No studies reported EEG based on clinical judgement in children with autism.

When EEG was performed for research purposes 47% (95%CI 20, 76) of children with autism and 40% (95%CI 31, 49) of children with ASD had abnormal results.

Brain scans

Magnetic resonance imaging (MRI)

Where MRI was performed routinely 3% (95%CI 1, 7) of children with ASD had abnormal results. 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% (95%CI 0, 8) of children with ASD had abnormal results.

When MRI was performed for research purposes 29% (95%CI 7, 59) of children with autism 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% (95%CI 2, 38) of children with ASD 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% (95%CI 0, 6) of children with ASD 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 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% (95%CI 7, 22) of children with ASD had abnormal results.

When tests were ordered on clinical judgement 3% (95%CI 2, 4) of children with autism and 4% (95%CI 1, 8) of children with ASD had abnormal results.

In research-based studies 5% (95%CI 1, 27) of children with autism and 11% (95%CI 3, 23) of children with ASD 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% (95%CI 2, 26) of children with autism and 7% (95%CI 0, 24) of children with ASD had a clinical diagnosis identified or confirmed (6 had clinical epilepsy, 16 had epilepsy and 2 had Landau Kleffner).

EEG based on clinical judgement did not lead to a clinical diagnosis in any of the children with autism but it did in 4% (95%CI 1, 11) of children with ASD (6 had clinical epilepsy, 2 had generalised epileptiform activity, three had unspecified generalised disorganization and 2 had unspecified hemispheric disorganisation).

Research-based EEG lead to a clinical diagnosis in 24% (95%CI 10, 41) of children with autism and 23% (95%CI 14, 34) of children with ASD (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 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 (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

22.9% (83/362) of children with intellectual disability had clinical epilepsy compared with 10.3% (4/39) of children with no intellectual disability. Children with intellectual disability had an increased risk OR = 2.45 (95%CI 0.85, 7.13) of clinical epilepsy in these four studies

MRI

Routinely performed MRI lead to a clinical diagnosis in 3% (95%CI 1, 7) of children with ASD (2 had macrocrania / partial agenesis of the corpos callosum and 1 had tuberous sclerosis) and 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 test performed based on clinical judgement in either autism or ASD.

Metabolic tests

No clinical findings were identified for routinely performed test children with autism or ASD.

Metabolic tests performed based on clinical judgement lead to a clinical diagnosis in none of the children with autism and 1% (95%CI 0, 6) of children with ASD (14 had hyperlactacidemia).

Research-based metabolic tests lead to a clinical diagnosis in 100% of children with ASD (56 had indolyl-3-acryloylglycine) and there were no studies in children with autism.

Blood tests

Routinely performed blood tests lead to a clinical diagnosis in none of the children with autism and in 3% of children with ASD (1 had serum uric acid).

No studies were identified for blood tests based on clinical judgment in either autism or ASD.

Research-based blood tests lead to a clinical diagnosis in 21% of children with autism and 58% of children with ASD (28 had Mycoplasma, Chlamydia pneumoniae, HHV-6; 9 had allergological test - IgE > 200 Ku/l).

Urine tests

No studies were identified for urine tests performed based on clinical judgment or for research-based urine tests in either autism or ASD. No pathological findings results from either routinely performed urine tests in either autism or ASD.

Genetic tests

Routinely performed genetic tests lead 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 lead to a clinical diagnosis in 3% (95%CI 2, 4) of children with autism and in 3% (95%CI 1, 7) of children with ASD.

Research-based genetic tests lead to a clinical diagnosis in 4% (95%CI 0, 21) of children with autism and 10% (95% CI 2, 24) of children with ASD.

(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 ASD identifies an unsuspected coexisting condition(s) • If selective testing (based on clinical judgement) of those with suspected or confirmed ASD confirms a suspected coexisting condition • If routine testing of those with suspected ASD identifies an alternative disorder to explain the signs or symptoms and thereby helped to rule out ASD • If selective testing (based on clinical judgement) of those with suspected ASD identifies an alternative disorder to explain the signs or symptoms and thereby helped to rule out ASD
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 ASD. From this evidence the GDG extrapolated conclusions about the usefulness of these tests in identifying coexisting conditions or an alternative (non-ASD)

diagnoses in those in whom ASD is suspected.

EEG

A usual reason for performing an EEG is to support a diagnosis of epilepsy when this is clinically suspected. Children and young people with ASD have an increased risk of epilepsy compared with the general population. Children with ASD and either intellectual disability or regression may have even higher rates of epilepsy.

The risk of harm associated with performing and EEG is minimal. However, it is a somewhat time-consuming test, and for some children and young people with ASD 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 ASD 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 (EE), may cause regression and so it is important to consider in the differential diagnosis of autistic regression. EE in children between one and two years of age (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 EE condition known as Landau-Kleffner syndrome (LKS) usually present over three years of age. Language regression is the key symptom but behavioural symptoms may be present and overt epilepsy may be absent. A diagnosis of EE 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 in 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 ASD based on ICD-10/ DSM-IV 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, except 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 ASD certain coexisting conditions might be associated with abnormal brain structure – for example tuberose 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 ASD, 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 ASD 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 ASD. Among more than 600 children studied (routinely, selectively or as part of a research protocol) no cases of a specific metabolic disorder were identified. In five of 336 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 ASD tested had an abnormal result.

The GDG considered the evidence regarding urine testing in children with ASD. 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 ASD and controls. The GDG considered that none of these studies provided evidence to support routine metabolic screening of children with suspected or confirmed ASD or the performance of blood or urine tests routinely.

There is no evidence of benefit from routine blood testing and potential harm in that it is often a 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 ASD-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, or an impact on the health of those with ASD 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[224] for a review of genetic syndromes associated with ASD). 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 CGH (comparative genomic hybridization), a technique for detecting abnormalities of genomic copy number variant (CNV). Those with ASD are found to have an increased rate of CNVs. Some appear to be specifically associated with ASD; 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 ASD 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 a cost-effective. Finally, the GDG considered that cost-effect selective use of appropriate specific genetic investigations in children and young people with clinical features suggesting the genetic disorders is justified on cost-effectiveness grounds because genetic disorders identified might have important implications for the individuals and other family members, for example the identification of Fragile X.
Quality of evidence	The quality of the evidence in relation to the EEG and neuroimaging, metabolic and genetic testing was very low. The GDG noted that studies that identified co-existing conditions gave yields that would

	be expected in routine practice. The GDG 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. 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 ASD in a child aged two years is unlikely to be due to epileptic encephalopathy. However, children with certain epileptic syndromes under two years do often regress, usually with more global symptoms and overt epilepsy. Autistic regression over three years of age is uncommon. Children who present with language regression aged three years or older 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 or 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 investigated but the yield of EEG and other tests has, to date, been vanishingly 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 epilepsy guidelines for investigation and management should be followed.
Recommendations	59. Do not routinely perform any medical investigations as part of an ASD 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

PICO research question	What is the effectiveness and acceptability of comparative genomic hybridisation (CGH) array compared with current genetic testing in children and young people with identified ASD?
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 ASD. 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 ASD is not always clear. Improved detection of genetic causes of ASD could increase the precision of genetic counselling for parents of a child or young person with ASD 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 ASD 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 co-existing conditions alongside ASD. More recent studies of a new genetic test, CGH array, have identified genetic abnormalities that may also be linked to ASD. The results of these studies may prove valuable to parents in terms of explaining a possible underlying cause of a child's ASD 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. 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 ASD and their families. Further research using CGH array would lead to a stronger evidence base to

[vi] See 'The epilepsies: the diagnosis and management of the epilepsies in adults and children in primary and secondary care' (NICE clinical guideline 20)

	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 ASD 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 ASD 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 ASD 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 co-existing 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 ASD and their carers need information they can understand and that is relevant to their circumstances. They may also require ongoing 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 has 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 ASD?

What kinds of day-to-day, ongoing support (not specific to therapeutic interventions/management of ASD) should be offered to children and young people, and their families/carers, during the process of referral, assessment and discussion of diagnosis of ASD?

9.1 Overview of the evidence – information during the process of referral, assessment and diagnosis

Four studies[131;132;134;135] are included in the review, all carried out in the UK and all uncontrolled observational in design. Two of the studies[131;132] used a postal questionnaire (a total of 1350 responses across both studies), one study[135] conducted structured interviews with 11 families and one study[134] conducted 15 focus groups involving a total of 70 parents. All studies reported from parents of children with ASD. No studies reported on children or young people's response. The authors of one study[135] summarised the views of participants but did not report verbatim quotes.

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 patient or parent/carer experience from individual studies is reported in a modified GRADE evidence profile (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[134]	1	Uncon obs	Not used	Not used	Not used	Very low	*'I didn't realize he could have had help'*
Delay in diagnosis[131]	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 [131]	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[132]	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 information should be provided							
Comprehensive, basic information[131]	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[132]	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[135]	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[135]	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	1	Uncon obs	Not used	Not used	Not used	Very low	The study authors reported participants views in summary only, without supporting quotes

diagnosis[135]							
More information on the child's progress and development[135]	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 ASD[134]	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 ASD[134]	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''*

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 information. 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.

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 of available support

- Benefits and allowances, such as Disability Living Allowance etc.
- Information about respite care

Information about available support organization

- 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	Evidence of 'good information, 'poor information' and 'parent

placed on the outcomes considered	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, young person and family and carers. The GDG concluded that children, young people and their families require different kinds of information which needs to be tailored to their biological and developmental age, their current health state and the impact of their condition on their lives. The potential harms were associated with the way that information was given by health care 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 need information about ASD, its impact on the child and 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 individualised to the child, and include information about what to expect with future developmental milestones. There were differences in how much information parents wanted at different times and they asked for specific information about what would happen next. 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 ASD in school, during adolescence and worries about leaving school. These were not found to be the concerns of parents and carers of younger children with ASD. 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 ASD pathway given the lack of evidence and the wide range of practice within the 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 and 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 cost-effectiveness evidence 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/ 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 to them can be extremely important to children, young people and their families and carers. It provides support, reduces stress and improves quality of life while additional assessments or interventions are on-going. The information should focus on local and national support organisations specific to ASD 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 ASD 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 specific 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 to provide on-going support to meet the child or young person and their families' needs.

Recommendations	68. Provide individual information on support available locally for parents, carers, children and young people with ASD, 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 ASD, 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 carried out in the UK[132;134;135] and one in the USA[225]. All were uncontrolled observational in design. One study included structured interviews, one used short, open-ended interviews with five families, one included fifteen focus groups with a total of 70 parents, and one was a postal questionnaire 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 [225]	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 [225]	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 ASD children [225]	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 [225]	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 [134]	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'*

Providing opportunities for ASD families to contact each other [134]	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 [134]	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 [134]	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[134]	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[134]	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'*
Offering support immediately after communicating the diagnosis[132]	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[135]	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[135]	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[135]	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)[135]	1	Uncon obs	Not used	Not used	Not used	Very low	The study authors reported participants views in summary only, without supporting quotes
Providing parents with support on demand[134]	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	1	Uncon obs	Not used	Not used	Not used	Very low	*'Tri-agency alliances are a must'*

services[134]							
Appointing someone as a 'key worker'[134]	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[134]	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.'*

9.7 Evidence statement – Support for children, young people, their families and carers

Good support

- involving the school and the family in the child's assessment.
- providing opportunities to work on social skills (e.g. supporting them to turn take 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 the families to have contact with each other.

Poor support

- 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

Support for children with ASD

- 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
- Providing parents with some leaflets of different things about children with difficult problems
- Respite

Support for assessment

- Co-ordinate information better, for example, share feedback from the clinic
- Appointing someone as 'key worker'
- Establishing a more coherent service system, involving health, education and social services
- Written information on what problems to expect
- Offering 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 'parent 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 ASD. 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 identified specific ideas and suggestions which they believed could be turned into practical recommendations for the NHS. The GDG also 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 a more streamlined data processing to simplify communication between agencies was one such idea. The GDG strongly support this, but see it as a part of a wider need to improve communication between agencies and not specific to the needs of families and children with ASD. The GDG view is that the right support and intervention earlier on could have a very large impact on the welfare of the child/young person and 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. It was the consensus of the GDG that a visit to the school by a member of the assessment team or to have a teacher present during a follow-up meeting with parents 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 ASD. For children educated at home, a visit by the ASD team to discuss the needs based management plan is also warranted.

	Another theme supported by the GDG is services provision for the child/ young person during the diagnostic process. Where waiting for assessment and throughout the process, services should be in place to support the child's needs. It is outside the remit of this guideline to specify what these services should be. However, the GDG 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 view is that a coordinator role is valuable in acting as a link between the ASD team and the child/ young person and their family. The GDG view was that this role should be performed by someone within the ASD team and this may be different from a generic key worker role. The GDG view was that an ASD team member should be assigned this coordinator role to offer support and information during and immediately after a diagnostic assessment. The GDG concluded a case coordinator should be appointed once the decision has been reached to proceed to a full diagnostic assessment to support the child/ 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 ASD 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 decision by the ASD 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 promotes 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 report feeling let down by the lack of support and information during the diagnostic

	assessment. Provision of information about local support services specific to their age and circumstances should be provided to all children and families to improve their quality of life during and after diagnosis. The case coordinator's role also includes keeping the family 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 health care 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 families/ carers' point of view, 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 ASD, 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 in 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 health care 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 on-going support of the child who has undergone a diagnosis for ASD, 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 health care 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 on-going 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 using qualitative evidence only 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 GDG consensus 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 GDG consensus is that, once a diagnostic assessment has been completed, regardless of the outcome, a model of enhanced communication between health, education and social care 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 health, education and social care for the long term future. The follow up visit by a health care 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 one of which is ensuring long term agreement professionals in health and education on how a child 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 and family's circumstances over time are well understood and incorporated into any management and support strategies across health, education and social care.
Recommendations	41. A case coordinator in the ASD team should be identified for every child or young person who is to have an ASD diagnostic assessment. 42. The ASD 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 ASD 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 ASD team • gather information relevant to the ASD diagnostic assessment (see recommendation 36). 65. Make sure the profile is made available to professionals in education and, if appropriate, social care, so it can contribute to the child or young person's individual education plan and needs-based management plan, for example through a school visit by a member of the ASD team. Consent should be obtained from the parents or carers, and the child or young person if appropriate, before information is shared with other agencies.

10 Service descriptions and resource use

10.1 Introduction

The goal of diagnostic assessment for Autism Spectrum Disorder (ASD) is to identify children who have an ASD as quickly as possible so that they can access appropriate services and support. It is important that resource used in the recognition and diagnosis of ASD is efficient and effective because health care resources are always scarce. It is important to demonstrate that the recommendations developed for this guideline improve the way in which a diagnosis of ASD is arrived at and improves the experience of the process for children, young people, their families and 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 has considered the impact of their 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 the guideline is on recognition and diagnosis of ASD. In order to identify whether a diagnostic intervention (for example an ASD specific diagnostic tool such as the ADI-R or ADOS) is likely to be cost-effective, it is necessary to understand the consequence of diagnosing ASD to 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/ developmental disorder or condition such as ASD. ASD manifests itself in children and young people with ASD very differently across the spectrum; between individuals, and within individuals as they grow older over time. ASD related disability is very difficult to quantify employing the usual metrics of health economic evaluation (the quality adjusted life year) but this is not the only way of measuring health and well being. But the methods of economic evaluation used by NICE require consideration of outcomes in terms of the QALY to allow for explicit comparison of health care resource use across different areas of the 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 guideline development group.

Furthermore, at present there is not enough evidence that a single diagnostic "test" is sufficient for diagnosing ASD. There are developments in genetic testing which may result in a definitive test in the future but the present evidence does not support this. Therefore, an economic model that considered the diagnosis of ASD 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

ASD. Their purpose is to diagnose other coexisting conditions or identify the cause of ASD in children and young people diagnosed with the condition. The value in identifying a cause of ASD 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 ASD.

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 ASD, 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 ADS 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 ASD 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 ASD but 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 ASD. The recommendation is that the ASD team 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 ASD alone and are somewhat generic to guidelines on developmental/behavioural and mental health conditions in childhood and adolescence. The complexity of the condition and the complexity of health care professionals' decision-making make it a difficult area for research that can directly inform a set of practical health care recommendations. Nevertheless decisions are made every day about how to recognise and diagnose ASD by individual clinicians and therapists. The postcode lottery for ASD diagnostic services across the NHS 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 translations in the guideline which has been done. The second is to describe what good ASD diagnostic services look like currently, 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 currently used and which health care professionals are involved in which parts of the diagnostic pathway.

The service descriptions that follow are real services in the NHS covering inner city and rural/urban services, hospital and community based services, and a specialist regional referral unit that accepts referrals from other ASD teams for children and young people with especially complex diagnoses. These are not set up to be 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 data on time taken to complete specific parts of the assessments in section 2 are estimates from one individual clinician working in that service. This data has not been verified by other evidence. The descriptions give examples of how resources can be used in different ways to achieve the same goals.

The rest of this chapter describes five current services in the NHS which could be seen as examples of good practice in ASD diagnostic assessment but that also give contextual information about how resources are employed currently, the pressure points for health services, and the forces at work which might increase or decrease costs for the NHS. The second section provides a systematic resource use analysis to describe how services are configured in terms of the way that NHS personnel are deployed to do different kinds of tasks at different stages of the ASD diagnostic pathway.

As a whole this chapter is intended to give those who are not familiar with how multidisciplinary teams are organised; their workload; how they 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 they feed back information to families regarding diagnosis and address diagnostic uncertainty; and the support available during the process of diagnosis.

The first section describes how five services are configured taking 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 and access to other professionals, as well as 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. NHS tariffs for an ASD assessment are not published for the NHS. These services are not costed because the resource use is not exhaustive and only 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 health care 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 health care 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 were clear that the level of competency and expertise required in an ASD team implies health care staff costs which are higher than the midpoint on the salary scale. For each individual service, and 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. The GDG was able to provide an estimate for what they guessed was the approximate amount of time taken to perform each task for illustration, but this estimate was not considered to be sufficiently robust as a basis for a cost analysis of an ASD assessment for the NHS. For that reason, cost data were not reported for this guideline

10.2 Descriptions of specific ASD diagnostic services

The following boxes describe specific services in England and Wales as reported by members of the GDG who work in these diagnostic services. They are based

on descriptions given in interviews with five GDG members about the usual components for assessments and 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 (SENCOs or educational psychologists) and social care. Increasingly the referrals come on a CAF (Common Assessment Framework) form, especially those from health visitors and SLTs. At present, there is a two-stranded assessment service for children with possible autism spectrum disorders in the borough: children under the age of 6, and older children and young people who have additional significant learning disabilities, are seen in the CDC while children over 6 who do not have learning difficulties are seen by 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 lasting about an hour. Those children whose referrals suggest possible ASD 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 SLT, 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 CDT 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, SLT, OT and 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, including a leaflet about social communication disorders and 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), audiology, SLT and OT. 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 Keyworker. If the child is already known to the educational psychology service the EP report is also obtained. For those children with significant developmental delay, or those with dysmorphic features, karyotyping and Fragile X assay is arranged; 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, 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 ASD 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 at that time, 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 ASD; 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 the ADI-R, and a standardised play based observation of the child's social communication using the 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 the ADOS while they themselves are being interviewed. The ADI-R is usually carried out by the consultant paediatrician and the ADOS by one or two other team members (SLT, OT and clinical psychologist). This part of the clinic takes about 2 hours. The family then have a break of about 45 minutes to an hour, while the team members score the 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 and observe the child in school, in a social setting; for others it is agreed to monitor their progress and to repeat the 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 probable ASD 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 from referral and the diagnostic assessment within a further 6 weeks but are not able to meet this target at present because of a shortage of appropriately skilled and trained professionals. About 100 children a year are currently referred into the SoCA pathway; we run a total of 7 clinics a month; 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 suggestions of 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.

Report writing is done after the clinics: the professionals type their own sections of each report which are then pasted together, including a summary of the relevant background information and information from previous assessments, plus, where applicable, details of the information obtained from the ADI-R and the observations made in the 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 multi disciplinary 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, commonly, Speech and Language Therapy, community paediatrics or CAMHS, or a combination, depending on the referrers 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 ASD, the initial clinician needs to make additional referrals whilst supporting the child and family. To start a diagnostic assessment, there needs to be agreement that this is appropriate between two 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 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 ASD diagnostic assessment is made with explicit signed consent from both parents (where applicable). A lead professional is identified (one of 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 approximately 26 of these assessments per year (population of area covered – 200,000). The average time to complete the ASD diagnostic assessment is 18 weeks.

Each professional produces a report which is circulated to those involved in the assessment and 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, OT, or CAMHS professionals. In addition, members of staff from the 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 ASD diagnosis is met. If it is not, then an agreed narrative formulation (1-2 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 jointly agree a list of strengths and needs of the child and an action plan. The structure of the final review meeting is flexible 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 ASD 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, psychologist and a 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 ASD 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 meeting by the psychiatrist and psychologist. The administrator also attends this meeting. If the referral is accepted, and mostly these are given the source of the referral, the administrator will allocate 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 indeed.

On the day of the clinic assessment, the multidisciplinary team meets together to review the information before seeing the child/young person and family. The family and the child/young person meet with all 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 one to two hours. Following the interview and the assessments, these will be scored, rated and discussed. If the outcome of the interview and ADOS clearly indicate ASD, 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 ASD is clearly not indicated, the family will also be informed of this and similarly provided with advice as to any further steps.

The extent of further assessments can range from observation in a school/other setting of the child at break time/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 as to 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 five years old and the referral could be years after the initial concerns about ASD 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 at service level 2 or 3 but many of those assessments will be out of date and will have to be done again at this stage.

The first appointment is between three and a half and four hours. We see the parents / carers and the child together. The consultant psychiatrist will attend for an hour and a clinical psychologist will attend throughout. There is often a junior doctor and trainee psychologist in attendance. Preparation time is around one 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 between 1 and 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 ASD, we will suggest the child is given another appointment to do an ADOS or ADI-R. The ADI-R can take 2 hours, and the ADOS 45 minutes, with half an hour to score. So we have two appointments to complete the assessment overall

Otherwise if not ASD suspected, the follow up appointments will depend on the needs of the child. In around 15% of the cases where ASD 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. So we have to allow a half to a full 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 one and a half 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 is an improvement 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 and schools and rarely GPs.

In response to very long waiting times for diagnostic assessment, we developed 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 one or two weeks, with the service receiving 25-30 referrals per month. It takes 2 hours and 12-15 referrals will be discussed. The referral meeting must have a minimum of 2 people, but ideally a consultant paediatrician, clinical psychologist and SLT. For every referral a decision is reached on whether the referral is appropriate 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 assessment that have already been carried out. Information from the school may be requested at this stage but 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 parents/carer support groups for families where no definitive diagnosis has yet been made but there is a clinical suspicion of ASD.

For the least complex children (typically under 5) we 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 these professionals strongly suspect ASD and the child or young person has obvious signs or symptoms, then they will refer to the ASD 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 ASD whilst 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 health care professionals that they are already involved with, 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 ASD diagnostic service. At the consultation, an informal ASD specific history is taken, and a structured play-based observation (using the ADOS) is carried out typically (for young children under 7) with the child and parents in the same room. The health care professionals (a paediatrician & SLT or clinical psychologist) involved in the assessment then meet to discuss whether the child meets the criteria for ASD, which takes up to 1 hour. The SLT or clinical psychologist will write up the ADOS 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.

There is then detailed feedback to the family/ carers which is the same as feedback for a type 1 assessment. Information on ASD 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 does usually happen 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) and referrals usually come via the CAMHS service, schools and paediatricians. The professionals involved in these assessments are consultant paediatricians, SLTs & 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 the 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 as is necessary: 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 on 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 an hour plus travel time. The ADOS takes about 45 minutes, the language and cognitive assessments one 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 other's this may be different, for example there may be a longer clinical discussion which can involve consultation with other colleagues so an immediate diagnosis is not possible or when an additional appointment is needed to complete the assessment.

For all types of assessment, once they have been completed, we write the report for parents that contain 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/psychologist types 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 which is followed-up by a face to face meeting with parents/ carers which lasts about an hour. It may require a longer meeting or a further follow-up appointment in some cases.

Each diagnostic assessment session is typically three and a half 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 ASD and receive regular training updates in diagnosis.

10.3 Estimating resource use for an ASD specific assessment

The resource use estimates reported in the tables below are measured in health care 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

- The cost of additional assessments routinely undertaken on all or some children before a decision is taken to do an ASD specific assessment
- The 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 ASD 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 it takes to do individual tasks on average, accepting that these tasks can take a far longer time for some individual children and young people. Most diagnostic assessments take place in a local child health setting. Some families also have additional diagnostic assessments at more specialist level.

Based on the service descriptions above, the minimum time required is around 3- 4 hours to discuss the assessment with the child and family, undertake a clinical history, examine the child where appropriate, and complete any ASD specific interviews, observations and profiling. Across the five services examined in detail in the previous chapter, this time frame was fairly constant.

The tables below 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 ASD 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 ASD team rather than resource use for a specific ASD 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	15 minutes	
Preparation for first ASD assessment (note reading)	Community paediatrician + one or two other members of the ASD team	20 minutes	100%
ASD-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%
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 + 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 & language therapist; OT, occupational therapist; SENCO, special educational needs co-ordinator

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 ASD 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 ASD assessment	Community paediatrician	8 hrs incl admin	100%
	SLT assessment	8 hrs incl admin	90%
	OT (if involved)	8 hrs incl admin	20%
	Psychologist (education)	8 hrs incl admin	95%
	Psychologist (clinical) (if involved)	9 hrs incl admin	10%
Final meeting to agree outcome of assessment (located at school/ nursery)		(2hours for each involved professional)	100%
Notes of meeting typed up		Included above	included above
Biomedical tests	Fragile X		20%
	Chromosome		20%

SLT, speech & language therapist; OT, occupational therapist

Table 10.3 Resource use for service 3

Cost item	Professional	Hours	% children
Level of service			
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 Psychiatrist	OP clinic	100%
	SLT assessment	2 hours	80%
	OT/Health Visitor/ Nursery/ Social care		25%
Administration	Secretary		100%
Pre preparation for 1st appointment	Psychiatrist, Junior Dr	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 ASD assessment	Consultant psychiatrist	90 mins	100%
	Clinical psychologist	90 mins	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	whole day	15%
Follow-up MDT meeting	Consultant psychiatrist	30 minutes	100%
	Clinical psychologist	30 minutes	100%
Biomedical tests	CG array		10%

Table 10.5 Resource use for service 5

The service reported in table 10.5 describes a service where children and young people referred to the service are offered a different kind of assessment based on the information received by the multidisciplinary team

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%

10.4 Conclusion

Across the NHS, diagnostic assessment of ASD is undertaken by different health care professionals, in different settings and with different kinds of health care professional resources. The reported times for assessment may be affected by the experience of the teams , their level of integration and access to other professional, as well as their thresholds for diagnosis. This chapter used information from the GDG members to describe five ASD 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 organisation and personnel cost of services that operate differently 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 ASD are currently configured around the country. It is compiled from discussions with one individual 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 which adhere to many of the clinical and organisations recommendations developed in this guideline.

11 References, abbreviations and glossary

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11.2 Abbreviations

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, AD/HD and other coexisting conditions
BISCUIT	Baby and Infant Screen for Children with Autism Traits
BITSEA	Brief Infant-Toddler Social and Emotional Assessment
CAF	Common Assessment Framework
CAMHS	Child and Adolescent Mental Health Service
CARS	Childhood Autism Rating Scale
CAST	Childhood Asperger Syndrome Test
CCC	Children's Communication Checklist
CDC	Child Development Centre
CHECKLIST	Infant/Toddler Checklist of Communication and Language Development
CI	Confidence interval
CSI-4	Child Symptom Inventory-4
DAWBA	Development and Well-Being Assessment
DBC-ES	Developmental Behavior Checklist – Autism – Early Screen
DCD	Developmental Coordination Disorder
3di	Developmental, Dimensional and Diagnostic Interview
DISCO	Diagnostic Interview for Social and Communication Disorders
DSM	Diagnostic and Statistical Manual of Mental Disorders
ECI-4	Early Childhood Inventory-4
ESAT	Early Screening of Autistic Traits Questionnaire
ESCS	Early social communication scales
GADS	Gilliam Asperger's Disorder Scale
GARS	Gilliam Autism Rating Scale
GDG	Guideline development group
GRADE	Grading of Recommendations Assessment, Development and Evaluation
ICD	International Statistical Classification of Diseases and Related Health Problems
ITC	Infant/Toddlers Checklist

KADI	Krug Asperger's Disorder Index
LKS	Landau-Kleffner syndrome
MCDI	MacArthur Communicative Development Inventories
M-CHAT	Checklist for Autism in Toddlers - Modified
MDT	Multi-disciplinary team
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
PIA	Parent Interview for Autism
RBS	Repetitive Behavior Scale
SCQ	Social Communication Questionnaire
SDQ	Strengths and Difficulties Questionnaire
SEN	Special Educational Needs
SIGN	Scottish Intercollegiate Guideline Network
SLD	Specific language disorder
SLT	Speech and Language Therapy/Therapist
SRS	Social Responsiveness Scale
SSI	Screen for Social Intervention
STAT	Screening Tool for Autism in Two-year-olds
YACHT-18 Checkup Tool	Young Autism and other developmental disorders

11.3 Glossary

Agreement	The degree to which more than one individual undertaking an assessment / scoring of an instrument agree 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 ICD10 and DSM IV.,
Autism spectrum disorders (ASD)	A term, used synonymously with pervasive developmental disorder, to describe qualitative impairments in social reciprocity and social communication combined with restrictive repetitive interests and behaviours.
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 actually doesn't. 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, e.g. 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 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.
Case-control study	A study that starts with the identification of a group of individuals sharing the same characteristics (e.g. people with a particular disease) and a suitable comparison (control) group (e.g. people without the disease). All subjects are then assessed with respect to things that happened to them in the past, e.g. things that might be related to getting the disease under investigation. Such

	studies are also called retrospective as they look back in time from the outcome to the possible causes.
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 health care professional providing patient care, e.g. doctor, nurse, 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, e.g. 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 (e.g. 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 and is a key tool for the 'Every Child Matters' campaign.
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.
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 well 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 health care 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 health care 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	Decision analysis is 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 e.g. 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	In health economics, a model is a theoretical construct that represents the costs and outcomes of alternatives for health care management. The economic model is a simplified framework designed to illustrate complex processes, often but not always using mathematical techniques.
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 (e.g. 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 trial and randomised controlled trial are examples of experimental studies.
Experimental treatment	A treatment or intervention (e.g. 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 ASD, it is often used to identify carriers of genes which code for specific coexisting conditions, or genetics sequences believed to be causative of ASD.
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 their 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 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 health care resources.
Heterogeneity	Or 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 say one small RCT.) Well-conducted studies of patients' views and experiences would appear at a lower level in the hierarchy of evidence.
Homogeneity	This means that 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 pre-set 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 comparisons 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 (e.g. difficult or biased questions), observer or interviewer errors (e.g. lack of blinding), response errors (e.g. lack of blinding if patients are aware of the treatment they receive) and measurement error (e.g. a faulty machine).
Intellectual disability	A broad concept of mental disability that encompasses mental retardation characterized by significantly impaired cognitive functioning and deficits in adaptive behaviours.
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 characterized 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 the ages of 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.
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, e.g. the study will be a randomised controlled trial, of 200 people, over one 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, e.g. a co-operative study between different hospitals; 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	Recurrent obsessional thoughts (ideas, urges or images that are
(OCD)	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 (e.g. whether or not people received a specific treatment or intervention) are studied in relation to changes or differences in other(s) (e.g. whether or not they died), without the intervention of the investigator. There is a greater risk of selection bias than in experimental studies.
Odds ratio	Odds are a way of representing probability, especially familiar for 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/ treatment/ 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 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 (i.e. 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 just tell us whether an effect can be regarded as statistically significant or not. In no way does the P value 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, it is not a diagnosis in the DSM and ICD. 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 behavior.
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 and DSM classifications to describe the group of disorders characterized 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.
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 (called Primary Care) and making sure that other appropriate health services are in place to meet local people's needs.
Primary care	Healthcare delivered to patients outside hospitals. Primary care covers a range of services provided by GPs, nurses and other health care professionals, dentists, pharmacists and opticians.
Prognostic factor	Patient or disease characteristics, e.g. 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 – e.g. 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 very much 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, e.g. 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 zero to one scale). One QALY is equal to one year of life in perfect health, or two 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) receiving the treatment that is being tested, and the other (the comparison or control group) receiving 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 retrospective study 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.
Royal Colleges	In the UK medical/nursing world the term royal colleges, as for example in 'The Royal College of….', refers to organisations which usually combine an educational standards and examination role with the promotion of professional standards.
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 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 (i.e. a statistically significant treatment effect) if there really was an important difference (e.g. 10% versus 5% mortality) between treatments. 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 pre-set 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, 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 association of several clinically recognizable features, signs (observed by a physician), symptoms (reported by the patient), phenomena or characteristics that often occur together,
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 – e.g. in terms of age, disease state, social background.
Tertiary centre	A major 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.
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.
	Unconjugated hyperbilirubinaemia arises if the liver cannot handle the amount of unconjugated bilirubin presented to it. This can occur as a result of excessive red blood cell breakdown – (haemolysis) and/or because of immaturity of the liver enzymes involved in conjugation.
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, e.g. 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 of the guideline

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, Aspergers 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, Aspergers 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 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:

GDG Member	Interest Declared	Type of Interest	Decisions Taken
Gillian Baird	Published research on 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 GB chaired all GDG discussions from 29-03-10
	Involved in the development of the DSM-IV-V and ICD-10-11	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 MRC and the NAS in the UK and NIH in the USA	Personal, non-pecuniary	Declare and can participate in discussions on all topics
	Involved in the development and testing CHAT, Q-CHAT screening instruments	Personal, non-pecuniary	Declare and can participate in discussions on all topics
	European Science Foundation COST Action:	Non-personal,	Declare and can

GDG Member	Interest Declared	Type of Interest	Decisions Taken
	Enhancing the Scientific Study of Early Autism (ESSEA); a 'network' grant that involves work on early screening and early intervention amongst other activities	pecuniary	participate in discussions on all topics
	ESRC/MRC grant "The UK 2012 Birth Cohort Study of environment, development, health and wellbeing". Co-Investigator with Carol Dezateux (Principal Investigator) + 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) + 7 others.	Non-personal, pecuniary	Declare and can participate in discussions on all topics
	Autism Education Trust grant (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

GDG Member	Interest Declared	Type of Interest	Decisions Taken
			all topics
	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' (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); NAP-C advisor to National Service Framework Disabled Children External Working Group (2001-03); 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+) with ASD; Dept of Health Adult Autism Strategy External Reference Group - Member of Health subgroup & Dept of Health North of England Stakeholders Group (2008-10); 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

GDG Member	Interest Declared	Type of Interest	Decisions Taken
	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
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 Autism Spectrum Disorders (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

For a list of registered stakeholder organisations please see the NICE website:

http://guidance.nice.org.uk/CG/Wave15/78/SHRegistration/SHList/pdf/English

Appendix D

Review questions

Signs and symptoms

1. a) What are the signs and symptoms that should prompt a health care or other professional in any context to think of ASD?

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

Diagnostic assessment

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

a) Are there screening instruments that are effective in assessing the need for a specialist ASD assessment?

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

part 1: General risk factors

part 2. Risk of ASD in co-existing conditions

c) Information from other sources as contextual information: information about how the child functions in different environments such as school and home; social care reports (i.e. 'Looked After' children); other agencies

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

a) Assessment tools specific to ASD: e.g. Autism Diagnostic Interview-Revised (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

b) Other assessment tools that help the interpretation of the specific ASD tools (e.g. ADI-R, 3di, DISCO, ADOS, Gilliam Autism Rating Scale): an assessment of intellectual ability; an assessment of receptive and expressive language etc.

c) Biomedical investigations for diagnosis of ASD e.g. EEG, brain scan, genetic tests, physical examination; genetic counselling; investigations for associated medical conditions

4.a) What are the most important differential diagnoses of ASD?

4.b)What features observed during diagnosis reliably differentiate the important differential diagnoses from ASD?

5. How should information be integrated to arrive at a diagnosis?

a) Is the diagnostic assessment more accurate and reliable when performed by a multidisciplinary team or a single practitioner?

b) What is the stability of an ASD diagnosis over time?

c) What is the agreement of an ASD diagnosis across different diagnostic tools?

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

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

Coexisting conditions

8. 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 ADHD, OCD, anxiety, depression, Tourette, Tic disorders;
- Medical problems such as functional gastrointestinal problems, tuberosclerosis, neurofibromatosis

Information and support

9. What information do children and young people, and their families/carers need during the process of referral, assessment and diagnosis of ASD?

10. What kinds of day-to-day, ongoing support (not specific to therapeutic interventions/management of ASD) should be offered to children and young people, and their families/carers, during the process of referral, assessment and discussion of diagnosis of ASD?

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 Classification of Diseases (ICD) 10

Re-produced with permission from World Health Organization http://apps.who.int/classifications/apps/icd/icd10online/ [accessed on 12-05-2011]

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.

Diagnostic and Statistical Manual of Mental Disorders (DSM) IV–TR

299.00 Autistic Disorder

A. 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

B. 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.

C. 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.

<u>299.80 Asperger's Disorder</u>

(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

<u>299.80 Pervasive Developmental Disorder Not Otherwise Specified (Including Atypical Autism)</u>

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]

ASD specific diagnostic interviews

There are a large number of instruments available to identify ASD and these range from self-completion questionnaires to formal diagnostic interview. Although their original designs may have been for a specific purpose, from population screening to specific diagnosis, the demand has led them to become extended in their use [226]

There are a number of published ASD specific diagnostic (semi-structured) interviews providing a framework for an ASD 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 ADI-R this can be undertaken using pre-recorded materials. Attendance at UK based training courses is required for the DISCO and 3Di. For each, the training provides dedicated learning in ASD 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 to enable trained staff 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 below:

Autism Diagnostic Interview (Revised) (ADI-R)

The ADI-R is a semi structured interview to be used with the parent(s)/main caregiver 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 (DSM-IV-TR and ICD-10). It 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 three 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 ASD from general developmental delay/learning disability and other neurodevelopmental disorders[227]. It can be used for individuals of the mental age of two years and above. Recently studies have used the ADI-R to

[vii] See Section 11.1 for references

'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.

Designed originally as a research tool, this internationally recognised interview is available in several languages.

The Diagnostic Interview for Social and Communication Disorders (DISCO)

The DISCO is a clinical interview schedule designed to consider information on 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 ASD [228] 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 [229;230]. It is a semi-structured interview of the parents/main caregivers by a specifically trained assessor which takes about three hours to complete.

The Developmental Diagnostic and Dimensional interview (3Di)

This is a modular, structured interview that uses a laptop computer to work through a variety of areas with an informant, usually a parent. Besides questions that are specific to autism, it covers other mental states as well as demography, family background, developmental history and motor skills. The whole interview takes about ninety 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 use across the range of age and ability and it has good validity against the ADI. Its format lends itself to good reliability with limited interviewer training[113].

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 forty-five minutes. Second, a shortened (53 item) version has been developed and validated against the ADI [231].

The Childhood Autism Rating Scale (CARS/CARS-2)

This 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 parental and teacher report 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. [232]

A new edition includes two rating scales - the standard version (CARS2-ST). comparable to the original CARS, is for use with young children or those with communication or intellectual difficulties. The High Functioning version (CARS2-HF) for more able individuals, older than five years and verbally fluent. There is also a separate questionnaire for parents/caregivers.

The Development and Well-Being Assessment (DAWBA)

http://www.dawba.info/a0.html

The DAWBA is a package of questionnaires, interviews, and rating techniques designed to generate ICD-10 and DSM-IV psychiatric diagnoses on 5-16-year-olds across the field of mental health. Designed as an epidemiological tool [233]

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 subjects themselves either by a self-completion computer programme 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 encouraging 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[234]

ASD diagnostic observational assessment

There is one published ASD specific diagnostic observational assessment – the Autism Diagnostic Observation Schedule (ADOS) that the GDG has reviewed in detail. As with the ASD-specific semi-structured interviews, training is required to use the ADOS. This training is currently available from a small number of ASD clinical-academic centres across the UK (and at other training centres outside UK). Again there are resource implications for training in the use of this measure for everyday clinical practice. Budgeting for test equipment, extended appointment times, for coding the assessment and report writing; and for attending regular supervision/ reliability meetings to ensure maintenance of high quality standardised practice between different professionals working in different settings are all necessary:

Autism Diagnostic Observational Schedule (ADOS)

The ADOS is a widely used semi-structured, direct assessment of the child/ young person that uses a combination of standardised play, activities and verbal interview to elicit the symptoms of ASD in the three behavioural domains (social-communication; reciprocal social interaction; play, imaginative use of materials and repetitive behaviours) that comprise the ICD-10/DSM-IV-TR criteria for a diagnosis of ASD. There are four modules for use with individuals ranging from pre school children without useful speech through to verbally able adults[235-237]. The choice of module is determined by the level of expressive language. The 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 ASD and other disorders. They apply to modules 1- 3 and summarise the ratings for two domains - social- communication behaviour (the social-affect domain) and restricted, repetitive behaviour[238;239]. The ADOS is available in several languages, but further work may well be required to consider particular social and cultural factors.

Training is required in the use of the ADOS and in the coding of observed behaviours. Once professionals have been trained, regular reliability checks are necessary[105;235]

The observations made during the administration of the ADOS complement information gained from other assessment procedures such as the developmental history and direct observations in other settings such as the home, nursery, school and clinic. This assessment provides useful clinical and research information about the child/ individual that can inform intervention planning and, although the instrument was originally developed as a diagnostic tool, it has also been used as a research outcome measure[240-242].The original author and colleagues have reported the development of a severity matrix using the ADOS scores which might provide the first example of a tool sufficiently standardised to allow the developmental trajectory of ASD to be measured[243].

ASD Screening Instruments:

Gilliam Autism Rating Scale (GARS/GARS-2)

The GARS is a 42 items checklist divided into three sections (stereotyped behaviours, communications and social interactions) deriving information from parents and taking 5- 10 minutes to complete and score. The authors advocate use of GARS as a screening instrument that has been standardized on over a thousand 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 ASD[109;244;245]. Although the revied version is said to show improved validity and reliability, a factor analysis of its standardization sample did not support its subscale structure[246].

The Parent Interview for Autism-Clinical Version (PIA-CV)

The PIA is a 118-item structured interview for parents developed to measure change in autism symptomatology to be used in clinical and research settings; it was not designed as a diagnostic instrument[247]. The items are subgrouped into 11 domains: - social relating, affective responses, imitation, peer interactions, object play, imaginative play, language understanding, non-verbal communication, motoric behaviors, sensory responses, and need for sameness Over 30-45 minutes, parents rate their child on a five-point Likert-type scores which are summed to give a total measure for each domain[248].

Appendix K

Differential diagnosis advice for healthcare professionals

The GDG also developed this advice to support the decision-making process in 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 ASD. It covers key clinical features; 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.

Key presenting features that may overlap with ASD	Main features to differentiate from ASD	Assessments or investigations to differentiate from ASD	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
	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
		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
			ASD and speech and language impairment may coexist

Key presenting features that may overlap with ASD	Main features to differentiate from ASD	Assessments or investigations to differentiate from ASD	Special notes / diagnostic pitfalls
• Beyond the preschool period, there may be an impact on the child's ability to develop and maintain peer friendships	• A clear positive approach to peer friendships, at least in the preschool years There would usually be an absence of: • Echolalia • Rigid repetitive behaviours • Stereotyped mannerisms • Abnormal responses to sound and other senses • Over focussed intense interests	problems with grammatical structures than in other areas • In ASD: o Expressive language can be better than receptive o Single word noun vocabulary may be extensive but with impaired abstract concepts o Sentence structure can be better than comprehension of paragraphs o 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 o Pattern of responses to tests may give an uneven profile across different subtests# o Use of language may be more limited than capability suggests, for example single words or minimal phrases for needs despite	

Key presenting features that may overlap with ASD	Main features to differentiate from ASD	Assessments or investigations to differentiate from ASD	Special notes / diagnostic pitfalls
		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 • Limited social interactions and peer relationships	In severe intellectual disability: • The delay is likely to be across all areas of development, with a more 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 ASD 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	Tests of intellectual/cognitive function will distinguish the generally low cognitive level from the often uneven profile found in ASD. Tests of adaptive impairment eg Vineland or ABAS may not distinguish since adaptive skills are often much more impaired in ASD that would be predicted from the IQ.	• ID can co-occur with ASD • It is still important to diagnose ASD, if present, in a child with a severe overall intellectual impairment as this will 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

Key presenting features that may overlap with ASD	Main features to differentiate from ASD	Assessments or investigations to differentiate from ASD	Special notes / diagnostic pitfalls
	In ASD 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		
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 some, peer relationships are often poor	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 ASD 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
Mental and behavioural disorders			
Attention deficit hyperactivity disorder (ADHD)			
• Poor attention • Impulsive behaviour • Increased level of physical activity	In ADHD: • The child's overactive behaviour is characterised by fidgety, restless behaviour	• Careful developmental history • Observation and/or good accounts of the child in different settings, for example	ADHD commonly co-exists with ASD (see chapter 7 on Co-existing conditions)

Key presenting features that may overlap with ASD	Main features to differentiate from ASD	Assessments or investigations to differentiate from ASD	Special notes / diagnostic pitfalls
• 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	• 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 • They do not usually react with marked distress to stimuli to	home and school, including situations likely to elicit distractibility and disorganised behaviour • Specific rating scales for ADHD	

Key presenting features that may overlap with ASD	Main features to differentiate from ASD	Assessments or investigations to differentiate from ASD	Special notes / diagnostic pitfalls
	which they are over sensitive. In ASD: • 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	• Children/young people with a psychotic disorder will not have the early developmental	• A careful interview and mental state examination, obtaining specific examples, will	• Adolescents with ASD may deteriorate in their social functioning in a manner similar

Key presenting features that may overlap with ASD	Main features to differentiate from ASD	Assessments or investigations to differentiate from ASD	Special notes / diagnostic pitfalls
• 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 • YP 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	features seen in ASD. • The psychotic symptoms will typically have an onset no earlier than late childhood/early adolescence.	distinguish between hallucinations and delusions from unusual ideas and concrete interpretation of questions.	to that seen in psychotic disorder. • Psychotic features may occur as part of a mood disorder as a co-exisitng condition in ASD.
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.	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,	At times these disorders can be hard to distinguish on presenting behaviour alone; they may also co-occur (see chapter on Co-existing conditions)

Key presenting features that may overlap with ASD	Main features to differentiate from ASD	Assessments or investigations to differentiate from ASD	Special notes / diagnostic pitfalls
	• May not be pervasive: it may be less evident in some settings.	bullying) that may be associated with a change in behaviour and functioning.	
Anxiety disorder			
Anxiety may be associated with: • Repetitive anxious behaviour (e.g. repetitive questioning or demanding reassurance). Social phobia may present with: • Social avoidance: 'anticipatory anxiety'	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. 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		

Key presenting features that may overlap with ASD	Main features to differentiate from ASD	Assessments or investigations to differentiate from ASD	Special notes / diagnostic pitfalls
	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			
• 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 ASD: • Behaviour may lack normal boundaries but this is less likely to be in order to gain social attention. For example: child with ASD child 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 ASD	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, nursery staff. school teachers or social worker is essential Clinical judgement is often the	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 ASD	Main features to differentiate from ASD	Assessments or investigations to differentiate from ASD	Special notes / diagnostic pitfalls
• 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	rather than avoidant as in emotionally withdrawn attachment. • Children with ASD 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) • Children with attachment disorders usually do not show over-intense or unusual interests • In attachment disorder, the child may make a lot of rapid progress when exposed to a more nurturing environment, including nursery, school or foster placement	crucial factor in distinguishing between a maltreated child and one with ASD In those with continuous 'good parenting', an attachment disorder would be unlikely.	
Oppositional defiant disorder (ODD)			

Key presenting features that may overlap with ASD	Main features to differentiate from ASD	Assessments or investigations to differentiate from ASD	Special notes / diagnostic pitfalls
• 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 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 ASD: • May have little if any awareness of the impact of their behaviour on others- their prime focus will be exclusively focussing on	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 co-exist in ASD as a separate disorder. The oppositional outburst behaviours in ASD 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 ASD with passive early onset, obsessive behaviours which are 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.

Key presenting features that may overlap with ASD	Main features to differentiate from ASD	Assessments or investigations to differentiate from ASD	Special notes / diagnostic pitfalls
	the behaviour/ interest that they are wanting to pursue • The child with ASD is often upset when it is pointed out to them they have hurt other people		
Conduct disorder			
• Individuals with CD can be described as callous/ unemotional and have limited empathy • Individuals with ASD 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 ASD: • 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 ASD

Key presenting features that may overlap with ASD	Main features to differentiate from ASD	Assessments or investigations to differentiate from ASD	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 • Behaviours may be associated with distress for the child/ young person • Rituals are less likely to be associated with obsessional thinking (the child with ASD 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 ASD: • 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	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 ASD

Key presenting features that may overlap with ASD	Main features to differentiate from ASD	Assessments or investigations to differentiate from ASD	Special notes / diagnostic pitfalls
	pattern of everyday activity, e.g., the way food is served on the plate, which route is taken going to school		
Conditions in which there is developmental regression:			
Rett syndrome			
• Regression of developmental skills before or around the first birthday, associated with lack of speech and loss of social communication behaviour • Stereotyped hand movements and hyperventilation are common	• Mainly affects girls • Motor regression, ataxia, loss of purposeful hand movements and oro-motor skills • Fall off of head growth • Characteristic "hand-wringing" movements of hands • often social interest is a relative strength (i.e. relative to level of cognitive impairment)	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 likely to have a co-occurring diagnosis of ASD. 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	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	• 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. Ref NICE epilepsy guidelines

Key presenting features that may overlap with ASD	Main features to differentiate from ASD	Assessments or investigations to differentiate from ASD	Special notes / diagnostic pitfalls
younger children < 2 years • Regression of language rather than regression to autism is found in Landau-Kleffner syndrome (LKS) epileptic encephalopathy usually in children >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	• 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		
Other conditions			
Severe visual impairment (blind)			
• 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	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	• Competence in assessing blind/severely partially sighted children/YP as the key presenting features need to be assessed relative to typically developing blind children.	ASD 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

Key presenting features that may overlap with ASD	Main features to differentiate from ASD	Assessments or investigations to differentiate from ASD	Special notes / diagnostic pitfalls
• 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	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)		
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	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	• Formal and careful hearing testing is essential - bearing in mind that bright hearing impaired children are very visually alert	• ASD can co-occur with hearing impairment

Key presenting features that may overlap with ASD	Main features to differentiate from ASD	Assessments or investigations to differentiate from ASD	Special notes / diagnostic pitfalls
communication	peer interaction • Rigid repetitive behaviours, stereotyped mannerisms, abnormal 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 ASD and selective mutism may co-exist