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Analysis of the Potential Economic Impact of the Guidance: ‘Improving Outcomes for people with Sarcoma’

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CONTENTS

Executive summary

The economic consequences of the recommendations of the "*Guidance on Cancer Services: Improving Outcomes for People with Sarcoma*" in England and Wales are set out in this document. The analysis focuses on those aspects of the key recommendations that are likely to be of greatest consequence in terms of cost. The major impacts on costs in respect of sarcoma will vary according to type of sarcoma. Bone sarcomas are currently treated centrally, whereas soft tissue sarcomas are treated more disparately. Moving to a more centralised service as proposed by the Guidance Manual will have cost implications.

There is uncertainty concerning the estimates presented and there will be variation at the diagnostic clinic and treatment centre level. Sensitivity analyses were conducted to account for uncertainty in the estimated costs. Further assessments will be needed at cancer network level and/or NHS trust level to determine the exact cost implications. Work is currently being carried out in the NHS in England, in connection with 'Payment by Results', to develop a better understanding of costs of treatment and care. This may help these assessments in the future.

The summary of economic implications is outlined in Table 1.

Table 1 Summary of estimated annual economic implications

	Costs per year (£)	
	Low range	**High range**
Cost of a written record for all patients with sarcoma in Wales, and an audio record for all patients with sarcoma in England and Wales	1,604	
Cost of producing information leaflets (for all patients with sarcoma in England and Wales)	20,000 (yr 1) 15,000 (subsequent yrs)	25,000 (yr 1)
Cost of a National Implementation Group (for England and Wales)	98,443	100,843
Core employment costs of a diagnostic clinic	40,548	53,337
Employment costs of additional staff required to undertake triple assessment (per clinic)	48,285	
Employment costs of additional staff required at existing molecular pathology/cytogenetics laboratories	79,950	
Core employment costs of a sarcoma treatment centre	482,399	819,039
Cost of orthotic and prosthetic appliances (per network)	5,622	28,649
Employment cost of having a lead cancer registry (for England and Wales)	34,788	

Patient Perspective

The total resource implication of providing patients with a permanent written record of their consultations has been estimated to be £1,604 per year.
In Wales the resource implications will be £1,150 for all patients to receive an audio and a written permanent record of their diagnosis. In England, for all patients with sarcoma to receive an audio record of the consultation at diagnosis, the cost would be £454; this assumes that these patients would already have funds allocated for written records.

The resource implications of providing information leaflets for sarcoma patients throughout England and Wales are expected to be between £20,000 and £25,000 for the first year and £15,000 for subsequent years. This cost assumes the production of up to eight generic leaflets on different types of sarcoma and also the production of diagnostic clinic/sarcoma treatment centre specific leaflets.

National Implementation Group

It is anticipated that the National Implementation Group would have a wide-ranging function including establishing an expert board to develop a comprehensive strategy to implement and monitor the guidance at all levels.

It is assumed that the National Implementation Group would comprise a full time manager and 1 or 2 administrative support workers; and a public health doctor and specialist commissioner (both on a sessional basis). The group would establish and facilitate a board (meeting 3-4 times a year). The estimated resource implications would be between £98,443 and £100,843 per annum.

Improving diagnostic services

The economic implications of this section consider three issues, namely

- the employment costs at diagnostic clinics,
- the employment costs of any additional staff that may be required as a result of triple assessment and pathology review

and

- the employment cost of the additional staff required at cytogenetic/molecular pathology laboratories

The annual opportunity cost for each clinic operating one diagnostic session per week for 45 weeks of the year, inclusive of four training sessions per year, is estimated to be between £40,548 and £53,337. The variation is dependent upon whether the clinic is lead by a doctor or a sarcoma CNS. These costs represent opportunity costs as the staff involved in the diagnostic clinics are already contracted to the NHS.

In addition to the opportunity costs of the healthcare professionals detailed above, additional staff may need to be recruited as a result of the introduction of triple assessment for people with lumps suspicious of being sarcoma. The annual employment costs of this will be approximately £48,285 per clinic. These costs are likely to be incurred at all clinics where triple assessment of all patients with a suspected sarcoma is not yet conducted.

The guidance development group anticipates that additional staff will be required at the existing cytogenetic/molecular pathology facilities, to undertake the work generated as a result of implementing the guidance. It is anticipated that there would need to be an additional clinical scientist, biomedical scientist and administration support employed at each of the laboratories. The additional employment cost per laboratory would be around £79,950.

Improving treatment

Opportunity costs for minimum staffing levels at a sarcoma treatment centre have been estimated. The annual employment cost of the medical, nursing and other staff caring for 100 new patients per year is estimated to be between £482,399 and £819,039 per year. The cost calculations are for members of the MDT, ward and clinic nurses and administrative support. The cost of ancillary and catering workforce is not included.

There is likely to be an additional requirement for some health care professionals, in particular, sarcoma CNS and specialist sarcoma physiotherapists. This needs to be considered by local commissioners. As with costs associated with the employment of staff at the diagnostic clinics it needs to be emphasised that these costs represent opportunity costs, the staff involved in the treatment centres are already contracted to the NHS. However at present the staff are employed in a variety of locations rather than in designated sarcoma treatment centres.

Orthotic and Prosthetic Appliance Provision

It is not known how many people who have sarcoma related amputations will require an activity limb, or indeed how many already have one. We have presented a sample of costs for patients with sarcoma who have undergone trans-femoral amputations. The annual cost estimates vary from £5,622 to £11,459 per network for 50% of trans-femoral amputees to have a water activity limb. For all sarcoma related trans-femoral amputees to have an activity limb with computerised knee and cosmesis, the cost is estimated to be between £14,054 and £28,649 per network. The cost impact of this aspect of the guidance will vary in line with patient choice.

Improving knowledge

It is anticipated that there would need to be an additional full-time data manager or research officer post at the lead observatory or cancer registry that is commissioned to become holder of the national sarcoma dataset. The employment costs of a data manager (Agenda for Change Band 6 pt 30) will be around £34,788 per year. This would vary in line with the exact requirements of the post and the experience of the data manager.

1. Introduction

The Manual has been developed to improve the provision of services for people with sarcoma. This economic analysis serves to inform commissioners, trusts and cancer networks of the resource and cost implications of implementing the recommendations in the Manual. The Centre for the Economics of Health at the University of Wales, Bangor has been commissioned to support this process by analysing the potential cost implications.

1.1 Scope

The objectives of this economic analysis are to:

- Identify possible models of implementation which will vary depending both on the baseline position and on the chosen means of achieving the targets set out in the guidance.
- Identify the key economic issues and cost drivers of guidance implementation.
- Estimate the costs of implementing the guidance according to the different models identified and, in so doing, provide a structure and methodology that commissioners may use to do their own analysis.
- Estimate the cost implications of implementing the Manual at the diagnostic and treatment centre level.

The analysis does not aim to:

- Provide a definitive answer to the cost implications of the Manual for specific cancer centres or networks but to produce an indication of the scale of costs involved for different models.
- Analyse the health outcome consequences of implementing the Manual.
- Estimate the cost-effectiveness of implementing the guidance recommendations.

2. Process and Methods

2.1 Integration of economic analysis with the cancer service guidance

The research into the cost implications of the guidance was developed in parallel with the production of the *Improving Outcomes Guidance for people with Sarcoma*. One or more of the authors attended the Guidance Development Group (GDG) meetings to gain a full understanding of the guidance as it developed.

2.2 Literature and data searching

Literature searches were carried out by the National Collaborating Centre for Cancer (NCC-C) information specialists and the Health Economics team at Bangor. Searches were conducted in order to identify any existing costing exercises, audits of cancer activity, cost of illness studies or models of treatment pathways. Literature was screened for economic content and any emerging economic literature was referred to the health economics team for appraisal.

In addition to the specific research questions raised by the GDG, searches were conducted of the published economic literature relating to:

- the care of patients with sarcoma,
- specific issues on the key recommendations of the guidance.

The databases searched were MEDLINE, CINAHL, NHS EED, HTA and DARE. A health economics filter was used to restrict the searches and further limitations included:

- studies in English
- publicly funded health services, i.e. similar systems to the NHS
- publications after 1990.

Unpublished data were obtained as a result of direct contact with members of the GDG, other expert clinicians, finance directors from cancer centres and trusts, as well as private healthcare providers and voluntary agencies on occasion.

Procedural cost data were obtained using Healthcare Resource Group (HRG) costs from Payment by Results[1]. HRG costs are produced by every trust in the country using a very detailed method which costs all elements of patients' care including theatre time, laboratory tests, pathology tests, minutes of nursing time, minutes of consultant time, physiotherapy, X-rays, ultrasound, pharmacy and overheads (administration, heating etc.)[1]. Data were available for inpatient elective and non-elective cases, as well as day cases. Where HRG costs were not available, financial managers at NHS trusts or PCT/LHBs were consulted.

Staff salaries were primarily based on Agenda for Change banding for 2005/06[2]. The only exceptions to this were orthotists and prosthetists whose salaries were obtained from a contractor to the NHS. For each professional grade either a spine point or mid-point was chosen, upon which 20% employment on-costs plus a London weighting were added as appropriate. The consultant salary is based on a mid-point in the range for consultants of more than 7 years experience, except where stated in the text. Where calculations were based on hourly rates, salary and on-costs, leave and sickness were taken into account by assuming a 42 week year[3]. Further advice on calculating staffing costs was provided by the payroll managers of three NHS trusts.

The impact of the Working Time Directive is not clear at this time and has not been taken into account. However it will need to be considered by commissioners, as will Agenda for Change as it becomes fully implemented across England and Wales[4].

2.3 Discussions with clinicians and other healthcare professionals

Advice from members of the GDG was sought to ensure that appropriate assumptions were made for future activity, to identify data sources and to assist in the interpretation of data. In addition, doctors and/or finance managers from individual trusts were contacted to discuss resource implications of various aspects of the Manual. Further details are included in the relevant sections. Several clinical nurse specialists (CNS) and multidisciplinary team (MDT) coordinators were also contacted to discuss their roles in MDTs and in patient-centred care. Information and advice was sought from the department of health (DH), cancer networks and Royal Colleges.

2.5 Identification of key cost issues

The guidance development process, GDG discussions and a formal survey of GDG members identified and prioritised the key cost issues according to their potential budgetary impact. A proforma was produced to collate information on the key economic issues to be included, and the extent to which literature was available for key questions relating to this Guidance.

2.6 Cost analysis

For each of the key issues identified, an estimate of the national, network or diagnostic clinic/sarcoma treatment centre level cost consequences has been made wherever possible. The approach adopted for each issue is detailed in the relevant section.

The costs for each cancer network will vary depending on population base, health service facilities, staffing levels and local patient flows. Estimates were based on broad working assumptions concerning future staffing configurations. Commissioners and trusts will need to make further considerations based on their local situation.

2.7 Sensitivity analysis

When estimating costs, where appropriate we chose a range of ± 25% to reflect uncertainty in the estimate, in line with other cancer service guidance documents. There is uncertainty in our estimates, for example, in existing configurations, frequency of MDT meetings and in current and future staffing levels. In addition there may be cost savings as a result of the Manual that are not possible to quantify at this time.

3. **Patient perspective**

The Manual recommends that:

> *"Patients should be offered a permanent written or audio record of their diagnosis and of any important points relating to the consultation. Their key worker should be identified in writing together with their contact points and this information should also be supplied to their GP".* (Patient perspective section)

Evidence concerning techniques to improve communication between patients and healthcare professionals is reviewed in the NICE guidance on *Improving Supportive and Palliative Care for Adults with Cancer*. It also reviewed the evidence concerning the quality of information. No evidence concerning the uptake of offers of letters or audio records was identified. A literature search was conducted by the present reviewers but no further evidence was forthcoming (for literature search methods see section 2).

The economic implications of this section will be based on costs relating to patients being offered a permanent record of diagnosis and the costs of patient information leaflets. The permanent record will include written and audio formats. The information leaflet requirement will include generic leaflets on sarcoma and also leaflets specific to diagnostic clinics or sarcoma treatment centres. In England and Wales there are approximately 400 new patients per year diagnosed with bone sarcoma and approximately 2000 patients diagnosed with soft tissue sarcomas (Background section). Approximately 132 of all 2400 patients with sarcoma will be from Wales. This is a crude estimate based on the proportion of people in Wales compared with England applied to sarcoma incidence.

3.1 Costs of patient letters

In England, all patients with cancer currently receive a written record of their diagnosis[6]. This is currently not the case for Wales[7]. However, not all patients in England are currently offered an audio record of diagnosis. The resource implications will therefore consider the cost of:

- an individualised letter or audio record at diagnosis only for all patients in Wales;
- and an audio record for all patients in England.

The costs of having a permanent record of diagnosis of sarcoma are based on the clinical and clerical time that would be required, as calculated in previous NICE service guidance[5].

The Manual recommends that each patient with a diagnosis of sarcoma be sent a letter or an audio record of their consultation explaining the diagnosis and the key points of the consultation. An individualised summary of the main points of the diagnostic consultation would involve around 6 minutes of consultant time and 12 minutes of secretarial time to transcribe the letter and to transfer the consultant's voice recording from the digital format to CD. Postage and stationary costs would be additional but the patient may prefer to have it sent electronically via email, in which case the costs would be reduced. The cost of a digital voice recorder, required to produce an audio record of consultations, is approximately £100. Each diagnostic clinic would require 2 such recorders for use by staff. The costs associated with the permanent record are given in Table 3.1.

Table 3.1 Annual costs of providing a permanent record of diagnosis for all patients with sarcoma in England and Wales

	Cost calculation	**Cost (£)**
Individualised written and audio summary of consultation	Consultant time- 6 minutes (Mid Pt Consultant Contract)*	6.24
	Secretarial time: 12 minutes*	1.97
	CD	0.20
	Stationary and postage	0.30
Total for 1 permanent record		**8.71**
Cost for one permanent record for all patients with sarcoma in Wales	132 patients	**1,150**
Cost of one permanent audio record of consultation for all patients with sarcoma in England	Cost of CD £0.20, 2268 patients	454
Total for England and Wales per consultation		**1,604**

* Employment costs as multidisciplinary team section

In Wales, where patients currently do not receive a written record of their consultations, the resource implications will be £1,150 for all patients to receive a written and audio record of their diagnosis (plus an additional cost of £200 per clinic to buy the appropriate recording equipment). In the interests of good communication there may be more than one time point per patient pathway where a permanent record of the consultation may be advantageous. Examples of such time points are:

- On referral to diagnostic clinic
- If sarcoma is suspected and the term is specifically used with the patient
- On diagnosis
- Confirming referral to sarcoma treatment centre
- On any treatment decision
- On referral to another sarcoma treatment centre
- After surgery or other treatment
- If targeted therapy is proposed (e.g. imatinib for GIST)
- In the event of advanced disease (whether at diagnosis or later)

- When a clinical trial is proposed
- When no treatment other than palliative is available.

In England, for all patients with sarcoma to receive an audio record of their diagnosis the cost would be £454 (plus an additional cost of £200 per clinic to buy the appropriate recording equipment); this assumes that these patients would already have funds allocated for written records. In view of the lack of evidence[5] concerning uptake of letters or audio records, together with the low costs, we have not attempted to estimate what the uptake will be.

The estimate is uncertain. Some doctors may already be giving their patients a permanent record in a format which best meets their needs.

3.2 Information for patients with sarcoma

Evidence collected for the Manual suggests that there is a need for simple leaflets including basic factual information on sarcoma to be readily available. In addition there is a need for leaflets about the diagnostic clinic/sarcoma treatment centre containing specific information on that particular clinic/centre.

The charity CancerBACUP produces high quality generic and specific booklets about all aspects of cancer and sarcoma and these are free to cancer patients (£1.95 to others). Their literature includes 63 booklets and about 50 leaflets as well as tapes, video and books. The sarcoma-specific booklets they produce relate to bone, soft tissue and Kaposi's sarcoma. CancerBACUP recorded outgoings of £86,726 for publications in their annual report in 2004[8]. Hospitals do not carry a stock of patient information publications, patients are advised to request them directly from the charity, although not all patients do this[9].

In order to estimate costs for producing the information required by the Manual, Sarcoma UK were contacted and the results are outlined below.

3.2.1 Generic leaflets on sarcoma

This cost is based on producing generic introductory leaflets on specific types of sarcoma that guide the patient to other sources of information. It is anticipated that there would be up to 8 different generic leaflets produced. The costs of producing a tri-fold or A5 4-page leaflet is around £1400 in the first year and around £600 annually to maintain stocks with a 3 year updating of the leaflet[9]. The set up and consequent costs are presented in Table 3.1.

Table 3.1 Set up and annual cost estimates for producing generic sarcoma leaflets

	(£)
Design and development	250
Printing (first 5000)	850
Distribution	300
First year total for 1 generic leaflet	1400
Annual cost in subsequent years	600

All diagnosed patients should have the opportunity to receive a leaflet. Many printers require a minimum print run of 5000. This would ensure sufficient supplies of leaflets for the first two years.

3.2.2 Diagnostic clinic/sarcoma treatment centre-specific leaflets

The Manual recommends that:

> *"Commissioners and provider organisations should ensure that at every diagnostic clinic/sarcoma treatment centre, information is available that:*
> - *is specific to that centre*
> - *describes the tests/treatments it provides*
> - *describes the individual patients' diagnosis or disease stage*

- *is age-appropriate (see the NICE guidance on Improving Outcomes in Children and Young People with Cancer)".* (Patient perspective section)

A simple one page black and white information leaflet on a specific sarcoma sub-type could be developed and distributed to sarcoma clinical nurse specialist (CNS) and consultants. The leaflet could be printed from a CDROM or the internet on demand. This would obviate the need for storage space for the leaflets.

The design would require input from the clinicians and Sarcoma CNS. The costs have been estimated to be around £3,220, with annual costs of £500, again assuming a 3-year redesign and re-pressing of the CDROM[9]. These costs are presented in Table 3.2.

Table 3.2 Set up and annual cost estimates for producing diagnostic clinic/treatment centre-specific leaflets

	(£)
Design and development	2000
CDROMS (including index)	850
Distribution of CDROMS	120
Web space (approx)	250
Total for year 1	3,220
Annual cost in subsequent years	500

3.2.3 Total costs for the production of information leaflets for patients

The total annual costs of designing, producing and distributing generic and diagnostic clinic/treatment centre-specific patient information leaflets are summarised in Table 3.3. The quality and the consistency of the content would be ensured by having centrally produced material. Nationally produced materials would also minimise duplication. The overhead cost of production, if produced centrally, is around £12,000 per year (estimate provided by Sarcoma UK).

Table 3.3. Total costs for the production of information leaflets for patients

	(£)
Set-up for eight generic leaflets	11,200
Set-up for CDROM	3,220
Annual overheads	12,000
Total for year 1	**26,420**
Annual cost in subsequent years (600 x 8 + 500)	5,300
Annual overheads	12,000
Total for subsequent years	**17,300**

The actual total costs may be less due to economies of scale. Sarcoma UK estimate that the costs would be between £20,000 to £25,000 for the first year with on-going annual costs of around £15,000.

4. National Implementation Group

The Manual recommends that:

> *"This guidance should be commissioned by primary care trusts (PCTs)/local health boards (LHBs) working collaboratively through their specialist commissioning groups, in close consultation with cancer networks. A National Implementation Group should be considered in England and Wales." (Multidisciplinary team section)*

The economic implications of establishing a National Implementation Group to ensure that the Manual is implemented has been included in this review.

The National Implementation Group would have a wide-ranging function and would include establishing an expert board to develop a comprehensive strategy to implement and monitor the guidance at all levels.

It is assumed that the National Implementation Group would comprise a manager and one or two administrative support workers (all working full time); a public health doctor and specialist commissioner (each working 1 day per week). The costs associated with the employment of the staff members is stated in Table 4.1. The employment costs include 20% on-costs (details are included in section 2, Methods).

Table 4.1 Employment costs of the National Implementation Group

Profession (Grade and FTE)	**Annual Employment cost (£)**
Manager (Band 7 pt 28-32)	34,897
Public health doctor (Consultant grade 1, 0.2 FTE)	16,720
Specialist commissioner (Afc Band 7 pt 32, 0.2 FTE)	7,588
Administrative support (Band 2/3 pt 7)	16,433
Administrative support (Band 3/4 pt 12)	19,205
Total*	**94,843**

* (Rounded to the nearest £)

The resource implications of the board would be, primarily, in expenses paid to the healthcare professionals, patients and commissioners who would attend approximately three or four meetings a year. It is assumed that there would be 12-15 board members from across England and Wales. The estimated costs for each meeting are based on the costs related to the current GDG meetings where expenses for each meeting are around £100 per member. The cost estimates are between £3,600 and £4,500 per year for 12 or 15 members meeting on three occasions. For quarterly meetings, the cost of attendance would be between £4,800 and £6,000 per year for 12 and 15 members, respectively.

The annual employment cost for staff of the National Implementation Group and expenses for board members is between £98,443 (based on 12 board members and 3 meetings) and £100,843 (based on 15 board members and 4 meetings). In addition there would need to be provision for accommodation and equipment. This will vary according to location and will require further investigation by commissioners. It is anticipated that the group would need to be in-situ for at least 3 years and it is possible that there would be an ongoing function to ensure delivery and monitoring of services for this patient group.

5. Diagnostic service

This section includes costs relating to diagnostic service for soft tissue sarcoma. Costs relating to the diagnosis of bone sarcoma are funded by the National Specialist Commissioning Advisory Group (NSCAG) in England and by Health Commission Wales in Wales. Costs relating to a review that is currently underway by NSCAG are due to be published later in 2005[10].

The Manual states that:

"To improve the early diagnosis of soft tissue sarcoma this guidance proposes that a clearly defined network of diagnostic clinics, linked to sarcoma treatment centres be established. Two models are recommended to achieve this:

EITHER:

- *Patients with a suspected diagnosis of STS (as defined by the urgent referral criteria) would be seen at a diagnostic clinic that is part of a sarcoma treatment centre, within the two week wait.*

OR:

- *Patients with a suspected diagnosis of STS (as defined by the urgent referral criteria) would be seen at a specifically designated diagnostic clinic in their local cancer network, within the two week wait. This would purely be a diagnostic rather than a treatment clinic, and be clearly affiliated to one sarcoma MDT.*

These diagnostic clinics (in either model) should undertake triple assessment including clinical assessment, imaging and biopsy of all patients. There would be no requirement for a surgeon or oncologist to be part of such a team, but the members of the diagnostic team should be trained by and work in close collaboration with members of the affiliated sarcoma MDT. Patients identified as having a STS should be rapidly referred on to a sarcoma MDT for definitive treatment, as would any cases with equivocal images or biopsy." (Improving diagnosis section)

The economic implications of the Improving Diagnosis section will be based on staffing levels at the diagnostic clinics and additional staff that will be required as a consequence of introducing triple assessment for diagnosing suspected sarcomas.

5.1 Employment costs for staff at diagnostic clinics

The staffing levels discussed below assume that there would be one diagnostic clinic serving a population of 1.5 million population in England and Wales. The diagnostic service would be either a specifically designated diagnostic clinic or based at a sarcoma treatment centre.

It is anticipated that each diagnostic clinic would be led by a consultant level doctor or senior nurse and include sarcoma clinical nurse specialists, a specialist sarcoma pathologist (or a designated pathologist), a radiologist and administrative support. The Manual recommends that those diagnostic clinic teams that are not based at sarcoma treatment centres should have training sessions from the treatment centre MDT. For the purposes of the economic analysis it has been assumed that there will be four training sessions per year. The employment costs of these healthcare professionals are outlined in Table 5.1. It needs to be emphasised that these costs represent opportunity costs as the staff involved in the diagnostic clinics will already be contracted to the NHS. There will be local variation dependent upon the salary point of the health professionals. Local commissioners will need to consider the opportunity costs of any increase in existing diagnostic clinics.

Table 5.1 Employment costs for a sarcoma diagnostic clinic

Consultant-led clinic	**Sessions per week** [b]	**Annual Salary + 20% on-costs (£)**[a]	**Sarcoma CNS-led clinic**	**Sessions per week** [b]	**Annual Salary + 20% on-costs (£)**[a]
Consultant	0.2	19,656			
Radiologist	0.1	9,828	Radiologist	0.1	9,828
Specialist sarcoma pathologist	0.1	9,828	Specialist Sarcoma Pathologist	0.1	9,828
Sarcoma CNS (pt 32)	0.2	7,623	Sarcoma CNS (pt 32)	0.4	15,245
Administrative support (Band 3/4, pt 12)	0.2	3,841	Administrative support (Band 3/4, pt 12)	0.2	3,841
Total per year		50,776	Total per year		38,742
Training sessions – 4 per year		2,561	Training sessions – 4 per year		1,805
Total inclusive of 4 training sessions per year		**53,337**	**Total inclusive of 4 training sessions per year**		**40,548**

[a] Totals rounded to the nearest £

[b] Number of sessions per week calculated based on a clinic seeing 10-12 patients per diagnostic session

The annual opportunity cost for each clinic operating one diagnostic session per week for 45 weeks of the year, inclusive of four training sessions per year, is estimated to be between £40,548 and £53,337. The variation is dependent upon whether the clinic is lead by a doctor or a sarcoma CNS. (In practice there will also be variation depending upon the grade of the healthcare professional involved).

5.2 Costs of triple assessment

The costs for triple assessment for diagnosis of patients who are suspected of having soft tissue sarcoma are taken from the National Reference Costs for 2003[11] for breast cancer. It has been anticipated that no additional facilities or equipment will be required. National Reference Costs for triple assessment in the diagnosis of sarcoma are not available, however, the national average unit cost for triple assessment for breast cancer was £213 with an inter-quartile range of between £150 and £242 based on submissions from 97 Trusts with

50,507 attendances (HRG code J26op). Costs for sarcoma are likely to be more expensive than for breast cancer because the diagnostic procedures used for triple assessment are usually more expensive.

The Manual states that there are around 2000 soft tissue sarcomas diagnosed each year and around 10 times this number will have been referred for diagnosis. If all 20,000 patients are referred for triple assessment the total cost would be around £4,260,000 per year (inter-quartile range £3,000,000 to £4,840,000[11]). It should be noted however that in many diagnostic clinics, triple assessment of patients with suspected sarcoma is already being carried out.

5.3 Additional staff

In addition to the opportunity costs of the healthcare professionals detailed above, there may need to be additional staff recruited as a result of the introduction of triple assessment for people with lumps suspicious of being sarcomas. This would be around 0.3 FTE general pathologist per clinic (primarily to free up time for the specialist sarcoma pathologist to undertake sarcoma work), an additional biomedical scientist (0.5 WTE) and a radiographer (0.3 FTE) to cope with the increased demand. The costs of this will be around £48,285 per clinic per year, Table 5.2. The guidance development group consider that the current provision of diagnostic imaging equipment is sufficient to accommodate patients with sarcoma.

Table 5.2 Annual employment costs for additional staff required to undertake triple assessment

	FTE	Salary plus 20% on cost
General Pathologist (Consultant Grade 1)	0.3	£25,080
Biomedical scientist (Band 5 pt 21)	0.5	£13,460
Radiographer (Grade I or II)	0.3	£9,745
Annual cost per clinic		**£48,285**

The background section of the Manual reports that currently there are 65 trusts in England and Wales with more than 50 hospital episodes coded to orthopaedics, general and plastic surgery for sarcoma over a five year period and 189 trusts showing at least some activity. As a result of the implementation of the Manual these patients would be referred to a diagnostic clinic. It is likely that with increased activity at fewer clinics, staff will need to be re-deployed from Trusts where there is insufficient activity. We anticipate, therefore, that the costs detailed in this section will not be new, with the exception of the staffing implications of triple assessment in those clinics where this is currently not taking place.

5.4 Cytogenetic/molecular pathology facilities

The Manual states that

> *"Commissioners should fund:*
> - *A formal system for second opinions and review of difficult cases*
> - *Molecular pathology and cytogenetics facilities."* (Improving Pathology section).

The guidance development group have identified that additional staff will be required to undertake the work that will be generated as a result of implementing the Manual. It is anticipated that there would need to be an additional clinical scientist, biomedical scientist and a secretary employed at each of the four existing cytogenetic/molecular pathology laboratories. The additional employment cost per laboratory would be around £79,950. The detailed cost estimates are given in Table 5.3

Table 5.3 Annual employment costs of additional staff required at the existing cytogenetic/molecular pathology laboratories

	FTE	**Annual salary plus 20% on-cost**
Clinical scientist Grade B (AfC Pt 35)	1.0	£43,338
Biomedical scientist (Spine 21)	1.0	£26,920
Secretary (Band 3/4 Pt 12)	0.5	£9,692
Annual cost per laboratory		**£79,950**

6. Improving treatment: Multidisciplinary teams (MDTs)

A key recommendation of the Manual states that:

> *"A sarcoma MDT should meet minimum criteria and manage the care of at least 100 new patients with sarcoma per year.."*

Each sarcoma MDT should either be based in a single hospital or in several geographically close and closely affiliated hospitals, which would constitute the sarcoma treatment centre. A soft tissue sarcoma MDT is likely to serve a population of 2-3 million people and a bone sarcoma MDT a population of 7-8 million.

In order to estimate the costs for providing a safe and sustainable service for the care and treatment for patients with sarcoma, minimum staffing levels have been estimated and are discussed below. These healthcare professionals will in the main already be employed by the NHS. The objective in undertaking this exercise is to enable commissioners to consider infrastructure, staffing levels and patient flow in their local treatment centre. It is acknowledged that there will be differences between centres in line with case mix, the complexity of disease and stage of treatment, and, for some sarcomas, the age of the patient.

6.1 Methods

Minimum staffing levels have been estimated by the GDG, for a sarcoma treatment centre to provide a safe and sustainable service, managing at least 100 new patients with sarcoma per year. NHS staff salary pay-scales, obtained from the Department of Health[2] were used to calculate the current staffing cost 2005/06; in the case of orthotists and prosthetists, salaries were obtained from a contractor to the NHS (see Section 2 for further information).

6.2 Cost of staffing at sarcoma treatment centres

The full time equivalent (FTE) staffing levels, together with an estimated annual employment cost, for staff dedicated to the care of patients with sarcoma are outlined in Tables 6.1. It is anticipated that clinical and other specialist posts would be undertaken by two or more individuals to ensure adequate leave and sickness cover. It is likely that the staffing levels will exceed the minimum in some settings depending on activity levels, case mix, intensity of treatment and types of referrals to the centres.

Table 6.1 Annual employment costs of minimum staffing level at a sarcoma treatment centre managing 100 new patients per year

Staff requirements	**Minimum FTE**[a]	**Annual Salary + 20% on-costs (£)**[b]
Specialist sarcoma surgeons	1	98,280
Specialist sarcoma radiologists	0.6	58,968
Sarcoma specialist pathologist	0.4	39,312
Medical oncologist	0.3	29,484
Clinical oncologist	0.3	29,484
Paediatric oncologist	0.1	9,828
Administrative support (Band 3/4, pt 12)	2	38,410
Key worker (Based on nursing salary AfC Band 7 Pt 32)	2	76,227
Palliative care specialist (Based on nursing salary AfC Band 7 Pt 32 or consultant)	0.2	7,623 to 19,656
Specialist sarcoma physiotherapist	1	32,484
Specialised AHP – occupational therapist	0.1	3,426
Specialised AHP - orthotist	0.1	3,248
Specialised AHP - prosthetist	0.1	3,272
Ward nurses (AfC Band 6 pt 27)	5	160,214
Clinic nurses (AfC Band 6 pt 27)	1	32,043
MDT Support staff MDT coordinator (band 4 pt16) Secretarial support Pt 12	 0.5 0.5	 11,291 9,602
Total		**643,198 to 655,231**
Sensitivity analysis ± 25%		**482,399 to 819,039**

[a] FTEs not necessarily 1 individual
[b] Costs are rounded to the nearest pound

The annual employment costs of the medical, nursing and other staff caring for 100 new patients per year is estimated to be between £643,198 (± 25%, £482,399 and £803,998) and £655,231 (± 25%, £491,424 and £819,039). The variation is dependent upon whether the palliative care specialist is a nurse or a consultant. The cost calculations are for members of the MDT, ward nurses and outpatient nurses, however it is not inclusive of all staff who would be involved with the patients' care. Ancillary, catering or administration workforce would be an additional cost. These factors would need to be considered by commissioners.

In addition to the staff listed in Table 6.1, there would be a need for palliative care nurses for sarcoma patients. However it is likely that patients would prefer to receive their palliative care at a local hospital rather than at a regional sarcoma treatment centre, the costs of which are included in the economic review of the NICE guidance on *Improving Outcomes In Palliative And Supportive Care*[5].

As a result of this uncertainty, together with variation in remuneration for all personnel a sensitivity analysis of ± 25% has been applied. The estimated annual range of opportunity costs for staffing a sarcoma treatment centre caring for 100 new patients per year is between £482,399 and £819,039.

It needs to be emphasised that these costs represent opportunity costs as the staff involved in the treatment centres will already be contracted to the NHS. As with the diagnostic clinics, local commissioners will need to consider the opportunity costs of any increase in existing staffing levels.

6.3 MDT meetings

It is assumed that there will be an opportunity cost to enable staff to attend MDT meetings. Meeting costs could be derived by estimating the time spent attending meetings by different staff multiplied by their hourly rate (salary and on-costs). Although MDT meetings are usually conducted out of normal working hours[9] the costs calculated here are based on MDT meetings being conducted during paid hours of work. The new consultant contract formally places MDT work within programmed activities. These costs have therefore not been calculated.

There is likely to be an additional requirement for some healthcare professionals, in particular, sarcoma CNS and specialist sarcoma physiotherapists, either of whom could be designated key workers. Additional specialist sarcoma training will be required, such as the training modules offered by the University of Central England in conjunction with the Royal Orthopaedic Hospital. The cost of each module is around £220[12]. If all nursing staff and AHPs took one module the cost per treatment centre would be £2,420.

7. Orthotic and Prosthetic Appliance Provision

The Manual recommends that for those patients who need limb amputation:

> *"Special activity limbs should be provided where appropriate and proven technological improvements should be made available".* (Supportive and Palliative Care section)

There were 144 limb amputations in 2003/04 in the England and Wales as a result of a primary neoplasm [13], this represents 7% of all the new sarcoma patients per year[14]. Table 7.1 details the level of amputation as a result of neoplasia from the National Amputee Database[13].

The supportive and palliative care section of the manual sets out current provision and proposals for the provision of prosthetic appliances for patients with sarcoma in England and Wales. As the majority of patients who require such appliances are young (median age 21 years), they will require life-long access to specialist rehabilitation services and may want specialist activity limbs.

Current prosthetic provision in the UK is variable - a survey undertaken by the Audit Commission in 2000[15] found 25% of patients fitted with prosthetic limbs found them unusable. There is evidence that non-use of prosthetics is related to the weight of the appliance, inability to wear with some clothing and appearance. Improvements to the service had been reported in the subsequent report.[16]

Presently Disablement Service Centres (DSC) provide prostheses in the UK. There are 44 DSCs in the UK of which 14 match the template for specialist Prosthetic and Amputee Rehabilitation Centres (PARC) proposed by the British Society of Rehabilitation in 2003. The Manual recommends that sarcoma patients are referred, for pre-amputation assessment, to centres matching the PARC template. These centres have the necessary expertise and facilities to cope with all the intricacies of comprehensive prosthetic/amputee rehabilitation.

Sarcoma-related amputations represent around 3% of all amputations (n=5633) in England and Wales[13]. The majority of patients with sarcoma have lower limb amputations (n =106), primarily either trans-femoral or amputations at the hip. The Manual recommends that where appropriate sarcoma-related amputees be offered specialist activity limbs in addition to a conventional limb.

Private prosthetic companies are increasingly introducing advanced technological components for prosthetic limbs, particularly computerised knee joint units, carbon fibre prosthetic feet and silicone high-definition cosmesis, as well as water activity limbs. The artificial limb components of such prosthetics would enhance the capability and quality of life of the user, they are designed for specific stages of an individual's life (such as child or adult), activity levels and mobility grades, specialist activities (for example swimming, running, cycling) and body weight of users.

Not all patients who have had amputations will have sufficient function to benefit from an activity limb. The ability of an amputee to benefit from activity limbs decreases with higher proximal level amputation. If the amputation is at the hip, functionality for day to day living is usually as much as can be aimed for; at trans-femoral level there is likely to be a more active profile, depending on the muscle and quality of the amputation[16]. There will be a wide variation in type of limb required by each patient and consequently the cost.

Table 7.1 Level of amputation; by cause of neoplasia for England and Wales 2003/04[13]

		England					Wales		
	Level of Amputation	**Neoplasia – Malignant – Secondary**	**Neoplasia – Malignant – Primary**	**Neoplasia – Benign**	**Neoplasia – No Additional Detail**	**Total Neoplasia**	**Neoplasia – Malignant – Secondary**	**Neoplasia – Malignant – Primary**	**Total Neoplasia**
Upper Level Amputations	Forequarter	-	4	-	-	**4**	-	-	**-**
	Shoulder disarticulation	-	6	-	-	**6**	-	-	**-**
	Trans-humeral	-	16	-	-	**16**	-	-	**-**
	Trans-radial	-	3	-	-	**3**	-	1	**1**
	Wrist disarticulation	-	1	-	-	**1**	-	-	**-**
	Partial hand	-	5	-	1	**6**	-	-	**-**
	Upper Digits	-	2	-	-	**2**	-	-	**-**
Total Upper Level		-	**37**	-	**1**	**38**	-	**1**	**1**
Lower Level Amputations	Hemi-pelvectomy	-	1	-	1	**2**	-	-	**-**
	Hip disarticulation	-	8	-	-	**8**	-	2	**2**
	Trans-femoral	3	38	-	11	**52**	-	1	**1**
	Trans-tibial	2	25	1	5	**33**	1	2	**3**
	Ankle disarticulation	1	-	1	-	**2**	-	-	**-**
	Partial foot	-	2	-	-	**2**	-	-	**-**
	Double lower amputation	-	1	-	-	**1**	-	-	**-**
Total Lower Level		**6**	**75**	**2**	**17**	**100**	**1**	**5**	**6**
Total Neoplasia		**6**	**112**	**2**	**18**	**138**	**1**	**6**	**7**

The prosthetic service within the NHS is contracted to external companies. There is no central database that collects information on prescription of prosthetics and thereby the associated costs. The Purchasing and Supply Agency (PSA) have been approached for cost bandings for activity limbs for people who have had trans-femoral, trans-tibial and trans-humeral amputations. The type of activity limb that this group of people might require would enable them to swim, cycle, run or dance. The PSA cost bandings will hopefully be detailed in the final draft of the economic review but until then the cost calculations are based on data from a private prosthetic company[17].

In view of the individual differences in requirements between patients, the costs presented are for patients with sarcoma who undergo trans-femoral amputation in England and Wales (n=53). The costs detailed are based on two types of activity limb; a water activity limb costing around £8000 and a limb with a computerised knee and cosmesis costing up to £20,000[15]. Details are presented in Table 7.2. Other types of speciality limb may fall between these two cost examples.

The cost of the cosmesis has been included in our upper estimate. However, in 2001 the government allocated £4 million to enable all patients in England who require artificial limbs to have silicone cosmesis. In 2002, just £10,000 of the £1.3 million additional first year money had been spent for this purpose[16]. This allocation will have improved since the Audit Commission report was written, however, in view of the low allocation, the cost of cosmesis, around £2,000 per limb, has been included in this estimate.

Table 7.2 Costs of two types of activity limb for sarcoma-related amputees in England and Wales

	Estimated cost per activity limb (£)	If all 53 patients require an activity limb (£)	Estimated cost per network for 53 (£)	If 50% (n=26) require an activity limb (£)	Estimated cost per network for 26 (£)
Modular water activity knee	8,000	424,000	11,459	208,000	5,622
Limb with computerised knee and cosmesis	20,000	1,060,000	28,649	520,000	14,054

It is not known how many people who have sarcoma-related amputations will require an activity limb, or indeed how many already have them provided by the NHS. At present there is no central recording system for prescriptions of prosthetic limbs and without this monitoring uptake is very difficult.

We have presented the costs for 2 scenarios. If all sarcoma related trans-femoral amputees in England and Wales (n=53) require an activity limb the cost would vary between a minimum of £424,000 for a water activity limb to a maximum of £1,060,000 for a limb with a computerised knee and cosmesis. If just half of all patients request an activity limb the costs would vary between £208,000 for a water activity limb to £520,000 for one with a computerised knee. The cost of activity limbs is from a private supplier; it is likely to be an over-estimate for people with sarcoma who have had trans-femoral amputations. However it does not include the costs associated with providing activity limbs for people who have had amputations at other levels. The cost impact of this aspect of the guidance will vary in line with patient choice and existing provision of appliances.

8. Improving knowledge

The Manual states that:

> *"All sarcoma MDTs should collect data on patients, tumour, treatment and outcome.*
>
> *The data collected should be agreed nationally and should be based on the sarcoma subset of the National Cancer dataset. Cancer networks should ensure that a complete dataset exists for all patients managed within the network.*
>
> *Public health observatories or cancer registries should act as the data repository of the agreed dataset and a lead observatory or cancer registry should be commissioned as repository of a national dataset which could then become a national sarcoma register* "(Improving knowledge section)

The economic implications of this aspect of the guidance will be low. The chapter outlining the cost impact of MDTs indicates that each MDT should have a coordinator and clerical support as this will ensure that there is full recording of comprehensive patient data. In view of the low incidence and the increasing automation of cancer registries, it is unlikely that any additional costs will be incurred at more than one registry as a result of this recommendation.

It is anticipated that there would need to be an additional full-time data manager or research officer post at the lead observatory or cancer registry that is commissioned to become holder of the national sarcoma dataset. The employment costs of a data manager (Agenda for Change Band 6 pt 30) will be around £34,788 per year[4]. This would vary in line with the exact requirements of the post and the experience of the data manager.

9. References

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