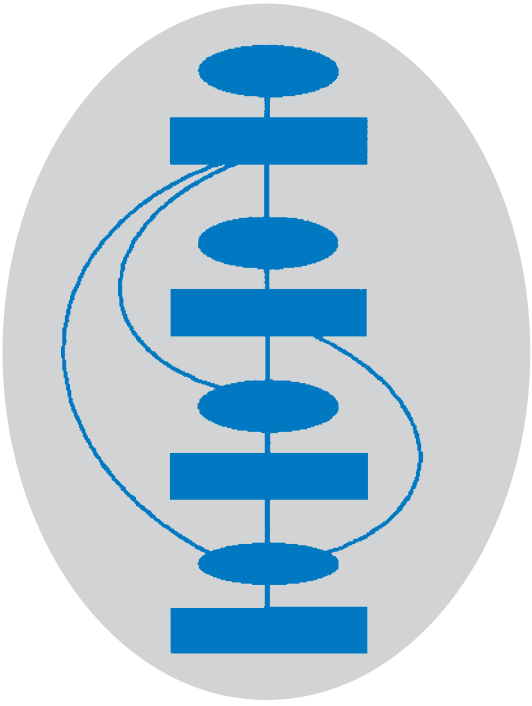
National Institute for Clinical Excellence

Guidance on Cancer Services

Improving Outcomes in Haematological Cancers

The Manual



This version of the guideline includes the 2003 recommendations and is for reference only. See the addendum and short version of the guideline for recommendations made as part of the 2016 update.

Haematological cancers service guidance

Cancer service guidance supports the implementation of *The NHS Cancer Plan* for England,[1] and the NHS Plan for Wales *Improving Health in Wales.*[2] The service guidance programme was initiated in 1995 to follow on from the Calman and Hine Report, *A Policy Framework for Commissioning Cancer Services.*[3] The focus of the cancer service guidance is to guide the commissioning of services and is therefore different from clinical practice guidelines. Health services in England and Wales have organisational arrangements in place for securing improvements in cancer services and those responsible for their operation should take this guidance into account when planning, commissioning and organising services for cancer patients. The recommendations in the guidance concentrate on aspects of services that are likely to have significant impact on health outcomes. Both the anticipated benefits and the resource implications of implementing the recommendations are considered. This guidance can be used to identify gaps in local provision and to check the appropriateness of existing services.

References

1. Department of Health (2001) *The NHS Cancer Plan.* Available from: www.doh.gov.uk/cancer/cancerplan.htm

2. National Assembly for Wales (2001) *Improving Health in Wales: A Plan for the NHS and its Partners.* Available from: www.wales.gov.uk/healthplanonline/health_plan/content/nhsplan-e.pdf

3. *A Policy Framework for Commissioning Cancer Services*: *A Report by the Expert Advisory Group on Cancer to the Chief Medical Officers of England and Wales* (1995). Available from: www.doh.gov.uk/cancer/pdfs/calman-hine.pdf

This guidance is written in the following context:

This guidance is a part of the Institute's inherited work programme. It was commissioned by the Department of Health before the Institute was formed in April 1999. The developers have worked with the Institute to ensure that the guidance has been subjected to validation and consultation with stakeholders. The recommendations are based on the research evidence that addresses clinical effectiveness and service delivery. While cost impact has been calculated for the main recommendations, formal cost-effectiveness studies have not been performed.

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Foreword

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The haematological malignancies are a complex group of neoplastic diseases, linked by their origin in bone marrow derived cells. The growing understanding of how haematological malignancies arise through disruption of the normal cellular processes in the bone marrow and immune system by a variety of molecular and cytogenetic abnormalities is challenging traditional approaches to disease classification. These advances are transforming both diagnosis and management of patients.

The characterisation of tumour cells by immunophenotypic and molecular methods is now regarded as being as important as the traditional morphological approach to diagnosis. This trend is being accelerated by the introduction of monoclonal antibody therapy and by novel drugs designed to specifically target the molecular abnormalities responsible for the development of the tumour. Such developments are of fundamental clinical importance as they increasingly define not just the diseases themselves, but how an individual patient should best be treated. Building these advances into the routine care of patients represents a demanding agenda for the clinicians and hospitals involved.

Just as the diseases are distinctive and show many differences from solid tumours, so too is the organisation of services. There is a degree of separation between the clinical services for haematological malignancies and those for solid tumours, perhaps reflecting their particular development pathways and the nature of the specialities involved. This has traditionally extended to the organisation and funding of research and many associated scientific activities.

Despite these differences, there are compelling reasons for regarding all cancer services as a logical whole, in which the diagnosis and treatment of the various disease types has an immense amount in common. Operationally the reality is that local hospital services for common solid tumours in cancer units rely in no small measure on haematology services. The active support of haematology services 'round the clock' underpins the safe delivery of chemotherapy for all tumour types, particularly the diagnosis and management of life-threatening complications.

Services for patients with haematological malignancies do have distinctive features. The generality of cancer patients are increasingly managed by clinicians from different professions and medical specialties, working together to combine their expertise and make collective decisions on the management of their patients. Whilst the management of haematological malignancies also involves a range of clinical and laboratory skills, the processes of diagnosis and subsequent clinical management are dominated by one medical discipline, clinical haematology. Indeed it remains perfectly possible for a patient's diagnosis to be made by a single clinician who then goes on to initiate treatment and subsequently determines further treatment as the patient's clinical course progresses. The same individual may also determine the point at which active therapy may no longer be appropriate for that patient. Thus for many patients, particularly those with leukaemia, it is not unusual for decisions on their management to involve only one or possibly two individual consultants, probably colleagues in the same discipline and hospital. It has been observed in some areas that less use is made of palliative services in haemato-oncology than is the case for patients with many solid tumours.

Other features of haemato-oncology services are equally characteristic. The main form of therapy for these diseases is chemotherapy (including immunotherapy). Other modalities such as radiotherapy have their roles, but these are more limited. Chemotherapy is particularly amenable to evaluation through randomised clinical trials. An admirable feature of British clinical haematology has been the widespread interest, and active participation of clinicians and hospitals, in clinical trials. Indeed, many national trials in these diseases have been extremely well supported by haematologists in all types and sizes of hospital, with high rates of trial entry. This has led to the widespread and routine adoption of evidence based protocols to help guide care in the various malignancies.

Collaboration in research has frequently been extended in other ways. In some places, but by no means all, there is professional networking between clinicians in district hospitals and between them and colleagues in more specialised units. In some places this collaboration can be very close, in others relatively token.

It is a paradox that despite the mass of trial evidence about chemotherapy regimens for the various clinical types and sub-types of disease, there is no well-established Cochrane Group and less research evidence than we would have wished to guide recommendations in some areas. Limitations in the evidence should always be acknowledged, but need not necessarily prevent important recommendations where these are consistent with other knowledge or experience in related areas. We have made some important recommendations about service organisation and delivery.

The management of individual patients should, as always, be based on sound and comprehensive diagnostic information. This is crucial in these diseases as the precise diagnosis does, in many situations, define the most appropriate treatment. Decisions on management should involve a range of knowledgeable professionals in the disease areas concerned, meeting together. They need to determine the management of individual patients as well as agreeing more general policies and operational procedures. Those managing patients with these diseases face difficult diagnostic and clinical decisions - such as defining the point at which further cycles of chemotherapy are not appropriate and change to a more palliative approach may be preferred. It is essential that this collective involvement in decision-making is adopted for haematological malignancies, as for other cancer types, even though for some disease-types most of those involved will be from one discipline. These arrangements should cover all patients and are likely to improve decisions about their care.

The number of patients with each discrete type of haematological malignancy presenting each year to cancer units is, by the standards of those who manage many solid tumours, often low. Whilst the use of protocols derived from clinical trials evidence may be a partial response to low throughput, issues remain about expertise and specialisation which cannot be easily evaded. Working collaboratively in teams, and hence being involved in decisions about the management of larger numbers of new patients than arise in any one clinician's practice, or in a single institution, is therefore likely to be beneficial. It will facilitate the development and sharing of expertise as well as allowing a wider range of inputs into decision-making about each patient.

Thus the challenge of preparing service guidance for haematological malignancies is set against a very distinctive backcloth. Our expectation is that a more systematic team-based approach will be an important move forward. Our recommendations are designed to offer considerable flexibility in implementation, which should enable local influence over the preferred model in each place. We acknowledge that much of what is described already exists in a number of locations, and in some places these arrangements have existed for many years. However, consistency in the quality of care is our primary goal. It is evident that for some, what is being recommended represents significant but necessary change.

Key recommendations

- All patients with haematological cancer should be managed by multi-disciplinary haemato-oncology teams which serve populations of 500,000 or more.

- In order to reduce errors, every diagnosis of possible haematological malignancy should be reviewed by specialists in diagnosis of haematological malignancy. Results of tests should be integrated and interpreted by experts who work with local haemato-oncology multi-disciplinary teams (MDTs) and provide a specialised service at network level. This is most easily achieved by locating all specialist haemato-pathology diagnostic services in a single laboratory.

- There should be rapid-access diagnostic services for patients with lymphadenopathy (chronically swollen lymph nodes or neck lumps).

- Clinical nurse and palliative care specialists are to have central roles in haemato-oncology teams, working closely with their medical colleagues. Clinical nurse specialists will arrange for patients and carers to receive multi-faceted support, co-ordinated care, and all the information they want, throughout the course of the illness.

- MDTs which manage patients with acute leukaemia should provide treatment intended to induce remission for sufficient new patients for the units concerned to develop and maintain expertise. Services are unlikely to be viable with five or fewer new patients per year. This treatment should be provided at a single facility within any one hospital site, in designated wards with continuous access to specialist nurses and haematologists.

- High dose therapy with progenitor cell transplantation is to be carried out only in centres which meet JACIE accreditation standards, including the minimum case-load criterion of 10 procedures per annum.

Background

Scope of this document

The purpose of this guidance is to describe key aspects of the service required to achieve the best outcomes for adult patients with haematological cancers. The guidance covers all aspects of care for this group of patients, including medical diagnosis and management.

Guidance on paediatric and adolescent services is expected from the newly-established National Institute for Clinical Excellence (NICE) Collaborating Centre for Cancer. It will be for that guidance to propose the definition of the interface between their service scope and the work of adult services covered by this guidance.

This background section is intended to help non-expert users of the manual to orientate themselves to this group of diseases and their management.

Haematological cancers: nature and numbers

Haematological cancers (cancer of blood cells) together represent the fifth most common type of cancer in the UK, accounting for 7% of all cancers. This is a uniquely diverse group which is sub-divided into three main diseases: leukaemia, lymphoma and myeloma. Some forms are highly aggressive, others so benign that they may only be picked up by chance; the symptoms can include lumps (in a variety of body sites), which are typical of lymphomas; bone fractures and kidney problems, characteristic of myeloma; and fatigue and vulnerability to infection, which can result from most types of haematological cancer but are particularly severe in acute leukaemia.

Like the forms of disease, the treatments used vary widely. Some are very demanding, both for patients and those who look after them. Aggressive forms of haematological cancer such as acute leukaemia may be curable, but only by repeated periods of intensive chemotherapy which requires long periods of hospitalisation and protection from infection, and sometimes, transplantation of blood progenitor cells from bone marrow or other sources. A wider range of treatments is needed for patients with lymphomas or myeloma,

including chemotherapy, radiotherapy and sometimes surgery; with lymphomas as with acute leukaemias, intensive treatment may continue over long periods of time. Less aggressive forms of haematological cancer, which are more common among elderly people, may only require monitoring or minimal palliative treatment, often given on an out-patient basis.

Despite these variations, the underlying problem is basically the same in all these diseases: a genetic change in a particular group (clone) of blood cells (or its precursor) that leads these cells to develop incorrectly and multiply in a disorganised and uncontrolled manner, crowding out cells that are essential to normal function. The diversity in the form of disease produced results from a combination of factors, particularly the type of cell affected, the nature of the genetic change that precipitates the malignancy, and the point in the cell's maturation process at which the malignant change occurs.

Blood cells begin their development in the bone marrow. When genetic disruption occurs at this point, cancer replaces the cells which would normally develop into oxygen-carrying red blood cells, platelets which are essential for clotting, and white cells that fight infection. This produces leukaemia, a disease characterised by anaemia, fatigue, bleeding, and susceptibility to infection.

As they mature, white blood cells (lymphocytes) migrate from the bone marrow and settle in lymph nodes or other parts of the immune system – in particular, the lining of the intestine, the skin, or the lungs – where their development continues. Malignant changes at this point in the cell's life cycle produce lymphomas. These tend to reveal themselves as lumps but they also produce a variety of other symptoms.

One particular type of blood cell (plasma cell) returns to the bone marrow for the final period of its life. When malignant changes occur here, excessive numbers of abnormal plasma cells destroy the surrounding bone. This is myeloma, usually known as multiple myeloma because it tends to happen in many parts of the skeleton simultaneously.

Prevalence, incidence and survival rates

There are no precise and reliable figures for incidence and survival rates for the different forms of haematological cancer in England and Wales. Whilst the Office for National Statistics (ONS) and the Wales Cancer Intelligence and Surveillance Unit do publish descriptive statistics (Table 1), there are many problems with these figures. For example, there is evidence that many cases are never reported to cancer registries, so the actual number of patients could be substantially higher than national figures suggest.[1]

With some of these diseases, it can be difficult to decide which individuals should be defined as patients. Blood changes which could be classified as chronic leukaemias are widespread among older people and often produce no symptoms. Incidence rates for these conditions therefore depend largely on whether anyone happens to look at blood samples from such individuals, and on clinicians' criteria for deciding whether malignancy exists at all. Even when it is clear that haematological malignancy is present, identifying the particular form of cancer requires sophisticated methods which are not available in many local hospitals, so a large number of registrations do not include detailed information on the diagnosis. This is especially true of non-Hodgkin's lymphoma (NHL), a large and varied group of conditions; indeed, the largest group of NHL registrations in ONS statistics is described as "unspecified". This issue is discussed in more detail below.

[1] The establishment of a new reporting system in the South Thames East Area was associated with an increase of 43% in annual registrations. (South Thames Haematology Specialist Committee and Thames Cancer Registry. *Report of the South Thames Haematology Register Cancer Sub-Committee on the Incidence of Haematological Malignancies in 1999.* London: King's College, 2001.) This is consistent with anecdotal evidence suggesting that many cases are not reported.

Table 1. Haematological malignancies: incidence, survival rates and deaths, England and Wales (ONS figures)[2]

Cancer	Disease Codes		No of cases [a] 1999	Incidence: crude rate per 100,000 1999	Deaths 2000	Death: rate per 100,000 2000	Relative survival [b]	
	ICD 9	ICD 10					One year	Five year
Acute lymphoblastic leukaemia (ALL)	*204.0*	*C91.0*	593	1.1	252	0.5	53%	26%
Acute myeloid leukaemia (AML)	*205.0*	*C92.0*	1779	3.4	1604	3.0	24%	8%
Chronic myeloid leukaemia (CML)	*205.1*	*C92.1*	605	1.1	508	1.0	61%	22%
Other & unspecified leukaemias	*204.2-204.9, 205.2-205.9, 206-208*	*C91.2, C91.3, C91.5-91.9, C92.3-C95*	751	1.4	392	0.7	no data	no data
Chronic myeloproliferative disorders (MPD)	*238.1*	*D47.1*	643	1.2	173	0.3	no data	no data
Myelodysplastic syndrome (MDS)	*284.9, 285.0, 288.8*	*D46*	2047	3.9	110	0.2	no data	no data
Multiple myeloma	*203*	*C90*	2991	5.7	2024	3.8	55%	19%
Hodgkin's lymphoma	*201*	*C81*	1218	2.3	241	0.5	88%	75%
Non-Hodgkin's lymphoma (NHL)	*200, 202*	*C82-85, C91.4, C96*	8075	15.3	4012	7.6	65%	45%
Chronic lymphocytic leukaemia (CLL)	*204.1*	*C91.1*	2071	3.9	778	1.5	77%	51%

a The level of underreporting, particularly of non-malignant cancers (ICD10 D codes), is not known.

b Patients diagnosed in 1986-90. Source: Coleman MP, Babb PJ, Damiecki P, Grosclaude P, Honjo S, Jones J, Knerer G, Pitard A, Quinn M, Sloggett A, De Stavola B. *Cancer survival trends in England and Wales, 1971-95: deprivation and NHS Region.* Studies in Medical and Population Subjects No. 61. London: The Stationary Office, 1999.

[2] Data provided by the National Cancer Intelligence Centre, Office for National Statistics, on request, October 2002.

Despite the problems with statistics, basic information is essential to plan service provision. Registration figures suggest that 39 new cases per 100,000 population are reported per annum, but those working in the field believe that the numbers are considerably higher. It is also crucial for service planning to know how many patients are likely to require intensive or complex forms of treatment, so varied groups of conditions like NHL must be split into aggressive, or 'high grade' and less aggressive 'low grade' forms, sometimes described as indolent lymphomas. Table 2 attempts to do this, although the figures are acknowledged to be estimates, particularly since the distinctions between some of these groups (such as high-grade and low-grade lymphoma) are often unclear.

Table 2. Haematological cancers: estimated annual incidence[3]

Disease	Incidence, England and Wales	Per million population	Per 500,000	Per 250,000
Acute leukaemia	2400	48	24	12
CML	500	10	5	2-3
CLL	4000	80	40	20
NHL 'high grade'	2000	40	20	10
NHL 'low grade'	5000	100	50	25
Hodgkin's lymphoma	1200	24	12	6
Myeloma	3000	60	30	15
MDS/MPD/other	2000	40	20	10

Incidence and mortality rates vary across England, with relatively high rates in the South West – around 50% higher than in Yorkshire.[4] The reasons for these geographical variations are not known, but are likely to include variations in diagnosis and reporting.

The overall prevalence of haematological cancer is rising, with the greatest increase in the number of people with non-Hodgkin's lymphoma. The rate of diagnosis has increased by 3-5% per annum between 1984 and 1993; ONS figures show that the age-standardised

[3] Estimated figures based on expert opinion from the editorial board.

[4] Cartwright, RA, McNally RJQ, Rowland J *et al. The descriptive epidemiology of leukaemia and related conditions in parts of the United Kingdom 1984-1993.* London: Leukaemia Research Fund, 1997.

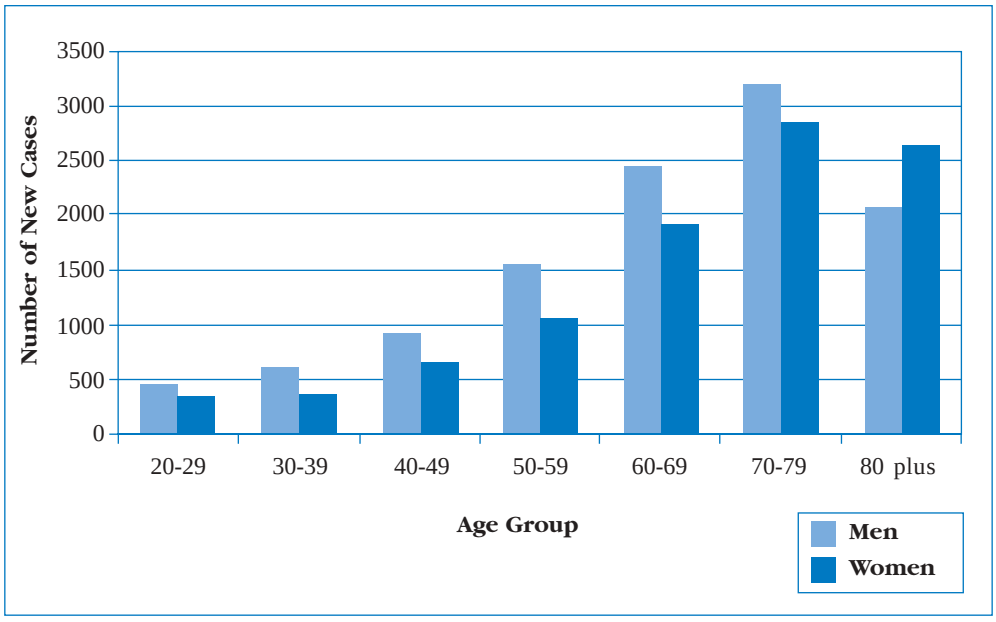
incidence rose almost three-fold between 1971 and 1997. The increased rate of diagnosis almost certainly reflects a real increase in incidence.[5]

Prevalence is also increased by improved survival rates. Before the 1970s, non-Hodgkin's lymphoma was usually fatal, but developments in therapy between 1971 and 1986 led to a 14% increase in five-year survival rates. Similar improvements are apparent for leukaemia: five-year survival rates have doubled since the early 1970s. In multiple myeloma, substantial improvements have been achieved in short-term (one- to three-year) survival rates, although longer term survival rates remain poor.[5]

Incidence and survival rates vary greatly with age. In people under the age of 60, five-year relative survival rates for leukaemia are around 40%; but in those over 70, only 20-25% survive this long after diagnosis. Age-related differences in survival time are particularly marked in acute myeloid leukaemia (AML). Leukaemia incidence and mortality rates have risen sharply in the elderly but not so much in younger people, which tends to depress overall survival rates. Similar patterns can be seen for other forms of haematological cancer, although aggressive lymphoma in older patients is unlike acute leukaemia in that it can often be successfully treated.

Considered as a group, haematological cancers become more common as populations age. The number of new cases among adults almost doubles with each decade between 20 and 60, and continues to rise until the eighth decade (Figure 1).

Figure 1. Number of new cases of haematological cancers (all types, combined) by age group, 1997[5]



[5] Quinn M, Babb P, Brock A, *et al. Cancer trends in England and Wales 1950-1999.* London: The Stationery Office, 2001.

It is not possible to judge whether outcomes for patients in Britain are better or worse than elsewhere. Survival rates in England and Wales are reported to be below the European average and lower than in the USA, but these apparent differences may not accurately reflect reality. For example, mortality statistics for haematological cancers are particularly unreliable because many patients die from infections and these, rather than the underlying cancer, may be recorded as the cause of death; and when national descriptive statistics are unreliable, international comparisons will be even more misleading.

Classification

One of the reasons for the lack of trustworthy statistics is that a reliable classification system for haematological malignancies has only recently been developed and agreed by oncologists and pathologists. Accurate classification is important because each type of haematological cancer has unique characteristics. To assess prognosis and select the optimum form of therapy, it is essential to know precisely what type of cancer the patient has.

There have been numerous attempts at classification, with 25 different systems recorded for lymphoma alone over the last quarter-century. The classification problem has recently been resolved by the development of the REAL/WHO system, which has been adopted by most pathologists in the UK. This allows the diagnosis of leukaemias and lymphomas to be cross-checked and agreed by laboratory-based pathologists and clinicians. Regrettably, the REAL/WHO system can be difficult to relate to classification systems on which national population statistics are based.

The REAL/WHO classification system is based on a combination of features, which together define the type of cancer. These are:

- Morphology of the tumour cells – their shape, size and general appearance under a microscope;
- Immunophenotype – specific proteins produced by tumour cells;
- Genetic features – mutations or abnormal arrangements of genes;
- Clinical features, including symptoms.

Although the REAL/WHO system was developed for lymphomas, the precise diagnosis of leukaemia is based on similar criteria. An initial diagnosis of acute leukaemia may be made on the basis of the patient's symptoms and the microscopic appearance of a blood sample, but, as with lymphoma, discrimination between sub-types and treatment selection requires a wider range of diagnostic tests.

Symptoms and treatment

Leukaemias

Leukaemias tend to produce generalised symptoms, notably fatigue, bruising, bleeding and reduced resistance to infection. The severity of disease, rate of progression and treatment varies greatly between leukaemias, so precise identification of the specific form of leukaemia is crucial to optimum management.

Acute leukaemia

This is a group of rapidly-progressing diseases, which includes acute myeloid leukaemia (AML) and acute lymphoblastic leukaemia (ALL). Acute leukaemia can affect adults of any age, but the incidence of AML rises sharply in middle age and is highest among elderly patients, whilst most people with ALL are under 65.[6] These diseases cause severe anaemia which makes sufferers feel absolutely exhausted; they are prone to repeated infections because they cannot produce enough normal blood cells to mount an effective immune response.

Acute leukaemia is treated with intensive chemotherapy, given on an in-patient basis through intravenous catheters, over periods of about four weeks at a time. Patients undergoing such treatment are extremely vulnerable to life-threatening infections (neutropenic sepsis) and great care has to be taken, both to minimise the risk of infection and to treat it rapidly and effectively when it occurs. Specialist nursing and 24-hour cover by appropriately trained medical staff are required.

Stem cell rescue – infusion of tissue from which blood cells develop – may be used in the hope of re-populating bone marrow destroyed by chemotherapy with healthy cells. This may require a transplant of donated bone marrow that closely matches the patient's own (allogeneic bone marrow transplant, or BMT) or re-infusion of cells taken from the patient before high dose chemotherapy (autologous stem cell rescue). Both methods carry specific risks: graft-versus-host disease with allogeneic transplants, or re-seeding with tumour with autologous transplantation.

Although acute leukaemia is sometimes cured, it frequently goes into remission after treatment, only to recur some time later. When this happens, the treatment may be repeated, perhaps intensified. It can be very difficult to judge the point at which attempting to cure leukaemia ceases to be in the best interest of the patient.

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[6] South Thames Haematology Specialist Committee and Thames Cancer Registry. *Report of the South Thames Haematology Register Cancer Sub-Committee on the Incidence of Haematological Malignancies in 1999.* London: King's College, 2001.

Chronic leukaemia

Chronic lymphocytic leukaemia (CLL) is the most common form of leukaemia, but it may also be classified as a form of lymphoma. It is most often found in elderly people. The effects of CLL vary widely; some people feel quite well and the condition is discovered incidentally; others may experience gradually increasing fatigue, repeated infections, sweats, bleeding problems, swollen lymph nodes and a swollen spleen which can become painful. A wide range of treatments may be used and there is considerable uncertainty about optimum management.

The second major form of chronic leukaemia is chronic myeloid leukaemia (CML). Younger people with CML can achieve long-term freedom from the disease after high dose therapy and transplantation of bone marrow from a matched donor (allogeneic BMT); although risky, this is currently the only curative treatment. Palliative measures may keep the symptoms under control for a few years, but the progress of the disease cannot be halted except by BMT; without this, CML is invariably fatal. Imatinib (Glivec) is a new form of treatment for CML, the first of a range of drugs designed to target the specific abnormal proteins produced by the cancer. This approach seems very promising but its long-term effects are unknown.[7]

Myeloproliferative disorders (MPD)

These are chronic conditions caused by bone marrow abnormalities, which usually affect older patients. People with myeloproliferative disorders may experience few problems at first, but fatigue is common as the condition progresses. Some develop night sweats, enlarged and painful spleens, bleeding or circulation problems, thromboses and other symptoms, depending on the condition. Out-patient supportive treatment or single agent therapy is normally sufficient, but some patients develop vascular complications and require treatment from other clinical specialists.

Myelodysplastic syndrome (MDS)

Like myeloproliferative disorders, myelodysplastic syndrome is caused by abnormal bone marrow and tends to affect older patients. It causes progressive marrow failure, leading to anaemia, problems with blood clotting and reduced resistance to infection. People with these diseases are usually given supportive care and regular transfusions on an out-patient basis. In about 30% of cases, myelodysplastic syndrome turns into acute myeloid leukaemia; when this occurs in younger patients, bone marrow transplantation may be offered.

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[7] National Institute for Clinical Excellence. *Guidance on the use of imatinib for chronic myeloid leukaemia.* Technology Appraisal Guidance No. 50. London: NICE, 2002.

Lymphomas

Lymphoma, the most common type of haematological cancer, includes a wide range of conditions. Lymphomas tend to produce lumps in lymph nodes; some forms affect other tissues such as the skin, lung or gut. Traditionally, lymphomas have been divided into Hodgkin's disease (now known as Hodgkin's lymphoma) and non-Hodgkin's lymphoma (NHL), but NHL is a diverse group of conditions which is often sub-divided into aggressive and indolent forms. This distinction is, however, blurred, because some normally indolent diseases are capable of progressing quite rapidly.

Hodgkin's lymphoma

Hodgkin's lymphoma is most common in relatively young people, with maximum incidence rates between the ages of 20 and 30, although it can affect adults of any age. It usually produces a painless lump in the neck, but lumps can develop in other parts of the body such as the chest. Other symptoms include recurring fevers and night sweats, weight loss and itchy skin.

It is often possible to cure Hodgkin's lymphoma with appropriate treatment. Decision-making about treatment depends on accurate staging, which requires specialist cross-sectional imaging facilities. Hodgkin's lymphoma is usually treated with multi-agent chemotherapy, given on an out-patient basis for several months. Radiotherapy may be given for localised or bulky disease or to treat masses that persist after chemotherapy. High dose chemotherapy with stem cell rescue can be offered to patients whose disease fails to respond to initial treatment, or who relapse after treatment.

Many patients with Hodgkin's lymphoma will want to have children after treatment. They are particularly likely to need fertility services.

Aggressive non-Hodgkin's lymphomas: diffuse large B-cell lymphoma (DLBCL), peripheral T-cell lymphoma, Burkitt's lymphoma, mantle cell lymphoma and AIDS-related lymphoma

People with aggressive non-Hodgkin's lymphomas usually develop lumps, which may grow quite rapidly. Although these lumps most often form in the neck, they can occur in other body sites, including the groin, abdomen, or armpit; on the skin, in the brain, lung, or bone marrow. By the time the condition is diagnosed, most patients have widespread disease, with fever, fatigue, weight loss and night sweats.

The most common aggressive lymphoma is DLBCL, which accounts for about 30% of new cases of NHL. AIDS-related lymphoma is a particularly aggressive condition. Burkitt's lymphoma produces fast-growing tumours in the abdomen.

Precise identification of the form of lymphoma and accurate staging using cross-sectional imaging is crucial both for choosing the optimum form of treatment and for monitoring progress. This requires specialist diagnostic staff and facilities. Most patients are treated on an out-patient basis with multi-agent chemotherapy over several months, but those who have very aggressive conditions such as Burkitt's lymphoma require in-patient treatment. Radiotherapy may be used to reduce bulky or localised tumours. About half of the total number of patients with aggressive lymphomas will need second-line therapy, sometimes high dose chemotherapy. Several trials are investigating the role of monoclonal antibodies in the treatment of lymphoma.

Less aggressive ("low-grade" or "indolent") lymphomas

Indolent, or low-grade, are misleading terms which should not be taken to mean minor: these diseases are usually incurable and eventually fatal. However, their rate of progression may be slow, with median survival periods of up to 10 years for some follicular lymphomas.[8] Like chronic lymphocytic leukaemia (CLL), which can be classified as a member of this group, these conditions tend to affect older people. Follicular lymphoma, which accounts for 22% of all cases of haematological cancer, is the most common form. Others include Waldenstrom's lymphoma and marginal zone lymphomas. Some types of marginal zone lymphoma form in lymph nodes, whilst others produce tumours outside lymph nodes – for example, on the skin or in the stomach lining.

The clinical presentation, rate of disease progression and patterns of treatment vary widely. The disease may continue for a decade or more and treatment is not always required; watchful waiting, with appropriate interventions when symptoms develop, is often the best option.

In a small minority of cases, the disease is localised and may be curable, for example by radiotherapy to a single lymph node. Usually (in probably 85-90% of cases), the disease has spread by the time of diagnosis and these patients are not likely to be cured. Nevertheless, there is much that can be done.

Selecting the most appropriate form of intervention is a complex decision process that must be re-visited each time the patient relapses. Once treatment becomes necessary, it is likely to be needed for the rest of the patient's life. Most patients are treated with single agent chemotherapy on an out-patient basis, but some will require regular supportive treatment such as blood transfusions and plasma exchange to manage blood abnormalities. There may be multiple episodes of remission and relapse, and the nature of the disease can change at relapse – often to a more aggressive form.

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[8] National Institute for Clinical Excellence. *Guidance on the use of rituximab for recurrent or refractory Stage III or IV follicular non-Hodgkin's lymphoma.* Technology Appraisal Guidance No. 37. London: NICE, 2002.

Patients with extra-nodal forms of NHL – that is, lymphomas that develop outside lymph nodes, such as those which affect the skin or intestine – may currently be treated by specialists who deal with that particular body system, particularly dermatologists and gastroenterologists. However, since these are systemic diseases, local treatment is rarely sufficient.

Younger patients who relapse after initial treatment may be offered high dose therapy, and there are several trials in progress to establish whether the benefits of such aggressive treatment justify the difficulties and risks. There are also several on-going trials of monoclonal antibodies such as rituximab. This approach to treatment is expected to become increasingly important in the future.

Myeloma and monoclonal gammopathy of uncertain significance (MGUS)

Myeloma causes painful, crippling bone destruction. As the disease progresses, the bones become very fragile and prone to fracture. Most patients present with persistent bone pain (usually backache), general malaise, and symptoms caused by blood abnormalities such as headaches and bleeding. Destruction of the bones produces high levels of calcium in the blood, which causes tiredness, thirst, nausea, and kidney problems. Some patients develop neurological problems such as spinal cord compression.

Many of these patients may be referred initially to hospital departments other than haematology – in particular, rheumatology, orthopaedics, and renal medicine. This may result in considerable delay in diagnosis. Myeloma is diagnosed by blood tests, examination of bone marrow, and imaging.

Myeloma is not curable but chemotherapy can often induce temporary remission. Typically, patients experience repeated periods of relapse, treatment and remission over the course of some years until the disease can no longer be controlled. High dose therapy with stem cell rescue is being increasingly used for those who can tolerate it, to reduce symptoms and increase survival time.

Patients with myeloma require treatment by a range of specialists, including haematologists, neurologists, oncologists, orthopaedic surgeons, pain specialists and renal specialists.

MGUS – monoclonal gammopathy of uncertain significance – is an abnormality which may be found on blood tests. Of itself, it produces no symptoms, but it can turn into myeloma or other haematological malignancies. In many people, MGUS remains stable and no active treatment is required.

Long-term impact of treatment for haematological cancer

Curative treatments for haematological cancer, particularly intensive or high dose therapies, can have lasting effects. These include a markedly increased risk of secondary primary cancers, particularly among people treated for Hodgkin's lymphoma. Secondary leukaemias have been linked with chemotherapy, and solid tumours, such as breast and lung cancers, with radiotherapy used to treat leukaemia or lymphoma. All these forms of cancer tend to emerge at a younger age in long-term survivors of haematological cancer than in the general population.[9]

Long-term hormone-related problems are also relatively common. Most patients will be rendered infertile by treatment for haematological cancer, and fertility services are important to enable at least some younger patients to have children.

Epidemiology, causes and trends

As stated earlier, the incidence of haematological malignancy, particularly NHL, appears to be rising quite rapidly. If this rate of increase continues, NHL will become one of the most common cancers in the next few years.[10] Although some of this apparent increase could be due to better case-finding, it is likely that there has been a real rise in the incidence of haematological cancers. Environmental pollution – both chemical pollution and radiation – is believed by many to be the underlying cause of a substantial part of the rise in these forms of cancer, but there is not yet sufficient reliable evidence to draw firm conclusions on this.[11]

Immune system depression, which has been linked with many forms of haematological cancer, affects increasing numbers of people. This can be due to diseases such as HIV, to drugs used to prevent rejection of transplanted organs, or to cytotoxic treatment (chemotherapy or radiotherapy), especially prolonged treatment with alkylating agents such as cyclophosphamide. All are becoming more common.

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[9] This information is derived from studies summarised in *Improving Outcomes in Haematological Cancers, The Research Evidence.* Available on the NICE website: <www.nice.org.uk>

[10] Cartwright RA. Non-Hodgkin's Lymphoma. In Hancock BW, Selby PJ, MacLennon K, Armitage JO. *Malignant Lymphoma.* London: Arnold, 2000.

[11] Steingraber S. *Living downstream: an ecologist looks at cancer and the environment.* London: Virago, 1999.

Immunosuppression can also be caused by agricultural and industrial chemicals, and such chemicals could be responsible for at least some of the rise in incidence of NHL. There are local excesses of NHL in rural areas, relatively high incidence rates among farmers and horticulturalists, and associations between exposure to agricultural biocides and risk of NHL. However, whilst atrazine, lindane and phenoxy herbicides such as 2,4D have all been implicated in some studies, current evidence does not show a clear-cut association between any specific agricultural chemical and lymphoma.[12]

Petrochemicals have been linked with various forms of haematological cancer. Benzene is particularly hazardous; long-term exposure is known to damage the bone marrow and to cause myeloid leukaemia.[13] These effects are dose-related but sensitivity varies widely between individuals. Benzene is widespread in the environment – it is found, for example, in cigarette smoke, engine exhaust and petrol fumes – but it is not known whether low concentrations precipitate leukaemia. The risk of acute myeloid leukaemia is doubled in people who smoke 20 cigarettes daily; about half of this excess risk can be attributed to the benzene content of cigarette smoke.[14]

Exhaust from petrol and diesel engines contains several harmful chemicals. Exposure to engine exhaust significantly increases the risk of multiple myeloma, but recent analyses suggest that benzene is not the causative agent, which remains unknown.[15]

Associations have also been found between exposure to tetrachloroethylene, a solvent widely used for dry cleaning and degreasing, and various forms of cancer including NHL. Although the published evidence for increased risk of NHL among people working with tetrachloroethylene is limited to three cohort studies, their results are consistent. Tetrachloroethylene is known to cause leukaemia in rats.[16]

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[12] Cartwright RA. Non-Hodgkin's Lymphoma. In Hancock BW, Selby PJ, MacLennon K, Armitage JO. *Malignant Lymphoma*. London: Arnold, 2000; pp171 and 173.

[13] Rinsky RA, Smith AB, Hornung R, Filloon TG, Young RJ, Okun AH, Landrigan PJ. Benzene and leukaemia: An epidemiologic risk assessment. *New Engl J Med* 1987;**316**:1044-1050.

[14] UK Department of the Environment, The effects of benzene on human health. Available at: <www.defra.gov.uk/environment/airquality/aqs/benzene/6.htm> International Association for Research into Cancer (IARC) monograph vol. 83 on smoking, available on: <http://monographs.iarc.fr>

[15] Sonoda T, Nagata Y, Mori M, Ishida T, *et al*. Meta-analysis of multiple myeloma and benzene exposure. *J Epidemiol* 2001;**11**:249-254.

[16] International Association for Research into Cancer (IARC) monograph vol. 63 on tetrachloroethylene, available on <http://monographs.iarc.fr>

NHS services for haematological cancers

A range of different levels of service, corresponding with the variety of forms of disease, is required to manage patients with haematological cancers. Patients with acute leukaemia may need repeated periods of intensive in-patient treatment lasting over three or four months; most will be re-admitted many times over a period of years. Hospital episode statistics show that haematological cancers account for about 17,000 in-patient bed days per million population per year, but the actual figure could be substantially higher than this. By contrast, patients with conditions at the opposite end of the spectrum of aggressiveness may need little more than regular monitoring.

The range of degrees of complexity of hospital treatment may be summarised as follows; the levels correspond with those specified by the British Committee for Standardisation in Haematology (BCSH).[17]

Level 1 Hospitals providing conventional chemotherapy and other forms of out-patient treatment, using dose levels that would not be expected to produce prolonged neutropenia.

This level may be subdivided into five types of service:

i. Out-patient assessment and monitoring.

ii. Out-patient chemotherapy and haematological support (e.g. oral chemotherapy for CLL and palliative interventions for myeloproliferative disorders).

iii. Day case chemotherapy e.g. for NHL.

iv. In-patient chemotherapy and palliative treatment, e.g. for patients with NHL who cannot cope with day case treatment.

v. Facilities for management of neutropenic sepsis.

Level 2 Facilities for remission induction in patients with acute leukaemia, using intensive chemotherapy regimes. This level of facility is also required to treat patients with aggressive lymphoma.

Level 3 Facilities for autologous transplantation, using the patient's own bone marrow or peripheral blood stem cells.

[17] The four levels of care defined by BCSH are described in *Guidelines on the provision of facilities for the care of adult patients with haematological malignancies*, available on the BCSH website at: <www.bcshguidelines.com/pdf/CLH3.pdf>

Level 4 Centres with expertise in both autologous and allogeneic transplantation, which provide bone marrow transplants from matched donors.

It is believed that over a hundred hospitals in England and Wales provide treatment at Levels 1 to 2; another 50 carry out autologous transplantation (Level 3), of which about 30 also carry out allogeneic transplants (Level 4). Accreditation standards for bone marrow transplantation (available on www.ebmt.org) specify that any hospital which offers stem cell rescue – whether autografts or allografts – should carry out a minimum of 10 procedures of the type offered per year. Returns to the European Group for Blood and Marrow Transplantation (EBMT) suggest that this criterion is not met in all Trusts.[18]

Complex chemotherapy for induction of remission in acute leukaemia (Level 2) is just as clinically complex, demanding and risky as autografting, with treatment-related death-rates of up to 25% in patients over 60 years old and around 8% in younger patients. This emphasises the importance of all units performing this work having sufficient experience, staff, and facilities to deliver these treatments safely and effectively.

At present, patients with leukaemias and most other forms of haematological cancer are managed by haematologists. Although Trusts vary widely, NHS services for patients with leukaemia have some impressive features. The proportion of patients entered into clinical trials is high; haematologists are particularly likely to work to protocols; and follow-up systems are often good. There is a high level of networking between haematologists, which may be seen as a rational way of coping with individual lack of specialisation in haematological malignancy. Pooling knowledge by involvement in trials, extensive use of protocols and consultation with colleagues tends to improve the probability that individual patients are offered the most effective treatment.

Problems are more likely to occur with types of haematological cancer other than acute leukaemia, where the cause of the symptoms may be more difficult to identify. The symptom patterns within the spectrum of haematological malignancy are very variable, so patients who are not referred directly to a haematologist may take a range of routes through the system, seeing a series of specialists before a diagnosis is established.

[18] Gratwohl A, Baldomero H, Horisberger B, *et al.* Current trends in hematopoietic stem cell transplantation in Europe. *Blood* 2002;**100**:2374-2386.

Current services are, moreover, very heterogeneous. Although some parts of England have established formal multi-disciplinary team (MDT) working, with specified teams for each major form of haematological cancer, many haematologists in other areas are accustomed to working without such support; some, indeed, work effectively single-handed. The level of integration between oncology and haematology also varies widely and it may not be clear where responsibility for some patients should lie.

Some specific aspects of NHS services give particular cause for concern. For example, there is evidence showing an unacceptably high rate of errors in diagnosis (see Topic 3, *Diagnosis and evaluation*). Current diagnostic services fall into four broad categories:

1. Fully integrated specialist diagnostic laboratories.

2. Services spread over different laboratories. Typically, pathology, haematology and immunology departments share the workload. With this way of working, the results have to be integrated into a single interpretative report containing all the information relevant to the management of the patient, to avoid duplication and possible contradictions that may arise when key investigations are carried out in separate laboratories.

3. Access to some specialist technical services. Many district general hospital laboratories can carry out a limited range of diagnostic tests on site, with reports on tissue specimens (e.g. lymph node biopsies) provided by general pathologists whilst blood and bone marrow specimens are assessed by the haematologist who also treats the patients. Some specimens may be referred to larger centres for specialist investigations.

4. No access to specialist diagnostic services (this is not believed to be a common situation).

Even when specialist diagnostic review is available, treatment plans are not always altered when expert review suggests that an alternative treatment would be more appropriate. This suggests poor integration between diagnostic and clinical services.

The level of expertise of clinical staff also varies widely from Trust to Trust. Patients report excellent services in some hospitals, but obvious inadequacies – lack of suitably trained nurses, for example – in others. An adequate service requires high levels of staffing by nurses and doctors who have sufficient expertise to respond appropriately to medical crises which may occur at any time without warning. A single-handed haematologist simply cannot provide this level of care all the time.

Lack of integration between haematology and other clinical disciplines means that people with haematological malignancies may not have access to services from which they would benefit. Haematologists who treat these patients need to be able to work closely with other disciplines, particularly oncology (including adolescent oncology), palliative care services and services for the elderly. Such integration would benefit patients and reduce the load on haematologists.

Commissioning services for haemato-oncology

All bodies which commission services for patients with haematological cancers within each cancer network should work together to ensure that these services function in a co-ordinated way. Smaller networks may collaborate and pool resources to deliver a full range of services. These issues are further discussed in Topic 4, *Organisation of specialist services.*

This version of the guideline includes the 2003 recommendations and is for reference only. See the addendum and short version of the guideline for recommendations made as part of the 2016 update.

Recommendations in this document are shaded:

- **green if the evidence has been reviewed**
- **peach if the evidence has not been reviewed**
- **grey if the recommendation will be deleted from the final version of the guideline.**

1. Access to care

A. Recommendations

Urgent (two-week) referral guidelines

The following guidelines for urgent referral have been published by the Department of Health:[1]

- Blood count/film reported as suggestive of acute leukaemia or chronic myeloid leukaemia;
- Lymphadenopathy (>1cm) persisting for six weeks;
- Hepatosplenomegaly;

[1] Department of Health. *Referral Guidelines for Suspected Cancer*. Available on: <www.doh.gov.uk/cancer>.

- Bone pain associated with anaemia and a raised ESR or plasma
- viscosity;
- Bone x-rays reported as being suggestive of myeloma;
- Constellation of three or more of the following symptoms: fatigue, night sweats, weight loss, itching, breathlessness, bruising, recurrent infections, bone pain.

Patients with these symptoms should be referred to the haemato-oncology multi-disciplinary team (MDT) without delay (see Topic 4, Organisation of specialist services). Every hospital which receives urgent referrals should establish a process to ensure that patients with lymphadenopathy are seen by designated clinicians.

Routine referral

General practitioners (GPs) should work with specialist clinicians in the cancer network to produce locally agreed referral guidelines for haematological malignancies. These guidelines should be designed to help GPs to identify possible sufferers, give contact details for the haemato-oncology MDT to which patients with suspected haematological cancer should be referred, and specify information required from the referring doctor.

Haematological malignancies tend to cause extreme forms of nonspecific symptoms that may seem common in general practice, notably unusual tiredness. Patients describe the distressing and destructive experience of feeling ill for long periods of time, consulting GPs repeatedly, yet not being taken seriously. This problem is an understandable consequence of the rarity of these diseases: an individual GP

may only see one new patient with one of these conditions every two years; and although lymphadenopathy is common, few patients with lymphadenopathy have cancer.

These conditions can cause a wide variety of symptoms. GPs should consider the possibility of haematological cancer when patients present with fatigue, night sweats, weight loss, itching in the absence of a rash, breathlessness, bruising, recurrent infections or persistent bone pain, and carry out a systematic assessment to check whether they have other symptoms that might be consistent with such a diagnosis.

Any patients with unexplained lymphadenopathy (a lump - usually in the neck but sometimes in the axilla or groin - which persists for more than six weeks in the absence of signs of infection) should have a full blood count and should be referred either to a designated clinician with specific responsibility for investigating lymph nodes, or to a lump clinic (see below), for assessment within two weeks. Patients who require biopsies should be referred to designated surgeons who work with the lymphoma MDT (see Topic 3, Diagnosis and evaluation). No patient should undergo surgical excision or biopsy of an enlarged lymph node without preliminary discussion with a haematologist or oncologist.

GPs should review their threshold for ordering blood counts to detect haematological malignancy to check that it is in line with current guidelines. A full blood count should always be carried out if the GP is suspicious but a normal blood count should not be taken as definitive evidence that the patient does not have a haematological malignancy.

In about three-quarters of cases, chronic lymphocytic leukaemia (CLL) is diagnosed incidentally, by a blood test taken for reasons other than suspected haematological

malignancy. Such patients should be given information and reassurance about their condition before referral to a routine out-patient haematology clinic. Most will never require treatment.

The range of time-scales over which haematological cancers develop is wide, but probably fewer than 2% of patients present as emergencies. These patients usually have acute infections and the disease is likely to be diagnosed by a blood test at the time of admission. A patient with acute leukaemia discovered by a blood test would normally be admitted to hospital within 24 hours.

Patients with multiple myeloma may present in a variety of ways. Early symptoms can include back pain, bone pain, fatigue, anaemia, infections and kidney problems. Bone pain is the most common presenting symptom and it is important that GPs should consider this possibility and order appropriate blood tests and plain x rays when they see patients with bone pain and other symptoms that could be due to myeloma, since non-steroidal anti-inflammatory drugs can precipitate renal failure in these patients.

In about a third of patients with myeloma, the initial diagnosis is made by a blood test and such patients come to the attention of haematologists directly; the other two-thirds are referred through various routes, such as rheumatology, orthopaedic or renal departments. Any patient who is to have surgery for a lytic lesion (hole in bone) should first have a test for paraprotein to check for multiple myeloma.

Investigation of lymphadenopathy

Networks should ensure that adequate rapid access facilities are available for investigation of lymphadenopathy, with a locally agreed, specified process that ensures that appropriate

investigations are available quickly. GPs should refer all patients with persistent, unexplained lymphadenopathy to designated clinicians with specific responsibility for investigating this particular symptom. Formal lump clinics may be established to investigate isolated lumps in the neck or axilla; these would be broadly similar to one-stop breast diagnosis clinics, but organised collaboratively by haematology, ENT, and services for head and neck cancer.

Whatever form of organisational structure is used, it should be designed to facilitate co-operation between designated haematologists, radiologists, ENT specialists, head and neck surgeons and oncologists (see lymphoma MDT, Topic 4, Organisation of specialist services), who should work together to provide an appropriate diagnostic workup for patients with lymphadenopathy (see Topic 3, Diagnosis and evaluation). Patients found to have cancer should be referred without delay to the appropriate MDT. There should be pre-booking systems for appointments at results clinics at which each patient with a diagnosis of cancer would be seen by a senior member of the MDT which deals with that type of cancer, and where support would be available from a clinical nurse specialist.

Networks should agree local clinical guidelines designed to ensure that patients who are seen initially in dermatology departments or who present with gastro-intestinal or chest symptoms, but who are found to have lymphomas, are referred without delay to the haematological cancer team. Implementation of these guidelines should be audited.

No definitive treatment should be given for haematological cancer, with the exception of highly aggressive conditions such as Burkitt's lymphoma or acute leukaemia, without discussion by the appropriate MDT. If such treatment is

given, it should be discussed by the MDT at the earliest opportunity.

B. Anticipated benefits

Implementation of these recommendations should lead to improved detection of possible haematological cancer in primary care and more appropriate referral of patients. This will reduce delays in diagnosis, so that patients can be offered suitable treatment more quickly. There is considerable anecdotal evidence that people who go through ENT services but are found to have lymphomas may wait for long periods before receiving appropriate treatment.

A significant proportion of patients with unexplained and persistent lumps in the neck or axilla have malignant disease, often lymphoma. Rapid-access lump clinics can offer an efficient route to treatment both for patients with lymphomas and for those with head and neck cancers.

C. Evidence

Note: the reliability and quality of evidence supporting the recommendations is graded as A, B and C, where A is the strongest evidence. The grading taxonomy is explained in Appendix 2.

Patient surveys suggest that a substantial proportion of people feel unwell for long periods and consult their GPs repeatedly before appropriate investigations are carried out to diagnose haematological malignancy.(C) Delays in diagnosis do not seem to affect long-term outcomes in lymphoma but the level of any potential risk posed by delay is likely to depend on the nature of the disease. Shorter delays appear to be associated with worse prognosis because more aggressive disease is diagnosed more quickly; so evidence suggesting no

relationship between delay in diagnosis or treatment and clinical outcomes may be misleading.

The NHS National Patient Survey reported that 68% of patients with NHL were given a hospital appointment within a month of consulting their GPs, and 43% were seen within two weeks. However, 6% had to wait more than six months, and 41% said that their condition had deteriorated while they waited for an appointment. The majority of patients were told the diagnosis at, or before, their first hospital appointment, but 25% had to wait another two weeks or more. The delay before treatment began was also long for some patients – 13% waited seven months or more after their first hospital appointment.[2]

A study of 89 patients with lymphomas from four UK centres between 1997 and 1999 found that the average delay between the onset of symptoms and the beginning of treatment was 7.5 months. The largest single component was delay by the patients themselves – on average, nearly four months. The mean period between initial consultation and diagnosis (diagnostic delay) was 2.8 months, the greatest part of which occurred between the initial appointment and biopsy.(B)

Both patients and GPs report high levels of satisfaction with one-stop diagnostic clinics. These allow initial investigations to be carried out over a short time-period, thus reducing patient uncertainty and diagnostic delay, and can help to rationalise referral patterns.(B). Advantages of this arrangement include high levels of patient and GP satisfaction and the capacity to screen out benign conditions and epithelial cancers. Data from an established lymph node diagnostic clinic at the Royal Marsden Hospital in London, to which patients are directly referred by GPs, shows that

[2] Airey C, Becher H, Erens B, Fuller E. National Surveys of NHS Patients: Cancer, National Overview 1999/2000. London: Department of Health, 2002

median time from initial referral to diagnosis of malignancy was three weeks. 12% of these patients were found to have lymphomas. 46% of the patients referred by GPs or hospital departments to a dedicated clinic for investigation of neck masses at Wexham Park Hospital, Slough, had enlarged lymph nodes. Of these, 7% had lymphoma and 22% had squamous cell carcinoma.(B)

D. Measurement

1

Structure

- Referral guidelines for GPs, agreed across the network, which specify named clinicians to whom, or clinics to which, patients with possible or suspected haematological cancer should be referred.
- Local clinical guidelines which specify that patients who present with gastro-intestinal, chest or dermatological symptoms, but who are found to have lymphomas, should be quickly referred to an appropriate haematological cancer MDT when the diagnosis is established.
- Facilities for rapid investigation of lymphadenopathy. These may be:

either: specific clinics for rapid investigation of lymphadenopathy (rapid-access lump clinics at cancer units), staffed by designated clinicians who work in haematology and/or oncology,

or: designated clinicians with close links with haematology and/or oncology, who take responsibility for prompt and appropriate investigation of lymphadenopathy.

- Designated surgeons, who work with the clinicians or clinics described above, who carry out lymph node biopsies within an agreed time and refer patients with suspected haematological cancer to the appropriate haemato-oncology MDT.

Process

- Audit of time from first GP consultation with symptoms of cancer to referral.
- Audit of time from referral to diagnosis; this should be less than four weeks.
- Audit of patient pathways against guidelines which specify referral patterns for patients with haematological cancer, particularly those whose presenting symptoms affect the gastrointestinal tract, chest or skin.

Outcome

- Patient satisfaction.

E. Resource implications

Improving access to appropriate diagnostic clinics for patients with possible symptoms of haematological cancer is likely to involve streamlining the current service. These patients are already in the hospital system, so these resources will, to a large extent, already be available. It should, therefore, be possible to implement the recommendations in this topic area by re-organising the use of existing resources.

2. Patient-centred care

2

It is anticipated that the National Institute for Clinical Excellence (NICE) guidance on improving supportive and palliative care for adults with cancer will be published in 2003. This guidance is intended to complement this manual, giving detailed and specific recommendations on many of the issues introduced in this section as they apply to cancer care generally, with supporting evidence. It will cover the following topic areas:

- Co-ordination of care;
- Face-to-face communication;
- Information;
- Psychological support services;
- Specialist palliative care services;
- General palliative care services;
- Social support services;
- Rehabilitation services;
- Complementary therapy services;
- Spiritual support services;
- Carer and bereavement support services;
- User involvement.

A. Recommendations

Clinical nurse specialists

Clinical nurse specialists should be available to provide support for patients with haematological cancer. These nurses should have specific training in communication, counselling and ethics; they should be full members of haematological cancer multi-disciplinary teams, with specific responsibility for facilitating the provision of patient-centred care and the involvement, as necessary, of other professionals. They will provide information and support for patients and help other clinical staff to acknowledge and give full consideration to individual patients' perspectives. (See Topic 4, *Organisation of specialist services*.)

From the time of diagnosis, each patient should have access to a specific clinical nurse specialist who can offer psychosocial support and continuity of care. Each patient and his/her carer should be given a telephone number so that they can contact this nurse when they feel they need information, help or support. Whilst most people with cancer are primarily concerned that their chances of survival should be maximised through appropriate treatment, it is important that their other needs are also recognised and met. These include emotional and practical needs, and may range from simple human contact and reassurance to help and advice on practical issues such as getting appropriate and acceptable food in hospital.

The counselling role of the clinical nurse specialist is likely to be particularly important in haematological cancer. For some patients, the balance between the potential survival benefits of treatment and the risk and suffering that the process may entail is such that the decision about whether to go through with it is very difficult. For others, such as older patients

with acute leukaemia, and those for whom repeated efforts to control the disease have failed, the risks of intensive treatment may make it inadvisable. In these cases, in particular, counselling by a clinical nurse specialist who understands both the nature of the disease and the dilemma faced by the patient, and with whom patients and carers feel they can talk freely, can be especially valuable.

Information for patients

A recurring theme in patients' experiences of services for haematological cancer is lack of information: first about their diagnosis, and later about what may happen to them. Effective systems should be established to ensure that clear, honest and consistent information is given to patients from the outset.

Clinical nurse specialists can play crucial roles in ensuring that patients and carers understand both what is happening to them and what is likely to happen as they progress through the various phases of their illness and treatment, but all those involved in caring for these patients should adopt an attitude of openness and willingness to share information.

The consultation at which patients learn that they have cancer is a crucial event. Sensitive and compassionate communication is essential. This is, literally, a life-changing experience for patients.[3] Although factual details may be forgotten, the way the news that they have cancer is broken is often remembered with great clarity; it colours later relationships with health professionals, establishing either trust or deep resentment. In haematological cancer, there is often more than one "bad news" consultation during the course of the disease.

[3] National Cancer Alliance. *Patients' views of haematological cancer services and the draft national haematological cancer guidance.* April 2001, p 17.

Patients should be encouraged to bring a close friend or relative to "bad news" consultations. The consultation should be held in a private room by a senior clinician, preferably the individual who will be responsible for the patient's future care. Adequate time should be allowed for explanation and there should be no interruptions.

The nurse specialist should be present during this consultation and should remain with the patient afterwards to offer support and further information tailored to individual needs. Other people, such as students, should only be present with the patient's explicit consent.

All clinicians, particularly those in senior positions, should have specific training in communication skills. Such training should also be available for other health professionals who have responsibility for face-to-face care.

When there is a choice between different therapeutic approaches, patients should be offered the opportunity to discuss the options in a joint meeting with the clinicians who would be responsible for their treatment and the specialist nurse. Providers should ask patients if they want additional information and seek to discover how much they wish to be involved in discussions about treatment. If there is uncertainty about what treatment might be necessary, patients should be given realistic information about the different possibilities. Clinicians should tell patients as early as possible if they have reason to believe that successive courses of treatment will be required, that recovery could entail an extended period of time, or that the disease is incurable.

It is important that patients' views about treatment are respected. Different individuals vary widely in their attitudes and in their willingness to tolerate cancer treatment, and their views may change from time to time. Some would choose

the chance of extended survival at almost any cost, some would rather die of their disease than undergo intensive therapy, and others may choose to defer radical treatment until after what they regard as a crucial life priority such as having a baby.

Patients should be offered as much information about their disease and its treatment as they wish to have, in forms they can use and language they are likely to understand, and at a rate they can assimilate. Doctors should ask patients what they want to know and about their concerns, and check that they understand what they have been told. Patients often find it difficult to take in information given during the consultation, so they should be offered a record in writing (which could take the form of a copy of a letter to their GP) or on audiotape. Patients must be offered copies of letters written about them to their GPs.

Patients should receive both individual support and guidance from members of the multi-disciplinary team (MDT) and well-produced information leaflets.[4] They should be encouraged to return to MDT members for additional information and clarification when they want it. Written information should be consistent across each network.

Patients should be given an outline of their overall treatment plan as soon as the necessary clinical decisions have been made, and told of the probable and potential time-scales. Clinicians should not seek to minimise the impact of the treatments they offer, nor the length of time required for recovery from treatment. They should do their best to explain clearly what is happening at each point in the patient's journey, to be honest about uncertainty and the risk that treatment might do more harm than good, and to make sure

[4] Sources of information for patients with cancer can be found on the NHS Direct website at: <www.nhsdirect.nhs.uk> telephone advice is available from NHS Direct on 0845 4647.

the patient understands when treatment can only be expected to produce temporary remission.

When English is not the patient's first language, somebody who speaks the patient's language should be available to facilitate communication. Providers should not normally expect members of the patient's family to act as interpreters.

Information offered to patients should include:

- Sufficient information about basic anatomy and pathology for patients and their carers to understand the disease and how it might affect them;
- Realistic information about the disease and the range of individual variation in its impact and rate of progression;
- The aims, risks and likely effects of proposed diagnostic procedures. Each procedure should be explained to the patient before it is undertaken;
- Balanced information with clear explanations about potential treatment options, including the probability of improved survival or symptom reduction (and uncertainties about benefits), known risks and potential short- and long-term adverse effects;
- Information about other potential effects of the illness and its treatment on both patients and carers, such as anxiety and depression;
- The likelihood of long-term continuing contact with the haematological cancer team;
- Reasons for not offering interventions which patients might anticipate.

Patients should also be given clear information about the hospital service. This should include:

- A description of the way the clinics and doctors function together;
- The way the appointments system operates;
- The names of members of the MDT responsible for managing the patient, and their different responsibilities;
- Contact details for people with whom patients or carers can talk if they feel concerned about any aspect of the illness, treatment, or hospital service.

All health professionals involved with each patient should know what information has been given to the patient. A record of this, along with the patient's preferences for information and involvement in decision making and a comprehensive summary of the management plan, should be included in the notes. This information should also be given to the patient's GP within 24 hours so that primary care staff can provide additional support for patients and carers.

Fertility issues

Each network should agree policies on fertility issues.[5] These should include training for clinical nurse specialists in counselling patients who could lose their fertility after treatment, and arrangements for cryopreservation of sperm. Whenever possible, patients of reproductive age should have specialist advice on the implications of treatment for their fertility before treatment begins.

[5] Joint Council for Clinical Oncology. *Management of gonadal toxicity resulting from the treatment of adult cancer: Report of a working party for the Joint Council for Clinical Oncology.* London: Royal College of Physicians/Royal College of Radiologists, 1998.

Practical and social support

Haematological malignancies often cause long periods of illness, during which many patients are dependent on benefits. Nurse specialists, primary care and palliative care teams all have important roles in co-ordination with social services to ensure that the needs of both patients and carers are identified and met. Patients and carers should be given information about sources of help, such as local and national services and support groups and disability and benefits helplines, both verbally and in writing. Advice on benefits and help with application forms should be available from someone who is familiar with the benefits system.

Nutritional and dietetic support

Intensive treatment for haematological cancers causes problems with nutrition. This issue is particularly important for patients who may remain in hospital for weeks or months at a time. Providers should ensure that patients receive specialist dietetic and nutritional support and high-quality food that meets their individual needs and is acceptable in the context of their ethical or religious beliefs. Dietetic support should also be available after discharge, if required.

Physiotherapy and occupational therapy

Haematological cancer and its treatment can cause disability, fatigue, weakness and loss of muscle, reduced exercise tolerance, pain and respiratory disorders. Patients should have access to specialist physiotherapists and occupational therapists who understand the disease process and can provide appropriate and effective care, e.g. aids and adaptations; advice on coping with the practical elements of disability.

B. Anticipated benefits

Provision of patient-centred, holistic care and clear and timely information can help patients to cope with their disease, enhance satisfaction with services, and reduce criticism and complaints. Information has a variety of benefits for cancer patients, particularly anxiety reduction, improved ability to cope with treatment and better self-care.

Good communication – particularly sensitive delivery of bad news – is appreciated by patients and leads to greater satisfaction with care. But improving communication skills also benefits doctors, enhancing job satisfaction and reducing stress. Effective communication tends to heighten awareness of the various needs - whether medical, practical, physical or psychological - of patients and carers, and increase the probability that these needs can be met.

C. Evidence

Note: the reliability and quality of evidence supporting the recommendations is graded as A, B and C, where A is the strongest evidence. The grading taxonomy is explained in Appendix 2.

To inform this guidance manual, the National Cancer Alliance (NCA) used focus group discussion and written submissions to explore the feelings and experiences of patients who had been treated for haematological cancers.[6] The NCA report shows that health care professionals often fail to provide the information that patients want and that many are not honest about the likely effects of treatment on patients' lives.

[6] National Cancer Alliance. *Patients' views of haematological cancer services and the draft national haematological cancer guidance*. April, 2001.

Patients reported that they would have liked to know how long the full course of treatment would take, and what it might involve, early on in the process. Clinicians tended to minimise the impact of treatment, using phrases like "a bit of radiotherapy" when referring to daily treatment over a month. A patient who reported being told by her consultant that, "'We might do a bit of a transplant'," said, "That 'bit of a transplant' has taken a year out of my life and I would like to have known before."[7]

In the focus group, patients explained that they needed information about treatment effects, duration and potential consequences in order to prepare themselves for the ordeal ahead, plan their lives, and arrange for support for the whole course of their cancer journey. All said that a copy of their treatment plan would have been helpful.

Several patients mentioned problems with hospital food and with inadequately trained nurses on non-specialist wards.

The National Patient Survey suggests that there may be particular problems with information for patients with non-Hodgkins lymphoma (NHL).[8] These patients were more likely to report that they did not completely understand the diagnosis than were patients with common solid tumours (30% versus 17% for all patients), less likely to understand the purpose of diagnostic tests (65% understood, versus 75% of all patients), and less likely to realise that different types of treatment were available (59% versus 66%). 25% of patients did not completely understand the purpose of their treatment and 32% did not know how well their treatment had gone. 18% would have preferred more information about the outcome of their treatment.(C) There appear to be few high-

[7] Ibid, p 26.

[8] Airey C, Becher H, Erens B, Fuller E. *National Surveys of NHS Patients: Cancer, National Overview 1999/2000*. London: Department of Health, 2002.

quality research studies focusing specifically on non-medical issues or psychosocial interventions for patients with haematological cancers. Evidence reviews carried out for previous documents in this series are, however, relevant. Summaries of studies showing patients' desire for clear information, the need for health service professionals to have specific training in communication skills, and patients' continuing need for psychological, social and practical support, are available in the *Improving Outcomes* series.[9]

The review did not assess studies describing the specific role of clinical nurse specialists in haematological cancer. There are studies of such nurses working with patients with other types of cancer, notably breast; this role was, after all, developed in the context of breast care services. It seems that care from specialist nurses is generally valued by patients, and that contact with such nurses can improve both physical and emotional well-being of patients.(A)

An analysis of the working practices of three cancer support nurses in the UK describes their role and the types of problem with which they assist. They report that psychological morbidity and social isolation are particularly common among patients with cancer. Cancer support nurses facilitate good communication amongst those responsible for delivering care and ensure a prompt response to patients' needs.(B)

A report of a small uncontrolled observational study of an emotional support course ("Taking Control") for patients with haematological cancer suggests that the majority of participants responded very positively. Although a minority (about 10%) reported some discomfort – usually because they

[9] *Improving outcomes in breast cancer* and *Improving outcomes in urological cancers* are available on the NICE website <www.nice.org.uk>; earlier documents dealing with other common cancer sites can be found at: <www.doh.gov.uk/cancer>

had to face information that they had not wanted to acknowledge – most found that the course helped them to cope emotionally with their situation and helped them to think more positively. Meeting others with haematological cancer on the course helped them to 'feel normal'. Fifteen of the 26 participants who completed the post-course questionnaire said that what they had learnt had been translated into behavioural changes.(B)

Where structured interventions such as this are not available, support groups can facilitate interaction between patients with cancer. But fewer than half of the NHS patients with NHL who took part in the National Patient Survey were told about support or self-help groups.[10]

An older (1983) study reported on two small randomised controlled trials (RCTs), run concurrently with patients with Hodgkin's lymphoma. One compared the effects of written educational material about the disease (a booklet and newsletters) with no educational material and found that patients' knowledge was improved by the intervention. This was associated with additional benefits including significantly reduced anxiety and fewer treatment problems. The other RCT assessed the effects of participation in eight meetings with a peer support group designed to stimulate discussion, which was attended by an oncologist, psychologist and social worker who took non-directive roles. The peer support group did not appear to produce any significant benefits.(A)

Telephone services that allow patients with cancer (or their carers) to get help and advice with the problems they face at home are appreciated and can be successfully run by trained oncology nurses.(B) The majority of calls are for information and are fairly short; only a minority require further action.

[10] Airey C, Becher, H, Erens B, Fuller E. *National Surveys of NHS Patients: Cancer, National Overview 1999/2000*. London: Department of Health, 2002.

These studies suggest that information is beneficial for patients but that talking about problems without being offered solutions is not helpful.

A longitudinal uncontrolled study, which included 22 leukaemia patients who received psychotherapeutic interventions including training in coping strategies and stress management, found significant decreases in anxiety and depression.(B) However, it is not possible to judge the effectiveness of the various components of what appears to be a complex intervention.

An RCT from the US comparing "treatment as usual" with therapist support, relaxation and imagery training and cognitive-behavioural therapy for 94 patients with haematological cancers undergoing bone marrow transplantation reported no significant differences in outcomes between the interventions. No meaningful comparisons were made between "treatment as usual" and the various psychotherapeutic interventions so it is not possible to judge their effectiveness.(B)

Various other authors describe psychotherapy services and interventions for patients with haematological cancers, but none provides reliable information on their effectiveness or appropriateness.(B) They appear to assume that such interventions are worthwhile.

There is a substantial body of research dealing with communication, information, psychotherapeutic and other non-medical aspects of care for patients with cancer. This literature does not focus specifically on the needs of patients with haematological cancers but the findings may be generalised to this group. Reviews of these aspects of patient-centred care are summarised in other documents in the *Improving Outcomes* series, available on the NICE and

Department of Health websites, and in *Improving Supportive and Palliative Care for Adults with Cancer*, soon to be published by NICE. A clear, evidence based discussion of communication skills and how they may be acquired has recently been published in the *British Medical Journal*.[11]

D. Measurement

Structure

- Availability of clear information for patients in appropriate forms and languages, about their disease, proposed treatment and how its effects might be managed, the hospital and MDT responsible for their care, and any services and sources of support that are likely to be appropriate.
- Clinical nurse specialists who have had training in counselling patients with haematological cancer.
- Facilities and expertise for counselling patients about fertility issues.
- Facilities and support for patients' mutual support groups.

Process

- Attendance by senior clinicians (including consultants) at training courses in communication skills.
- Private rooms used for crucial meetings between health care staff and patients (in particular, consultations at which patients are given bad news).

[11] Maguire P, Pitceathly C. Key communication skills and how to acquire them. *BMJ* 2002;**325:**697-700.

- Audit of information offered when:
  - The patient is given bad news;
  - The patient is to undergo a potentially unpleasant diagnostic procedure;
  - Decisions need to be made about treatment;
  - The patient is about to start a course of treatment.

2

- The application of Trust guidelines on obtaining and documenting informed consent may facilitate the audit of process within networks.
- Audit of patients' and carers' experience of psychological support by suitably trained staff from the time of diagnosis and at each subsequent stage of their journey through the illness.
- Evidence that every patient has access to a named nurse specialist who knows about his or her condition, who offers advice and can arrange meetings with appropriate health or social services staff when required.
- Audit of the proportion of staff involved in direct patient care who have had specific training in communication and counselling skills.
- Record of discussion with patients of information given and patient's involvement in decision-making about care.
- Evidence of effective user involvement.

- Audit of assessment for, and provision of, physical, practical and social support.

Outcome

- Providers should carry out surveys of patients' experience to assess the adequacy of each component of patient-centred care. This should include the following:

  - Patients' knowledge about resources relevant to them;
  - Their views on information they were given and the way it was communicated;
  - Whether they felt able to participate (if they wished to do so) in choosing between treatment options;
  - Whether patients felt that they had been offered sufficient information to give informed consent to each intervention;
  - Quality of care and pain control;
  - Adequacy of nutritional support and food available, especially for patients with eating problems;
  - Waiting times;
  - Adequacy of support for patients in their homes (occupational therapy);
  - Transport arrangements.

E. Resource implications

Additional resources may be necessary for the provision of high-quality information and educational material for patients and carers, and to allow staff time and facilities for talking with patients and carers.

Resources will be required for training, both for clinical nurse specialists and to improve the communication skills of other health professionals, including senior medical staff.

The main costs of improving patient-centred care in line with these recommendations will be for training and employing more clinical nurse specialists. It is estimated that about four new posts will be required per typical cancer network serving 1.5 million people – altogether, around 140 additional clinical nurse specialists for England and Wales, at an estimated total cost of £4.6 million (see Appendix 1, *Economic implications of the guidance*).

3. Diagnosis and evaluation

The Department of Health is developing guidance on modernising pathology services which supports the development of clinical networks in pathology across a number of Trusts, to build capacity, reduce fragmentation, and provide an enhanced level of equipment and expertise[12]. The recommendations below are consistent with this strategy.

Improving the consistency and accuracy of diagnosis is probably the single most important aspect of improving outcomes in haematological cancer. Specialist pathology services should be specifically designed to integrate with, and support, clinical haemato-oncology. In order for this to work in practice, the following structures and systems need to be established:

- Haemato-oncology multi-disciplinary teams (MDTs), described in the next chapter of this manual. These should include haematopathologists, i.e. specialists in the diagnosis of haematological malignancy who may come from a range of backgrounds;
- All haemato-oncology MDTs should have adequate facilities for rapid and accurate assessment of cellular morphology of blood samples;

[12] The Department of Health has published its response to the consultation on its draft guidance <www.doh.gov.uk/pathologymodernisation>, and the final guidance will be published in 2003.

- Effective systems for collecting suitable fresh tissue samples and transporting them rapidly to specialist pathology facilities;

- Access to accurate immunophenotyping, molecular biology, and identification of genetic abnormalities. Immunophenotyping, molecular biology and cytogenetics require specialist services;

Regularly-updated computer software designed to support precise identification of haematological malignancies. This software should generate worksheets and instructions on an appropriate sequence of diagnostic tests;[13]

- Access to appropriate imaging facilities.Imaging requirements for assessment of specific types of haematological cancer are discussed below;

- Arrangements to allow expert pathologists and radiologists to share and discuss diagnostic information in meetings of MDTs responsible for developing treatment plans for individual patients. Teleconferencing systems may be established to facilitate such discussion when geography makes it difficult for crucial specialists to attend MDT meetings in person.

A. Recommendations

Haemato-pathology services should be organised at network level. Smaller networks may collaborate to provide joint services and achieve economies of scale.

[13] It is hoped that this software will shortly become available on the net.

Two levels of haemato-pathological service are required: a local service, as exists at present in most district general hospitals and cancer units, which provides initial assessment of specimens and appropriate referral to a specialist service, which is likely to serve one or more networks.

Involvement in external quality assessment (EQA) is necessary at both levels. Haemato-pathologists should participate in EQA schemes, which should normally be co-ordinated at national level, although some may be best operated on a regional basis. All laboratories should be covered by Clinical Pathology Accreditation (UK) Ltd (CPA) accreditation.

Each diagnostic laboratory should serve as large a population base as can be achieved without sacrificing personal involvement of specialist laboratory-based haemato-pathologists in the haemato-oncology MDTs with which they work[14]. Trusts should identify clear pathways to ensure that all samples are sent to specified laboratories which have clearly defined arrangements for synthesis of laboratory and clinical information at MDT meetings.

Tissue samples from all patients with possible or definite diagnoses of haematological malignancy should be assessed by specialist haematopathologists. A specified range of tests should be carried out on each sample in a systematic way, following protocols which define both the order and choice of tests.

Haemato-pathologists should keep records of all samples where cancer is found and take responsibility for ensuring that each one of these patients is discussed in an appropriate MDT meeting. An accurate diagnosis should be established

[14] Experience at Leeds demonstrates that this personal contact is possible even when the specialist haematology pathology service serves a population base of over three million, part urban and part rural.

for every patient, according to an appropriate clinical protocol.

Leukaemia

The initial diagnosis is likely to be made by examination of blood films by a local haematologist. A member of a leukaemia MDT should take immediate responsibility for managing any patient who appears to have leukaemia and a blood specimen should be sent to the specialist pathology laboratory for further assessment. Bone marrow samples are likely to be required for precise assessment of the disease.

Patients with acute leukaemia are likely to require treatment before a precise diagnosis is available, but their management should be discussed at the earliest possible meeting of the leukaemia MDT and reviewed when a complete pathological assessment, including molecular analysis, has been carried out.

Lymphoma

Achieving a precise diagnosis of lymphoma and making decisions about appropriate treatment can be complex. It requires the same level of haemato-pathological expertise as leukaemia, plus additional input from other specialists. These are listed in the lymphoma MDT, described in the next chapter of this manual.

Pathological diagnosis

Biopsy is required for pathological investigation of persistent lumps in lymph nodes or abnormalities in other tissues that may be caused by lymphoma. Specific ENT or head and neck surgeons should be nominated to do lymph node biopsies within an agreed time and send suitable specimens to

be assessed by designated specialist pathologists who work with lymphoma MDTs.

If clinical signs or the patient's history (particularly smoking) suggest that cancer originating outside the lymph node could be the cause of the lump, this possibility should be investigated first, using endoscopy of the upper aerodigestive tract and fine needle aspiration or core biopsy of the lump. Only when this diagnosis has been excluded should the affected node be removed. It should then be delivered fresh to a specialised haemato-pathology laboratory.

Pathologists who assess lymphoma specimens should discuss their findings with the MDT responsible for managing the patient, so that clinical, laboratory and imaging information can be integrated in the context of the MDT meeting. Treatment for lymphoma should ideally be deferred until a definitive diagnosis is available. If treatment has begun, it should be reviewed by the MDT in the light of detailed diagnostic information.

Imaging

Imaging is essential to staging lymphoma. Clinical policies for the co-ordinated use of appropriate imaging when required for patients with lymphoma should be agreed at network level by all the lymphoma MDTs in the network. Cross-sectional computed tomography (CT) should be available without delay for planning treatment, both initially to judge the extent of the disease, and after treatment to assess residual disease. Magnetic resonance imaging(MRI) is not routinely used in lymphoma, although it may be required in specific clinical situations such as cranial disease.

Positron emission tomography (PET) scanning may be considered, if available, for discriminating between residual lymphoma and fibrotic tissue after chemotherapy, but further

research is necessary to determine its cost and utility in relation to other forms of imaging. When carried out in centres with a high level of expertise, gallium scanning can be a useful adjunct to CT.

Myeloma

Myeloma produces characteristic proteins which can be detected in the serum and sometimes, the urine of patients. Staging and decisions about treatment require information derived from the clinical picture (including assessment of renal function), bone marrow, and imaging[15]. Plain x-rays should be used for all patients; MRI should not be used routinely because its potential value for informing decisions about management is unclear, but may be appropriate in particular circumstances, for example to assess possible spinal cord compression.

B. Anticipated benefits

Expert review of pathology improves diagnostic accuracy. There is evidence (see below) that up to 5% of people treated for lymphoma in Wales actually have benign disease, and the situation is likely to be much the same in England. This means that every year, 400 people may suffer the distress and upheaval of a cancer diagnosis and undergo risky treatment unnecessarily. Many more patients – at least 10% – receive sub-optimal treatment because their disease is classified incorrectly. At a unit cost of £100-£150,[16] the financial cost of a precise diagnosis is a small fraction of the cost of treatment; and the human cost of error can be enormous.

[15] Guidelines developed by BCSH/UKMF on the diagnosis and management of multiple myeloma are available on the net at: <www.ukmf.org.uk/guidelines.shtml>

[16] Unit cost per specimen in Yorkshire, where the diagnostic facility serves a population of 3-4 million.

Once established, integrated diagnostic facilities for haematological malignancies are likely to be highly cost-effective. Rational selection of diagnostic tests, following precisely defined protocols, can conserve resources by ensuring that only those tests that may yield useful information about each particular patient are carried out.

C. Evidence

Note: the reliability and quality of evidence supporting the recommendations is graded as A, B and C, where A is the strongest evidence. The grading taxonomy is explained in Appendix 2.

Accuracy of diagnosis in lymphoma and leukaemia

There is consistent evidence from audit and similar studies, both of a high level of inaccuracy in diagnosis, and that specialist pathological review of diagnostic reports on haematological malignancies improves accuracy. The level of major discrepancies between diagnoses made by local clinicians and specialists – generally around a quarter of lymphoma reports reviewed – is broadly similar in most studies.(B) A report from the US suggests that similar problems arise in the diagnosis of acute leukaemias.

Examples from the UK include the following:

- In Wales, the first two years of central review of lymphoma pathology (1998-2000) revealed major diagnostic discordance for over 20% of 275 lymph nodes. In five cases judged by the expert panel to be lymphoma, the district hospital diagnosed a benign condition. Thirteen patients with benign conditions and four with non-haematological cancers were given diagnoses of lymphoma by local clinicians. Fifteen diagnoses were changed from non-Hodgkin's

Lymphoma (NHL) to Hodgkin's lymphoma or vice versa. Sixteen patients with NHL were assigned to a different prognostic group. In addition, in 21% of cases, the submitted diagnosis was lymphoma but no REAL classification was given. The central review group produced definitive diagnoses in 95% of these cases.

A follow-up study using case notes from a random sample of 33 patients whose diagnosis had been changed revealed that the management strategy should have been changed for half of this group (17 cases). In practice, first-line treatment was altered for 12 patients;

- There was diagnostic disagreement between a Lancashire hospital and a regional oncology centre in nearly a quarter of lymphoma pathology reports. 36% of the discrepancies were considered to be major;
- Audit by a specialist centre of 100 lymph node biopsies from hospitals in north east England found diagnostic discrepancies that would have changed management in 26% of cases;
- In suspected Hodgkin's lymphoma, 94% of diagnoses reviewed by the Scottish and Newcastle Lymphoma Group were confirmed but histological sub-typing was altered in 28% of 574 cases with initial sub-type information. This resulted in a change of management for 10% of patients.

Problems have also been found in the interpretation of radiological images by local clinicians. An audit of CT scans referred to a regional oncology centre for a second opinion found fundamental differences in the interpretation of CT findings for 34% of 124 patients. In most cases, more disease

was found. Specialist review had little impact on actual patient management, however; in 27% of cases, treatment decisions had been made before the review was requested.

Effectiveness of imaging

PET and gallium scanning for lymphoma

PET appears to be particularly effective for discriminating between residual lymphoma and fibrotic tissue in patients who have been treated with chemotherapy. It is more sensitive than gallium scanning and is especially useful for showing when lymphoma has not been successfully eradicated. Gallium scanning is more effective than CT scanning for revealing residual lymphoma but can have a moderate false negative rate, particularly in centres with less expertise.(B)

MRI for detection of bone lesions in multiple myeloma

There is no evidence that routine use of MRI provides information that is useful for decision-making about the treatment of patients with myeloma. In asymptomatic stage I disease, MRI can reveal bone marrow lesions that are not detected by other means, but it is not clear how this information might affect patient management.

D. Measurement

Structure

- Availability of specialist diagnostic laboratories.
- Systems for rapid and efficient communication between specialist pathologists, local haematologists and oncologists, and haematological cancer MDTs.

- Arrangements for rapid transfer of fresh biopsy specimens to designated haemato-pathologists who assess the samples without delay and arrange specialised pathological review.

Process

- Time from GP referral to specialist diagnosis.
- Time between lymph node biopsy and availability of detailed pathology report (this should not be more than two weeks).
- Time between initial clinic assessment of patients with suspected lymphoma or myeloma and availability of imaging results.

Outcome

- Audit of accuracy of diagnosis.
- Audit of appropriateness of lymph node biopsy.

E. Resource implications

A minority of cancer networks in England already have centralised or partly centralised specialist diagnostic services, but most will have to create such services from scratch, at a cost of about £230,000 for an average network (1.5 million people). Overall, the estimated setting up costs for suchspecialist diagnostic services for England are around £6.5.8 million, withand annual running costs are estimated at of about £7.50 million. There are substantial economies of scale, so the actual costs will depend on the size of population served.(Note: these are initial, not final, estimates) (See Appendix 1, Economic implications of the guidance.)

The situation in Wales differs from that in England, in that the All Wales Lymphoma Pathology Review Service has secured funding for specialist diagnostic review for all new cases of lymphoma. The All Wales Lymphoma Panel audit found a diagnostic error rate of 17% in lymphoma diagnosis without specialist review; it is believed that the current cost of inappropriate treatment associated with misdiagnosis is around £200,000 per year. In addition, there are huge potential medico-legal costs.

Cost savings from avoided misdiagnosis in England are currently unknown but could be substantial.

4. Organisation of specialist services

A. Recommendations

4

Commissioning services for haemato-oncology

Service commissioning should be carried out in a co-ordinated way, using specific mechanisms which involve all relevant commissioning bodies. Commissioners should establish explicit organisational arrangements which identify those responsible for overseeing the introduction and adoption of these recommendations. Commissioners will need to conduct baseline assessments of current provision and, using this guidance, set priorities and develop proposals for local implementation.

Commissioners should carefully review services to ensure that patients have access to each form of treatment in the following categories:

Non-intensive chemotherapy	All other chemotherapy not included in the definitions below.
Intensive (non-transplant) chemotherapy	Anticipated to result in more than 7 days of neutropenia of $0.5x10^9$/litre or lower, as well as other potential organ toxicities. This is usually but not exclusively chemotherapy used for curative treatment of acute myeloid leukaemia, acute lymphoblastic leukaemia/lymphoblastic leukaemia, high-risk/hypoplastic myelodysplastic syndrome, Burkitt lymphoma and lymphoblastic lymphoma.

	This definition does not usually include salvage treatments for lymphoma.
Autologous and allogeneic haematopoietic stem cell transplantation	Previously referred to as high-dose therapy in the 2003 manual. Commissioned centrally through NHS England specialised commissioning. Centres should meet FACT-JACIE accreditation standards.

Multi-disciplinary teams

Clinical services for patients with haematological cancers should be delivered by multi-disciplinary haemato-oncology teams. A unitary multi-disciplinary team (MDT), which could take responsibility for the management of patients with any form of haematological cancer, is described below.

Trusts may, if desired, establish two or three haemato-oncology MDTs based on this model, to treat specific forms of haematological cancer: for example, a combined leukaemia/myeloma MDT and a separate lymphoma MDT. Other arrangements can be envisaged; for example, a Trust might form an MDT to provide local treatment for patients with leukaemia, but refer those with lymphoma or myeloma to specialist MDTs at other Trusts. The minimum population served by any team should be 500,000.

Every patient with any form of haematological cancer (as defined by current WHO criteria) should be managed by a haemato-oncology MDT. All patients should have their care discussed in formal MDT meetings attended by members involved in the diagnosis, treatment, or care of that particular patient, and all the clinicians in the MDT should regularly treat patients with the particular forms of haematological cancer with which that MDT deals. These MDTs should be

responsible not only for initial recommendations about what treatment should be offered, but also for delivery of treatment and long-term support for patients. Individual clinicians should be responsible for discussing the MDT's recommendations with their patients, who should have the opportunity to be informed of the outcome of MDT meetings.

Clinicians who are not members of the MDT should refer any patient with suspected or previously diagnosed haematological cancer to an appropriate haemato-oncology MDT. Written referral policies should be disseminated both within hospitals (particularly to departments such as gastroenterology, dermatology, rheumatology and medicine for the elderly) and to primary care teams, to promote prompt and appropriate referral.

Core members of haemato-oncology MDTs

Each haemato-oncology MDT must include sufficient core members for the following people to be present in person or remotely (for example via video conferencing) at every meeting:

• Haemato-oncologists (either haematologists, or some medical oncologists)	At least two who specialise in each tumour type being discussed at that meeting (e.g. leukaemia or lymphoma). At least one from each hospital site contributing to the MDT;
• Haemato-pathologist	At least one haematopathologist from the SIHMDS should be present; to provide the diagnostic information (new 2016).;

• Nurses	At least one clinical nurse specialist, also ward sisters from hospitals which provide intensive chemotherapy
• Palliative care specialist	At least one palliative care specialist (doctor or nurse) who liaises with specialists from other sites. If, because of staff shortages, a palliative care specialist cannot regularly attend MDT meetings, the MDT must be able to demonstrate that it reviews patients regularly with such a specialist;
• Support staff	Staff to organise team meetings and provide secretarial support.

Teams established to manage patients with lymphoma should include the following additional core members, who should be fully and regularly involved in MDT discussions:

• Clinical oncologist	At least one;
• Radiologist	At least one, who liaises with radiologists at other sites.

Teams responsible for managing patients with myeloma should include at least one radiologist who liaises with

radiologists at other sites and is fully and regularly involved in MDT discussions. Teams which care for patients with myeloma should have rapid access to oncologists for palliative radiotherapy, although it is not necessary for clinical oncologists to regularly attend team meetings.

Extended team members

The MDT should include the following extended team members. They do not have to be present at every MDT meeting.

- Clinical member of the transplant team to which patients could be referred
- Microbiologist (especially for patients with leukaemia)
- Pharmacist
- Vascular access specialist
- State registered dietitian (SRD)
- Orthopaedic surgeon (myeloma MDT)
- Clinical oncologist (myeloma MDT and leukaemia MDT; provision of cranial radiotherapy for patients with acute lymphoblastic leukaemia (ALL) is an important role for a clinical oncologist)

Other specialists who may be required for specific cases:

MDTs should have access to the following specialists:

- Dermatologist
- Gastroenterologist

- ENT surgeon
- Interventional radiologist
- Renal physician

Support for patients and carers

All haemato-oncology MDTs should have access to support staff, including:

- Allied health professionals including rehabilitation specialists, as described in the context of patient-centred care.
- Liaison psychiatrist and/or clinical psychologist
- Social worker
- Bereavement counsellor

A clinical nurse specialist should normally be the initial point of contact for patients who feel they need help in coping with their disease, its treatment or consequences. This nurse should be able to arrange re-admission, clinical review, or meetings between patients and support staff such as those listed above. Networking between nurses with different types of expertise should be encouraged.

Achieving access to expertise

Patterns of MDT membership should be agreed and co-ordinated at network level to achieve the best use of resources and to ensure that each MDT has reliable access to the level of facilities and expertise it needs to carry out its function effectively. When all the necessary specialists are not available within a Trust, experts may contribute to the MDT's discussion through "in-reach" or "out-reach" arrangements.

In-reach arrangements are those where clinicians who work in peripheral hospitals travel to the centre to attend MDT meetings, bringing information about their patients with them. Everyone at the meeting can then contribute to discussion about the management of patients at each of the participating hospitals. Such arrangements have to be set up and supported by specialists in the relevant disease group at the cancer centre (or haematological equivalent) for the network as a whole, and additional staff or facilities for teleconferencing may be required. In large networks, two specialist centres may work in this way.

In the out-reach model, MDT meetings are held in peripheral hospitals, normally those that provide intensive in-patient treatment (BSCH Level 2). Specialists take peripatetic roles; for example, specialist haemato-pathologists, transplant specialists, oncologists and radiologists may travel to several hospitals to meetings of various MDTs. If this is not practicable, locally scarce specialists may contribute to MDT meetings by teleconferencing. Where such arrangements are established, they should be reviewed annually by the network clinical lead.

Specialist input is particularly important for diagnosis and assessment of lymphoma. If MDT members who do this work are not lymphoma specialists, arrangements should be made either for visiting specialists to join a substantial proportion of MDT meetings (out-reach), or for MDT members to visit centres where they can discuss individual cases with specialists (in-reach), using teleconferencing if necessary. The aim of such meetings should be both to improve the accuracy of assessment in these cases and to enhance the level of expertise of MDT members.

When facilities or expertise are based outside the cancer network, there should be arrangements to ensure smooth and efficient cooperation across network boundaries.

Responsibilities of haemato-oncology MDTs

Haemato-oncology MDTs should meet weekly, during normal working hours. All core members should have a special interest in haematological cancer and attend MDT meetings as part of their regular work. They should attend at least two thirds of meetings.

At each meeting the MDT should:

- ensure all new diagnoses have had SIHMDS review and integrated reporting **[new 2016]**
- establish, record and review diagnoses for all patients with the forms of cancer that fit the team's definition criteria;
- assess the extent of each patient's disease and discuss its probable course;
- work out treatment plans for all new patients and those with newly-diagnosed relapses;
- review decisions about treatment, particularly those made in the interval between MDT meetings. This review should cover not only the clinical appropriateness of the treatment but also the way patients' views were elicited and incorporated in the decision-making process;
- discuss the response to treatment, both during therapy and when the course of treatment is complete.

- Think about the appropriateness of radiotherapy in the light of the response to chemotherapy;
- think about the patients' other requirements such as palliative care or referral to other services. MDTs should be able demonstrate effective systems for collaboration with hospital and community palliative care services;
- discuss discontinuing treatment. Each MDT should develop a specific process for considering discontinuation of treatment when its effectiveness has become so limited that adverse effects might outweigh potential benefits;
- agree dates for reviewing patients' progress;
- discuss clinical trials and audit results.

The MDT should:

- review all SIHMDS reports of borderline conditions such as aplastic anaemia and other non-malignant bone marrow failure syndromes (which overlap with hypoplastic myelodysplastic syndrome), and lymphocyte and plasma cell proliferation of uncertain significance (which overlap with lymphoma and myeloma) **[new 2016]**
- identify requirements for staff and facilities for any form of treatment it provides;
- liaise with primary care teams, palliative care teams, services for the elderly and voluntary organisations such as hospices;

- ensure that adequate information, advice and support is provided for patients and their carers throughout the course of the illness;
- ensure that GPs are given prompt and full information about the nature of their patients' illness or treatment, any changes in management, and the names of individual MDT members who are primarily responsible for their patients' management;
- record, in conjunction with the cancer registry, the required minimum dataset for all cases of haematological cancer within its specified catchment area, including those cared for by clinicians who are not haemato-oncology MDT members;
- identify the training needs of MDT members and make sure these needs are met;
- be involved in clinical trials and other research studies;
- collaborate in planning, and collecting data for audit.

One member of each team, usually the lead clinician, should act as the administrative head of the team, taking overall responsibility for the service it delivers. Lead clinicians from all haemato-oncology teams in each MDT should collaborate to develop and document evidence-based clinical and referral policies which should be consistently applied across the MDT as a whole. They should agree process and outcome measures for regular audit. All teams should be involved in audit and clinical trials. There should be an operational policy meeting at least once a year at which each MDT discusses its policies and reviews the way it functions.

Maximising the effectiveness of MDT meetings

Suitable facilities should be provided to support effective and efficient team working. In addition to basic physical facilities such as adequate room and table space, there should be appropriate equipment, for example to allow the group to review pathology slides and imaging results.

Every MDT meeting should have a designated chairperson. Whilst this may be the lead clinician, teams should consider rotating the role of chairperson between members. Teams should aim for an egalitarian mode of interaction, to facilitate open discussion to which all members feel able to contribute.

Each MDT should have named support staff who take the roles of team secretary and co-ordinator. Since these roles overlap, one person may be able to cover both functions in smaller teams. If a team decides that a clinical nurse specialist should be responsible for co-ordinating meetings, secretarial and administrative support should be provided for this nurse. The team co-ordinator should arrange meetings, inform all those who are expected to attend, and ensure that all information necessary for effective team functioning and clinical decision-making is available at each meeting. This will include a list of patients to be discussed and copies of their case notes, along with diagnostic, staging, and pathology information.

The secretary should take minutes at all meetings, and record and circulate decisions made by the team within the casenotes and both to both MDT members and to those others identified as appropriate for routine circulation by the MDT, such as GPs, who may require this information. Confidentiality dictates that these records go to relevant clinicians only. A designated member of the team's support staff, working with the administrative head of the team, should be responsible for

communication with primary care, palliative care, and other site-specific MDTs.

Local services

Local services should be developed around MDTs which include at least three haematologists whose sole or main specialist interest is in haemato-oncology.

All inpatients undergoing intensive forms of treatment such as complex chemotherapy under the care of this team should normally be treated on a single hospital site, but members of the team may provide palliative or outpatient care in other hospitals. Teams should specify which patients they can treat locally and make specific arrangements for the delivery of clinical services which they do not provide.

All in-patients undergoing intensive forms of treatment such as complex chemotherapy under the care of this team should be treated either at one hospital, or, where there is a locally agreed case for providing this service at more than one hospital, in hospitals which then each must independently meet the full criteria for the safe delivery of these treatments (summarised in Table 4, page 59). Members of the team may provide palliative or out-patient care in other hospitals.

Each haemato-oncology MDT which provides intensive chemotherapy must have facilities (as specified in section 1.2 of the short version and section 3.1 of the addendum) and must be able to demonstrate adequate arrangements for 24-hour cover by specialist medical and nursing staff. These arrangements must be sufficiently robust to allow cover for holidays and other absences of team members. Haemato-oncologists in such a team should work together as a cohesive group, sharing management of patients. There should be efficient systems for routine information-sharing and frequent

opportunities for informal discussion as well as formal meetings.

Networks should review the number of new patients with acute leukaemia treated by each Trust over the past five years, using information from their local cancer registry and other databases. Remission induction is appropriate for about 50% of patients with acute leukaemia, so Networks may either use the figure of 50% of new patients or the actual number of new patients who have undergone this treatment.

Networks should review their arrangements for managing patients at BCSH Level 2 (i.e. acute leukaemia, some intensive lymphoma regimens, and other bone marrow failure patients) in conjunction with their haematology MDTs, particularly those involved in acute leukaemia. This should be with The aim should be too consolidate this work within a stable system of service delivery, by ensuring that all hospitals providing these services remain committed to supporting this work, with the necessary staff, and facilities and reliable arrangements for specialist medical and nursing cover.

Networks should give priority to transferring BCSH Level 2 workloads to those hospitals it identifies as most appropriate to undertake this work on a long term basis, giving particular consideration to the future roles of those hospitals performing relatively little such work, for example induction therapy to induce remission in acute leukaemia in five or fewer new patients each year.

Clinicians working in such hospitals, who wish to continue to be actively involved in this type of clinical responsibility, should consider the feasibility of playing an active role in a haemato-oncology MDT based in the hospital to which patients from their locality would be referred.

Members of haemato-oncology MDTs will have other responsibilities within their hospitals, and requirements for the management of patients with haematological cancers should be considered in the context of the wider role of haematology services. Haematooncologists play essential roles in the care of patients with solid tumours undergoing chemotherapy, in particular monitoring and managing haematological adverse effects, and may provide services such as placing central venous catheters.

All hospitals which give chemotherapy, or which are likely to admit patients undergoing chemotherapy as medical emergencies, should have documented clinical policies, agreed with haematology and oncology staff, which clearly specify arrangements for the care of such patients.

B. Anticipated benefits

Since the publication of the Calman-Hine report,[17] MDTs have become central to services for cancer because they represent a way of working that offers advantages for both clinicians and patients. MDT meetings ensure that each patient is considered from a range of viewpoints by people with different areas of specialisation, who can pool their expertise and learn from one another.

Haematological cancer has many variants and both diagnosis and management can be particularly complex; so the supportive environment of an MDT meeting, which allows members to share difficult problems, can be especially helpful for clinicians. Those who have experience of working in MDTs report that they also provide valuable, and often unanticipated, learning opportunities.

[17] Expert Advisory Group on Cancer, *A policy framework for commissioning cancer services.* Department of Health/Welsh Office, 1995.

For patients, management by an MDT offers many potential benefits, particularly a greater probability of timely and appropriate treatment and better continuity of care.

The contributions made by clinical nurse specialists and palliative care nurses to decision-making in the MDT can be particularly valuable because patients are often more frank with nurses about their symptoms, problems and desires. Such nurses can therefore help to focus clinical decision-making on the needs, values and priorities of individual patients. This is helpful to inform discussion about supportive care, and becomes particularly important at the point in the disease when continued active treatment may be doing more harm than good – a point that can be difficult for clinicians to recognise. Nurses and palliative care specialists can play important roles as informed patient advocates in initiating the transition from active treatment to palliative care.

Regular discussion in the context of MDT meetings is likely to lead to improved clinical policies, more effective delivery of care, and more participation in clinical audit and research. Consolidation of services for centration of patients undergoing complex treatment in a smaller number of centres those hospitals able to consistently meet the required standards, and which have a sufficient depth of clinical specialist cover, particularly in medicine and nursing, will mean that all staff, including junior members, will be better able to meet their needs. All of these factors will tend to improve outcomes.

C. Evidence

Note: the reliability and quality of evidence supporting the recommendations is graded as A, B and C, where A is the

strongest evidence. The grading taxonomy is explained in Appendix 2.

There is no research evidence demonstrating the superiority of any specific model of MDT structure for the management of haematological cancers, although there is now considerable anecdotal evidence of benefits associated with team working in the management of patients with solid tumours.

There are various strands of evidence to suggest that treatment in low-volume hospitals, which tend to lack both specialist clinicians and facilities, may be associated with poorer outcomes. There are also data from cancer registries which, although not consistent between regions, tend to suggest that specialised centres can achieve better survival rates among some groups of patients; however, these figures are not adjusted for severity of disease or co-morbidity, and therefore could reflect differences in case-mix. The evidence supporting specialised care, limited though it is, is stronger for lymphomas than for other forms of haematological cancer.

Leukaemia

There is no definitive evidence to show that hospitals that treat more patients with leukaemia achieve better outcomes, but some suggestion that there may be problems with providing small numbers of bone marrow transplants.

Two studies which sought relationships between acute leukaemia outcomes and hospital volume were included in a systematic review. One, a study of 879 adolescents and young adults in England and Wales, found no specific benefit associated with treatment in a national trial, care at a teaching hospital, or hospital case volume. The second, which focused on bone marrow transplants for early leukaemia, found a

relationship of borderline significance between centre throughput and outcome, but only when results from centres which carried out fewer than five transplants per year were compared with higher-volume centres. Above this level, there was no evidence of any relationship between centre size and outcome.(B) Registry data from Japan show higher survival rates after treatment in high volume centres, but the effect is only significant for bone marrow transplants from sibling donors, not for transplants from unrelated donors.(B)

Limited data from cancer registries in various regions of the UK suggest that some groups of patients with leukaemia treated in specialist centres may survive longer, but this could be due to patient selection. In the Northern and Yorkshire Region, 27% of patients are alive five years after treatment in specialist centres, compared with 25% treated in non-specialist centres ($p=0.04$); this difference reflects better outcomes in younger patients (below the age of 45) only. Thames Cancer Registry figures show a highly significant survival advantage for patients with acute myeloid leukaemia (AML) treated in teaching hospitals, compared with those treated in non-teaching hospitals. But there is no apparent relationship between specialisation of treatment centre and survival rates in the South and West Region or in Scotland.

Review of results by a specialist population-based registry for lymphoid malignancy in the North West Region of England found that significant factors affecting survival among patients with myeloid leukaemia and ALL included treatment according to a recognised protocol and treatment at a specialist oncology centre.

Audit evidence shows that patients with AML in the south-west of England who were treated in a clinical trial did better than those of a similar age who were not in a trial. Whilst this could be because such patients are more likely to be

treated according to an evidence based protocol, by clinicians with a special interest in this disease, selection of patients may have contributed to the difference found. This highlights the general difficulty of using evidence of outcomes from patients entered into clinical trials to judge variations in population outcomes. A separate trial – albeit including elderly patients with aggressive lymphoma – reported that patients who were not in the trial tended to have higher levels of co-morbidity and therefore would not be expected to do so well.(B)

Multiple Myeloma

There is conflicting evidence on whether treating higher numbers has a beneficial effect. A study from Finland found no significant differences in progression-free or overall survival between hospitals which enrolled larger or smaller numbers in multi-centre trials, and concluded that decentralisation of treatment was acceptable. As with leukaemia, figures from some cancer registries suggest that specialist centres achieve better survival rates than non-specialist centres, but the pattern is not consistent between regions and any differences could be due to patient selection. In Northern and Yorkshire, the overall five-year survival rate for specialist centres is 21%, compared with 14% for non-specialist centres, a highly significant difference; but no such difference is apparent for the South and West.(B)

Lymphoma

Evidence of links between survival rates and hospital specialisation or number of patients treated is generally more consistent for lymphoma than for other forms of haematological cancer.

A US study described in a systematic review found that death-rates were 50% higher among patients treated for lymphoma (type not specified) in community hospitals than in specialist cancer centres (relative risk of death 1.5, 95% CI: 1.3 to 1.7).(B) Another US study reported better outcomes among patients with aggressive non-Hodgkin's lymphoma (NHL) who were treated in hospitals that managed three or more such patients per year, compared with one or two. 54% of patients were free from progression after two years at the higher-volume centres, 32% where the numbers were small (p=0.06); and overall survival rates were 71% versus 52%. All the higher-volume hospitals, but only 27% of the others, were approved transplant centres.(B)

Registry data from Northern and Yorkshire show significantly higher five-year survival rates among patients treated for lymphoma in specialist centres than in non-specialist hospitals. Overall, 47% of those treated in specialist centres survived, compared with 35% elsewhere, but the difference only becomes apparent in patients over the age of 55. In Scotland, five-year survival rates achieved by specialist centres are consistently higher, at 45% overall, than those at non-specialist centres, with 39% ($p<0.001$). In the South and West, however, no effect of specialisation is apparent

Organisation

The Trent Region has demonstrated that it is possible, in practice, to implement accreditation standards that include the establishment of MDTs for the management of haematological malignancies. The Trent standards require that lymphoma MDTs, which include haematologists and/or oncologists, a specialist pathologist and a radiologist, should meet at least monthly. The centre MDT designates non-core members for additional roles in extended teams. Trent

lymphoma MDTs work out diagnoses, plan treatment, record information about all patients on an agreed proforma, organise audit, and agree clinical and referral guidelines with the network site specific group. Whilst MDTs based at cancer units can treat lymphoma, patients with unusual forms of the disease, or for whom intensive or combined modality treatment may be appropriate, are discussed by the cancer centre MDT.

D. Measurement

Structure

- MDTs established throughout each network for each major type of haematological cancer.
- Support staff in place for every MDT.
- Rapid and effective communication systems between local (peripheral) hospitals and specialist centres.

Process

- Network baseline assessments should include the following measures:
  - Numbers of haematologists and specialist haemato-oncology nurses per Trust;
  - Current specialisation by Trust;
  - Current referral patterns for leukaemia, lymphoma and myeloma;
  - Current information and audit of diagnosis and treatment;
  - Protocols in place, and whether they are agreed across the network;

- Relationship between different specialties involved in diagnosis and/or management of patients with haematological cancers, e.g. ENT, head and neck, haematology;
- Staffing and configuration of existing MDTs.

4

- Evidence that every patient with a diagnosis of haematological malignancy is discussed by an appropriate MDT.
- Evidence that MDT members discussing patients at centre meetings (in-reach arrangements) routinely bring all necessary information with them.
- Audit agreed and reviewed over whole network.
- Patients with acute leukaemia treated in designated units which meet the appropriate standards of staffing and facilities, and are likely to with have a minimum of six ten new patients per year for whom therapy intended to induce remission is appropriate.

Outcome

- Evidence that MDTs audit individual clinicians' actions against MDT decisions.
- Record of each member's attendance at MDT meetings.
- Record of business carried out (including patients discussed and decisions made) at MDT meetings.

E. Resource implications

MDTs for leukaemia and myeloma do not currently exist in the majority of Trusts; and where lymphoma MDTs are

established, many lack the full range of members. The cost of additional staff time for fortnightly MDT meetings to deal with all patients with haematological cancers, and for ensuring that every MDT includes a co-ordinator, is estimated to be £7.2 million per year for England and Wales as a whole. The level of uncertainty is, however, high, because the potential costs vary according to the model adopted (see Appendix 1, *Economic implications of the guidance*).

In general, lower costs are associated with the following:

- Less frequent MDT meetings: weekly meetings are likely to increase costs by about 50%, compared with fortnightly meetings;
- Use of teleconferencing, with optimum charging packages;
- A pragmatic mix of in-reach and out-reach arrangements for access to specialist expertise;
- Combining myeloma and leukaemia MDTs.

5. Treatment (excluding high dose therapy)

5

A. Recommendations

Information about treatment in this section is intended to be used as service guidance; the recommendations should not be taken as clinical guidelines. Networks should agree detailed clinical guidelines and update them regularly, using the best available evidence and any specific guidance from the National Institute for Clinical Excellence (NICE). Treatment provided should be audited against these guidelines.

Conventional dose therapy – that is, cytotoxic chemotherapy given in doses that do not necessitate stem cell rescue – is appropriate for most patients with haematological cancers. Often, this can be given on an out-patient basis, but treatment may continue over long periods of time. Other types of treatment are appropriate for specific conditions. Some patients, particularly those with acute leukaemia, chronic myeloid leukaemia, myeloma and some forms of lymphoma, can only achieve remission with more intensive treatment, and the use of high dose therapy and stem cell rescue is increasing. This is discussed in the next chapter of this manual (Topic 6, High dose therapy).

Chemotherapy for induction of remission in acute leukaemia is particularly demanding (see Treatment requirements, Acute leukaemia, below). These patients require in-patient treatment lasting for weeks or months together; and, because

both the disease and the therapy reduce immunity to infection, they are very vulnerable throughout this period. This form of treatment should therefore be offered only by hospitals which can provide adequate levels of staffing and facilities (see previous chapter).

National standards have been developed for chemotherapy services generally.[18] These call for:

- Clearly defined leadership and organisational arrangements;
- Provision of suitably equipped areas for the administration of chemotherapy;
- Co-ordination and control over the use of specified chemotherapy regimens within networks;
- Supervision of chemotherapy prescribing by appropriate specialists, who may be consultant or specialist registrar level oncologists or clinical haematologists;
- Administration of chemotherapy by appropriately trained staff;
- Use of guidelines for the prevention and treatment of side effects of chemotherapy;
- Provision of facilities for aseptic reconstitution of cytotoxic agents;
- Clear and comprehensive documentation of chemotherapy.

[18] See Accreditation Standards for Chemotherapy in the *Manual of Cancer Services Assessment Standards.* NHS, 2000.

Specific treatments vary widely. Table 3, below, shows the main types of treatment currently used for the various forms of haematological cancer, and Table 4 summarises facilities required for their delivery. The choice of agents and the way they are used depends both on the type of cancer and on the individual features of the case. For some patients, no treatment is necessary at the time of diagnosis; for the majority, conventional dose therapy is appropriate, but some of these may be offered high dose therapy if the disease does not respond or if they relapse. Patients whose disease progresses despite continued or intensified treatment may reach a point at which anti-cancer therapy does more harm than good, and palliative therapy becomes more appropriate. Systems for decision-making and delivery of treatment must therefore be flexible and responsive to changing patient needs.

Table 3. Illustrations of types of systemic anti-cancer treatment and the settings in which they are usually administered.

Treatment, disease groups	Examples	Setting
High-dose therapy + progenitor cell rescue (allogeneic or autologous) AML, ALL, CML, Hodkgin's lymphoma, NHL, myeloma.	BEAM Total body irradiation Busulphan/ cyclophosphamide	In-patient, intravenous therapy on dedicated ward with specialised nursing/support team. Isolation facilities and specialisd rooms normally used.

Induction therapy for acute leukaemia Induction treatment for Burkitt's and lymphoblastic leukaemia Treatment of recurrent high grade NHL	3+7, UKALL protocol CODOX-M ESHAP, ICE	In-patient, intravenous therapy on dedicated ward with specialised nursing/support team.
Initial treatment of: High grade NHL Hodgkin's lymphoma Myeloma	 CHOP ABVD C-VAMP	 Normally day-case, intravenous therapy in dedicated out-patient unit with specialised chemotherapy team.
Monoclonal antibody therapy NHL, AML, CLL	Rituximab, alemtuzumab	Normally day-case, intravenous therapy in dedicated out-patient unit with specialised chemotherapy team.
Radioimmunotherapy NHL	Ibritumomab, tositumomab	In-patient suite with radioprotection facilities and specialist nuclear

		medicine team.
Cytokine treatment CML, NHL, myeloma	Interferon	Out-patient treatment, usually subcutaneous injection, self-administered by the patient.
Oral chemotherapy Myeloma, CML, CLL, NHL, palliation for ALL/AML	Chlorambucil, fludarabine, hydroxyurea	Out-patient oral treatment, self-administered by the patient.
Kinase inhibitor CML	Imatinib	Out-patient oral treatment, self-administered by the patient.

* Inclusion in this table of any treatment should not be taken as a recommendation on its use.

Treatments for haematological malignancies are being continuously developed and there are several clinical trials in progress. Each network should agree and adopt guidelines for involvement in such trials. Network-wide formularies and policies for the adoption of new drugs should be agreed by commissioning bodies, chemotherapy lead clinicians, and haematologists, oncologists and pharmacists involved in treating patients with haematological malignancies.

Treatment requirements

Facilities necessary for provision of intensive chemotherapy

The standards necessary for units which manage remission induction for patients with acute leukaemia using current standard intensive chemotherapy regimens (together with equivalent treatments for some lymphomas and bone marrow failure) are summarised in Table 4. These patients must be treated on specialist haematology/oncology wards, where they are likely to remain for several months.

Indwelling venous catheters are used to deliver intensive chemotherapy. These should only be handled by designated staff members, since scrupulous hygiene and expertise are essential. Insertion should be carried out in dedicated areas (special procedure room or operating room) and real-time imaging should be available. Trainees must be closely supervised by personnel with documented competence in such supervision.

Patients undergoing treatment for acute haematological malignancies are highly susceptible to infection. There should be a written policy which specifies responses to life-threatening problems, which should be readily accessible in a ward book which explains precisely what should be done for each eventuality. There should be strict policies on hand washing, adherence to which should be regularly audited. This should be part of a wider education programme to reduce levels of hospital-acquired infection.

Table 4. Summary of Standards necessary for all Units providing induction therapy for acute leukaemia or aggressive lymphoma, and other patients likely to have prolonged neutropenia.

Table 4a Facilities

Ensure that there is provision for direct admission to the ward or unit. **[2016]**

Ensure that there are specific beds in a single dedicated ward within the hospital with the capacity to treat the planned volumes of patients. **[2016]**

Ensure that there is a designated area for out-patient care that reasonably protects the patient from transmission of infectious agents, and provides, as necessary, for patient isolation, long duration intravenous infusions, multiple medications, and/or blood component transfusions. **[2016]**

Ensure that there are full haematology and blood transfusion laboratories on site. Ensure that there is rapid availability of blood counts and blood products including products such as CMV seronegative and gamma-irradiated blood components. **[2016]**

Central venous catheter insertion should be performed by an experienced specialist. **[2016]**

Ensure that there are on- site facilities for emergency cross-section imaging. **[2016]**

Ensure that cytotoxic drug reconstitution is centralised or organised at the pharmacy. **[2016]**

Table 4b Staffing

Specialist haematology centres should have consultant-level specialist medical staff available 24 hours a day. This level of service demands at least three consultants,

all full members of a single haematology multidisciplinary team (MDT) and providing in-patient care at a single site. **[2016]**
• Cover in Specialist haematology centres should be provided by specialist trainees and specialty doctors who are
- Haematologists or oncologists
- Involved in providing care to the patients being looked after by the centre
- Familiar with and formally instructed in the unit protocols. **[2016]**
There should be enough nurses in specialist haematology centres to provide care for the patients, based on the severity of their clinical status. **[2016]**
There should be at least 1 trained specialist nurse on the ward at the specialist haematology centre all times, and they should be able to deal with indwelling venous catheters, recognise early symptoms of infection, and respond appropriately to potential crisis situations. **[2016]**
Specialist haematology centres should have access to consultant-level microbiological advice at all times. There must be ready access to specialist laboratory facilities for the diagnosis of fungal or other opportunistic pathogens. **[2016]**
Specialist haematology centres should have access to a consultant clinical oncologist for consultation, although radiotherapy facilities do not need to be on site. **[2016]**
Specialist haematology centres should have access to

on- site advice from a specialist haematology pharmacist. **[2016]**
Specialist haematology centres should have dedicated clinical and administrative staff to support patient entry into local and nationally approved clinical trials and other prospective studies. **[2016]**

Table 4c Clinical Support

Ensure that there is on site access to bronchoscopy, intensive care and support for patients with renal failure. **[2016]**
Specialist haematology centres should ensure that there are written policies for all clinical procedures. **[2016]**
Specialist haematology centres should ensure that there is participation in network based audit of process and outcome. **[2016]**

Treatment for specific forms of haematological cancer

Acute leukaemia

Combination chemotherapy, normally using two or three drugs including an anthracycline, is appropriate for patients with acute leukaemia who are sufficiently fit to withstand it. Remission induction should be considered for fitter older patients, but careful judgements need to be made about the appropriateness of treatment because of the risk of treatment-related death and of impairing the quality of the patient's remaining life. About 70% of patients with acute myeloid

leukaemia (AML) (the most common form of acute leukaemia) are over 60 years of age and outcomes in this group are poor, with early treatment-related death-rates of around 25%.

Patients with acute lymphocytic leukaemia (ALL) require intrathecal as well as intravenous treatment. Cranial radiotherapy should also be available when required, and should be given by a member of the extended leukaemia MDT.

B-cell chronic lymphocytic leukaemia (CLL)

Treatment is not necessary for all patients when CLL is first diagnosed, but about half of those known to have CLL will require treatment at some stage. When treatment is required to control symptoms such as anaemia, oral out-patient therapy is usually appropriate. The most commonly used drug is oral chlorambucil, but an Medical Research Council (MRC) trial (CLL-4), comparing different drugs (including fludarabine) for such patients is currently in progress. Recruitment to this trial should be supported.

Recurrence is inevitable and many patients will need second-line treatment. A variety of drugs may be used, either as single agents or in combination. Fludarabine, which can usually be taken by mouth, is specifically recommended by NICE for patients for whom first line chemotherapy has failed or who cannot tolerate it, and who would otherwise receive combination chemotherapy. [19]

Chronic leukaemias, myeloproliferative disorders and myelodysplastic syndrome

[19] National Institute for Clinical Excellence. *Guidance on the use of fludarabine for B-cell chronic lymphocytic leukaemia*. Technology Appraisal Guidance No. 29. London: NICE, 2001.

In most of these conditions, the emphasis should be on symptom control. Supportive treatments ranging from single-agent chemotherapy to regular transfusion, given on an out-patient basis,

are appropriate for most patients. Vascular complications of myeloproliferative disorders may require input from other specialists who should be members of the extended leukaemia MDT.

5

Treatment for chronic myeloid leukaemia (CML) varies according to the phase of the illness and other prognostic factors, in particular, presence or absence of the "Philadelphia chromosome" and the patient's age. Interferon-a and/or conventional chemotherapy – usually hydroxyurea – either of which can be given on an out-patient basis, can often control the disease during the chronic phase but the benefits may be short-lived and a substantial proportion of patients develop intolerable side-effects. Supportive treatment to normalise the balance of blood constituents is required as the disease progresses.

NICE has recommended that imatinib should be offered to patients with chronic-phase Philadelphia-positive CML if treatment with interferon fails to control the disease or produces unacceptable sideeffects. NICE has also recommended imatinib as an option for the treatment of adults with Philadelphia-positive CML in accelerated phase or blast crisis, provided they have not received imatinib at an earlier stage. This is an area of rapid change; the role of imatinib earlier in therapy is currently being considered.

Allogeneic bone marrow transplantation should be discussed with younger patients (see Topic 6, High dose therapy).

Lymphomas

All patients with lymphomas should be discussed at, and managed by, lymphoma MDTs.

Hodgkin's lymphoma

Out-patient treatment with multi-agent chemotherapy (usually ABVD) over a period of months is normally required. Radiotherapy should be available for patients with localised disease, bulky masses or an incomplete response to chemotherapy. High dose therapy (Topic 6, High dose therapy) should be discussed with younger patients who are potentially able to benefit from it, in particular those who have relapsed or whose disease fails to respond to standard dose treatment.

Non-Hodgkin's Lymphoma (NHL)

The disease groups described below include a variety of conditions which require very different management strategies (see Background). Even within diagnostic categories, there is great diversity between patients. A range of medical specialists may be involved in caring for these patients, for example dermatologists and gastroenterologists. These should be members of the extended lymphoma MDT.

The forms of clinical management regarded as optimal are changing continuously and will not be described in detail here.

Aggressive NHL, including diffuse large B-cell lymphoma, peripheral T-cell lymphoma and Burkitt's lymphoma

Haematologists and oncologists may be involved in the treatment of patients with aggressive (high-grade) forms of lymphoma.

Chemotherapy followed by limited field radiotherapy is likely to be appropriate for patients with localised aggressive NHL.

CHOP-based chemotherapy is used for patients with disseminated aggressive disease who are fit enough to tolerate it; this can cure about one-third of these patients.

Evidence is emerging to suggest that rituximab may have a role in selected patients with diffuse large B cell lymphoma since survival appears to be lengthened by its co-administration with CHOP in one trial. NICE will be producing guidance on this.

Combination chemotherapy using a different group of drugs from that initially used may induce remission if the disease recurs. High dose therapy (see Topic 6, High dose therapy) may be appropriate for selected younger patients if standard chemotherapy fails.

Patients who need other forms of treatment, such as surgery, should be treated by designated clinicians who are members of the extended lymphoma MDT.

Other forms of NHL

Single-agent out-patient therapy is appropriate for initial treatment for most patients; a wide variety of types of treatment may be used. In the majority of cases, disseminated low grade lymphomas are not cured by any of the treatments currently in use. Repeated courses of treatment, sometimes using combination chemotherapy or radiotherapy, are likely to be required over many years. Patients should be discussed by the lymphoma MDT each time symptoms recur, since decision-making about the most appropriate form of management can be complex.

Asymptomatic patients are often managed by observation alone initially, although most require treatment at some stage. Single alkylating agents are widely used in initial therapy, and at recurrence or for those requiring alternative treatment

there is a range of options including combination chemotherapy, purine analogues, rituximab, radioimmunotherapy, and high dose chemotherapy with progenitor cell rescue. Which of these is appropriate will depend upon the condition of the patient and their prior treatment, and many trials evaluating these approaches are in progress. Wherever possible, patients should be offered the opportunity to take part in these.

NICE has issued guidance on the use of the monoclonal antibody, rituximab, for follicular lymphomas. Currently, rituximab is recommended only in the context of a prospective case series, for last-line treatment when alternative therapeutic options have been exhausted.

Multiple myeloma

Out-patient combination chemotherapy is appropriate for most patients, but high dose treatment with autologous stem cell rescue should be discussed with those who are sufficiently fit to withstand it (see Topic 6, High dose therapy). Orthopaedic and renal complications require involvement of other specialists, who should be members of the extended myeloma MDT. Long-term treatment with bisphosphonates should be considered from the time of diagnosis.

Rapid access to palliative radiotherapy is essential for these patients, both to control pain and to reduce the risk of fractures and spinal cord compression.

Management of complications of chemotherapy

Networks should agree, document and disseminate guidelines for both prophylaxis and management of neutropenic sepsis. Patients, their carers, primary care teams, accident and emergency departments, and others who may encounter this

type of problem should be given precise information about whom they should contact and where patients should be taken in the event of treatment complications. These patients should be managed by a specialist haemato-oncology MDT (see Topic 4, Organisation of specialist services).

B. Anticipated benefits

Many patients are already being treated in ways outlined here, but for those who are not, a range of benefits may be anticipated. Crucially, patients would be looked after by staff who know about their condition, in appropriate facilities. This will both ensure that patients receive the most appropriate forms of treatment and enhance safety. For example, it will allow complications of treatment to be recognised quickly and managed efficiently, thus reducing iatrogenic morbidity and death.

C. Evidence

Note: the reliability and quality of evidence supporting the recommendations is graded as A, B and C, where A is the strongest evidence. The grading taxonomy is explained in Appendix 2.

Most of the evidence on the effectiveness of treatment for haematological malignancies has been systematically reviewed by the Swedish Council on Technology Assessment in Health Care (SBU). The text below summarises information from these reviews.

Acute leukaemia

The review includes nearly 70 publications (n=17,009), including one meta-analysis (n=1897) and 31 randomised controlled trials (RCTs) (n=10,516). This shows that initial therapy with an anthracycline (usually daunorubicin or

idarubicin and ara-C) can produce lasting remission in some patients; the total doses of both drugs are important to maximise time in remission.(A) Response rates, remission duration and survival are better with idarubicin than daunorubicin.(A)

The inclusion of other agents, such as mitoxantrone and etoposide, has been found to improve outcomes in some studies, but the evidence is not conclusive. Post-remission intensive chemotherapy may improve the duration of remission in younger patients but it is not clear whether it increases long-term survival rates.(A)

Standard dose chemotherapy can prolong survival in elderly patients with good performance status, but it is too toxic for the majority.(A) For those with poor performance status, palliative treatment with lower doses of chemotherapeutic agents may be helpful, but the optimum treatment has not been identified.

Chronic myeloid leukaemia (CML)

Evidence from RCTs carried out before imatinib became available has been reviewed by the American Society of Haematology. This suggests that newly diagnosed patients with good prognostic factors in the early stage of chronic-phase CML are most likely to survive if they receive interferon with added chemotherapy. Observational studies suggest that complete remission is likely to require four to six months of treatment. For patients who prefer conventional chemotherapy to interferon, hydroxyurea appears to be the agent more likely to improve survival without producing serious toxicity.(A) Uncontrolled studies suggest that high dose therapy with allogeneic transplantation can be effective for some patients.

Early results from an ongoing major RCT[20] that includes patients in the chronic phase of CML treated with imatinib (the IRIS trial, n=1106), confirms that it represents an important advance in treatment. Patients were randomised to treatment with imatinib or interferon alpha plus cytarabine. After a median follow-up period of 19 months, 76.2% of patients in the imatinib group had a complete cytogenetic response, compared with 14.5% of those taking the alternative treatment; differences between groups in other outcome measures are similarly dramatic. Although imatinib was associated with higher rates of some adverse effects (such as superficial oedema, muscle cramps and rash), it was generally much better tolerated and few patients discontinued treatment because of adverse effects. (A)

Additional research evidence on imatinib has been summarised by NICE.[21] Whilst it is clear that imatinib can control the symptoms of CML, there is as yet no information on its long-term effects.

Chronic lymphocytic leukaemia (CLL)

A meta-analysis of studies of chemotherapy for CLL found no advantage in treating the condition before symptoms develop. Initial treatment with combination chemotherapy does not produce significantly better survival rates than single-agent chlorambucil, but drug combinations often induce remission when the disease has progressed despite single-drug treatment.(A) Fludarabine, which can usually be taken by mouth, can be effective for patients for whom first line chemotherapy has failed or who cannot tolerate it, and

[20] O'Brien SG, Guilhot F, Larson RA, Gathmann I, *et al*. Imatinib compared with interferon and low-dose cytarabine for newly diagnosed chronic-phase chronic myeloid leukemia. *New Engl J Med* 2003;**348**:994-1004.

[21] National Institute for Clinical Excellence. *Guidance on the use of imatinib for chronic myeloid leukaemia*. Technology Appraisal Guidance No. 50. London: NICE, 2002.

appears to produce less nausea, vomiting and hair loss than combination chemotherapy.(A)[22]

Two national (MRC) trials, CLL-4 and CLL-5, which are currently in progress, will provide more evidence on optimum treatment strategies for patients with CLL.

Multiple Myeloma

High dose treatment is being used increasingly frequently for patients with myeloma. For those who cannot tolerate high dose treatment, combination chemotherapy or melphalan plus prednisolone seem equally effective. Time to disease progression can be prolonged by six months with interferon maintenance therapy ($p<0.01$), but this is a costly form of treatment with unpleasant side-effects. Interferon appears to increase overall survival time by about four months.(A)

The British Society for Haematology has recommended that all patients with multiple myeloma should be treated with

bisphosphonates, whether or not bone lesions are present.(A) Meta-analysis of data from 11 RCTs shows that a vertebral fracture can be prevented in one in 10 patients (OR 0.59, 95% CI: 0.45 to 0.78, P=0.0001) and the absolute risk of bone pain is reduced by 9% (95% CI: 3.5% to 14.4%). There is consistent evidence of benefits from a variety of studies, including reductions in pain, hypercalcaemia and pathological fractures.(A) Zoledronic acid, a new, more potent bisphosphonate, is at least as effective as pamidronate.(A)

[22] National Institute for Clinical Excellence. *Guidance on the use of fludarabine for B-cell chronic lymphocytic leukaemia*. Technology Appraisal Guidance No. 29. London: NICE, 2001.

Aggressive Non-Hodgkin's Lymphoma (NHL)

The SBU review reports that chemotherapy followed by radiotherapy is usually effective for patients with localised disease, but the optimum dose of radiotherapy is uncertain. CHOP chemotherapy is effective for most patients (including the elderly) with aggressive disseminated NHL. No chemotherapy regimen has been shown to be superior overall, nor is there clear evidence that adding other drugs improves the effectiveness of CHOP. For second-line therapy after relapse, combinations of agents not used for initial treatment can produce complete remission in 20-40% of patients but fewer than 10% will have prolonged remission.(A)

Hodgkin's lymphoma

Chemotherapy and radiotherapy have been used alone and in combination for patients with Hodgkin's lymphoma. Several combination chemotherapy regimens, for example ABVD or MOPP/AVBD hybrid or alternating schemes, are similarly effective but have different patterns of acute and late adverse effects (see *Improving Outcomes in Haematological Cancers, The Research Evidence* for details). Extended field radiotherapy is more likely to produce long-term adverse effects such as breast and lung cancer, and for this reason, is less often used than previously. The addition of radiotherapy does not improve survival rates, but limited field radiotherapy is appropriate for selected patients to reduce the risk of relapse and need for further intensive treatment.(A)

Management of complications

Preventing infection in neutropenic patients

The evidence does not allow any definitive conclusions to be made on the necessity of isolating neutropenic patients and the role of air filtration. The apparently simple measure of

hand washing is important and should be part of a wider education programme to prevent hospital-acquired infection. The role of barrier nursing as a routine procedure in the management of neutropenic patients and transplantation is unclear.(B)

A study of infection control interventions in a US teaching hospital highlighted the poor rate of compliance with hand washing protocols, particularly among physicians (56% compliance, compared with 86% among nurses).

Indwelling venous catheters (central lines)

The use of specialist teams to insert central lines and the care of such lines by designated, trained personnel can reduce infection rates and complications.(B) Suitably trained clinical nurse specialists can provide this type of service. Ultrasound guidance can significantly improve the success rate and may reduce complications.(B) Line insertion outside a special procedure room or operating room has been identified as a risk factor for blood stream infection associated with central lines in patients treated in intensive care units.(B)

Colony-stimulating factors (CSF)

The evidence suggests that CSF should not be used routinely in patients with neutropenia who are not febrile. The collective results of eight trials provide strong evidence for not using CSF routinely as adjunct therapy for uncomplicated fever and neutropenia.(A) There was a decrease in the duration of neutropenia of less than 500/µL, but no consistent clinical benefit. There is no reliable evidence that CSF is beneficial for patients with fever and neutropenia who are at higher risk of infection-associated complications, and who have prognostic factors that are predictive of poor clinical outcome.

Epoetin for prevention and treatment of anaemia

Epoetin (commonly known as epo) is a synthetic form of the natural hormone erythropoietin, which regulates production of red blood cells. It is used to treat or prevent anaemia caused by cancer or cancer treatment, reducing patients' need for transfusions.

In patients with haematological cancers, the response to epoetin varies according to the type of disease and treatment. It is particularly effective for patients with multiple myeloma and may be valuable for those with NHL and CLL who are treated with chemotherapy, but is less effective for those with myelodysplastic syndrome.(A) It does not appear to be useful for patients receiving autologous stem cell transplants, nor for those with mild anaemia (haemoglobin levels above 10g/dL).

D. Measurement

Structure

- See Table 4.

Process

- Audit of adherence to guidelines for hand-washing and prevention of infection.
- Audit of management of patients with neutropenic sepsis.
- Number of patients treated per annum for induction of remission in acute leukaemia.

Outcome

- Iatrogenic deaths and deaths due to infection.

- One, five and 10-year survival rates.
- Long-term adverse effects of treatment.
- Outcomes registers should be linked with research.

E. Resource implications

Concentration of services for provision of intensive chemotherapy in hospitals and wards which have appropriate levels of qualified staff and adequate facilities will require significant resources in some areas. The short-term cost of transferring patients from hospitals which currently treat fewer than five patients per year for induction of remission of acute leukaemia to higher-volume units is estimated to be about £1.9 million for England and Wales as a whole (see Appendix 1, *Economic implications of the guidance*). This figure is based on the assumption that 115 new patients per annum are currently treated in hospitals which deal with small numbers.

6. High dose therapy

A. Recommendations

Whenever possible, high dose therapy with stem (progenitor) cell rescue should be given in the context of well-designed randomised controlled trials (RCTs), so that the value of this form of treatment can be more clearly established.

High dose therapy is potentially toxic and must be fully discussed with patients and their carers before the decision to begin treatment is made (see Topic 2, Patient-centred care). This is particularly true of allogeneic bone marrow transplantation. The intention of high dose therapy is normally to eliminate malignant cells by myeloablation – destruction of rapidly-dividing tissue in the bone marrow. This is described as "conditioning" and it may be achieved either by high dose chemotherapy or radiotherapy (total body irradiation, or TBI). Patients and their families should be fully aware of how this form of treatment could affect them, and that the possibility of long-term remission and good quality of life is balanced by significant risks of treatment-related death or chronic illness in some survivors.

Psychological factors should be taken into account in decision-making about the appropriateness of transplantation, and psychosocial support should be available for patients and their close family members throughout the period of treatment and isolation. Continuing psychosocial support and rehabilitation may be necessary for an extended period after transplantation.

Facilities and expertise

High dose therapy and stem cell rescue should be provided only in specialised centres which meet JACIE accreditation standards for bone marrow transplantation. These are described in full on the European

Group for Blood and Marrow Transplantation (EBMT) website (www.ebmt.org), the main points of which are summarised below. TBI is appropriate before allogeneic transplantation. This is a specialised technique that should only be given in radiotherapy centres which perform such treatments regularly and have the requisite scientific and physics support. Careful attention should be given to the clinical management and commissioning arrangements for the radiotherapy component of the service to ensure the efficient operation of the transplant service as a whole.

JACIE accreditation requirements[23]

Each clinical haemopoietic progenitor cell transplantation programme must meet the following criteria:

- It must consist of an integrated medical team housed in geographically contiguous space with a single programme director, common staff training programmes, protocols and quality assessment systems;
- It must work with cell collection facilities and processing laboratories which also meet JACIE standards;
- It must carry out a minimum of 10 autologous and/or 10 allogeneic stem cell transplant procedures per year;

[23] Criteria derived from JACIE standards described in the *Haematopoietic progenitor cell collection, processing & transplantation accreditation manual*, on <www.ebmt.org> (downloaded October 2002).

- The medical team must include the programme director and attending physicians who are haematologists or medical oncologists. All members of the medical team should have had specialist training in stem cell transplantation, which includes training in patient selection, stem cell harvesting, administration of high dose therapy, and management of the various problems that may develop in patients undergoing transplantation;
- There must be access to named consulting physicians from other key disciplines, including surgery, pulmonary medicine, intensive care, gastroenterology, nephrology, infectious disease, cardiology, pathology, psychiatry, and, if large-field or total body irradiation is used, clinical oncology;
- There must be sufficient nurses experienced in the care of transplant patients to produce a nurse/patient ratio adequate for the care of severely ill patients;
- There must be support staff including pharmacists, dietitians, social workers, physical therapy and data management;
- There must be a designated in-patient unit that minimises airborne microbial contamination, and a designated out-patient area that protects patients from transmission of infection, where medication and blood product transfusion can be provided;
- There must be written policies for all clinical procedures.

It is essential to minimise the risk of infection in patients who have undergone high dose therapy (see Table 4). Strict isolation facilities are important for patients undergoing

allogeneic transplantation. However, standard single rooms with en-suite facilities, as recommended for patients undergoing intensive chemotherapy (see Table 4), may be sufficient for patients undergoing autologous stem cell rescue. Rooms with laminar airflow and high-efficiency particulate air (HEPA) filtration should be available for all patients undergoing high dose therapy, particularly when there is risk of contamination by environmental organisms such as Aspergillus, for example during periods of building renovation.

Colony-stimulating factors should be considered to enhance recovery after high dose therapy.

High dose therapy with autologous stem cell rescue

High dose therapy with autologous stem cell rescue should be available for patients who have multiple myeloma or recurrent or treatment-resistant Hodgkin's lymphoma or aggressive lymphomas and who are fit enough to undergo this form of treatment. It should only be offered to those with other types of haematological cancer in the context of multi-centre RCTs.

High dose therapy with allogeneic stem cell transplantation

Allogeneic stem cell (normally bone marrow) transplantation should be considered for younger patients with leukaemia whose disease cannot be controlled with chemotherapy alone. Allogeneic transplantation has a particularly high treatment-related mortality rate but appears to offer the only hope of cure for some forms of haematological cancer (notably chronic myeloid leukaemia (CML)). It should be carried out only by specialist MDTs working in major centres which meet JACIE accreditation standards. Well-designed multi-

centre RCTs are essential to assess the effectiveness of allogeneic bone marrow transplantation.

Some allogeneic transplants are now carried out using treatment that is strongly immunosuppresive but not myeloablative, in order to create a state of recipient-donor mixture (chimerism). The chemotherapy is of relatively low intensity so its acute side effects are less severe, but the risk of graft-versus-host disease remains and these patients require intensive follow-up with monitoring for opportunistic infections. This approach – often described as "mini-allo" – has allowed allogeneic transplantation to be used for patients who would have otherwise been excluded because of age or co-existing medical conditions, but no prospective trials have yet been performed to determine its usefulness.

B. Anticipated benefits

Delivering high dose therapy in specialised centres which deal with larger numbers of patients is likely to create a more cost-effective service with better staffing levels, facilities and expertise. This should reduce the incidence of life-threatening complications, improve management of patients, and thus reduce the frequency of treatmentrelated deaths.

C. Evidence

Note: the reliability and quality of evidence supporting the recommendations is graded as A, B and C, where A is the strongest evidence. The grading taxonomy is explained in Appendix 2.

Effectiveness of high dose therapy and stem cell rescue

Autologous stem cell rescue

RCTs have been carried out comparing high dose therapy and autologous stem cell rescue with conventional chemotherapy or no treatment in patients with a variety of forms of haematological cancer. High dose treatment, being more toxic than conventional chemotherapy, is more likely to lead to treatment-related death or death in remission.(A) However, there is good evidence for benefit in patients with multiple myeloma or recurrent aggressive lymphoma or Hodgkin's lymphoma.(A)

It is not clear whether high dose therapy is beneficial for initial treatment of patients with aggressive lymphoma, and this should still be regarded as experimental. High dose therapy does not appear to convey benefit when used after a short course of induction treatment; two studies suggest a benefit from the completion of conventional therapy. In patients with poor prognostic features it may be appropriate to test the place of high dose therapy after a full course of induction. There is better evidence for high dose therapy in second remission and this is now routine practice.

In Hodgkin's lymphoma, the only randomised trials of high dose therapy show improved progression-free survival but not overall survival. (A) Nevertheless, this approach is now routine in second or subsequent remission.

In acute leukaemias, there is no clear evidence that autologous transplantation produces higher survival rates than chemotherapy without transplantation.(A)

Larger randomised studies, stratified by age and with long follow-up periods, are urgently required to clarify the role of

high dose therapy with autologous transplantation, particularly for patients with lymphoma.

Allogeneic bone marrow transplantation (BMT) for leukaemia

Allogeneic BMT is a high-risk treatment strategy, with significant rates of treatment-related death and morbidity, especially in older patients. Despite these risks, there have been very few controlled trials comparing allogeneic BMT with conventional chemotherapy.

Two RCTs have assessed the effectiveness of high dose therapy and allogeneic stem cell rescue during first remission of acute myeloid leukaemia (AML). In both, patients randomised to the high dose therapy arm underwent allogeneic BMT if suitable donors were available, but when no donor could be found, autologous stem cell rescue was used. These trials found that allogeneic BMT was significantly more risky than intensive chemotherapy with or without autologous stem cell rescue, and did not lead to better survival rates.(A)

There do not appear to be any other RCTs comparing allogeneic bone marrow or peripheral stem cell transplantation with standard chemotherapy for any form of haematological cancer.

Information from six controlled (non-randomised) trials (CCTs) suggests that allogeneic transplantation may be associated with improved survival rates among selected patients with acute lymphoblastic leukaemia (ALL). Meta-analysis of data from three CCTs (n=261) gives a combined two-year OR of 0.38 (95% CI:0.22 to 0.65) for progression-free survival - an absolute survival benefit of about 23% (95% CI:11 to 35%) in favour of high dose therapy with allogeneic transplantation. Pooled three- and four-year

progression-free survival data from two CCTs (n=123) showed an absolute survival benefit of about 35% (95% CI:15 to 51%) (OR 0.23, 95% CI:0.10 to 0.51).(B)

Allogeneic bone marrow transplantation may offer the only hope of long-term remission for patients with CML. The best outcomes are achieved with human leucocyte antigen (HLA)-matched sibling allografts, with survival rates in most published reports of around 60% among relatively young patients (median age 37 years or less) in the chronic stage of the disease. It is considered significant that survival rates after allogeneic transplantation reach a plateau, whilst those for patients treated with conventional chemotherapy show an inexorable decline. Among older patients, those given poorly matched grafts or transplants from unrelated donors, outcomes are considerably worse, with higher rates of death, relapse, and graft-versus-host disease. Where rates of chronic graft-versus-host disease are reported, they range from 18% to 67%.(B)

One report of dose-reduced conditioning in 44 older patients (median age 52 years) was included in the review. The median overall survival time was 37 months, but 41% of patients were still leukaemia-free at 47 months.(B)

Conditioning regimens

Several comparative trials have demonstrated that survival rates are slightly higher after total body irradiation (TBI) than after busulphancyclophosphamide conditioning (BUCY).(A) Less toxic regimens, known as “mini-allografts”, are beginning to be used for older or less fit patients. In 2001, 231 mini-allografts were reported in England and Wales[24].

[24] Data provided on request by British Society for Bone Marrow Transplantation (BSBMT) Registry, October 2002.

No trials have been identified which compare mini-allografts with other treatments.

Granulocyte-colony-stimulating factor (G-CSF)

Recovery after transplantation seems to be quicker after the administration of granulocyte-colony-stimulating factor (G-CSF), whether used to improve the harvest of stem cells or after transplantation. There is no advantage in using doses over 5µg/kg/day, and treatment may be delayed until up to 10 days after transplant.(A)

Minimising risk of infection

There is conflicting information on the value of isolation and air filtration for patients undergoing allogeneic transplantation, and there have been no randomised studies addressing these issues. Registry analysis of large numbers of patients nursed in isolation suggest that HEPA filtration and laminar airflow are beneficial, but other nonrandomised studies have found that similar outcomes (in terms of infection rates) could be achieved using standard single rooms.(B)

There is evidence that patients undergoing autologous transplantation do not need strict isolation; indeed, carefully selected patients can be treated as out-patients. Many of those given out-patient treatment will require hospital admission for treatment-related illness, but are likely to spend less time in hospital (median, 7 nights versus 14, $p<0.001$).(B)

Strong associations have been found between environmental contamination with Aspergillus and building renovation. HEPA filtration alone is not sufficient to protect against this, but HEPA filtration plus laminar airflow is effective against Aspergillus.(B)

Psychological issues

Patients' ability to cope with transplantation

A prospective study of patients with acute leukaemia found that distraction coping techniques and fighting spirit had highly significant impacts on the probability of survival five years after allogeneic transplantation. The only clinical factor that had a significant influence on survival was stage of disease at transplant.(B)

Quality of life after high dose treatment and transplantation

High dose treatment is both physically and emotionally stressful and people who go through it continue to feel exhausted and depressed for a long period – several months, perhaps years – afterwards. Sexual function may be particularly slow to recover. Patients who undergo high dose treatment experience poorer quality of life than those who had conventional chemotherapy for about a year, but these differences diminish with increasing time. High dose therapy can produce long-term adverse effects such as fatigue, which affect dayto-day functioning; this may still be reported a decade later.(B)

Chronic graft-versus-host disease, a relatively common consequence of allogeneic transplantation, can cause persistent malaise and poor quality of life. Patients may require long-term treatment with steroids. This problem appears to be particularly common when peripheral blood stem cells are used for allogeneic transplantation.(B)

Use of transplants for adults with haematological cancers in England and Wales

The British Society for Bone Marrow Transplantation (BSBMT) registry maintains a database of the use of stem cell transplantation in England and Wales. Table 5 shows the number of transplants carried out for each type of haematological cancer in adults in 39 centres in 2001, along with the change in the use of this form of treatment in the five-year period since 1996.

Table 5. Number of stem cell transplants in adults with haematological cancers, England and Wales, 2001[25]

Disease	Type of transplant		Total number, 2001	% change since 1996
	Autologous	Allogeneic		
AML	53	162	215	+23
ALL	20	125	145	+21
CML	10	93	103	-18
MDS	5	45	50	+56
CLL	8	20	28	+65
Myeloma	499	35	534	+124
Hodgkin's lymphoma	132	16	148	-25
NHL	402	73	475	+47
Totals	**1129**	**569**	**1698**	**+38**

[25] Data provided on request by BSBMT Registry, October 2002.

BSBMT figures show that the annual number of stem cell transplants given for these forms of cancer as a group increased by 38% over this period, from 1228 to 1698. The largest single component of this increase is due to greater use of autologous stem cell rescue for patients with myeloma.

Number of transplants undertaken by individual teams

A recent report gives figures for the number of patients treated with high dose treatment and stem cell rescue in hospitals in the UK.[26]

This reveals that 10 or more procedures were carried out by 26 teams in 2000; these are listed below, with the number of allografts and autografts reported by each. It appears that some of these teams worked in two hospitals, some distance apart (e.g. Cambridge and Norwich). (Children's hospitals are excluded where separate figures are given.)

Table 6. Teams in England and Wales which carried out 10 or more allografts and/or autografts in 2000.

Hospital	Number of allografts	Number of autografts
Birmingham, Heartlands Hospital	14	20
Birmingham, Queen Elizabeth Hospital	42	49
Bournemouth, Royal Bournemouth	0	11

[26] Gratwohl A, Baldomero H, Horisberger B, *et al*. Current trends in hematopoietic stem cell transplantation in Europe. *Blood* 2002;**100**:2374-2386.

Hospital		
Bristol, Royal Hospital for Sick Children and Southmead Hospital	65	19
Cambridge, Addenbrooke's Hospital and Norwich Hospital	11	34
Cardiff, University Hospital of Wales	11	29
Exeter, Royal Devon and Exeter Hospital	0	13
Leeds, St James's University Hospital and Leeds General Infirmary	26	76
Leicester, Royal Infirmary	13	38
Liverpool, University Hospital	13	35
London, Guy's Hospital	8	17
London, Hammersmith and Charing Cross Hospital	45	75
London, King's College Hospital	41	24
London, Royal Free Hospital	44	17
London, St Bartholomew's and the Royal	19	34
London Hospital		

London, University College Hospital	54	89
Manchester, Christie Hospital	20	66
Manchester, Royal Infirmary	32	21
Newcastle upon Tyne, Royal Victoria Infirmary	41	43
Nottingham, City Hospital	43	42
Oxford, John Radcliffe Hospital	14	26
Plymouth, Derriford Hospital	11	22
Poole, Dorset Cancer Centre	0	20
Sheffield, Royal Hallamshire, Weston Park and the Children's Hospitals	19	26
Southampton General Hospital, CRC Wessex	0	20
Stoke-on-Trent, North Staffordshire Royal Infirmary	0	12

Teams at the following hospitals carried out fewer than 10 of one or both of these procedures (number of allografts/autografts in 2000):

Bangor, Ysbyty Gwynedd (0/8); Coventry, Walsgrave Hospital (0/6); London: Oncology Marrow Transplantation Group, 1/6; London: St George's Hospital (7/5); Manchester, Hope Hospital (0/2); Manchester, Trafford General Hospital (0/1); Rotherham, General Hospital (0/1); Sunderland, Royal Hospital (0/4); Swansea, Ysbyty Singleton (0/7); Swindon, Princess Margaret Hospital (0/4); Taunton, Somerset and Taunton Hospital (1/7);Wakefield, Pinderfield and Pontefract Hospitals (0/9).

D. Measurement

Structure

- Appropriate facilities for high dose therapy at specified centres.
- Availability of rooms with filtered air.

Process

- Evidence that patients are fully informed about what high dose treatment involves, its potential consequences and the uncertainty about benefit, before they agree to it.
- Implementation of accreditation systems for transplant centres.
- Number of patients undergoing each type of procedure per annum.

Outcome

- Mortality rates at one and five years.
- Submission of results from accredited centres to the national registry (BSBMT).

- Rates of graft-versus-host disease requiring long-term treatment.
- Quality of life measures from long-term monitoring and audits of care.

E. Resource implications

The main resource implications for high dose therapy arise from a continuing increase in the number of transplants (based not on recommendations in this guidance, but on extrapolation from current trends), and the need for adequate staff levels and bed numbers in units providing this form of treatment. The expected growth in the volume of activity is discussed in Appendix 1, Economic implications of the guidance.

It is believed that there will be a particularly large rise in the number of "mini-allografts", which are at least as expensive as standard allogeneic transplants (£40,269), and may cost up to 30% more. Overall, the cost of increasing transplant activity in England and Wales is likely to be around £7.3 million per year, but there is considerable uncertainty about both the rate of increase and its potential cost; huge variations in the reported costs of transplants in individual centres add to this uncertainty.

The costs of engaging more staff have not been calculated, but about half of the centres which carry out both autologous and allogeneic transplants report shortages of trained nurses and many also lack data managers. It is believed that only minor service reconfiguration will be required to achieve the minimum patient numbers recommended by JACIE, so this has not been included in the economic analysis.

Although not a direct consequence of this guidance, resources are required to develop and sustain existing commitments to

JACIE accreditation systems and to cover the running costs of the BSBMT transplant registry. Both activities are important to quality assurance.

7. Continuing management

A. Recommendations

Most forms of haematological cancer follow a chronic relapsing course, so patients need regular monitoring. There is no reliable evidence on what form of monitoring is most appropriate, or what the optimum intervals between clinic visits might be. Local clinical policies should be agreed by all the haemato-oncology multidisciplinary teams (MDTs) within each network.

The progress of haematological cancer is generally assessed by blood tests, often including ongoing cytogenetic testing. Molecular follow-up is increasingly used for chronic myeloid leukaemia (CML) and acute leukaemia. In lymphoma, CT scans may also be required.

Long-term follow-up

This document does not deal with follow-up for people treated for haematological cancer as children or adolescents; this issue should be covered in forthcoming National Institute for Clinical Excellence (NICE) guidance on child and adolescent cancers.

Patients should be informed that routine long-term follow-up does not offer any clinical advantage to them. Those whose disease is believed to be cured should normally be discharged, but long-term follow-up by telephone or written questionnaire should be considered. The primary aim of such

long-term follow-up should be to identify and collect information on delayed effects of treatment. Since it is not possible to be certain whether a permanent cure has been achieved, patients should be given clear written instructions on whom they should contact if they are concerned about any new symptoms. They should be given information about the level of risk of recurrence of their disease and reassured that relapse is rare after five years' freedom from signs of disease. Patients and their GPs should also be given information about the risk of delayed adverse effects of treatment, and symptoms that should prompt contact with the haematological cancer MDT.

Long-term problems are particularly common after high dose treatment and allogeneic bone marrow transplantation (BMT). Providers may therefore consider establishing long-term follow-up systems for patients who have undergone this procedure. Follow-up may also be valuable for collection of information on long-term outcomes of treatment in people who participated in clinical trials.

A database should be maintained to record information about all patients who have undergone treatment for haematological cancer, whether or not they are being actively followed up. There is an increased risk of a variety of cancers after intensive treatment for haematological malignancies, especially among those who were treated as children or adolescents. One particular cause for concern after extended field radiotherapy for Hodgkin's lymphoma is the high rate of breast cancer in relatively young women. Patients who have had radiotherapy to the neck should have regular thyroid function tests.

B. Anticipated benefits

Since follow-up offers no clinical benefit for asymptomatic patients who appear to be cured, discharging such people allows clinic time to be used for others whose need is greater. A database of information about patients who have undergone treatment for haematological cancer will both improve knowledge of long-term epidemiology and permit patients to be recalled if new evidence emerges on delayed effects of treatment; such a database could be efficiently maintained through postal or telephone contact.

C. Evidence

Note: the reliability and quality of evidence supporting the recommendations is graded as A, B and C, where A is the strongest evidence. The grading taxonomy is explained in Appendix 2.

Effectiveness of follow-up

There is no reliable evidence showing that intensive follow-up of patients who have completed treatment for any form of haematological cancer is beneficial.

The risk of recurrence of Hodgkin's lymphoma is highest in the first two years after initial treatment. Recurrence can be identified through regular physical examination, blood counts, x-rays for those who had disease in the chest, but there have been no comparative studies to show whether this improves long-term outcomes. Retrospective studies suggest that educating and informing patients so that they recognise sinister symptoms and seek prompt attention may be more useful than routine follow-up, since most recurrences are detected by patients themselves.(B)

In leukaemia, relapse is usually signalled by changes in the blood; the evidence does not support routine use of more invasive procedures such as bone marrow aspiration or lumbar puncture for detecting recurrent disease.(B)

In patients who have been treated for non-Hodgkin's lymphoma (NHL), physical examination and measurement of serum lactate dehydrogenase (LDH) can be helpful for diagnosing relapse. Imaging may detect a higher proportion of recurrences in low-grade lymphoma but there is no evidence to suggest that this affects survival.(B)

Long-term effects of treatment

Quality of life

A review of studies suggests that quality of life and health status improves with increasing time since treatment. 80% of long-term survivors of BMT experience good to excellent health. People treated for Hodgkin's lymphoma may experience persistent side-effects of treatment, with generally poorer physical functioning and more health-related unemployment than age-matched controls; nevertheless, 75-85% of former patients are able to continue in work.(B)

Secondary malignancies

Secondary malignancies are recognised long-term adverse effects of treatment for haematological cancers. The incidence of both haematological malignancies and solid tumours is greatly increased among patients who were treated when young; and those who develop secondary cancers are more likely to die from their disease than other cancer patients of the same age.(B)

Risk estimates for secondary haematological malignancies vary widely between patient populations. In general, the risk

of leukaemia is more strongly associated with chemotherapy, especially in patients who had six or more cycles of chemotherapy, who received MOPP, or who were treated for relapse of their primary cancer. Solid tumours are more common after radiotherapy, and usually develop within the treatment field. The excess risk of secondary leukaemia peaks between five and nine years after treatment, but the risk of a secondary solid tumour continues to rise.(B)

Large studies reveal that patients treated for Hodgkin's lymphoma face about three to seven times the population risk of developing cancer (of any type). The absolute risk for these patients is about 5-7% 10 years after the initial diagnosis, rising to 14% after 20 years. One study reported that 28% of a group of 1253 patients who underwent initial treatment aged 40 or less, had developed a secondary cancer after 25 years of follow-up.(B) However, these patients would have undergone more risky treatment than is normally used today.

The risk of breast cancer among women treated for Hodgkin's lymphoma depends on their age at the time of their primary disease. Retrospective studies reveal that women treated at 21-30 years old are about six times more likely to develop breast cancer than normal, but among those treated aged 31-40, the risk is 2.4 times normal. A cumulative risk of breast cancer of 16% has been reported at 25 years after treatment.(B)

High dose therapy with allogeneic transplantation for any form of haematological cancer appears to be associated with a similar level of long-term hazard to treatment for Hodgkin's lymphoma - around four to five times the population risk for any form of cancer. About 1215% of these patients will develop a secondary cancer within 15 years of initial treatment.(B)

D. Measurement

Structure

- Local clinical policies on continuing management of asymptomatic patients with haematological cancer, agreed by all haemato-oncology MDTs in the network.
- Local clinical policies on long-term follow-up of patients whose haematological cancer is believed to be cured.
- Database for recording secondary cancers among people treated for haematological malignancies.

Process

- Audit of local follow-up practice against policy guidelines.

Outcome

- Rates of secondary malignancy after intensive treatment for haematological cancer.
- Patients' satisfaction with, and comprehension of, information on symptoms that should lead them to contact the haematological cancer MDT.

E. Resource implications

These recommendations are not expected to have significant additional resource implications. Resources will be required to establish and maintain a long-term follow-up database, but no analysis has been carried out of the potential cost.

8. Palliative care

The National Institute for Clinical Excellence (NICE) guidance on improving supportive and palliative care for adults with cancer[27] will be published in 2003. It is intended to complement the site-specific guidance, giving detailed recommendations on many issues relevant to this section as they apply to cancer care generally, with supporting evidence. The areas it covers are listed in Topic 2, Patient-centred care.

A. Recommendations

Palliative care services and haemato-oncology should work together to provide integrated care for patients with haematological cancers. These patients need ongoing management by the haemato-oncology multi-disciplinary (MDT) throughout the course of their disease. Adequate palliative care is nevertheless important to maximise quality of life and there should be effective integration between palliative care and haemato-oncology services throughout the patient's illness, not just when it is acknowledged that the terminal phase has been reached.

Palliative care specialists should be members of haematological cancer MDTs (see Topic 4, Organisation of specialist services). They should take active roles, both as advisors for those who provide direct care for patients on palliation of symptoms such as pain, and working directly with those patients who might benefit from their expertise. Patients and their carers often need multi-faceted support, including information on managing symptoms and help with

[27] National Institute for Clinical Excellence. Improving supportive and palliative care for adults with cancer.

accessing social care and benefits. This can be provided by palliative care teams, both in the community and in hospitals.

Palliative care specialists should be involved in discussing the management of patients, especially those for whom the possible survival benefits of treatment might be outweighed by its disadvantages. There should be agreed guidelines for managing the transition from aggressive treatment to palliative care which ensure that it is handled sensitively and appropriately, and that it takes account of individual patients' emotional and physical needs. This transition should be regarded as a change in treatment goals and emphasis, not a complete handover from haemato-oncology to palliative care services.

Palliative treatment in haemato-oncology

Long-term support for patients is part of normal haematology practice and most of the long-term treatment provided for patients with haematological cancers is actually palliative in nature. Blood product support may be necessary at many points in the disease process and it becomes essential to continued survival in the later stages of leukaemia and myeloma. Haemato-oncology MDTs should make arrangements to enable blood product support to be provided to patients in places other than acute hospitals or haematology units.

Some symptom control issues for haemato-oncology patients are the same as for many other malignancies. Pain can be a major problem for some patients. Effective pain control is particularly important for those who undergo intensive treatment and for those with inherently painful diseases such as myeloma. Each haemato-oncology MDT should have access to a pain specialist (who may be the palliative care specialist member of the MDT) who has specific expertise in

the management of the types of problem that patients with haematological cancer may experience. Palliative radiotherapy should be available for patients with bone pain and for those with low-grade lymphomas.

The specialist palliative care team

Palliative care is essentially a local service and specialist palliative care teams should be based both in local hospitals and in the community. The role of the specialist palliative care team includes both direct care for patients and families with complex problems, and the provision of advice, support and education for other health professionals. One member of the team should be responsible for ensuring efficient coordination of palliative care services and rapid communication between professionals and with patients and their families. 8

The specialist palliative care team should include, as a minimum, the following members:

- Palliative care physician;
- Palliative care nurse specialists.

The team should have close links with the following:

- Pain management team;
- Clinical psychologist/liaison psychiatrist ;
- Social worker;
- Chaplain/pastoral care worker who can offer counselling and spiritual guidance for patients with advanced incurable illness and their carers;
- Bereavement care worker;

- The primary care team.

Those who care for these patients should be able to get advice by telephone from appropriately trained nurses at any time of the day or night. A named member of the palliative care team should be responsible for ensuring effective co-ordination of services to support patients, facilitating both continuity of care and rapid communication between professionals, with patients, and with carers.

The team should endeavour to make it possible for patients to spend their remaining life in the place they prefer, whether this is home, hospital or hospice; but team members should be alert to the possibility that patients' views about where they would prefer to die may change as death approaches.

Bereavement counselling should be available for carers and close family members, who may become very distressed by an extended period of aggressive treatment which ends with the patient's death. Some patients and carers may need counselling at the point of transition from attempted cure to purely palliative measures, to help them accept that further aggressive treatment is pointless.

Palliative care in the community

Palliative care teams should be available to arrange the provision both of relief from symptoms and social and psychological support for patients living at home whose needs cannot be adequately met by primary care teams. Community palliative care services should work closely with primary care teams and hospital-based services; rapid and effective communication and information-sharing between teams is essential.

Criteria for referral for specialist care should be agreed and documented for the whole cancer network by palliative care

specialists and representatives from primary care and haemato-oncology teams. Primary care teams should assess patients' needs regularly and accurately, to ensure that patients who require specialist palliative care or treatment are quickly referred to the appropriate MDT.

B. Anticipated benefits

Better integration of palliative care with treatment services throughout the course of the illness can be expected to enhance quality of life for both patients and their carers. Integrated care is particularly essential at the end of life, and the contribution of palliative care specialists can help to create a more appropriate balance between efforts to preserve life and the need for comfort, peace and the support of close family members when it becomes clear that death is inevitable.

C. Evidence

Note: the reliability and quality of evidence supporting the recommendations is graded as A, B and C, where A is the strongest evidence. The grading taxonomy is explained in Appendix 2.

There is weak but consistent evidence that palliative care is used less in haematological cancers than in patients with solid tumours, and that access to specialised palliative care support may have been less available to haematologists than solid tumour oncologists, particularly for patients in the final phase of illness. Much of this evidence originates outside the UK, but whilst it is not clear how similar attitudes here may be to those in the US and Australia (where most studies have been carried out), information from the UK does point to the same conclusions.

The National Cancer Alliance survey carried out to inform this guidance found that few patients had had contact with palliative care teams, but those who had received support from palliative care teams for pain management reported that it had been valuable. This survey did not, however, focus on patients in the terminal phase. 8

One particular problem with haematological cancer is judging when to stop using intensive forms of treatment; clinicians, patients and their families often find it difficult to acknowledge when remission induction is no longer possible. The decision to change to a palliative approach may be taken too late or not at all, and persistence with aggressive treatment can cause great distress.(B)

A survey based on accounts from carers in the UK bereaved in 1990, found that patients who died of haematological cancer were considerably less likely to receive care from community specialist palliative care nurses in the last months of life than those with other forms of cancer (OR 0.37, $p<0.001$).(B) These patients are more likely to die in hospital than at home or in a hospice.(B)

A study from the US, based on case-notes of patients who had died of haematological cancer, reported that there was significant variation between doctors in the probability of providing palliative therapy.(B)

There are a few reports of more satisfactory management of the dying process of patients with haematological cancers, but each is based only on one or two cases. Factors that appear to produce better emotional outcomes include early involvement of the palliative care team, whose members may be able to assist the transition from curative to palliative care; reducing use of medical technology and invasive treatment, concentrating instead on the patient's physical and

psychological comfort; and facilitating dying at home whenever possible. The research suggests that the emotional and spiritual needs of patients and their families are often not recognised and addressed.(C)

A randomised controlled trial (RCT) assessing the effects of improved co-ordination of services for patients dying from a variety of forms of cancer show that this is cost-effective and can improve outcomes for patients. Patients who could contact a co-ordinator who could facilitate access to appropriate services spent significantly less time in hospital or hospice, required significantly fewer home visits by nursing services, and were more likely to receive effective treatment for vomiting.(A)

D. Measurement

Structure

- Availability of palliative care teams to support patients at home or in hospices.
- Availability of telephone support, advice and information services for patients and their carers.
- Availability of bereavement counselling for close family members and carers.

Process

- Audit of involvement of palliative care teams in the management of patients with haematological cancers.
- Evidence that providers elicit information about patients' preferences about place of death and their views about medical intervention in the terminal phase of illness.

Outcome

- Audit of patients' experience of pain and satisfaction with pain control during intensive treatment.
- Audit of myeloma patients' experience of pain and satisfaction with pain control.
- Audit of patients' and carers' preferences about place of death.
- Carers' comments on services provided during the patient's final month of life.

E. Resource implications

The use of palliative radiotherapy and services for the provision of blood product support are not expected to change significantly under the new guidance. Improving service provision, including the availability of palliative care teams to support patients at home and in hospices and providing bereavement counselling, is likely to have the greatest cost impact. These services provide support to patients with all types of cancer, and is being considered in the context of the NICE guidance on improving supportive and palliative care for adults with cancer, due to be published in 2003.

9. Clinical trials and use of protocols

A. Recommendations

Improvements in the management of haematological cancers (as for solid tumours) require reliable evidence that interventions are effective and that they improve outcomes for patients. It is therefore important that health service commissioners should support the well-designed clinical trials within the National Cancer Research Network (NCRN) portfolio. There should be network-wide co-ordination of local participation in NCRN clinical trials in haematology through each cancer research network. Haemato-oncologists should regularly review the national portfolio of recognised studies and identify those they wish to support at local research network level.

During the period between trials and publication of any National Institute for Clinical Excellence (NICE) appraisal of the interventions assessed, there should be continued support to provide ongoing treatment for patients who took part in the trials.

Multi-disciplinary teams (MDTs) should aim to maximise entry into trials by considering this issue, discussing on-going trials, and reporting on problems and progress at their regular meetings. The possibility of entry into an appropriate trial should be discussed with every patient who fits the inclusion criteria. Such patients should be given accurate and accessible information to inform their decision about whether to participate in the trial (see Topic 2, Patient-centred care).

Trials of treatment for haematological cancer should be designed with outcome measures that reflect quality of life (assessed by patients, not just clinicians) as well as survival time and clinical measures with prognostic significance (surrogate endpoints).

Patients who are not involved in a clinical trial should be treated according to local clinical guidelines based on research evidence.

B. Anticipated benefits

Reliable information on the effectiveness of clinical interventions can only be obtained from large, well-designed trials. Thus, the more patients included in such trials, the better the knowledge base for optimum treatment. Management in the context of trials also tends to be associated with longer survival times for patients with cancer.

In acute leukaemia in particular, survival rates have increased dramatically over the past few decades, especially among young people. This improvement may be directly attributable to knowledge gained from clinical trials.

C. Evidence

Note: the reliability and quality of evidence supporting the recommendations is graded as A, B and C, where A is the strongest evidence. The grading taxonomy is explained in Appendix 2.

In acute leukaemia, the level of participation in multi-centre research studies is high; a majority of eligible patients are currently entered into trials. The same is not true, however, of other forms of haematological cancer; in lymphoma, it is estimated that only about 10% of those who fit the entry criteria for major clinical trials are actually in them. Overall,

perhaps as few as 5% of patients with haematological cancer are treated in the context of a clinical trial.(C)

A systematic review of cancer trials provides some evidence that participation in clinical trials can benefit patients, but it is difficult to distinguish between a real protocol effect from bias due to clinician selection.(A) Audit data from the UK shows that among patients with either acute myeloid leukaemia (AML) or aggressive lymphoma, participation in a trial is associated with a significantly higher chance of complete remission and improved survival.(B) However, patient selection could again account for much of the apparently better outcome. In one of the few studies identified that described outcomes in eligible patients who were not randomised for entry into a trial (of treatment for non-Hodgkin's lymphoma (NHL)), there was no significant difference in disease-free survival between the groups.(A)

Outcome measures of trials of treatments for haematological cancers are, in almost every case, confined to survival rates and clinical measures that have prognostic value but may not clearly reflect the way patients feel. Since evidence-based decision-making about treatment relies heavily on the results of these trials, it is important that patients' views of their experience of treatment and its aftereffects should be considered. Reliable and reproducible quality of life measures are available for use in trials of cancer treatment and can have important implications, both for the appropriate use of interventions and so that patients can give truly informed consent to treatment. See *Improving Outcomes in Lung Cancer*[28] for a discussion of this issue.

Although the evidence in haematology is far from definitive, treatment in accordance with local clinical guidelines

[28] Available on the Department of Health website <www.doh.gov.uk/cancer> under the heading Guidance for NHS.

(protocols) is generally associated with better outcomes (see *Improving Outcomes in Breast Cancer*[29]). The development of local protocols demands a critical attitude towards best practice which is likely to have a beneficial effect on those involved. However, further research is required which looks at treatment protocols and outcome in all patients, not just those in trials.

D. Measurement

Structure

- Network-wide information systems that allow clinicians to identify trials for which specific patients might be eligible.
- Availability of support for clinical trials.
- Availability of continued support for patients who have been successfully treated with products used in clinical trials.

Process

- Evidence of regular discussion of participation in clinical trials at MDT meetings.

Outcome

- Proportion of patients with each type of haematological cancer entered into trials.

E. Resource implications

Treatment in the context of a clinical trial tends to cost more than standard treatment. Adequate resources need to be made

[29] Available on the NICE website <www.nice.org.uk>, where it is described as "Breast cancer service guidance".

available, both to support research and to provide appropriate and effective continuing management for patients who have participated in clinical trials. The potential cost impact of these recommendations has not been calculated.

Appendix 1

Economic implications of the guidance

An economic modelling exercise was carried out to estimate the cost implications for England and Wales of implementation of the main recommendations of this guidance.

The major impacts on costs fall in five broad areas:

- Specialist diagnostic services
- Multi-disciplinary teams (MDTs)
- Patient-centred care (clinical nurse specialists)
- High dose therapy and transplant services
- Induction chemotherapy for remission of acute leukaemia

Specialist diagnostic services

Improving the consistency and accuracy of diagnosis for haematological malignancies is a key objective of the guidance. Two levels of haemato-pathological service are recommended: a local service, as exists at present in most district general hospitals and cancer units, and a specialist service providing molecular biology and identification of genetic abnormalities, which is likely to serve one or more cancer networks.

In England a number of networks are already operating with centralised or partly-centralised diagnostic services. In other networks, centralised specialist services will need to be developed more or less from scratch. Initial one-off payments needed to set up the system in England are estimated to be around £5.8 million, with annual running costs of approximately £7.5 million per annum. Costs will vary according to the size of centralised services and the type of equipment purchased. In the low scenario set up costs are estimated at £4.7 million with annual running costs of £6.7 million (assuming a high proportion of services cover a large population of 3 million and no services purchase a gene sequencer and quantitative PCR machine). In the high scenario set up costs are estimated to be £7.5 million with annual running costs of £8.1 million (assuming a high

proportion of services cover a population of 1.5 million, with all services purchasing a gene sequencer and quantitative PCR machine).

In Wales the All Wales Lymphoma Pathology Review Service has recently secured funding to allow 100% of cases of new lymphoma to be reviewed using a wide spectrum of diagnostic techniques including immunocytochemistry, flow cytometry, conventional cytogenetics, interphase cytogenetics together with molecular genetic studies and, in the near future, gene expression profiling.

Cost savings from avoided misdiagnosis are not known but may be substantial.

Multi-disciplinary teams

Multi-disciplinary team (MDT) working allows patients to benefit from the expertise of a range of specialists for their diagnosis and treatment, and helps ensure that care is given according to recognised guidelines. Lymphoma MDTs are already well-established in many Trusts. However, MDTs for leukaemia and myeloma do not currently exist in a significant proportion of Trusts and therefore new MDTs will need to be created.

A wider range of staff will need to be involved, with additional time required for attending meetings and travelling, in order that MDTs can function in accordance with the guidance. Many Trusts, particularly units, currently suffer from lack of administrative support. Other staffing issues include shortages of radiologists, pathologists and oncologists.

The cost of additional staff time for MDT meetings and for ensuring that all MDTs have a co-ordinator is estimated to be an additional £7.2 million per year. The level of uncertainty is high, with a range of £4.2 million to £10.0 million. The cost of service re-configuration for an individual cancer network will vary according to the existing MDT configuration and staffing levels, as well as the future MDT configuration model adopted. The base case assumes that meetings are held fortnightly. Moving to weekly meetings would almost double the cost of running MDTs. Factors such as the number of teams serving the cancer, which team members travel and the distances travelled (or the price package for line charges) will impact on the annual cost of running MDTs and should be investigated independently by each cancer network.

Staffing issues will be significant and the development of MDTs will need to evolve gradually over a number of years. Additional staff may need to be recruited to allow existing staff the time to attend meetings. Shortages of radiologists, pathologists and oncologists will hamper development of full MDTs in the short term.

The use of teleconferencing facilities offers potential cost savings in networks where geographical dispersion of hospitals results in long travel times. Costs for purchasing and running teleconferencing facilities will vary according to the type of system required and the number of sites involved. Assuming that all networks will need to purchase new equipment, the initial investment for England and Wales is estimated to be £3.5 million for the basic system, increasing to £6.3 million if remote diagnosis is required at each site. It is however anticipated that other MDTs will utilise the equipment once purchased and therefore the initial cost would be shared across a wide range of specialities and is not included in the cost summary.

Patient-centred care (clinical nurse specialists)

The guidance emphasises the need for improved information and support for patients with haematological malignancies, and the central role that clinical nurse specialists (CNS) should play in delivering more patient–centred care. CNSs should also play an active role in MDT meetings.

Data on current numbers of nurse specialists are limited. The CHI/Audit Commission report indicated that at the time of their survey (winter 2000/2001) around 55% of Trusts had no CNS posts and that around 80% of those working with patients with haematological cancers reported severe time constraints on the service that they could provide.

An order of magnitude estimate of the additional number of nurses required was made, based on the CHI report and discussions with a number of CNSs. This was cross-checked against local estimates of future posts required in a number of areas. It is estimated that around 140 additional CNS posts are required nationally, approximately four new posts per typical cancer network of 1.5 million population. The total cost of providing additional CNSs for haematological malignancies in England and Wales is estimated to be £4.6 million.

High dose therapy and transplant services

The guidance recommends that high dose therapy and stem cell rescue should be provided only in specialist centres which meet JACIE accreditation standards for bone marrow transplantation (BMT). These standards include a minimum activity level of 10 autologous and/or 10 allogeneic stem cell transplants per year. Data from the British Society for Bone Marrow Transplantation (BSBMT) registry database for 2001 suggest that there is already considerable centralisation of these services, with only a small number of centres in England and Wales undertaking fewer than 10 transplants per year.

Data from the BSBMT registry database show that the annual number of stem cell transplants for haematological malignancies in England and Wales increased by 38% between 1996 and 2001, from 1,228 to 1,698. The largest single component of this increase was the volume of autologous stem cell rescue for patients with myeloma. Other recent trends include the increasing use of "mini" or "reduced intensity" allografts. Discussions with a number of leading clinicians suggest that the most significant trend over the next four to five years is likely to be a continuation of the rise in mini-allografts. The volume of autologous and standard allogeneic transplants is also expected to rise slowly. The cost implication of the rise in the volume of transplants is estimated to be £7.3 million.

In addition, there are expected to be significant economic implications in relation to facilities and staffing requirements to meet JACIE standards. A recent survey of UK BMT centres, facilities and staffing on behalf of the Executive Committee of the BSBMT identified a number of areas where resources were inadequate. The scale of the cost consequences of these shortfalls is currently unknown, but will be significant. Further detailed work is recommended to identify the likely resource implications of tackling current shortages and the future consequences of meeting JACIE standards.

Induction chemotherapy for remission of acute leukaemia

It is assumed that resource implications of recommendations on services for treatment of patients with acute myeloid leukaemia (AML) and acute lymphoblastic leukaemia (ALL) are similar. These patients require high levels of facilities, staff cover and expertise, and it is unlikely that these requirements can be met without some concentration of services.

Three scenarios are presented, each illustrating a different pattern of hospital provision. The first is based on a slight increase in concentration of this work, the second a radical increase, and the third sets out an intermediate position. It is not suggested that greater changes are to be preferred, but that the potential cost implications are best illustrated by showing a wide range of possibilities.

In scenario 1, the cost of achieving a minimum of five new patients in all treating hospitals is estimated.

Scenario 2 estimates the potential cost impact of radical restructuring, such that all hospitals which offer this form of treatment deal with at least 10 new patients per annum.

In scenario 3, it is assumed that all units treating fewer than five new patients per annum will give up this work. Of those treating between five and 10 new patients per annum, an arbitrary proportion of 50% will re-structure their services so that all units deal with 10 or more, whilst the remaining 50% will continue to provide this form of treatment for between five and 10.

Data on current local patterns of presentation and treatment suggest that about 115 patients receive chemotherapy for remission induction in units treating fewer than five new patients per annum, whilst between 300 and 800 are treated in hospitals with fewer than 10 such patients per year. The cost impact of re-structuring services will vary according to current treatment patterns and the extent of consolidation or centralisation. The costs of implementing the three levels of concentration of services described above are estimated to be £1.9 million for scenario 1, £9.0 million for scenario 2, and £4.3 million for scenario 3.

Other potential cost implications

Assessment

Lymphoma patients need access to computed tomography (CT) scanning for initial diagnosis to judge the extent of the disease and after treatment to assess residual disease. The guidance recommends that cross-sectional CT should be available without delay. This may require additional CT scanning capacity in some Trusts. Investment in new CT equipment is ongoing, as part of existing Department of Health funding programmes. By 2003/4 there will be 182 new CT scanners (110 replacements and 72 additional). It is assumed that no additional investment in CT scanners will be required to accommodate any growth in haematological malignancies. Running costs (staffing and consumables) will need to be funded to ensure scanners can be fully utilised.

Rapid investigation of lymphadenopathy

The guidance recommends either the use of designated clinicians with close links with haematology and/or oncology, who take responsibility for prompt investigation of lymphadenopathy or alternatively, the development of specific clinics for rapid investigation of lymphadenopathy (rapid-access lump clinics) at cancer units. A single access point will streamline service for patients. Given that these patients are already in the hospital system it is assumed that these resources will, to a large extent, already be available and this should be achievable with some re-organisation of existing resources.

Palliative care

The use of palliative radiotherapy and services for the provision of blood product support are not expected to change significantly under the new guidance. Recommendations relating to service provision issues including the availability of palliative care teams to support patients at home and in hospice and availability of bereavement counselling are likely to have the most significant cost impact. These types of services provide support to patients with all types of cancer and the cost impact of such service re-configuration is being considered separately as part of the *Guidance for Improving supportive and palliative care for adults with cancer*, planned to be published in 2004.

Cost summary

(All costs in £ million per year)

Specialist diagnostic services		
Annual running costs		**£ 7.5**
Low scenario	£ 6.7	
High scenario	£ 8.1	
One-off set up costs		**£ 5.8**
Low scenario	£ 4.7	
High scenario	£ 7.5	
Multi-disciplinary teams		
Additional costs of staff time for MDT meetings		**£ 6.2**
Low scenario	£ 3.2	
High scenario	£ 9.0	
MDT co-ordinator for all hospitals		**£ 1.0**
Patient–centred care (clinical nurse specialists)		**£ 4.6**
Induction chemotherapy for remission of acute leukaemia		
Intermediate scenario		**£ 4.3**
Minimal consolidation	£ 1.9	
Radical re-structuring of services	£ 9.0	
Transplant services		**£ 7.3**
Low scenario	£ 3.0	
High scenario	£12.4	
Total		**£36.7**
Range		**£25.2-£51.5**

Appendix 2

How this guidance manual was produced

The manuals in this series are intended to guide health organisations (strategic health authorities, primary care trusts, cancer networks and trusts), their managers and lead clinicians in improving the effectiveness and efficiency of services for patients with cancer. The information and recommendations in the manual are based on systematic reviews of the best available evidence on diagnosis, treatment and service delivery. This evidence is assessed by experts and the recommendations are the product of extensive discussion with leading clinical specialists. The production process is described briefly below; more detail is available in earlier guidance manuals in the series.

The production process begins with a two-day residential event where proposals for improving services for patients with cancer of a specific site (or sites) are generated. A large group of relevant health care professionals, people with personal experience of the particular type of cancer being considered, health care commissioners and academics from around the country, meet to put forward structured proposals based on their experience and knowledge of the research literature. All proposals share a common structure and are intended to improve outcomes for patients. These proposals are then sent to referees, including clinicians, academics, representatives of health authorities, the Department of Health, patient organisations, and relevant charities, many of whom make detailed comments and suggestions. They are also reviewed as part of the process of the National Institute for Clinical Excellence (NICE) and form the basis of the scope of the guidance. Systematic reviews of the research literature, designed to evaluate the proposals, are then carried out or commissioned by the NHS Centre for Reviews and Dissemination (CRD) at the University of York.

This process culminates in the production of two large sources of information, one with a practical or operational focus, and the other containing detailed research evidence on effectiveness. The guidance draws on both these sources, with added input from commissioners, patients, and experts in the particular fields. The writing of the guidance manual is overseen by an editorial group chaired by Professor Bob Haward, accountable to the National Cancer Guidance Steering Group. The writing is undertaken by Dr Arabella Melville, in conjunction with CRD.

Complementary research, designed to quantify the potential cost of major changes in services, is carried out by the School of Health and Related Research at the University of Sheffield. This work involves literature searching, interviews with clinicians and managers, and analyses of costs.

The production of this guidance was funded by NICE, and it has been subject to the full NICE consultation process.

Evidence grading

The reliability and quality of evidence which supports the recommendations in the guidance manual is graded throughout the document. The grades are as follows:

A. Evidence derived from randomised controlled trials or systematic reviews of randomised trials.

B. Evidence from non-randomised controlled trials or observational studies.

C. Professional consensus.

The quality of research evidence forms a continuum and there is overlap between these categories. Most of the published research on cancer focuses on clinical evaluations of treatment; little direct research has been carried out on the organisation and delivery of services, issues on which randomised controlled trials (categorised here as the highest quality evidence) may not be feasible. Research designs which might be regarded as of relatively poor quality for evaluating a clinical intervention may therefore be the most reliable available for assessing the organisational issues.

The systematic reviews used to inform the manual are summarised in the document *Improving Outcomes in Haematological Cancers: The Research Evidence*. This document includes details of all the studies to which the manual refers. It is available on the CD-ROM provided with this manual, and is also available in printed format as a CRD report (email: crdpub@york.ac.uk, Tel: 01904-433648).

Appendix 3

People and organisations involved in production of the guidance

3.1 National Cancer Guidance Steering Group

3.2 Participants in the proposal generating event

3.3 People/organisations invited to comment on original proposals

3.4 Researchers carrying out literature reviews and complementary work

3.5 Members of focus groups

Guidance synthesis and writing

Ms A Eastwood	Senior Research Fellow, NHS Centre for Reviews and Dissemination, University of York
Professor J Kleijnen	Director, NHS Centre for Reviews and Dissemination, University of York
Dr A Melville	Independent Consultant

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Dr M H Cullen, Consultant Medical Oncologist, Queen Elizabeth Hospital, Birmingham
Dr A Frater, Director of Public Health, North Hampshire Primary Care Trust
Dr A Jack, Consultant Histopathologist, The General Infirmary at Leeds
Professor P Johnson, Professor of Medical Oncology, Southampton General Hospital
Dr R Johnson, Consultant in Diagnostic Radiology, Christie Hospital, Manchester
Dr S A N Johnson, Consultant Haematologist, Taunton and Somerset Hospital
Professor N H Russell, Professor of Haematology, Nottingham City Hospital

Dr D Swirsky, Consultant Haematologist, The General Infirmary at Leeds
Dr M V Williams, Consultant Clinical Oncologist, Addenbrooke's Hospital, Cambridge

People/organisations invited to comment on drafts of the guidance
National Cancer Guidance Steering Group
Focus groups
Various professional organisations
Department of Health
NICE Stakeholders; the drafts were subject to the full NICE consultation process

Economic reviews
School of Health and Related Research, University of Sheffield

Project support
The Northern and Yorkshire Cancer Registry and Information Service

Appendix 3.1

Membership of the National Cancer Guidance Steering Group

(This Group, originally established to oversee production of the 'Improving Outcomes' programme, also managed its transition to the NICE programme)

Chairman

Professor R A Haward	Professor of Cancer Studies, University of Leeds

Vice Chairman

Professor M A Richards	Sainsbury Professor of Palliative Medicine, St Thomas' Hospital, London and National Cancer Director

Members

Dr J Barrett	Consultant Clinical Oncologist and Clinical Director, Four Counties Cancer Network
Mrs G Batt	Section Head, Cancer Policy Team, Department of Health, Wellington House
Mr A Brennan	Director of Operational Research, School of Health and Related Research, University of Sheffield
Ms A Eastwood	Senior Research Fellow, NHS Centre for Reviews and Dissemination, York
Dr J Hanson	Cancer Services Project Co-ordinator, Welsh Office
Dr G Harding	GP and Medical Director, St John's Hospice, Doncaster
Professor J Kleijnen	Director, NHS Centre for Reviews and Dissemination, York
Professor P Littlejohns	Clinical Director, National Institute for Clinical Excellence
Professor R E Mansel	Chairman, Division of Surgery, University of Wales College of Medicine, Cardiff
Dame G Oliver	Director of Service Development, Macmillan Cancer Relief
Mrs V Saunders	Manager, Northern and Yorkshire Cancer Registry and Information Service
Dr J Verne	Director, South West Public Health Observatory

Appendix 3.2

Participants in the haematological cancers proposal generating event

A3

Dr J Apperley	Consultant Haematologist, Hammersmith Hospital, London
Professor M R Baker	Director/Lead Clinician, Yorkshire Cancer Network
Ms C Beardmore	Radiotherapy Services Manager, Royal Berkshire Hospital, Reading
Dr S F Beardsworth	Consultant Physician, Castle Hill Hospital, Cottingham
Dr E M Bessell	Consultant Clinical Oncologist, Nottingham City Hospital
Ms R Bratt-Wyton	Clinical Nurse Specialist, Russells Hall Hospital, Dudley
Mrs C Brown	Patient
Mrs M Brown	Nurse Lecturer in Haematology, Thames Valley University
Ms T Burgoyne	Nurse Lecturer/Practitioner in Haematology/Oncology, University of Central England, Birmingham
Dr S Closs	Consultant in Palliative Medicine, Ty Olwen Palliative Care Service, Morriston Hospital
Dr R Cowan	Consultant Clinical Oncologist, Christie Hospital, Manchester
Mrs L Czyzewska	Patient
Dr J Davies	Consultant Haematologist, Western General Hospital, Edinburgh
Ms J Downing	Lecturer in Cancer Care, The Centre for Cancer & Palliative Care Studies, The Royal Marsden Hospital, London
Professor A Faulkner	Professor of Communication in Health Care, Great Barrow, Cheshire
Dr J Ferguson	Clinical Director, South East London Strategic Health Authority

Mr M Geering	Patient
Dr S George	Senior Lecturer in Public Health Medicine, Health Care Research Unit, Southampton General Hospital
Miss V Goode	Nurse Clinician, Christie Hospital, Manchester
Professor B Hancock	Professor of Clinical Oncology, Weston Park Hospital, Sheffield
Dr A Haynes	Consultant Haematologist, Nottingham City Hospital
Dr J Healey	Consultant Radiologist, Chelsea & Westminster Hospital, London
Dr F Hicks	Consultant in Palliative Medicine, St James's University Hospital, Leeds
Dr P Hoskin	Consultant Clinical Oncologist, Mount Vernon Hospital, Middlesex
Dr M Howard	Consultant Haematologist, York District Hospital
Ms S Hunton	Director, Bradford Cancer Support Centre
Dr T Illidge	Consultant Clinical Oncologist, Royal South Hants Hospital, Southampton
Dr A Jack	Consultant Histopathologist, The General Infirmary at Leeds
Professor P Johnson	Professor of Medical Oncology, Southampton General Hospital
Dr C C Kibbler	Consultant Medical Microbiologist, Royal Free Hospital, London
Professor K MacLennan	Professor of Cytopathology & Histopathology, St James's University Hospital, Leeds
Dr A McMillan	Consultant Haematologist, Mount Vernon Hospital, Middlesex
Dr R Marcus	Consultant Haematologist, Addenbrooke's Hospital, Cambridge
Dr P Norris	GP, Kingston upon Thames
Dr R Pettengell	Consultant Medical Oncologist, St George's Hospital Medical School, London
Mr C Pilmoor	Patient
Professor R Powles	Professor of Haematological Oncology, The Royal Marsden Hospital, Surrey
Dr A Prentice	Consultant Haematologist, Derriford Hospital, Plymouth
Ms A Ridehalgh	Haematology Clinical Nurse Specialist, The Ipswich Hospital
Mrs J Sale	Patient
Dr S Schey	Consultant Haematologist, Guy's Hospital, London
Dr C Singer	Consultant Haematologist, Royal United Hospital, Bath

Dr J Spencer	Consultant Radiologist, St James's University Hospital, Leeds
Mr M Summerhayes	Pharmacist, Guy's Hospital, London
Dr G Tanner	GP, Bridgwater
Dr B Walker	GP, Seascale
Mr D Watson	Clinical Nurse Manager, Clinical Apheresis Unit, Glasgow Royal Infirmary
Professor J Wilkinson	Professor of Public Health, North East Public Health Observatory

Facilitated by:

Dr J Barrett	Consultant Clinical Oncologist and Clinical Director, Four Counties Cancer Network
Professor R A Haward	Professor of Cancer Studies, University of Leeds
Professor J Kleijnen	Director, NHS Centre for Reviews and Dissemination
Professor M A Richards	Sainsbury Professor of Palliative Medicine, St Thomas' Hospital, London and National Cancer Director

Appendix 3.3

Referees of the haematological cancers proposals

The guidance was subject to the NICE consultation process (see website **www.nice.org.uk** for details)

The individuals listed below were also invited by the Developer to act as referees of whom 43% responded.

Dr S Allard	Consultant Haematologist, Northwick Park Hospital, Middlesex
Mr R Anderson	Economic Adviser, Department of Health
Dr B Angus	Senior Lecturer in Pathology, Royal Victoria Infirmary, Newcastle upon Tyne
Dr D Armstrong	Consultant in Public Health Medicine, Guy's, King's and St Thomas' School of Medicine, London
Professor P Armstrong	Professor of Radiology, St Bartholomew's Hospital, London
Dr D Ash	President of the Royal College of Radiologists and Consultant Clinical Oncologist, Cookridge Hospital, Leeds
Dr R Attanoos	Consultant Histopathologist, Llandough Hospital, Penarth
Ms L Baker	Senior Haematology Nurse, Birmingham Heartlands Hospital
Dr M Baker	GP, Lincoln
Mr J J Bannister	Consultant Surgeon, Barnsley District General Hospital
Dr J Barrett	Consultant Clinical Oncologist and Clinical Director, Four Counties Cancer Network
Dr M Bhavnani	Consultant Haematologist, Royal Albert Edward Infirmary, Wigan
Dr N Bienz	Consultant Haematologist, Wexham Park Hospital, Slough
Dr D Black	GP and Chair, Nottingham Clinical Haematology Project
Dr P Blain	Member of the National Cancer Implementation Group
Ms R Bradley	Clinical Nurse Specialist, St Bartholomew's Hospital, London

Ms R Bratt-Wyton	Clinical Nurse Specialist, Russells Hall Hospital, Dudley
Mr A Brennan	Director of Operational Research, School of Health and Related Research, University of Sheffield
Ms J Buckham	Oncology Services Pharmacist, Sheffield Children's Hospital
Dr C Bunch	Medical Director, John Radcliffe Hospital, Oxford
Mr S Burgess	Consultant Obstetrician & Gynaecologist, King George Hospital, Essex
Ms T Burgoyne	Nurse Lecturer/Practitioner in Haematology/Oncology, University of Central England, Birmingham
Professor A K Burnett	Professor of Haematology, University of Wales College of Medicine, Cardiff
Dr A Byrne	Consultant in Palliative Medicine, Holme Tower Marie Curie Centre, Penarth
Ms L Bywater	Clinical Nurse Specialist, John Radcliffe Hospital, Oxford
Ms C Cafferty	Radiographer, Weston Park Hospital, Sheffield
Dr G Carroll	Clinical Director, Eastern Region Specialised Services Commissioning Group, Cambridge
Professor J A Child	Consultant Haematologist, The General Infirmary at Leeds
Dr D Clark	Consultant Cellular Pathologist, Grantham and District Hospital
Ms H Clements	Radiographer, The Churchill Hospital, Oxford
Ms D Coats	Senior Cancer Information Nurse Specialist, CancerBACUP
Dr R Coltart	Consultant Clinical Oncologist, Kent and Canterbury Hospital
Ms J Connelly	Director, Cancer Action Team, St Thomas' Hospital, London
Dr B Cottier	Head of Cancer Services Analysis, National Cancer Services Analysis Team
Dr I Cox	GP, Birmingham
Ms S Crofts	Haematology & Myeloma Research Nurse, Royal South Hants Hospital, Southampton
Ms D Crowther	Chief Executive, Wirral Holistic Care Services
Dr M H Cullen	Consultant Medical Oncologist, Queen Elizabeth Hospital, Birmingham
Dr J Cullis	Consultant Haematologist, Salisbury District Hospital
Dr P Cumber	Consultant Haematologist, West Wales General Hospital

Dr D Cunningham	Consultant Medical Oncologist, The Royal Marsden Hospital, Surrey
Ms E Dannie	Clinical Nurse Specialist, Hammersmith Hospital, London
Dr P Darragh	Deputy Chief Medical Officer, Department of Health, Social Services and Public Safety, Northern Ireland
Ms J Davie	Sister, Ninewells Hospital, Dundee
Dr T W Davies	Director, East Anglian Cancer Registry, Cambridge
Dr D Deakin	Consultant Clinical Oncologist, Christie Hospital, Manchester
Dr S Devereux	Consultant Haematologist, King's College Hospital, London
Professor A K Dixon	Professor of Radiology, Addenbrooke's Hospital, Cambridge
Professor L Donaldson	Chief Medical Officer, Department of Health
Ms S Eagle	Radiographer, The Royal Marsden Hospital Surrey
Ms A Eastwood	Senior Research Fellow, NHS Centre for Reviews & Dissemination, University of York
Dr J Ellershaw	Medical Director, Liverpool Marie Curie Centre
Ms M Ellis	Bone Marrow Transplant Co-ordinator, John Radcliffe Hospital, Oxford
Dr D Empey	Medical Director, The Royal London Hospital
Mr S Evans	Chief Executive, The Society of Radiographers
Ms J Fenelon	Member of the National Cancer Implementation Group
Dr J Ferguson	Clinical Director, South East London Strategic Health Authority
Professor I Finlay	Medical Director, Holme Tower Marie Curie Centre, Penarth
Ms A Flory	Haematology Sister, Royal Berkshire Hospital, Reading
Dr A Ford	GP, Nottingham
Dr A Frater	Director of Public Health, North Hampshire Primary Care Trust
Dr J Galloway	GP, Kings Lynn
Professor K Gatter	Professor of Pathology, John Radcliffe Hospital, Oxford
Professor D George	President, British Association of Surgical Oncology
Dr D Gilson	Consultant Clinical Oncologist, Cookridge Hospital, Leeds

Dr J Goepel	Consultant Histopathologist, Royal Hallamshire Hospital, Sheffield
Professor J Goldman	Professor of Leukaemia Biology and Chairman, Department of Haematology, Hammersmith Hospital, London
Professor A H Goldstone	Professor of Haematology, University College Hospital, London
Professor E C Gordon-Smith	Professor of Haematology, St George's Hospital Medical School
Dr H W Habboush	Consultant Haematologist, Nevill Hall Hospital, Abergavenny
Dr R Hall	Chief Medical Officer, Welsh Office
Dr J Halpin	Lead Clinician, Mount Vernon Cancer Network
Professor G W Hanks	Professor of Palliative Medicine, University of Bristol
Dr J Hanson	Cancer Services Project Co-ordinator, Welsh Office
Professor J D Hardcastle	Network Lead Clinician, Mid Trent Cancer Services Network
Dr M Harding	Consultant in Public Health Medicine, Sutton and Merton Primary Care Trust
Mr T Harris	Director, Association of Community Health Councils for England and Wales
Dr C Harrison	Medical Director, Greater Manchester Strategic Health Authority
Dr P Harvey	Consultant Clinical Psychologist, Queen Elizabeth Hospital, Birmingham
Dr C Hatton	Consultant Haematologist, John Radcliffe Hospital, Oxford
Dr V Hempsall	Cancer Lead, Dorset and Somerset Strategic Health Authority
Dr A Hibble	GP, Stamford
Dr N Hicks	Consultant in Public Health Medicine, East Hampshire Primary Care Trust
Professor I Higginson	Professor of Palliative Care and Policy, Guy's, King's and St Thomas' School of Medicine, London
Dr R Hillier	Consultant Physician in Palliative Medicine, Countess Mountbatten House, Southampton
Ms H Hollis	Clinical Nurse Specialist, Royal Berkshire Hospital, Reading
Professor A Horwich	Professor of Clinical Oncology, The Royal Marsden Hospital, Surrey
Dr G Houghton	GP, Birmingham
Dr M Howard	Consultant Haematologist, York District Hospital
Dr P A Hulse	Consultant Radiologist, Christie Hospital, Manchester
Ms S Hunton	Director, Bradford Cancer Support Centre

Professor P G Isaacson	Professor of Histopathology, Royal Free and University College Medical School, London
Sir B Jackson	Former President, Royal College of Surgeons of England
Dr P James	GP, Birmingham
Dr M Jefferson	Consultant in Palliative Medicine, University of Wales College of Medicine
Dr R Johnson	Consultant in Diagnostic Radiology, Christie Hospital, Manchester
Dr S A N Johnson	Consultant Haematologist, Taunton and Somerset Hospital, Taunton
Dr I D A Johnston	Medical Director, University Hospital, Nottingham
Dr A C Jones	Consultant Clinical Oncologist, The Churchill Hospital, Oxford
Dr E Jorge	Former Director of Public Health, Portsmouth and South East Hampshire Health Authority
Ms H Kelly	Radiographer, Royal South Hants Hospital, Southampton
Dr S Kelly	GP, Chichester, West Sussex
Dr P R Kelsey	Consultant Haematologist, Victoria Hospital, Blackpool
Ms V Kelsey	Haematology Clinical Nurse Specialist, Guy's Hospital, London
Professor D Kerr	Professor of Clinical Oncology, University of Birmingham
Dr N Ketley	Consultant Haematologist, Greenwich District Hospital, London
Dr C C Kibbler	Consultant Medical Microbiologist, Royal Free Hospital, London
Mrs D Knupfer	Executive Director of Nursing, Christie Hospital, Manchester
Dr A Kyle	Consultant Haematologist, Antrim Area Hospital, Belfast
Dr A K Lakhani	Consultant Haematologist, Farnborough Hospital, Orpington
Dr R Lane	Consultant in Palliative Medicine, Dewsbury & District Hospital
Ms E Lardner	Clinical Nurse Specialist, Singleton Hospital, Swansea
Dr A W Lee	GP, Scunthorpe
Dr S Levy	GP, Stockport
Ms C Lewis	Research Nurse, Royal Berkshire Hospital, Reading
Professor D C Linch	Professor of Haematology, Royal Free and University College Medical School, London
Professor T A Lister	Professor of Medical Oncology, St Bartholomew's Hospital, London

Professor P Littlejohns	Clinical Director, National Institute for Clinical Excellence
Dr P Lorigan	Consultant Medical Oncologist, Weston Park Hospital, Sheffield
Mr G McGhee	Senior Staff Nurse, Western General Hospital, Edinburgh
Dr M McGovern	Senior Policy/Medical Adviser, Department of Health
Dr I MacLellan-Smith	GP, Cheadle, Cheshire
Dr A D L MacVicar	Consultant Radiologist, The Royal Marsden Hospital, London
Professor G McVie	Director General, Cancer Research Campaign
Dr J Maher	Consultant Clinical Oncologist, Mount Vernon Hospital, Middlesex
Dr A R Manhire	Consultant Radiologist, Nottingham City Hospital
Dr I Manifold	Medical Director, Weston Park Hospital, Sheffield
Professor R E Mansel	Chairman, Division of Surgery, University of Wales College of Medicine, Cardiff
Dr R Marcus	Clinical Director, British Committee for Standards in Haematology
Mr I Mark	Consultant Urologist, Lincoln County Hospital
Dr T S Maughan	Consultant Clinical Oncologist, Velindre Hospital, Cardiff
Dr G M Mead	Consultant Medical Oncologist, Royal South Hants Hospital, Southampton
Dr A B Mehta	Consultant Haematologist, Royal Free Hospital, London
Mrs R Miles	Chair, National Cancer Alliance
Dr D W Milligan	Consultant Haematologist, Birmingham Heartlands Hospital
Professor G Morgan	Professor of Haematology, University of Leeds
Ms C Morris	Sister, Haematology Day Care Unit, Royal Cornwall Hospital, Truro
Dr T C M Morris	Consultant Haematologist, Belfast City Hospital
Professor G J Mufti	Professor of Haemato-oncology, Guy's, King's and St Thomas' School of Medicine, London
Dr S Munday	Director of Public Health, South Warwickshire Primary Care Trust
Ms M Nendick	Nursing Officer, Department of Health
Dr G Newman	Consultant Clinical Oncologist, Royal Sussex County Hospital
Dr P Norris	GP, Kingston upon Thames

Dr A J Norton	Senior Lecturer in Histopathology, St Bartholomew's Hospital, London
Dame G Oliver	Director of Service Development, Macmillan Cancer Relief
Dr B A Oppenheim	Consultant Microbiologist, Withington Hospital, Manchester
Ms H Outhwaite	Clinical Nurse Specialist, Guy's Hospital, London
Mrs S Pacey	Pharmacist, Nottingham City Hospital
Dr A Pagliuca	Consultant Haematologist, King's College Hospital, London
Ms J Palin	Project Manager, Cancer Action Team, St Thomas' Hospital, London
Dr G Park	GP, Stokesley
Dr M Parmar	Head, Cancer Division, MRC Clinical Trials Unit, Cambridge
Dr H Parry	Consultant Haematologist, Ysbyty Gwynedd, Bangor
Dr J Pawade	Consultant Histopathologist, Bristol Royal Infirmary
Professor M Pearson	Deputy Director of Human Resources, Department of Health
Dr S Pearson	Director of Clinical Strategy, Gloucestershire Hospitals NHS Trust
Ms S Perrett	Macmillan Clinical Nurse Specialist for Haematology, University Hospital of Wales, Cardiff
Dr F Pitt	Consultant in Public Health Medicine, North Sheffield Primary Care Trust
Mrs E Porterfield	Member of the National Cancer Implementation Group
Dr M Potter	Consultant Haematologist, Royal Free Hospital, London
Dr C Poynton	Consultant Haematologist, University Hospital of Wales, Cardiff
Dr A Prentice	Consultant Haematologist, Derriford Hospital, Plymouth
Dr T Priestman	Consultant Clinical Oncologist, New Cross Hospital, Wolverhampton
Dr J Pritchard	Scientific Adviser, Welsh Office
Professor S J Proctor	Professor of Haematological Medicine, Royal Victoria Infirmary, Newcastle upon Tyne
Dr E Pugh	Medical Director, Butterwick Hospice, Stockton-on-Tees
Dr J Radford	Consultant Physician, Christie Hospital, Manchester
Dr S Ramakrishnan	Lead Clinician, Weston Park Hospital, Sheffield

Dr A D Ramsay	Secretary, British Lymphoma Pathology Group, Great Ormond Street Hospital for Children, London
Mr B Rees	Consultant General Surgeon, University Hospital of Wales, Cardiff
Dr P Revell	Consultant Haematologist, Staffordshire General Hospital, Stafford
Professor R H Reznek	Professor of Diagnostic Imaging, St Bartholomew's Hospital, London
Professor M A Richards	Sainsbury Professor of Palliative Medicine, St Thomas' Hospital, London
Ms A Ridehalgh	Haematology Clinical Nurse Specialist, Ipswich General Hospital
Ms M Rigge	Director, College of Health
Dr M H Robinson	Senior Lecturer in Clinical Oncology, Weston Park Hospital, Sheffield
Professor P Robinson	Professor of Clinical Radiology, St James's University Hospital, Leeds
Dr P Roderick	Senior Lecturer in Public Health Medicine, Health Care Research Unit, Southampton
Professor T Rogers	Imperial College Medical School, London
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Dr N Rooney	Consultant Pathologist, Royal United Hospital, Bath
Dr A W W Roques	Consultant Haematologist, Worthing Hospital, West Sussex
Mr R D Rosin	Consultant Surgeon, St Mary's Hospital, London
Dr J R Y Ross	Consultant Haematologist, Northampton General Hospital
Professor G Rubin	GP, Yarm
Professor N H Russell	Professor of Haematology, Nottingham City Hospital
Dr R D Russell-Jones	Consultant Dermatologist, St Thomas' Hospital, London
Dr S Schey	Director of Clinical Haematology, Guy's Hospital, London
Dr E A Scott	Implementation Director, NHS Modernisation Agency
Dr M Sekhar	Consultant Haematologist, West Middlesex University Hospital,
Professor P Selby	Professor of Cancer Medicine, St James's University Hospital, Leeds
Professor K Sikora	Professor of Clinical Oncology, Hammersmith Hospital, London
Dr C Sinnott	Consultant and Senior Lecturer in Palliative Medicine, St Thomas' Hospital, London

Dr D N Slater	Consultant Histopathologist/ Dermatopathologist, Royal Hallamshire Hospital, Sheffield
Mr J Smallwood	Lead Cancer Clinician, Southampton General Hospital
Mr C Smee	Chief Economic Adviser, Department of Health
Dr A G Smith	Consultant Haematologist, Southampton General Hospital
Dr M J Smith	Consultant Physician, Heatherwood Hospital, Ascot
Dr S R Smith	Consultant Haematologist, Torbay Hospital, Torquay
Dr J Spiby	Consultant in Environmental Public Health, Chemical Incident Response Service, London
Mr M Stone	Director, The Patient's Association
Mrs R Stone	Manager, Hogarth Haematology and Bone Marrow Transplant Unit, Nottingham City Hospital
Dr N Stuart	Consultant Medical Oncologist, Ysbyty Gwynedd, Bangor
Mr M Summerhayes	Principal Oncology Pharmacist, Guy's Hospital, London
Dr N Summerton	Clinical Senior Lecturer in Primary Care Medicine, University of Hull
Dr P Sutton	GP, Brigg, North Lincolnshire
Dr N Sykes	Consultant in Palliative Medicine, St Christopher's Hospice, London
Dr G Tanner	GP, Bridgwater, Somerset
Dr T Tate	Medical Adviser, Marie Curie Cancer Care
Dr J Thomas	Director of Public Health, Sunderland Teaching Primary Care Trust
Mrs H Thornton	Chairman, Consumers' Advisory Group for Clinical Trials
Mr A Turner	Member of the National Cancer Implementation Group
Dr P Twentyman	Secretary, United Kingdom Co-ordinating Committee on Cancer Research
Dr E A Vandenberghe	Consultant Haematologist, Royal Hallamshire Hospital, Sheffield
Dr J van der Walt	Consultant Histopathologist, St Thomas' Hospital, London
Dr J Verne	Director, South West Public Health Observatory
Dr S Vinnicombe	Consultant Radiologist, St Bartholomew's Hospital, London

Dr C Waine	Former Director of Health Programmes and Primary Care Development, Sunderland Health Authority
Mr D Watson	Clinical Nurse Manager, Clinical Apheresis Unit, Glasgow Royal Infirmary
Dr P Watson	Medical Director, Essex Strategic Health Authority
Dr B Wee	Consultant in Palliative Medicine, Countess Mountbatten House, Southampton
Dr N C West	Consultant Haematologist, West Cumberland Hospital, Whitehaven
Mrs K Westbrook	Radiographer, Bristol Royal Infirmary
Dr B S Wilkins	Senior Lecturer in Pathology, University of Southampton
Dr M V Williams	Consultant Clinical Oncologist, Addenbrooke's Hospital, Cambridge
Dr J Z Wimperis	Consultant Haematologist, Norfolk and Norwich Hospital
Dr H Winter	Senior Lecturer in Public Health Medicine, University of Birmingham
Dr C Wolfe	Reader in Public Health Medicine, Guy's, King's & St Thomas' School of Medicine
Dr A Wotherspoon	Consultant Histopathologist, The Royal Marsden Hospital, London
Mr N Young	Chief Executive, Macmillan Cancer Relief

Appendix 3.4

Researchers carrying out literature reviews and complementary work

Overall co-ordinators

Ms A Eastwood Professor J Kleijnen and Dr H McIntosh	NHS Centre for Reviews and Dissemination, University of York

i) Literature reviews

Professor P Johnson and Ms B Bennett-Lloyd	Cancer Research UK Oncology Unit, Cancer Sciences Division, University of Southampton School of Medicine
Dr S Agrawal	Barts and the London School of Medicine and Dentistry
Dr S George	Health Services Research Unit, Community Clinical Sciences Research Division, University of Southampton School of Medicine.

Contributed reviews which were used to inform guidance on Topics 1, 3, 4, 5, 6, and 7.

Miss R Collins and Miss M Womphrey	NHS Centre for Reviews and Dissemination, University of York

Contributed reviews which were used to inform guidance on Topics 2 and 8.

Ms K Misso and Ms G Ritchie	NHS Centre for Reviews and Dissemination, University of York

Undertook the literature searches for the review work.

ii) Patient views of haematological cancer services

Ms R Miles and Ms C Smith	National Cancer Alliance, Oxford

iii) Economic review

V Abbott R Ara M Holmes C Knight M Stephenson S Ward	School of Health and Related Research, University of Sheffield

Appendix 3.5

Focus groups: membership

Ms E Andelin	Assistant Director of Patient Services, Bradford City Primary Care Trust
Professor M R Baker	Director/Lead Clinician, Yorkshire Cancer Network
Mr M Bellamy	Former Chief Executive, Ealing, Hammersmith and Hounslow Health Authority
Dr A Benghiat	Cancer Lead Clinician, Leicester Royal Infirmary
Dr P Bevan	Deputy Director of Public Health, Directorate of Health and Social Care for London
Mr D Campbell	Chief Executive, Liverpool Central Primary Care Trust
Dr A Champion	Assistant Cancer Services Project Co-ordinator, Welsh Office
Dr I G Cox	Macmillan GP Adviser in Cancer and Palliative Care, Birmingham
Miss C Edwards	Chief Executive, North Trent Commissioning Network, Barnsley Primary Care Trust
Mrs S Ellis	Partnership Director, West Yorkshire Primary Care Organisations, Wakefield West Primary Care Trust
Mr J Grimes	Director of Finance, North & East Yorkshire and Northern Lincolnshire Strategic Health Authority
Dr J Halpin	Lead Clinician, Mount Vernon Cancer Network
Dr V Hempsall	Cancer Lead, Dorset and Somerset Strategic Health Authority
Dr J Kearney	Director of Public Health, Dacorum Primary Care Trust
Dr A W Lee	GP, Scunthorpe
Dr M Marshall	Cancer Lead, Middlesbrough Primary Care Trust
Dr S Munday	Director of Public Health, South Warwickshire Primary Care Trust
Dame G Oliver	Director of Service Development, Macmillan Cancer Relief

Dr S Pearson	Director of Clinical Strategy, Gloucestershire Hospitals NHS Trust
Dr F A Pitt	Consultant in Public Health Medicine, North Sheffield Primary Care Trust
Mr R J Priestley	Former Chief Executive, North Staffordshire Health Authority
Dr E A Scott	Implementation Director, NHS Modernisation Agency
Dr J Spiby	Consultant in Environmental Public Health, Chemical Incident Response Service, London
Dr J Thomas	Director of Public Health, Sunderland Teaching Primary Care Trust
Dr J Verne	Director, South West Public Health observatory
Dr P Watson	Medical Director, Essex Strategic Health Authority

Facilitated by:

Ms S O'Toole	Consultant in Health Policy and Management

Supported by:

Mrs V Saunders	Manager, Northern and Yorkshire Cancer Registry and Information Service

Appendix 4

Glossary of terms

Acute
Sudden or severe, in onset.

Acute leukaemia
A rapidly progressive cancer of the blood forming system of sudden onset where immature *white blood cells* proliferate uncontrollably.

Acute lymphoblastic leukaemia (ALL)
A type of *acute leukaemia* in which the *white blood cells* produced in excess are immature *lymphocytes* (*white blood cells* formed from lymphoid *stem cells*).

Acute myeloid leukaemia (AML)
A type of *acute leukaemia* in which the *white blood cells* produced in excess are immature *granulocytes* or monocytes (types of *white blood cells* formed from myeloid *stem cells*).

Age-standardised incidence
A method of more accurately comparing incidence rates between populations by removing differences in the age distributions of those populations.

Agricultural biocides
Chemicals that kill organisms e.g. herbicides and pesticides.

Alkylating agents
A family of drugs that prevent the division of cancer cells by damaging DNA.

Allogeneic transplantation/allograft
A procedure in which a patient receives *bone marrow* or *blood stem cells* from a genetically matched donor following *high dose therapy* to destroy their own *bone marrow*.

Anaemia
A condition in which the number of red blood cells in the blood is below normal.

Antibodies
Proteins made by *plasma cells* in response to a foreign substance (*antigen*) in the body.

Antigen
Any molecule recognised by the immune system as being foreign and therefore provoking the production of *antibodies*.

Audit
A method by which those involved in providing services assess the quality of care. Results of a process or intervention are assessed, compared with a pre-existing standard, changed where necessary, then reassessed.

Autologous transplantation/autograft
A procedure in which a patient receives their own *bone marrow* or *stem cells* which were collected prior to a course of *high dose therapy* to destroy their remaining *bone marrow*. Also see *stem cell harvesting*.

Axilla
The armpit.

Biopsy
Removal of a sample of tissue or cells from the body to assist in diagnosis of a disease.

Bisphosphonates
Drugs used to slow bone damage caused by *myeloma* cells, reduce the risk of fractures and reduce bone pain.

Blast crisis
A phase of *CML* in which the disease progression becomes more rapid and aggressive and the number of immature, abnormal *white blood cells* (blasts) in the *bone marrow* and blood is extremely high. Also called the blast or acute phase.

Blood products
Whole blood or components of the blood including red blood cells, platelets and *plasma*.

Blood stem cells
Progenitor cells which give rise to red blood cells and immune system blood cells.

Bone marrow
The soft inner part of the bone. Bone marrow produces the *stem cells* which develop into the three different types of blood cells: red blood cells, *white blood cells* and platelets.

Bone marrow transplantation (BMT)
A procedure to replace *bone marrow* that has been destroyed by *high dose therapy*. There are two types of transplant – *allogeneic* where healthy *bone marrow* is taken from a donor who has a similar tissue type to the patient and *autologous*, where the patient's own *bone marrow* is used.

Cardiology
A branch of medicine concerned with the diagnosis and treatment of diseases affecting the heart and blood vessels.

Central venous catheter/central line
A thin plastic tube which is inserted through the skin into a vein in the chest through which blood tests can be taken and *intravenous chemotherapy* and blood transfusions can be given. Once in place it can remain in the vein for many months.

Chemotherapy
The use of drugs that kill cancer cells, or prevent or slow their growth.

Chronic
Long-lasting or slowly progressing.

Chronic leukaemia
Generally a slowly progressing cancer of the blood, usually of gradual onset, where the *white blood cells* present in excess are more mature than those in *acute leukaemia*. In some types of chronic leukaemia the blood cells are not over-produced but fail to die when they should do.

Chronic lymphocytic leukaemia (CLL)
A type of *chronic leukaemia* in which the *white blood cells* present in excess are *lymphocytes* (*white blood cells* formed from lymphoid *stem cells*).

Chronic myeloid leukaemia (CML)
A type of *chronic leukaemia* in which the *white blood cells* present in excess are *granulocytes* (*white blood cells* formed from myeloid *stem cells*).

Clinical oncologist
A doctor who specialises in the treatment of cancer patients, particularly through the use of *radiotherapy*, but may also use *chemotherapy*.

Cognitive and behavioural therapy
Types of therapy, often delivered by psychologists, usually based on talking and practising specific types of voluntary activity. This group of interventions can include, for example, relaxation training, counselling, and psychological approaches to pain control.

Colony-stimulating factors (CSF)
Substances which stimulate the production of certain blood cells e.g. G-CSF stimulates *granulocytes*. They may be used to produce extra *stem cells* prior to a *stem cell harvest*, or to promote the recovery of *white blood cells* following *chemotherapy.*

Combination chemotherapy
The use of more than one drug to kill cancer cells.

Computed tomography (CT)
An x-ray imaging technique.

Conditioning
The elimination of malignant cells by the use of *high dose therapy* prior to *bone marrow* or *stem cell transplantation*.

Core biopsy
The removal of a tissue sample with a needle for laboratory examination. This test uses a slightly larger needle than the one used for *fine needle aspiration (FNA)* and is usually done under local anaesthetic.

Cranial
Of or relating to the skull.

Cryopreservation
Preservation by freezing.

Cytogenetic abnormalities
Abnormalities of chromosomes.

Cytogenetics
The study of chromosomes and chromosomal abnormalities.

Cytokines
Proteins that are released by cells of the immune system which have specific effects on other cells. Some cytokines help the body to destroy abnormal cells. Examples of cytokine treatment include interferon and interleukins.

Cytotoxic
Toxic to cells. This term is used to describe drugs which kill cancer cells or slow their growth.

Dermatologist
A doctor who specialises in disorders of the skin.

Epidemiology
The study of populations in order to determine the frequency and distribution of disease and measure risks.

Epithelial cancers
Cancers originating in epithelial tissue. This is a membrane-like tissue that lines internal and external surfaces of the body including organs, vessels and other small cavities.

Erythrocyte sedimentation rate (ESR)
A test that measures the rate at which red blood cells settle out of suspension in blood *plasma*. The amount of protein in the *plasma* may increase as a result of infection or cancer which causes the red cells (erythrocytes) to settle out more quickly than normal.

Febrile
Feverish.

Fibrotic tissue
Fibrous tissue that replaces normal tissue e.g. scars or tissue that is left after the cancer has been killed by treatment.

Fine needle aspiration (FNA)
The removal of cells using a fine needle for examination in the laboratory.

Gallium scanning
An imaging technique sometimes used to provide further information about abnormalities identified on plain x-ray or *CT* scan images.

Gastroenterologist
A doctor who specialises in disorders of the digestive system including the liver.

Graft-versus-host disease
A serious complication of *bone marrow transplantation* where the donated *bone marrow* reacts against the patient's own tissue.

Granulocyte
A *white blood cell* that is an essential component of the immune system.

Granulocyte-colony-stimulating factor (G-CSF)
See *colony-stimulating factors.*

Haematological cancers
Cancers of the blood and blood-forming tissues.

Haematologist
A doctor who specialises in disorders of the blood and blood-forming tissues.

Haematology
A branch of medicine concerned with the study and treatment of disorders of the blood and blood-forming tissues.

Haemato-oncology
A branch of medicine concerned with the study and treatment of cancers of the blood and blood-forming tissues.

Haemopoietic or haematopoietic
The process by which blood cells are produced in the *bone marrow*.

Hepatosplenomegaly
Abnormal enlargement of both the liver and the *spleen*.

High dose therapy
Intensive treatment with *chemotherapy* and/or *radiotherapy* to kill malignant cells in the *bone marrow*. As the treatment also kills healthy *bone marrow* cells, it must be followed by *bone marrow* or *stem cell transplantation*.

High grade lymphomas
Faster growing, clinically aggressive *lymphomas*.

Hodgkin's lymphoma
A type of cancer in which the cells of the lymph tissue are produced in excess and result in the progressive, painless enlargement of *lymph nodes,* the *spleen* and general lymph tissue. A particular abnormal cell, known as the Reed-Sternberg cell is found in Hodgkin's lymphoma.

Human Leukocyte Antigen (HLA)
Comparing the tissue type of patients and potential donors.

Hypercalcaemia
Abnormally high levels of calcium in the blood.

Iatrogenic
As a consequence of treatment.

Immunophenotype
Pattern of specific proteins (*antigens*) present on the surface membrane of blood cells.

Immunosupression
Suppression of the immune system.

Immunotherapy
Treatment by stimulating or restoring the body's own immune system.

Indolent lymphomas
Lymphomas that grow and spread slowly (also called low grade *lymphomas*).

Induction chemotherapy
The first phase of *chemotherapy* treatment designed to induce *remission.*

Indwelling venous catheters
See *central venous catheters.*

Intrathecal
Into the fluid around the spine.

Intravenous (IV)
Into a vein.

Kinase inhibitors
Drugs that interfere with the growth of some cancer cells by blocking the signals that prompt the cancer cells to divide.

Leukaemia
Cancer of the blood forming system in the *bone marrow*, usually characterised by the production of abnormal *white blood cells* which may be present in the *bone marrow* and blood.

Lymphadenopathy
Disease or swelling of the *lymph nodes.*

Lymphocytes
A class of *white blood cell* that fights infection and disease by producing *antibodies* and other protective substances. There are two categories – B cells and T cells.

Lymphoid cell
Pertaining to cells involved in lymph or lymphatic tissue.

Lymphoma
Cancer of the lymphatic system. There are two main types of lymphoma - *Hodgkin's lymphoma* and *non-Hodgkin's lymphoma.*

Magnetic resonance imaging (MRI)
A non-invasive method of imaging which allows the form and metabolism of tissues and organs to be visualised (also known as nuclear magnetic resonance).

Medical oncologist
A doctor who specialises in the treatment of cancer through the use of *chemotherapy*.

Meta-analysis
The statistical analysis of the results of a collection of individual studies to synthesise their findings.

Microbiologist
A person who specialises in the study of micro-organisms such as bacteria, viruses and yeasts, who may also be involved in the development of treatment plans for such infections.

Monoclonal antibody therapy
Antibodies produced in the laboratory from a single copy of a human *antibody* that can target specific cancer cells wherever they may be in the body.

Monoclonal gammopathy of uncertain significance (MGUS)
A condition in which increased numbers of abnormal *plasma cells* produce identical (monoclonal) *antibodies*. The condition is of little significance in itself and does not require treatment. However, 20-30% of people with MGUS go on to develop *myeloma*.

Morphology
The shape, size and general appearance of cells under a microscope.

Multiple myeloma
See *myeloma*.

Myelodysplasia
Abnormal formation of blood cells in the *bone marrow*.

Myelodysplastic syndrome (MDS)
A group of diseases in which the *bone marrow* functions abnormally and fails to produce enough normal blood cells. It may progress to *acute myeloid leukaemia*.

Myeloid leukaemia
A type of *leukaemia* in which the *white blood cells* produced in excess are those produced by myeloid *stem cells*. Also see *acute myeloid leukaemia* and *chronic myeloid leukaemia*.

Myeloma/multiple myeloma
A type of cancer characterised by the uncontrolled production of *plasma cells* in the *bone marrow* (myeloma cells). As it can develop in many places simultaneously, it is also known as multiple myeloma.

Myeloproliferative disorders (MPD)
Disorders in which too many blood cells are made by the *bone marrow* with increased numbers of red cells, *white cells* or platelets in the blood.

Neoplastic disease
Disease characterised by new and abnormal growth of tissue (cancer).

Nephrology
A branch of medicine concerned with the diagnosis and treatment of diseases of the kidneys.

Neutropenia
A condition in which the number of *granulocytes* (*neutrophils*) in the blood is below normal.

Neutropenic sepsis
Life-threatening infection made more severe by the reduced *neutrophils*.

Neutrophils
A specific sub-type of *granulocyte.*

Non-Hodgkin's lymphoma (NHL)
Any cancer of the lymphatic system other than *Hodgkin's lymphoma.* There are two main groups – *high grade* which are aggressive and fast growing and low grade which are slow growing (also known as *indolent lymphomas*). High grade *lymphomas* include: diffuse large B-cell lymphoma (DLBCL), peripheral T-cell lymphoma, Burkitt's lymphoma, mantle cell lymphoma and AIDS-related lymphoma. Low grade or *indolent lymphomas* include: follicular lymphomas, Waldenstrom's lymphoma and marginal zone lymphomas. Extra-nodal *lymphomas* are those that develop outside *lymph nodes* such as those affecting the skin or intestine.

Oncologist
A doctor who specialises in treating cancer.

Oncology
The study of the biology and physical and chemical features of cancers. Also the study of the causes and treatment of cancers.

Palliative
Anything which serves to alleviate symptoms due to the underlying cancer but is not expected to cure it. Hence palliative care.

Paraprotein
An abnormal *antibody* produced by *myeloma* cells.

Pathologist
A person who specialises in the diagnosis of disease through study of the microscopic structure of cells and tissues.

Peripheral blood stem cells
Stem cells in the bloodstream (as opposed to the *bone marrow*).

Philadelphia chromosome
A chromosomal abnormality found in the blood cells of all people with *chronic myeloid leukaemia.*

Plasma cells
Plasma cells are a type of *lymphoid cell.* They produce *antibodies* (also called immunoglobulins) in response to infection.

Positron emission tomography (PET)
A highly specialised imaging technique used to produce a computerised image of metabolic activity of body tissues.

Precursor
A substance from which another substance is formed.

Progenitor cells
Parent cells that give rise to progeny that serve more specialised functions e.g. *stem cells.*

Prophylaxis
An intervention used to prevent an unwanted outcome.

Protocol
A policy or strategy which defines appropriate action.

Psychosocial
Concerned with psychological influence on social behaviour.

Pulmonary
Having to do with the lungs.

Quality of life
The individual's overall appraisal of his/her situation and subjective sense of well-being.

Radioimmunotherapy
Treatment with a radioactive substance linked to *antibodies* in order to specifically target tumour cells.

Radiologist
A doctor who specialises in creating and interpreting pictures of areas inside the body. An interventional radiologist specialises in the use of imaging techniques to assist treatment e.g. the insertion of *intravenous* catheters.

Radiotherapy
The use of radiation, usually x-rays or gamma rays, to kill cancer cells.

Randomised controlled trial (RCT)
A type of experiment which is used to compare the effectiveness of different treatments. The crucial feature of this form of trial is that patients are assigned at random to groups which receive the interventions being assessed or control treatments. RCTs offer the most reliable (i.e. least biased) form of evidence of effectiveness.

Recurrence
The return of cancer.

Remission
A period when cancer has responded to treatment and there are no signs of cancer or cancer-related symptoms.

Renal
Having to do with the kidneys.

Serum
The clear liquid that separates from blood on clotting.

Spleen
An organ which is part of the lymphatic system. It produces *lymphocytes*, stores blood cells, filters the blood and removes and destroys worn-out red blood cells.

Squamous cell carcinoma
Cancer originating in squamous cells – thin, flat cells resembling fish scales – found in the tissue that forms the surface of the skin, the lining of the hollow organs of the body, and the respiratory and digestive tracts.

Staging
The extent (stage) of disease defined by internationally agreed criteria. Staging helps determine treatment and indicates prognosis.

Stem cell harvesting
Collection of *stem cells* either from the *bone marrow* (for *bone marrow transplantation)* or the bloodstream (for *stem cell transplantation). Stem* cells are normally found in the *bone marrow.* However, the *bone marrow* can be stimulated to produce lots of *stem cells* by the administration of growth factors (see *colony-stimulating factors*) causing the *stem cells* to spill into the bloodstream for easier collection. If the *stem cells* are being collected for *autologous transplantation*, they may be purged to destroy any remaining malignant cells before being preserved until required.

Stem cell rescue
See *stem cell transplantation.*

Stem cells
Blood cells at their very earliest stage of development; they may become red cells, *white cells* or platelets.

Stem cell transplantation
A procedure similar to a *bone marrow transplant*, but using *stem cells* obtained from the blood rather than from the *bone marrow.*

Steroids
Steroids are hormonal substances naturally produced in the body. They can also be made artificially and used as drugs. Some types of steroid have been found to destroy some types of cancer cells and can make *chemotherapy* more effective.

Thrombosis
Formation or presence of a blood clot within a blood vessel.

Total body irradiation (TBI)
Radiation to the whole body.

Ultrasound
High-frequency sound waves used to create images of structures and organs within the body.

Vascular
Having to do with blood vessels.

White blood cells
Blood cells that do not contain haemoglobin. They are part of the immune system and are present in the blood and lymphatic system, including the lymph glands and *spleen.* The *bone marrow* produces a number of different types of white blood cells which work together to fight infection.

Appendix 5

Abbreviations

ABVD	Adriamycin (doxorubicin), bleomycin, vinblastine and dacarbazine
AIDS	Acquired immune deficiency syndrome
ALL	Acute lymphoblastic leukaemia
AML	Acute myeloid leukaemia
BCSH	British Committee for Standardisation in Haematology
BEAM	Carmustine (BCNU), etoposide, cytosine arabinoside and melphalan
BMT	Bone marrow transplantation
BSBMT	British Society for Bone Marrow Transplantation
BUCY	Busulphan-cyclophosphamide (conditioning for BMT)
CCT	Controlled (non-randomised) trials
CHI	Commission for Health Improvement
CHOP	Cyclophosphamide, doxorubicin, vincristine and prednisolone
CI	Confidence interval
CLL	Chronic lymphocytic leukaemia
CML	Chronic myeloid leukaemia
CMV	Cytomegalovirus
CNS	Clinical Nurse Specialist
CODOX-M	Cyclophosphamide, vincristine, doxorubicin and high-dose methotrexate
CPA	Clinical Pathology Accreditation (UK) Ltd
CSF	Colony-stimulating factors
CT	Computed tomography
C-VAMP	Cyclophosphamide, vincristine, adriamycin (doxorubicin) and methyl prednisolone
DLBCL	Diffuse large B-cell lymphoma
EBMT	European Group for Blood and Marrow Transplantation
ENT	Ear, nose and throat
EQA	External quality assurance
ESHAP	Etoposide, methyl prednisolone, cytarabine and cisplatin
ESR	Erythrocyte sedimentation rate
G-CSF	Granulocyte-colony-stimulating factor
HEPA	High efficiency particulate air
HICPAC	Healthcare Infection Control Practices Advisory Committee

HIV	Human immunodeficiency virus
HLA	Human leukocyte antigens
ICE	Ifosfamide, carboplatin and etoposide
JACIE	Joint Accreditation Committee EBMT-EurolSHAGE
JCCO	Joint Council for Clinical Oncology
MDS	Myelodysplastic syndrome
MDT	Multi-disciplinary team
MGUS	Monoclonal gammopathy of uncertain significance
MOPP	Mechlorethamine, vincristine, procarbazine and prednisone
MPD	Myeloproliferative disorders
MRC	Medical Research Council
MRI	Magnetic resonance imaging
NCA	National Cancer Alliance
NCRN	National Cancer Research Network
NHL	Non-Hodgkin's lymphoma
NICE	National Institute for Clinical Excellence
ONS	Office for National Statistics
OR	Odds ratio
PCR	Polymerase chain reaction
PET	Positron emission tomography
RCT	Randomised controlled trial
REAL	Revised European-American Classification of Lymphomas
SBU	Swedish Council on Technology Assessment in Health Care
SRD	State registered dietitian
TBI	Total body irradiation
UKALL	United Kingdom Acute Lymphoblastic Leukaemia trials
UKMF	United Kingdom Myeloma Forum
WHO	World Health Organisation