Evidence Based Clinical Guidelines for the Physiotherapy Management of Adults with Lower Limb Prostheses

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Foreword

It is with great pleasure that I read these clinical guidelines and not without a great deal of admiration for all those involved in their commitment to producing them, especially some of whom took on extra training to ensure appropriate rigour in their production. Four years of hard work but well spent.

It is, in my opinion, almost a labour of love on behalf of our patients to produce Evidence Based Clinical Guidelines. Without the investigation of practice and production of evidence we can't, and probably never would, move forward. Though we can, and do, of course, merely change direction often without clinical reason, just a fad. Whereas these guidelines provide a stable, scientific platform from which we can develop by ensuring we must apply rational reasoning.

So congratulations to all involved and also to the reader who will gain an insight into physiotherapy practice for lower limb amputees. The labour of love is however never really finished when professional practice is the issue, re-examination, evaluation and new techniques will all demand the same commitment from professionals, researchers and patients alike to keep this document living and robust, but what an excellent starting point has been created.

I hope that all readers, like myself, will gain knowledge of both practice and its research base, and will be able to reflect on how this can continue to be developed and explored for the benefit of our patients.

Avril Imison, OBE, MCSP

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Acknowledgments

Thanks are due to the following groups

The Working Party (Appendix 1)

Professional Advisers (Appendix 2)

Literature Appraisers (Appendix 4)

Chartered Society of Physiotherapy (CSP)

British Association of Physiotherapists in Amputee Rehabilitation (BACPAR)

Scottish Physiotherapy Amputee Research Group (SPARG)

Delphi Panel

External Reviewers (Appendix 11)

Peer Reviewers (Appendix 12)

Throughout this document the adults with lower limb prostheses may be referred to as individuals, amputees, patients or users.

Comments on these guidelines should be sent to:

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Contents

Background and development of the guidelines

Introduction

The British Association of Chartered Physiotherapists in Amputee Rehabilitation (BACPAR) is a clinical interest group recognised by the Chartered Society of Physiotherapy (CSP). BACPAR aims to promote best practice, through evidence and education, in the field of amputee and prosthetic rehabilitation for the benefit of patients and the profession. It is committed to research and education, providing a network for the dissemination of best practice in pursuit of excellence and equity whilst maintaining cost effectiveness.

These guidelines have been produced by practising physiotherapists who are members of the Chartered Society of Physiotherapy and who hold State Registration with the Health Professions Council.

A clinical guideline is not a mandate for practice – it can only assist the clinician with the decision making process about a particular intervention. Regardless of the strength of the evidence on which the guideline recommendations are made, it is the responsibility of the individual clinician to interpret their application for each particular patient encounter. This will include taking account of patient preferences as well as local circumstances. Patient consent should always be gained prior to any treatment (1)

These guidelines do not constitute a legally binding document. They are based on the best evidence currently available, and are intended as a resource to guide application of best practice. They should be used in conjunction with the CSP Core Standards (2000) (2).

The scope of these guidelines is purposely broad. It was not BACPAR's intention to include details of specific areas of physiotherapy management as these would detract from the broader overview that these guidelines present.

Recommendations for local implementation were developed by the working party based on the best available evidence and their expert knowledge. They are given to assist individual physiotherapists and service managers to implement the recommendations of the guidelines. It is recognised that local variations in service provision will influence their implementation.

These guidelines are intended to be useful to physiotherapists working in this clinical area as a readily available source of information. They can assist in clinical decision making, adapting knowledge into practice and providing recommendations to ensure competence. For the experienced clinician, the guidelines can act as a reference to support and guide clinical practice and service provision. They are intended to be a framework for best practice that all physiotherapists should aspire to achieve as part of their professional responsibilities.

BACPAR acknowledges that not everyone who undergoes a lower limb amputation will benefit from a prosthesis. These guidelines are intended for those adults who do receive a prosthesis.

The Need for Evidence Based Clinical Guidelines

Definition of Clinical Guidelines:

'Systematically developed statements to assist practitioner and patient decisions about appropriate health care for specific circumstances' [3].

The practice of evidence based medicine means integrating individual clinical expertise with the best available external evidence from systematic research [4].

Clinical Governance

In 1997 The Government White Paper 'The New NHS – modern and dependable' [5] set out a ten-year modernisation strategy for the health service. It was followed by a consultation document 'A first class service – quality in the NHS' (1998) [6] which focussed on increasing the quality of care at local level with clear national standards. Clinical governance is the lynch pin of this strategy, two of its key elements being evidence-based practice and professional responsibility.

Professional Responsibility

The Government has recognised the need for health care professionals to be informed of change and improvements in their clinical practice and to remain in touch with current research findings that affect clinical decision-making. Through commitment to continuing professional development and lifelong learning, physiotherapists are required to be reflective practitioners and base clinical judgements on the most appropriate information available.

In the field of amputee rehabilitation strategic thinking is needed to address the long-term needs of the patient. This involves teamwork and consultation, which should include the patient and their carers.

Resource Implications

In the year ending 31st March 1999 there were 5665 new referrals to prosthetic service centres in the United Kingdom [7]. The Audit Commission identified the provision of equipment services, including prostheses, as an area for investigation, resulting in the report 'Fully Equipped'[8]. The report examined economy, efficiency and effectiveness of service provision. The cost of the prosthetic service to the NHS requires an enormous commitment in terms of finances, equipment and resources and warrants maximum clinical effectiveness to ensure a cost efficient service.

Major lower limb amputation has a profound effect on quality of life with high levels of morbidity and mortality [9-15]. The number of people undergoing amputation is small in terms of overall national health need, affecting 51,000 of the population [8].

Multidisciplinary rehabilitation of this client group consumes significant resources. Using a prosthesis to minimise the disability caused by the loss of a limb demands highly skilled, specialised therapeutic input as well as the use of costly prosthetic componentry.

The dissemination of well-researched clinical guidelines will enable patients and all grades of clinicians to base decisions on the best available evidence.

Identifying the Need

The Scottish Physiotherapy Amputee Research Group (SPARG) and the Audit Commission demonstrated wide variation nationally in the quality and type of service and care offered by physiotherapists to adults with lower limb amputation [8,16]. BACPAR identified the need for the production of evidence-based guidelines to minimise such variations and guide the clinician to evidence based practice in this complex area of rehabilitation.

The Clinical Question

These guidelines address the question: What is best practice in the physiotherapy management of adults with lower limb prostheses?

Aims of the Guidelines

These guidelines have been produced to:

- facilitate best practice for physiotherapists working in lower limb prosthetic rehabilitation.
- assist clinical decision-making based on the best available evidence.
- inform users and carers.
- inform service providers in order to promote quality and equity.
- reduce variation in the physiotherapy management of adults with lower limb prostheses.
- facilitate audit and research.
- reduce unproven and ineffective practice.

Objectives of the Guidelines

These guidelines have been developed to:

- provide a comprehensive document which will inform physiotherapists in the management of adults with lower limb prostheses.
- rigorously appraise the current relevant literature.
- make recommendations for best practice based on the published evidence and expert consensus opinion.
- disseminate information.
- facilitate a tool for audit and benchmarking.
- identify gaps in the evidence for further research.

Scope of the Guidelines

These guidelines address the physiotherapy management of adults using lower limb prostheses. They are applicable to all major levels of amputation, including bilateral amputation, and all causes and pathologies.

The levels of amputation covered by the guidelines are:

- Transpelvic
- Hip disarticulation
- Transfemoral
- Knee disarticulation
- Transtibial
- Symes

The guidelines commence when the patient receives their first lower limb prosthesis and conclude when the patient is discharged from active treatment to a maintenance programme.

The guidelines are presented in discrete sections that cover:

- the multidisciplinary team
- prosthetic knowledge
- assessment
- the prosthetic rehabilitation programme
- patient education
- discharge and maintenance

The guidelines do not cover:

- pre-operative and pre-prosthetic management of the lower limb amputee
- specific types of equipment such as walking aids, wheelchairs and prosthetic componentry
- upper limb prosthetic management
- non-prosthetic management
- children

The Development Process

The Working Party

A working party of BACPAR members was formed reflecting the necessary experience and skills needed to compile clinical guidelines (Appendix 1). All members had an understanding of the use of guidelines in assisting and informing clinical practice, with some members having previous experience in the development of other guidelines. The BACPAR chairman led the working party.

None of the working party declared a conflict of interest.

Professional Advisers

The working party approached professional bodies and user groups, who were recognised as being stakeholders and interested parties, to assist in the development of the guidelines in the capacity of professional advisers (Appendix 2).

During the development of the guidelines the views of the professional advisers, including patients, were sought. Their comments and suggestions informed the guidelines.

From the start of the project BACPAR took advice from the CSP regarding procedures for the development of clinical guidelines. The CSP were kept informed at regular intervals of the progress of the guidelines.

The collaborative nature of this project reflects the multidisciplinary philosophy of rehabilitation and enhances the validity of the recommendations.

Funding

The guidelines were developed without external funding. The project was funded by the CSP and BACPAR.

National study day

A BACPAR study day entitled, 'Where's the Evidence? – How to conduct a literature search and critique papers.' was held in 1999. The key search terms were identified.

The Literature Search

Aims of search

To identify literature relating to the physiotherapy management of adults with lower limb prostheses.

Inclusion Criteria

Articles were included if they were:

- published since 1974
- published in English (for practical reasons)
- relevant to lower limb amputees
- relevant to adults, 18 years of age and over
- relevant to all pathologies/causes of amputation
- relevant to all major levels of lower limb amputation i.e. Transpelvic, hip disarticulation, transfemoral, knee disarticulation, transtibial and Symes. (excluding partial feet)

Exclusion Criteria

Articles were excluded if they were related to :

- pre operative care of the amputee
- surgical management of the amputee
- immediate post operative care of the amputee
- upper limb amputees
- paediatric amputees
- minor levels of amputation e.g. partial foot
- specific prosthetic products

The databases were searched in September 1999 and again in May 2001 and July 2002 to ensure the most up-to-date literature was included. The same search protocol was used throughout.

Key words

Under the guidance of a librarian and representatives from the CSP the following key words were selected for the literature search:

Physio*, Phys*, Therap*, Rehab* & Amp*, Prosthet*, Lower limb* (Appendix 3)

Databases

The following databases were searched for material between 1974 and 2002: RECAL (specialist prosthetic/orthotic database), Medline, Cochrane, Embase, Assia, AMED, CINAHL, BNI, Rehab Base, Physio Index.

BACPAR members were asked to search locally available databases and retrieve the selected articles.

Unpublished material

The British Schools of Physiotherapy and Occupational Therapy were contacted with the key words and asked to list relevant titles held in the libraries, both at under and post graduate levels.

Relevant conference proceedings and abstracts were obtained.

The Appraisal Process

Selection of Appraisal Tool:

The Journal of the American Medical Association (JAMA) appraisal tool [4] was chosen for this project for its validity and clinical applicability.

Training in appraisal skills

The Director of the Centre for Evidence Based Medicine (Oxford) trained ten physiotherapists in critical appraisal (Appendix 4).

The training included:

- Use of appraisal guides to estimate bias
- Extraction of numbers from papers
- Conversion of numbers into 'numbers needed to treat'
- Production of a declarative title about the article findings
- Establishment of level of evidence

The appraisers gained knowledge of:

- JAMA guides
- Different styles of papers e.g. therapy, diagnosis, randomised control trial
- Numerical analysis
- Levels of evidence

Selection of articles for Appraisal

Articles were examined and selected for appraisal. Using the inclusion and exclusion criteria the articles were assessed as

- 'not relevant',
- 'maybe relevant',
- 'possibly relevant'
- 'definitely relevant'

according to the agreement of at least two working party members. Any articles in the category 'not relevant' were rejected at this stage. If there was disagreement the article was discussed by the working party and a majority decision taken. All remaining articles were retrieved for appraisal by the JAMA trained physiotherapists. (Figure 1)

Appraising the literature

Two hundred and seventy four papers were retrieved. Articles were excluded if at least two of the appraisers felt the study was

- not relevant to the guidelines,
- contained inconclusive evidence
- was purely descriptive.

The appraisal group resolved any disagreement over categorisation.

The articles were classified as:

- therapeutic,
- diagnostic,
- prognostic,
- about harm or aetiology,
- systematic review
- economical analysis.

Three systematic reviews were found. Two were not included in the guidelines, (Appendix 5) because there was no description of

- data sources,
- the method of study selection for inclusion into a systematic review
- how the data were extracted from the individual articles.

Or

- the data appeared heterogeneous
- there were no independent reviews of individual trials
- the recommendations of the review was not relevant to the scope of the guidelines

Five groups consisting of two appraisers using the process developed by Sackett et al [4] appraised the articles independently. The two appraisers discussed differences in opinion and a CAT (Critically Appraised Topic) was written. If the two did not agree it was referred to the wider group for discussion and a CAT concluded by consensus. (Figure 1)

Forty-seven papers were critically appraised. CAT-maker was used to record this process. CAT-maker is a computer programme designed to organise and summarise the evidence. (Appendix 6) The CAT-maker assists by:

- carrying out the clinical calculations
- storing appraisals (as well as search strategies that led to them)
- generating files that can be formatted with word processors, stored and printed for other team members.

Update of Appraisal

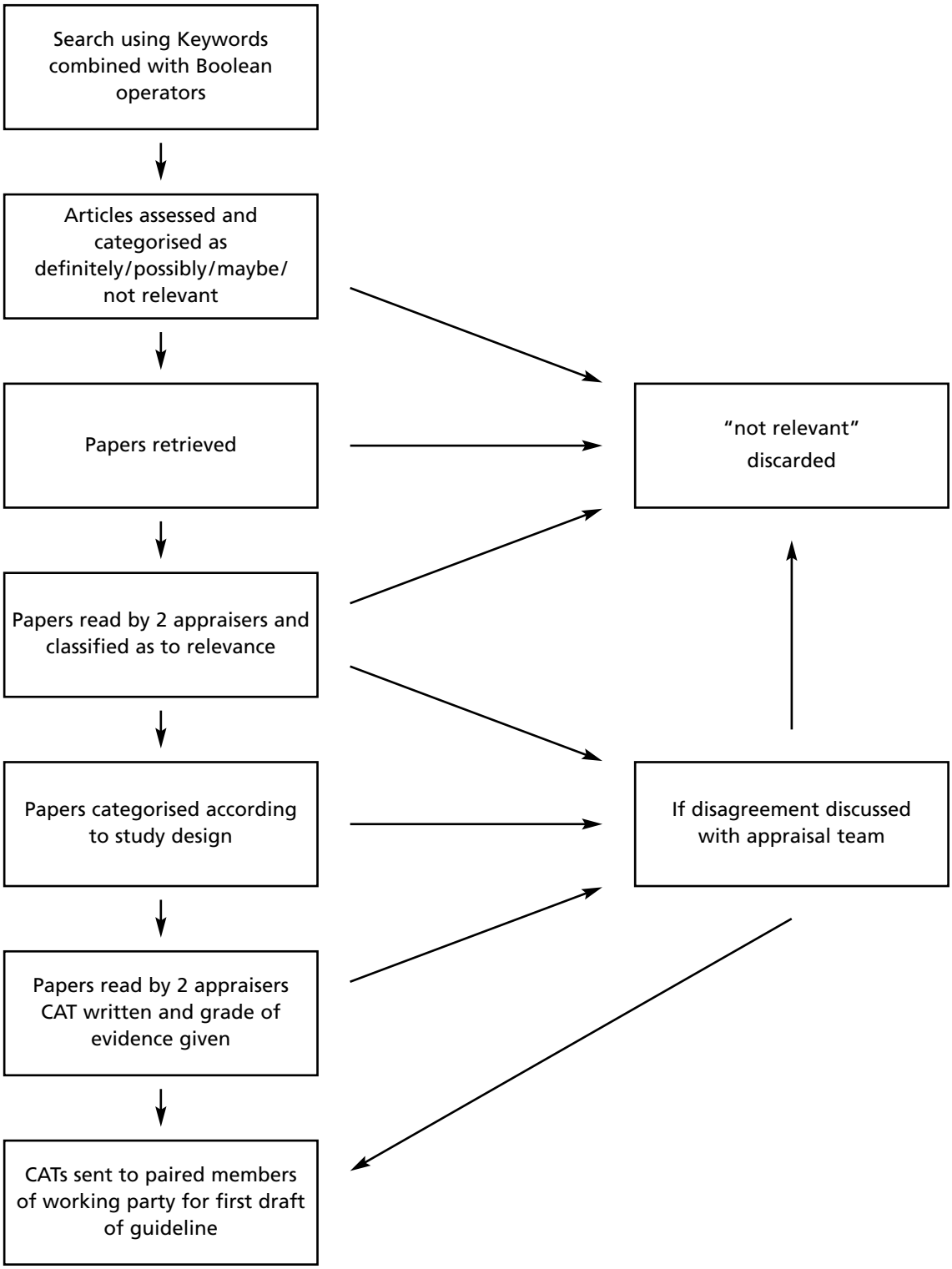
One article was considered suitable for inclusion into the guidelines from the updated, literature searches. The same appraisal protocol was adhered to.

Classification of Articles

Articles were classified using a grading tool (Appendix 7) to determine the level of evidence for each paper (Appendix 8).

Figure 1

The Appraisal Process



Initial Drafting of the Guidelines

Following appraisal the guidelines were drafted using the evidence gained:

- The guidelines were divided into sections covering topics relating to the clinical question. The section headings were decided on by using the
  · CSP Standards of physiotherapy practice for the management of patients with amputations [17]
  · CSP Core Standards (2000) [2]
  · Knowledge and expertise of the working party. (Appendix 1),
- Sections were allocated to paired members of the working party.
- Sections were drafted using the CATs (Appendix 6) to provide evidence.
- Draft sections were reviewed by a different pair of the working party and second draft produced.
- The working party reviewed all sections and third draft produced.
- The working party used their extensive clinical experience and knowledge base, the CSP Standards of physiotherapy practice for the management of patients with amputations [17] and the CSP Core Standards [2] to identify areas of clinical practice relevant to the guidelines not supported by evidence from the literature.
- The evidence was reviewed and gaps in the evidence were discussed by the working party.
- Gaps in the evidence were used to formulate the initial questions posed for consensus opinion.
- The professional adviser's comments were sought on the third draft.
- The professional adviser's recommendations were assimilated to produce the fourth draft.

The Consensus Process

The Delphi Technique

Where the literature did not provide sufficient evidence to develop recommendations within the areas identified consensus opinion was sought. The Delphi Technique was chosen to obtain consensus opinion where the literature was lacking. This method involves a series of questions to 'obtain the most reliable consensus of opinion of a group of experts … by a series of intensive questionnaires interspersed with controlled opinion feedback' [18]. Although more time consuming and labour intensive than a conference, the Delphi Technique ensures:

- all contributors have an equal voice
- consideration of the possible options for treatment
- contributors have the opportunity to contribute to and develop the guidelines

The Consensus Panel

The consensus panel consisted entirely of physiotherapists because the Delphi questions were directly related to physiotherapy practice.

BACPAR and SPARG members were asked to participate if they fulfilled the following criteria:

- they had worked for more than three years in prosthetic rehabilitation
- they spend more than 50% of their clinical time in prosthetic rehabilitation
- they had postgraduate training in the field of amputation rehabilitation

Thirty-eight agreed to participate in the initial round of questions.

The Delphi Process

The working party decided that if 75% or more of the respondents scored more than 75% agreement with a statement, consensus would be reached. If consensus was below 75% the statement would not have the agreement of the panel and the question was refined for a second round. If no consensus was reached after all the rounds of questionnaires then no recommendation would be written.

A postal questionnaire was developed (Appendix 9). An explanatory letter was sent with the questionnaire and copies of the draft evidence based guidelines were supplied.

Results of the Delphi Process

Thirty-eight questionnaires were sent out in the initial round. Thirty-four replied, a response rate of 89.5%.

Only two questions (4%) produced agreement of less than 75%. Thirty-eight questions (77.5%) had agreement greater than 90% and four (8%) had agreement between 75–90%. (Appendix 10)

Technically only two questions needed to be included in the second round, those with agreement below 75%. It was clear from the comments accompanying the scoring that although there was broad agreement with the Delphi statements, by altering or improving the clarity of some of the statements, a higher level of consensus could be expected.

To address the comments accompanying the returned papers ten questions were redrafted for the second round and resubmitted to the panel.

The response rate was 97%. Greater than 75% agreement was gained in all questions and consensus was considered to have been reached (Appendix 9).

The fifth draft of the guidelines was produced incorporating the evidence from the Delphi process and recommendations from the professional advisers.

The sixth draft of the guidelines was completed following the literature search update and appraisal.

The External Review

Experts in the development of evidence based clinical guidelines were chosen to reflect different backgrounds and perspectives (Appendix 11). Reviewers were asked to comment on the process of development, its validity and applicability, format and presentation, using the appraisal instrument recommended by the CSP [19]. The comments received were uniformly positive and constructive.

Their comments and suggestions were considered and the document amended accordingly.

For example;

- The representative from AMRS suggested stating clearly what the guidelines covered and what they did not cover.
- At the suggestion of the Technical Editor and the Director of SIGN, the references were grouped together to improve presentation of the document.
- The Head of Research at the RCN suggested that a flow chart and table of papers be added to improve the clarity of the description of the Literature Appraisal.
- A physiotherapy manager commented that the introduction implied the recommendations were mandatory. The introduction was therefore reworded to make it explicit that the aim of the guidelines was to aid clinical decision making.

Pilot Study and Peer Review

Six physiotherapists of various clinical grades were asked to pilot and review the guidelines (Appendix 12). Three had specialist knowledge in treating amputees whilst the other three were non-specialists. They were asked to comment on their ease of use, applicability, format and presentation. Alterations were made to the presentation of the guidelines following their recommendations. All the peer reviewers commented on how useful and applicable they found the guidelines, for both clinical practice and service development.

Implementation

Publication and Presentation

BACPAR recommends that copies of the guidelines should be distributed to:

- Hospital Trust physiotherapy managers
- Schools of Physiotherapy, Occupational Therapy and Prosthetics and Orthotics
- Members of BACPAR
- Prosthetic Centres
- Relevant User Groups
- Relevant Professional Bodies e.g. British Association of Prosthetists and Orthotists (BAPO), and International Society for Prosthetics and Orthotics (ISPO)
- Other relevant national or international bodies

Presentation should be made at:

- National BACPAR Conference
- CSP Congress
- National and International Conferences (e.g. BAPO, ISPO)

Dissemination

A quick reference guide is available with these guidelines.

During development considerable interest has been shown by our international colleagues; clinicians from Europe, America and Australasia have expressed their intention to use these guidelines. It is recommended that the CSP Core Standards (2000) are used alongside these guidelines.

Review

BACPAR will update these evidence-based guidelines every three years.

Audit

An audit tool is suggested in Appendix 13.

Health Benefits, Side Effects and Risks

The recommendations within the guidelines are evidence based and support best practice; however at the time of writing, no valid tool specific to prosthetic users was available to measure health gains.

No side effects or risks were identified from the literature, professional advisers or consensus panel.

Barriers to Implementation

In order to implement the recommendations in these guidelines a number of factors should be considered which may be barriers to their implementation

- Although implementation of these guidelines may have cost implications a cost benefit analysis could not be undertaken. The data required to enable an economic evaluation of prosthetic rehabilitation was not available.
- Implementing these guidelines may involve further training of staff.
- The co-operation of other members of the Multidisciplinary Team is required for full implementation of these guidelines.
- Resistance to change of practice
- Ability to access a suitable environment

Recommendations of the Guidelines

Introduction

The guidelines are divided into 6 sections for ease of reference:

The Multidisciplinary Team

Prosthetic Knowledge

Assessment

The Prosthetic Rehabilitation Programme

Patient Education

Discharge and Maintenance

Throughout these sections the adults with lower limb prostheses may be referred to as individuals, amputees, patients or users.

Each section includes an introduction, a summary of the evidence, the relevant recommendations and suggestions for local implementation.

Recommendations were developed and graded (A to D), according to the level of evidence (1 to 5), see Appendix 7. After each of the recommendations the letter in brackets refers to that grade. Where a number of sources of evidence were used to develop a recommendation the grade was based on the highest level of evidence used. A table of the papers used to develop the recommendations and their level of evidence is presented in Appendix 8.

Section 1

The Multidisciplinary Team

Introduction

A specialist multidisciplinary team (MDT) achieves the best prosthetic outcomes [20, 21]. To provide an effective and efficient service the team work together towards goals agreed with the individual prosthetic user. The physiotherapist plays a key role in coordinating patient rehabilitation [21, 22].

CSP Physiotherapy Core Standards [2] outline the role of the physiotherapist within a MDT. These standards emphasise the need for physiotherapists to be aware of the roles of other members of the MDT and to have clear protocols and channels of referral and communication between members.

For amputee rehabilitation the core multi-disciplinary team (MDT) may include: specialist physiotherapist, occupational therapist, prosthetist, rehabilitation doctor, counsellor and nurse.

Additional MDT members include: diabetic team, dietician, general practitioner, housing & adaptation officer, orthotist, podiatrist, psychologist, social services team, social worker, surgeon, ward team, wheelchair services team, community physiotherapist, pain control team.

Evidence

The multidisciplinary team approach to amputee rehabilitation is recognised internationally as the rehabilitation model of choice; however there is little published literature to support it.

Two case-control studies by Ham et al [21, 22] suggested that vascular amputees benefit from care by a specialist MDT with reduced hospital stay, reduced out patient re-attendance and increased use of the prosthesis. However these results are inconclusive as numbers in the first study were low, the second study sample was not representative of the population under investigation and the results were, incomplete due to changes in staff during the follow up period.

In 1997 Pernot et al [20] in a non-systematic overview of 71 studies concerning predictive or prognostic factors for functioning with a prosthesis advocated that a specialist rehabilitation team must lead rehabilitation.

In the absence of other evidence, it was agreed that the physiotherapist further contributes to the MDT in relation to audit, research and education.

Recommendations

1.1 A physiotherapist specialised in amputee rehabilitation (Appendix 14) should be responsible for the management of physiotherapy care. (B) [20, 21, 22]

1.2 The physiotherapist should contribute to MDT audit, research and education (D) [23]

Local Implementation

- The MDT should agree its approach to the rehabilitation process
- Channels of communication and opportunities for education and discussion should be established
- A format for documentation should be agreed
- Annual targets for education, audit and research should be set
- Integrated care pathways should be used
- Contact details of MDT members should be readily available to the patient and carers

Section 2

Prosthetic Knowledge

Introduction

It is essential for the physiotherapist to have an understanding of prosthetic design, componentry and function to facilitate rehabilitation and to ensure safe use of the prosthesis at all times [23].

The physiotherapist is responsible for keeping up to date with advances in prosthetic technology [23].

To provide an effective service the physiotherapist should maintain a close liaison with the prosthetic providers at the prosthetic centre.

Evidence

Five studies (1 cohort, 3 case-control and a case series) looked at a variety of patients from healthy fit young males to elderly or arthritic amputees with differing levels of amputation. All the studies suggested that understanding the mechanics of gait as well as the physiological and prosthetic factors affecting gait promotes greater independence and increased functional status [24-28].

The variation in design, quality, participants and prosthetic practice in these studies meant that little evidence was available to determine the effect of the physiotherapists' knowledge and understanding of prosthetics on the outcome of rehabilitation. The Delphi technique was used to gain consensus opinion.

Consensus opinion among physiotherapists suggests that with their detailed knowledge of the patient's physical potential, motivation and componentry the physiotherapist has a valuable contribution to make to the multidisciplinary team decision-making process regarding prosthetic prescription.

Recommendations

2.1 The physiotherapist should understand the theory of prosthetic componentry and the effects of prosthetic rehabilitation on the remaining body systems. (B) [24–29]

2.2 To provide effective gait re-education the physiotherapist should understand the principles of physiological and prosthetic gait and the factors (both physical and biomechanical) that affect them. (A) [25, 26, 27, 29]

2.3 The effects of prosthetic alignment on pressure distribution within the socket should be understood. (C) [29]

2.4 The management of residual limb volume changes in relation to socket fit should be understood. (D) [30]

2.5 The physiotherapist should understand the pressure tolerant and pressure sensitive areas of the residual limb in relation to prosthetic fit. (D) [23]

2.6 The physiotherapist should understand the different methods of donning and doffing prostheses. (D) [23]

2.7 The physiotherapist should check the prosthesis for correct and comfortable fit prior to each treatment, until the patient is able to do this for him/herself. (D) [23]

2.8 The physiotherapist should examine the residual limb before and after prosthetic use, until the patient is able to do this for him/herself. (D) [23]

2.9 The patient should examine the residual limb before and after prosthetic use. (D) [23]

2.10 The physiotherapist should contribute to the decision-making process regarding prosthetic prescription. (D) [23]

2.11 The prosthetic centre should be contacted if there is malfunction of any componentry. (D) [23]

2.12 The prosthetic centre should be contacted if the socket requires adjustment in order to achieve a correct and comfortable fit. (D) [23]

Local Implementation

- Agreed procedures for communicating with prosthetic centres should exist
- Agreed criteria for the issue of prostheses should be available
- There should be opportunities for continuing professional development and lifelong learning

Section 3

Assessment

Introduction

Sufficient information should be gathered at the initial assessment to enable goals to be set and a rehabilitation programme agreed with the patient. The physiotherapy assessment should include a subjective and objective examination, and should take into account social situation, home environment, and emotional and cognitive status.

Assessment should be based on a holistic approach and include both lower limbs, trunk and upper limbs. Included in the assessment should be diabetic status, skin condition, sensation (upper and lower limbs) and the presence of oedema. Due to the expected change in functional level as a result of rehabilitation, a relevant and validated outcome measure should be used and recorded to evaluate change.

Evidence

Thirteen studies of relevance to this section were found. Although the quality of these studies was generally poor (details of study designs, etc are given in the table of included studies in Appendix 8) the available information highlighted the need for a holistic approach when assessing patients with lower limb prostheses. No contradictory evidence found.

Most of the references investigated factors that affect function. Grieve et al [12], in a small case series with inadequate follow up, showed that following amputation patients experienced lower levels of function compared to "normals". In addition, those patients with diabetes were more likely to experience functional difficulties.

Collin et al in 1995 (13)concluded from a case series of poorly defined elderly individuals, who will be less mobile following a lower limb amputation that a wheelchair should be routinely provided. In 1992, Collin et al [31] reported the results of a retrospective case series looking at patients using a wheelchair following bilateral amputation. They emphasised that functional outcome can be affected by the environment into which the patient was discharged. Van de Ven in 1981 [32] highlighted the importance of environmental factors in determining mobility in a cohort study of 96 bilateral amputees. She felt this could explain deterioration in mobility outside the clinical setting.

Studies that gave evidence supporting the need to examine specific pathologies include a cohort study by Potter et al [33]. They noted that in patients with diabetes peripheral neuropathy is nearly always present in the intact limb and that it is also present in two thirds of non-diabetics. This demonstrates the need to ensure sensation is routinely checked at assessment. The importance of skin checks is reinforced by the cohort study carried out by Levy in 1995 [30] who investigated the skin problems associated with wearing a prosthesis. However, the participants in this study were not well defined and it was not possible to tell if the follow up of the subjects was adequate.

Nicholas et al in a case series of 94 amputees [9] and Waters et al [28] in a case-control study found that the higher the level of amputation, the greater the negative influence in respect to job retention and energy cost of walking respectively.

Hanspal et al [34] found impaired cognitive skills to negatively effect functional outcome with a prosthesis in a retrospective case series, where no adjustment had been made for other prognostic factors. A later paper by the same authors in 1997 [35] suggested that the results of an intellectual assessment soon after amputation can predict the level of mobility likely to be achieved. This was based on a study of 32 elderly patients but no specific results were published on level of mobility and links with cognitive status.

Neuromuscular status was found by Altner et al [36], in a retrospective case series of patients with hemiplegia and dysvascular lower limb amputation, to be the only significant factor affecting ambulation in patients.

There was often only one study for each prognostic factor investigated, making it difficult to draw any conclusions based on the evidence available at present.

Recommendations

3.1 There should be written evidence of a full physical examination and assessment of previous and present function (A) [9, 12, 13, 26, 28, 30, 33]

3.2 The patients' social situation, psychological status, goals and expectations should be documented. (B) [9, 12, 13, 31, 32, 34, 35]

3.3 Relevant pathology including diabetes, impaired cognition and hemiplegia should be noted. (C) [24, 30, 33–36]

3.4 The physiotherapist should record the prosthetic componentry, type of socket and method of suspension. (D) [23]

3.5 A problem list and treatment plan, including agreed goals, should be formulated in partnership with the patient. (D) [9]

Local Implementation

- A locally agreed physiotherapy assessment form should be used
- Names and contact details of the MDT members involved in the patient's care should be recorded to facilitate communication.

Section 4

The Prosthetic Rehabilitation Programme

Introduction

The aim of prosthetic rehabilitation is to achieve maximum independence, safely and with minimum extra energy expenditure. The individual's rehabilitation programme takes into account their pre-amputation lifestyle, expectations and medical limitations. The level of amputation, physical and psychological presentation and social environment influence the expected level of functional independence. The physiotherapist progresses the patient through a programme based on continuous assessment and evaluation. Through regular assessment, the physiotherapist should identify when the individual has achieved optimum function with a prosthesis, facilitating discharge to a maintenance programme. [2]

An alternative method of mobility is necessary when the prosthesis is not being worn.

Evidence

The factors influencing prosthetic gait rehabilitation and its outcome are well documented. Much of this documentation is based on descriptive case studies but there is a cohort [33] and case controlled study(44) also describing the problems encountered by the amputee population as regards peripheral neuropathy and torque producing capability.

Studies, using small numbers of subjects [26, 37], recommend specific muscle strengthening for the amputated and contra-lateral side.

Case control studies suggest [26, 38–42] that functional skills of increasing complexity should be taught within the patients' limits. Consensus opinion was sought to determine and detail the specific more complex tasks that may be taught, depending on the patients' ability. There was strong agreement for the activities listed, though teaching the use of public transport and escalators was qualified by many as being desirable but not practical due to time and resource constraints.

The consensus opinion was that the physiotherapist should contribute to the management of wounds, scars, residual limb pain and phantom pain and sensation together with other members of the multidisciplinary team.

The questions of when physiotherapy should begin and how frequently it should be received at the start of treatment produced the greatest controversy in the Delphi questionnaire. The opinions from the first round enabled the questionnaire to be more specific in the second round and a high level of agreement was reached.

Recommendations

4.1 Prosthetic rehabilitation should aim to establish an energy efficient gait based on normal physiological walking patterns. (A) [28–29, 43–45]

4.2 The physiotherapist should be aware that level of amputation, pre-existing medical conditions and social environment will affect rehabilitation. (A) [12, 31–33, 35, 45–49]

4.3 During rehabilitation the physiotherapist should take into account that prosthetic gait demands higher energy expenditure than physiological gait. (C) [28]

4.4 The physiotherapist should teach efficient control of the prosthesis through postural control, weight transference, use of proprioception and specific muscle strengthening and stretching exercises to prevent and correct gait deviations. (B) [38–41, 49, 50]

4.5 Prosthetic rehabilitation should begin within a maximum of 5 working days after receipt of the prosthesis. (D) [23]

4.6 During prosthetic rehabilitation patients should receive physiotherapy as often as their needs and circumstances dictate. (D) [23]

4.7 The prosthesis should be worn for short periods of time initially, increasing in use as exercise and skin tolerance allow. (D) [30]

4.8 Gait re-education should commence within the parallel bars. (D) [23]

4.9 Gait re-education should progress through walking within the hospital environment to walking within the home environment. (D) [23]

4.10 Walking aids should be provided to ensure that prosthetic users, where possible, progress to being fully weight bearing through their prosthesis. (D) [23]

4.11 Functional skills progressing in complexity should be taught within the patients' limits. (B) [26, 38–42, 50–52]

4.12 Rehabilitation should be functional and integrated with activities of daily living. (D) [23]

4.13 The physiotherapist should instruct the patient in a range of functional tasks relevant to the goals set with that individual. These may include:

- getting on and off the floor
- getting in and out of a car
- going up and down stairs, kerbs, ramps and slopes
- walking in a crowded environment
- carrying an object whilst walking
- walking over uneven ground outdoors
- changing speed and direction
- picking up objects from the floor
- opening and closing a door
- the use of public transport
- the use of escalators (D) [23]

4.14 Prosthetic users should be encouraged and assisted to resume hobbies, sports, social activities, driving and return to work. (C) [50]

4.15 The physiotherapist, alongside other professionals, should contribute to the care of wounds during rehabilitation. (D) [23]

4.16 The physiotherapist, alongside other professionals, should treat scar problems when these occur during rehabilitation. (D) [23]

4.17 The physiotherapist should contribute to the management of residual limb pain. (D) [23]

4.18 The physiotherapist should contribute to the management of phantom sensation/ pain. (D) [23]

4.19 When a prosthesis is provided for transfers or cosmetic purposes only, instruction and advice on its safe use should be given. (D) [24]

Local Implementation

- Resources, including staffing, and facilities that allow full functional rehabilitation are necessary.
- Local protocols should be referred to or developed to cover specific treatment modalities.

Section 5

Patient Education

Introduction

The rehabilitation process should have an educational element that empowers patients and carers to take an active role in their present and future management. This will assist with problem solving and awareness of when to seek professional help.

Due to the number of recommendations in this section it has been sub-divided into six sections for ease of use. These sub-sections are:

5.1 Use of a prosthesis

5.2 Care of the Residual Limb

5.3 Care of the Remaining Limb

5.4 Informed Goal Setting

5.5 Coping Strategies Following Falls

5.6 Further Information

5.1 Use of the Prosthesis

Evidence

The Delphi process was used to provide evidence and develop recommendations for this section as the literature search found no relevant references.

Recommendations

5.1.1 Patients/carers should be given information about the prosthesis, its functions and limitations. (D) [23]

5.1.2 Patients/carers should be given information regarding the care of their prosthesis. (D) [23]

5.1.3 Patients/carers should be given instruction on achieving correct socket fit, considering pressure tolerant and pressure sensitive areas of their residual limb. (D) [23]

5.1.4 Fluctuations in residual limb volume and its management should be explained. (D) [23]

5.1.5 Guidance should be given on the length of time the prosthesis should be worn and how this should be increased. (D) [23]

5.1.6 An explanation should be given on how changing footwear may alter prosthetic alignment and the distribution of pressure within the socket. (D) [23]

5.1.7 The patient/carer should receive instruction in the use and care of prosthetic socks. (D) [23]

5.1.8 Instruction should be given in the correct use of the type of suspension used. (D) [23]

5.2 Care of the Residual Limb

Evidence

Levy et al in 1995 [30] found a number of skin problems associated with wearing a prosthesis in a cohort study in an undisclosed number of patients. The causative factors included those created by poorly fitting sockets, for example, mechanical rubs, excessive negative pressure in suction sockets, excessive heat or other anatomical or physiological problems such as adherent scars, uncontrolled diabetes and poor hygiene. The effect on the skin due to these factors was varied and oedema, epidermoid cysts, abscesses, infection and fungal infections are all reported. The author suggests pads, compression bandages, gels, shrinker socks and improved socket fit have a place in the resolution of these problems. Due to the lack of details about the participants in this study, and in the absence of further literature evidence, consensus opinion was sought to further inform this section.

Recommendations

5.2.1 Techniques for the self-management of phantom pain/sensation should be taught (D) [23]

5.2.2 Advice should given to the patient/carer on the factors influencing wound healing (D) [23]

5.2.3 Instruction should be given to the patient/carer on methods to prevent and treat adhesion of scars (D) [23]

5.2.4 Information should be given on skin care of the residual limb and the potential problems related to poor hygiene, inadequate or overzealous skin care. (D) [30]

5.2.5 Patients/carers should be informed that sockets that no longer fit correctly, for whatever reason, can cause skin problems. (D) [23]

5.3 Care of the Remaining Limb

Evidence

Potter et al [33], in a cohort study of 80 patients with unilateral amputation due to diabetes, found peripheral neuropathy to be nearly always present in the remaining limb. In addition, two thirds of non-diabetic, non-traumatic, unilateral amputees were found to have peripheral neuropathy in their remaining limb. A cohort study by Jayatunga et al [53], with no control group, found patients with a unilateral transtibial amputation due to diabetes were subject to abnormal loading on the remaining foot. Careful monitoring of the remaining foot and early orthotic referral were recommended, as foot orthoses and appropriate footwear significantly reduced these forces in the study participants. In the absence of further literature evidence consensus opinion has been sought to further inform this sub-section.

Recommendations

5.3.1 The patient/carer should be taught to monitor the condition of the remaining limb (D) [23]

5.3.2 Physiotherapists should establish links with their local podiatry/chiropody services to ensure that information and education given to patients and carers is consistent. (D) [23]

5.3.3 Vascular and diabetic patients, and their carers, should be made aware of the risks to their remaining foot and educated in how they can reduce them. (A) [30, 53]

5.4 Informed Goal Setting

Evidence

Nine studies of mixed design and generally poor quality were found to inform this topic. Most studies examined the influence of the level of amputation on the outcome. Hubbard [54] in a retrospective case series stated there were no predictive factors for mobility levels attained other than level of amputation in patients who had amputation for peripheral vascular disease. The paper further concludes that pre-operative mobility and personal goals should be considered when evaluating the success of rehabilitation.

Two case series, by Beekman & Axtell [47] and Grieve & Lankhorst [12] both state that following amputation patients will have lower levels of function than bi-pedal subjects. Four studies, all but one with a retrospective design [46, 47, 48, 55], all concluded that the lower the level of amputation the greater the chance of succeeding with a prosthesis. Wolf et al [49], in a retrospective case series of 18 elderly vascular patients, who had had bilateral transtibial amputations, 50% became independently mobile with a prosthesis. For patients with a unilateral amputation as a result of either trauma or vascular disease the energy cost of walking increases as the level of amputation becomes higher [28]. Waters concludes from his case-control study from 1976 that when preservation of function is the chief concern amputation should be at the lowest possible level [28].

No contradictory evidence was found.

Recommendations

5.4.1 Patients/carers should be made aware that concurrent pathologies and previous mobility affects realistic goal setting and final outcomes of rehabilitation. (D) [23]

5.4.2 Patients/carers should be made aware that the level of amputation affects the expected level of function and mobility. (C) [46, 48, 49, 52, 55]

5.4.3 Patients/carers should be made aware that they will experience lower levels of function than bipedal subjects. (B) [12, 13, 47]

5.4.4 Patients/carers should be informed that the energy cost of prosthetic walking is related to the amputation level. (C) [28]

5.5 Coping Strategies Following Falls

Evidence

One article relevant to this section was found. Kulkarni et al in 1996 [52] reported an increased risk of falls following amputation in a cross-sectional study of 164 lower limb amputees. This was more likely to occur with transfemoral amputees compared with transtibial amputees. The study concluded that instruction on how to get up from the floor should be part of rehabilitation. However, this study did not include a comparison group and gives only limited evidence.

Recommendations

5.5.1 All parties involved with the patient should be made aware that the risk of falling is increased following lower limb amputation. (C) [52]

5.5.2 Rehabilitation programmes should include education on preventing falls and coping strategies should a fall occur. (C) [52]

5.5.3 Instructions should be given on how to get up from the floor. (C) [52]

5.5.4 Advice should be given in the event that the patient is unable to rise from the floor. (C) [52]

5.6 Further Information

Evidence

This sub-section is supported by consensus opinion in the absence of any published literature.

Recommendations

5.6.1 Patients/carers should be made aware of the possible psychological effects following amputation and how and where to seek advice and support. (D) [23]

5.6.2 Patients/carers should be educated in how to prevent secondary disabilities that may occur as a result of prosthetic use. (D) [23]

5.6.3 Patient information should be available in a format suitable to that individual. (D) [23]

5.6.4 All advice/information given to the patient should be recorded. (D) [23]

5.6.5 Information on the following should be made available:

- National & local amputee support & user groups
- Health promotion
- Sporting & leisure activities
- Driving after amputation
- Employment/Training (D) [23]

Local Implementation

- Information on self management as a prosthetic user of the prosthesis should be provided.
- Patients should be given information about the appointment system at the prosthetic centre and how to access it.
- Contact names, telephone numbers and addresses of relevant MDT members should be supplied to patients and carers.

Section 6

Discharge and Maintenance

Introduction

Effective discharge planning is required to ensure continued prosthetic use once a patient has achieved their set goals or reached a plateau in progression. Discharge and transfer reports should use accepted terminology and refer to agreed goals. [2]

Reviews and open access to physiotherapy should be available to support prosthetic use. Further rehabilitation should be made available if the prosthetic componentry is changed or the patient's status alters.

Evidence

No evidence was found in the literature to support how the prosthetic patient's discharge from rehabilitation should be conducted or how best to maintain their independence with a prosthesis through regular review and additional rehabilitation when necessary. All evidence was gained through consensus. A very high level of agreement was gained.

Recommendations

6.1 A summary of the patient's function and mobility at transfer or discharge from active rehabilitation should be documented in the treatment notes. (D) [23]

6.2 The prosthetic user should be provided with the necessary contact details to seek help and advice when required. (D) [23]

6.3 A system should exist for the review of patients after discharge from regular physiotherapy. (D) [23]

6.4 There should be a process in place for the patient to self-refer to physiotherapy after initial rehabilitation. (D) [23]

6.5 Additional rehabilitation should be made available if an individual's circumstances change: i.e. medical, environmental, prosthetic, physical, return to work or sport. (D) [23]

6.6 If prosthetic use is discontinued during the rehabilitation programme the reasons should be documented. (D) [23]

Local Implementation

Systems for patient review should exist

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Appendix 1

Working Party

Penny Broomhead

Guidelines Co-ordinator · Chair of working party

Experience:

Penny became interested in amputee rehabilitation as a student. During her early career she worked in hospital-based pre and post prosthetic rehabilitation before taking up her post at Leicester Disablement Services Centre in 1991.

She has a Diploma in the Physiotherapy Management of Lower Limb Amputees from King's College, London, (1992) and a post graduate Diploma in Lower Limb Prosthetic Biomechanics from the University of Strathclyde (1996).

Penny has been involved in BACPAR since it's beginnings as Public Relations Officer, Journal Officer, Chairman (1998–2001) and currently as Guidelines Co-ordinator and a member of the education sub-committee.

At present, she represents BACPAR on the Amputee Rehabilitation Clinical Forum and the NHS Purchasing and Supplies Prosthetic Strategic Supply Group.

She has lectured at regional, national and international levels and is a guest lecturer for the University of Strathclyde.

Diana Dawes

BACPAR Hon Research Officer and Chair

Experience:

Diana has worked as a senior I physiotherapist in the Oxford Prosthetics Service since 1995 and is now acting Clinical Manager. This includes clinical work with inpatients and outpatients as well as prosthetic centre administration. The Oxford Prosthetic service covers Buckinghamshire, Berkshire, Oxfordshire, some of Wiltshire and Northamptonshire.

She is responsible for audit within this service and along with a colleague is responsible for the prosthetic education of all the physiotherapists in the region. They run regular study days and regularly visit other hospitals and physiotherapy departments to give support in prosthetic care.

Diana was a contributor in the third edition of 'Therapy for Amputees' handbook with Barbara Engstrom and Catherine Van de Ven, doing the literature search, reading papers and updating the text. She has given lectures to the undergraduate physiotherapy students at Oxford Brooks University.

Diana undertook the validated course, Rehabilitative Management of the Amputee – the Physiotherapist's role, and is now a clinical supervisor for this course. She has gained a Certificate in Evidence-Based Health Care and is continuing to study for a Master degree in Evidence-Based Health Care.

She is a member of the BACPAR education sub-committee, presently involved in working with universities to introduce modules concerned with the care of people with an amputation.

Carolyn Hale

BACPAR Prosthetic Guidelines Committee

Experience:

Carolyn Hale has worked in the field of Amputation Rehabilitation since 1990. Her experience began with the responsibility for outpatient prosthetic rehabilitation at a large Disablement Services Centre.

She has played a role in education at both under- and post-graduate levels regionally, nationally and internationally, and has had several publications relating to this field. She has maintained her continuing professional development through relevant courses in Amputee Rehabilitation since 1991, culminating in a MSc in Health Practice.

Currently Carolyn works in a Manchester Teaching Hospital as a clinical specialist with trust-wide responsibilities for the management of people with lower limb amputation, including a specialist inpatient prosthetic unit and outreach community follow up.

Carolyn was involved in the production of clinical guidelines for wheelchairs and early walking aids whilst representing BACPAR. She chaired the working party that produced the 'Guidelines for the Education of Students in Amputation Rehabilitation.'

Amanda Lambert

Former Honorary Secretary BACPAR

Experience:

Amanda has worked in her present post since 1992. As Clinical Specialist Amputee Rehabilitation she has been responsibility for the co-ordination of both in and outpatient amputee rehabilitation within East Yorkshire. In addition to publications she has presented at regional, national and international level and is currently facilitating the development of an integrated care pathway for lower limb amputees. As Group Topic Leader for a Yorkshire based clinical guideline initiative she has gained previous experience in the development of evidence-based clinical guidelines.

Amanda holds a diploma in the physiotherapy management of lower limb amputees. On behalf of BACPAR she attends the Amputee Clinical Rehabilitation Forum which is a national group representing key stakeholders in amputee rehabilitation.

Di Quinlivan

BACPAR Prosthetic Guidelines Committee

Experience:

Di Quinlivan has worked in the specialised field of amputation rehabilitation since 1991. Her experience has included six years working in a large Disablement Services Centre at the Royal National Orthopaedic Hospital, Stanmore rehabilitating both in and outpatients. Since 1998 she has worked for Mid-Cheshire Hospitals Trust providing prosthetic rehabilitation and outreach work in the community for those with lower limb loss in Cheshire. She also regularly undertakes work as an Expert Witness in this speciality.

Di undertook a Post-Graduate Diploma from King's College, London (1992) in the Physiotherapy Management of Lower Limb Amputees and has conducted research and audit in this field.

She regularly teaches and presents at local and national levels and also internationally at ISPO World Congress.

Di is a founder member of BACPAR and served on the committee as Membership Secretary and Research Officer for a period of 8 years.

Robert Shepherd

Honorary Public Relations Officer

Experience:

Robert Shepherd began working with amputees in a large teaching hospital in 1988. During 1989-90, he worked as a research physiotherapist on the Leeds Hostel Beds Scheme for Lower Limb Amputees. He worked full time in prosthetic rehabilitation at Chapel Allerton Prosthetics Centre, Leeds for twelve years.

He was Yorkshire Regional BACPAR representative for 6 years before taking the role of Honorary Public Relations Officer in 1999. He is a member of the Journal Committee and the Education Committee.

He is an honorary lecturer at Bradford University and the University of Ripon and York, and also teaches students from the Universities of Huddersfield, Leeds.

His previous experience includes working on the evidence based clinical guidelines project in Yorkshire and the development of the BACPAR Guidelines for the Education of Students in Amputee Rehabilitation.

He took up the role of Business Manager, Central U.K. for Otto Bock Health care Ltd in July 2002.

Appendix 2

Professional Advisers

Due to the multidisciplinary nature of Amputation Rehabilitation the following groups were approached for support and comment during the production of these guidelines. Their named representatives are included:

Amputee Medical Rehabilitation Society (AMRS)

Mr JD Morrison, FRCS, Consultant in Rehabilitation Medicine

British Association of Physiotherapists in Amputee Rehabilitation (BACPAR)

Laura Burgess, MCSP, SRP, Chartered Physiotherapist

Pam Barsby, MCSP, SRP Chartered Physiotherapist

British Association of Prosthetists and Orthotists (BAPO)

Jane Muir, BSc (Hons), SR Pros, MBAPO

British Limbless Ex-service Men's Association (BLESMA)

Group Captain M Ward, FRCS, OBE

Chartered Society of Physiotherapy (CSP)

Judy Mead, MCSP, SRP, Head of Clinical Effectiveness

Ceri Sedgley, MSc, MCSP, SRP, Professional Adviser

Jo Jordan, BSc (Hons), MSc, MA, Systematic Reviewer

Clinical Interest Group in Orthotics, Prosthetics and Wheelchairs (CIGOPW) for the British Association of Occupational Therapists (BAOT)

Fiona Carnegie, SROT

EmPower (representing 15 disability groups)

Gary Martin, Director Limbless Association

International Society of Prosthetics and Orthotics (ISPO)

Dr R.S Hanspal FRCP, FRCS, Consultant in Rehabilitation Medicine

Scottish Physiotherapy Amputee Research Group (SPARG)

Morag McNaughton, MCSP, SRP Chartered Physiotherapist

Appendix 3

Search - Results: 7947 Records Display Records

Searched: *#12 or #18 or #21* Search History

Hint: All of the terms separated by **AND** must be in the records your search retrieves. **AND** helps to narrow or focus your search. For example: **lead and paint and children**. Help is available.

☑ Words Anywhere ☐ Title ☐ Author ☐ Subject

Search Clear

Language: ☑ Any Language ☐ English ☐ French ☐ Spanish ☐ German ☐ Other

Publication Year: ◉ Any Year ○ 2002 Only ○ From: To

Search History

Combine checked searches using: ◉ AND ○ OR Combine Checked

Include	#	Search	Results
☐	#22	#12 or #18 or #21	7947
☐	#21	#19 or #20	4125
☐	#20	Prosthet*	4009
☐	#19	'Artificial Limbs' / all subheadings in MIME,MJME	296
☐	#18	#16 and #17	1453
☐	#17	#1 or #13 or #14 or #15	1479
☐	#16	Amput*	2697
☐	#15	'Amputees' / all subheadings in MIME,MJME	92
☐	#14	'Amputation, Traumatic' / all subheadings in MIME,MJME	276
☐	#13	'Amputation Stumps' / all subheadings in MIME,MJME	115
☐	#12	#10 and #11	2653
☐	#11	physio*	379293
☐	#10	#2 or #3 or #4 or #5 or #6 or #7 or #8 or #9	8989
☐	#9	'Self Care' / all subheadings in MIME,MJME	1807
☐	#8	'Rehabilitation, Vocational' / all subheadings in MIME,MJME	406
☐	#7	'Early Ambulation' / all subheadings in MIME,MJME	148
☐	#6	'Activities of Daily Living' / all subheadings in MIME,MJME	4702
☐	#5	'Massage' / all subheadings in MIME,MJME	383
☐	#4	'Hydrotherapy' / all subheadings in MIME,MJME	85
☐	#3	explode 'Exercise Therapy' / all subheadings in MIME,MJME	1727
☐	#2	explode 'Physical Therapy (Specialty)' / all subheadings in MIME,MJME	99
☐	#1	explode 'Amputation' / all subheadings in MIME,MJME	1082

Remove or Retype checked searches in history. Reset checkboxes.

Change Display Options

Appendix 4

Literature Appraisers

Gillian Atkinson,

Jolly Barrow,

Penny Broomhead,

Jo Burton,

Lesley Cass,

Vanessa Davies,

Diana Dawes,

Anne Roberts,

Robert Shepherd,

Nicola Walsh.

Additional Support from:

Martin Dawes

Director of the Centre for Evidence-based Medicine, Oxford

Experience:

Dr Martin Dawes is Director of the Centre for Evidence Based Medicine at Oxford University. Prior to this he was a principle in General Practice for 16 years and a lecturer at the Department of Primary Care. He is responsible for the development of undergraduate and postgraduate curriculum for evidence based health care.

Over the last 5 years he has developed a multi-disciplinary Masters programme in Evidence Based Health Care run at the University of Oxford. He teaches on evidence based health care courses around the world as well as writing articles and books on the topic. His main research interest is in knowledge management during the consultation.

He runs a multi centred cohort study into Ambulatory Blood Pressure Monitoring and is involved in other research activities.

Appendix 5

Systematic Reviews

Systematic reviews found in search but not used in the guidelines:

CutsonT.M., Bongiorni D.R. *Rehabilitation of the Older Lower Limb Amputee* 1996 JAGS 44: 1388–1393.

The recommendations of the review were not relevant to the scope of the guidelines.

Coletta E.M. *Care of the elderly patient with lower extremity amputation*. 2000. J Am Board Fam Pract 13(1):23– 34.

There was no description of data sources, the method of study selection for inclusion into a systematic review, or how the data were extracted from the individual articles.

Appendix 6

Jama Appraisal Tool: Example of a CAT

Peripheral neuropathy is common in all nontraumatic amputees regardless of diabetic status

In diabetics requiring amputation peripheral neuropathy in the intact limb is nearly always present. Peripheral neuropathy is also present in 2/3rds of non diabetics.

Citation/s:

Incidence of Peripheral Neuropathy in the Contralateral limb of Persons with Unilateral Amputations due to Diabetes: Potter PJ, Maryniak O, Yaworski R, Jones I; Journal of Res Dev 1998:35:P335–339.

Lead author's name and fax:

Three-part Clinical Question:

Search Terms:

The Study:

The Study Patients: 80 nontraumatic amputees, mean age 66.7 yrs(SD=12.6)

Prognostic Factor: Unilateral Lower Limb Amputees. Prospective study of consecutive patients admitted to a rehabilitation unit.47.5% were diabetic

The Outcome: Peripheral Neuropathy in the intact limb

There was a well-defined sample at a uniform (early) stage of illness. Can't tell if follow-up was long enough; follow-up was complete. There were not blind, objective outcome criteria. Adjustment was not made for other prognostic factors. There was no validation in an independent test-set of patients.

The Evidence:

Prognostic	Factor	Outcome Result	Measure	Confidence Interval	Independent ?
Diabetes	Peripheral	Neuropathy	97.4%	PN	no
Non Diabetic	Peripheral	Neuropathy	66.7%	PN	no

Comments:

There is a need to be aware of peripheral neuropathy in all nontraumatic amputees

Appraised by: Diana Dawes ; 06 May 2000

Email:

Kill or Update By:

Level of Evidence = A1b

Appendix 7:

Levels of Evidence and Grades of Recommendation

Grades of Recommendation

A Consistent level 1 studies

B Consistent level 2 or 3 studies or extrapolations from level 1 studies

C Level 4 studies or extrapolations from level 2 or 3 studies

D Level 5 evidence or troubling inconsistent or inconclusive studies at any level

Reproduced from the website for the Centre of Evidence Based Medicine, Oxford., 18th November 1999

Articles were classified according to the following grading criteria

Grade of Recommendation	Level of Evidence	Therapy/ Prevention, Aetiology/Harm	Prognosis	Diagnosis
A	1a	SR (with homogeneity✣) of RCTs	SR (with homogeneity✣) of inception cohort studies; or a CPG▲ validated on a test set	SR (with homogeneity✣) of Level 1 diagnostic studies; or a CPG▲ validated on a test set
	1b	Individual RCT (with narrow Confidence Interval■)	Individual inception cohort study with > 80% follow up.	Independent blind comparison of patients from an appropriate spectrum✦ of patients, all of whom have undergone both the diagnostic test and the reference standard
	1c	All or none❖	All or none case-series	Absolute SpPins and SnNouts●

Grade of Recommendation	Level of Evidence	Therapy/ Prevention, Aetiology/Harm	Prognosis	Diagnosis
B	2a	SR (with homogeneity‡) of cohort studies	SR (with homogeneity‡) of either retrospective cohort studies or untreated control groups in RCTs.	SR (with homogeneity‡) of Level > 2 diagnostic studies
	2b	Individual cohort study (including low quality RCT; e.g., < 80% follow-up)	Retrospective cohort study or follow-up of untreated control patients in an RCT; or CPG not validated in a test set.	Any of: ·Independent blind or objective comparison; ·Study performed in a set of non-consecutive patients, or confined to a narrow spectrum of study individuals (or both) all of whom have undergone both the diagnostic test and the reference standard; ·A diagnostic CPG not validated in a test set.
	2c	Outcomes Research	Outcomes Research	
	3a	SR (with homogeneity‡) of case-control studies		
	3b	Case-Control Study		Independent blind or objective comparison of an appropriate spectrum✦, but the reference standard was not applied to all study patients

Grade of Recommendation	Level of Evidence	Therapy/ Prevention, Aetiology/Harm	Prognosis	Diagnosis
C	**4**	Case-series (and poor quality cohort and case control studies✪)	Case-series (and poor quality prognostic cohort studies❋)	Any of: ·Reference standard was unobjective, unblended or not independent; ·Positive and negative test were verified using separate reference standards; ·Study was performed in an inappropriate spectrum✦ of patients.
D	**5**	Expert opinion without explicit critical appraisal, or based on physiology, bench research or "first principles"	Expert opinion without explicit critical appraisal, or based on physiology, bench research or "first principles"	Expert opinion without explicit critical appraisal, or based on physiology, bench research or "first principles"

- These levels were generated in a series of iterations among members of the NHS R&D Centre for Evidence-Based Medicine (Chris Ball, Dave Sackett, Bob Phillips, Brian Haynes, and Sharon Straus)
- Users can add a minus-sign "-" to denote the level of that fails to provide a conclusive answer because of:
  · EITHER a single result with a wide Confidence Interval (such that, for example, an ARR in an RCT is not statistically significant but whose confidence intervals fail to exclude clinically important benefit or harm)
  · OR a Systematic Review with troublesome (and statistically significant) heterogeneity.
  · Such evidence is inconclusive, and therefore can only generate Grade D recommendations.

✣ By homogeneity is meant a systematic review that is free of worrisome variations (heterogeneity) in the directions and degrees of results between individual studies. Not all systematic reviews with statistically significant heterogeneity need be worrisome, and not all worrisome heterogeneity need be statistically significant. As noted above, studies displaying worrisome heterogeneity should be tagged with a "-" at the end of their designated level.

▲ Clinical Practice Guide.

✦ An appropriate spectrum is a cohort of patients who would normally be tested for the target disorder. An inappropriate spectrum compares patients already known to have the target disorder with patients diagnosed with another condition.

■ See note above for advice on how to understand, rate and use trials or other studies with wide confidence intervals.

❖ Met when all patients died before the treatment became available, but some now survive on it; or when some patients died before the treatment became available, but none now die on it

● An "Absolute SpPin" is a diagnostic finding whose Specificity is so high that a Positive result rules in the diagnosis. An "Absolute SnNout" is a diagnostic finding whose Sensitivity is so high that a Negative result rules out the diagnosis.

✷ Good, better, bad and worse refer to the comparisons between treatments in terms of their clinical risks and benefits.

✪ By poor quality cohort study is meant one that failed to clearly define comparison groups and/or failed to measure exposures and outcomes in the same (preferably blinded) , objective way in both exposed and non-exposed individuals and/or failed to identify or appropriately control known confounders and/or failed to carry out a sufficiently long and complete follow-up of patients. By poor quality case-control study is meant one that failed to clearly define comparison groups and/or failed to measure exposures and outcomes in the same (preferably blinded), objective way in both cases and controls and/or failed to identify or appropriately control known confounders.

❊ By poor quality prognostic cohort study is meant one in which sampling was biased in favour of patients who already had the target outcome, or the measurement of outcomes was accomplished in <80% of study patients, or outcomes were determined in an unblended, non-objective way, or there was no correction for confounding factors.

References

Canadian Task Force on the Periodic Health Examination: *The periodic health examination*. CMAJ 1979;121:1193–1254

Sackett DL. *Rules of evidence and clinical recommendations on use of antithrombotic agents*. Chest 1986 Feb; 89 (2 suppl.):2S–3S.

Cook DJ, Guyatt GH, Laupacis A, Sackett DL, Goldberg RJ. *Clinical recommendations using levels of evidence for antithrombotic agents.* Chest 1995 Oct; 108(4 Suppl):227S–230S.

Yusuf S, Cairns JA, Camm AJ, Fallen EL, Gersh BJ. *Evidence-Based Cardiology*. London:BMJ Publishing Group, 1998.

Appendix 8:

Table of Papers Referenced in Guidelines

These tables list the evidence appraised and used to inform the recommendations. The references are in numerical order as they appear in the text. Each table gives a reference, a brief description of the sample studies and the design, the subject of the study (e.g. the intervention), and a conclusion or comment. Readers are recommended to read the original references if they want more detail.

Ref No	Citation	Study Design	Characteristics	Subject of Study	Comments	Level of Evidence
9	Nicholas, J., et al., Journal of Prosthetics & Orthotics, 1993	Case series	94 consecutive amputees in Pittsburgh answered questionnaire.	Amputation and rehabilitation	Patients felt vulnerable, defenceless and conspicuous. Patient information should be given in written form. Treatment & assessment should be documented. Response to questionnaire 100%. Questionnaire piloted.	4
12	Greive, A.C., Lankhorst, G.J., Prosthet. & Orthotic. Int., 1996	Prospective Case series	26 Dutch lower limb amputees, 5 months after amputation. No control group.	Amputation or rotational osteotomy	Co-morbidity is associated with lower levels of functional outcome. Can't tell if sample well defined at uniform (early) stage of illness. Follow-up complete but not long enough. No blind, objective outcome criteria. Adjustment made for other prognostic factors. No validation in independent test-set of patients. Small study with possible skewed results as age associated with presence of IDDM.	2c
13	Collin, C., Collin, J., British Journal of Surgery, 1995	Case series	Elderly lower limb amputees with occlusive arterial disease	Amputation	Mobility is reduced post-amputation. Provision of a wheelchair should be routine. Provides very little information on a study performed by questionnaire. Poorly defined sample, generally refers to the elderly amputee. Cannot tell if there were blind, objective outcome criteria or if there was adequate follow up.	2c

Ref No	Citation	Study Design	Characteristics	Subject of Study	Comments	Level of Evidence
20	Pernot, H.F., et al.,Clin Rehabil, 1997	Literature overview	71 studies concerning predictive or prognostic factors. Lower limb amputees 1983–1994 due to p.v.d.		Increasing age, concurrent diseases and poor compliance are prognostic of a low functional level. Advocates multidisciplinary team. No homogeneity in studies. Can't tell if studies were multiple independent reviews of individual reports.	2a
21	Ham, R.O., Physiotherapy Practice, 1985	Prospective Case control	75 vascular amputees. Control group of 25 patients received no specialist physiotherapy or surgical care.	Specialist care	Amputees benefit from care by a specialist multidisciplinary team and early delivery of a prosthesis. Non-blinded, non-randomised trial without intention-to-treat.	4
22	Ham, R., et al., Prosthetics and Orthotics International, 1987.	Prospective Case control	233 consecutive patients with pvd admitted for lower limb amputation	Team approach to rehabilitation	To achieve 1 patient going home with a prosthesis 1 patient needs to be treated by the team approach (95%C.I. 1.1 to 1.7) but study is seriously flawed. Non-blinded, non-randomised trial without intention-to-treat. Results for final stage of study incomplete due to staffing changes. Not representative sample of population	4
24	Lachman, S.M.,.British Journal of Rheumatology 1993	Retrospective Case control	11 lower limb amputees with rheumatoid arthritis. Control subjects – matched amputees without rheumatoid arthritis.	Rheumatoid arthritis	Most amputees with rheumatoid arthritis use their prosthesis daily for help with transfers and cosmetic purposes. Small study size. Exposures were neither objective nor measured blind. Cannot tell if follow-up was long enough, but was complete.	4

Ref No	Citation	Study Design	Characteristics	Subject of Study	Comments	Level of Evidence
25	Steinberg, F.U., et al., Arch Phys Med Rehabil, 1985	Prospective Cohort	116 lower limb amputees in the USA, aged 65–86 yrs. No controls.	Amputation	Elderly patients are suitable for prosthetic provision, assuming there are no co-existing mental disorders, severe neurological or cardiovascular defects, and contractures are of a manageable level. Rehabilitation on a daily basis for the elderly produces successful rehabilitation outcomes. Poorly presented statistics. Well defined population with adjustment made for other prognostic factors	2c
26	Seroussi, R.E., et al., Arch Phys Med Rehabil, 1996	Prospective Case control	Subjects: 8 healthy, non-dysvascular, transfemoral amputees. Controls: 8 healthy, normal ambulators, no other information given.	Gait analysis	Hip extensors (bilaterally), eccentric hip flexors and ankle plantar flexors benefit from strengthening. Small numbers in trial. Non-blinded, non-randomised trial without intention to treat. All prostheses fitted by the same, experienced prosthetist with the same system (worn for >1month)	3b
27	Rush, P.J., et al. Arch Phys Med Rehabil, 1994	Prospective Case series	16 healthy males (mean age = 48). Unilateral, prosthetic, transfemoral amputees for ≥ 5 yrs. Compares bone density of amputated femur to contralateral femur.	Bone densitometry	There is an increased risk of developing Osteopenia in the femur of the amputated limb. Accounts for other prognostic factors. Small number in study, all healthy males. Not randomised or blind.	4

Ref No	Citation	Study Design	Characteristics	Subject of Study	Comments	Level of Evidence
28	Waters, R., et al., The Journal of Bone & Joint Surgery, 1976	Case control	70 unilateral prosthetic lower limb amputees, other pathologies not noted but had no stump pain, swelling or pressure sores. Number of controls unclear – "5 normal persons of each sex in each decade from third to seventh", comparable results with other large studies for non amputees.	Walking	The higher the level of amputation, the higher the energy cost. Amputees adjust their velocity to maintain the rate of energy expenditure within normal limits. Age adjusted but not randomised or blinded. Large number in study.	4
29	Pinzur, M.S., et al., J Rehabil Res Dev, 1995	Prospective Case series	14 trans-tibial amputees aged 25–74 yrs. 12 men, 2 women. Independent walkers, using prosthesis for >1yr. No controls, compared with contra lateral limb.	Prosthetic alignment	Small misalignments in a trans-tibial prosthesis will lead to increased loading of the residual limb. Small study. Subjects tested on a short walkway, therefore results not necessarily transferable to normal ambulation.	4
30	Levy, S.W., Cutis, 1995	Descriptive Cohort study	Lower limb amputees	Prosthesis, skin infection, residual limb oedema	1.Skin disorders may be due to mechanical rubs, over or under zealous skin care 2.Oedema may be caused by incorrectly fitted socket, excessive negative pressure in suction socket, underlying vascular disorder 3. Rub & shear cause epidermoid cysts Subjects not defined. Exposures and outcomes not objective or blind. Cannot tell if follow-up was long enough or complete.	5

Ref No	Citation	Study Design	Characteristics	Subject of Study	Comments	Level of Evidence
31	Collin, C., Wade,D. and Cochrane,G. Clin Rehabil, 1992	Retrospective Case series	37 amputees referred to DSC for review. PVD or diabetes.	Prosthetic rehabilitation	The physical environment to which the patient is discharged can affect functional outcome. Modifications to the environment can improve functional outcome. Well defined sample at uniform (early) stage. Follow-up long enough & complete. No blind, objective outcome criteria. Adjustment made for other prognostic factors. No validation in independent test-set of patients.	4
32	Van De Ven, C.M., B.M.J. (Clin Res Ed), 1981	Cohort	96 bilateral amputees aged > 55 yrs. Amputation within 3 years living at home or residential care	Bilateral amputation	Bilateral amputees should be provided with a wheelchair and attend a home visit early in the rehabilitation process to allow successful return to the domestic environment. No control group. Follow-up was long enough and complete. No blind, objective outcome criteria. Adjustment was not made for other prognostic factors. Large study with data gathered from many variables.	4
33	Potter, P.J., et al., J Rehabil Res Dev, 1998	Prospective Cohort	80 non-traumatic , unilateral amputees admitted consecutively to regional rehabilitation unit	Test for peripheral neuropathy	Peripheral neuropathy in the intact limb is nearly always present in diabetics requiring amputation. Peripheral neuropathy is also present in 2/3rds of non-diabetic amputees. Preventative measures of limb care should be utilized in all patients with an amputation. Well-defined cohort. Not blinded. Follow-up complete.	1b

Ref No	Citation	Study Design	Characteristics	Subject of Study	Comments	Level of Evidence
34	Hanspal, R.S., Fisher, K BMJ, 1991	Retrospective Case series	100 unilateral transfemoral & transtibial amputees, aged 60+ yrs. No control subjects.	Amputation	Functional outcome with a prosthesis is affected by cognitive and psychomotor function. Provides evidence for the need of accurate assessment and the setting of realistic functional goals. Well-defined sample. Cannot tell if follow-up long enough or complete. No blind, objective outcome criteria. No adjustment for other prognostic factors. Not randomised.	4
35	Hanspal, R.S., Fisher, K. Int. J. Rehab. Research, 1997	Cohort	32 lower limb amputees aged 54–72yrs. No control group.	Cognitive Assessment Scale. Clifton Assessment Procedure. Harold Wood/ Stanmore Mobility Grade	There is a correlation between cognitive, psychomotor status and mobility level achieved. Follow up long enough but can't tell if complete. No blind objective outcome criteria. Adjustment was made for other prognostic factors. No validation in independent test set of patients.	4
36	Altner, P.C., et al., Arch Phys Med Rehabil, 1987	Retrospective Case series	52 double-disability patients (hemiplegia & dysvascular lower limb amputation). No control group.	Hemiplegia	Neuromuscular status influences the mobility of amputees with a CVA. Eight patients attained independent prosthetic function while 16 patients were limited and six were nonambulatory. Cannot tell if follow-up was long enough, but was complete. No blind, objective outcome criteria. Adjustment was not made for other prognostic factors.	4

Ref No	Citation	Study Design	Characteristics	Subject of Study	Comments	Level of Evidence
37	Moirenfeld I, et al, Prosthet Orthot Int, 2000	Case series	11 trans-tibial Israeli amputees aged 22–68 yrs. Regular, independent walkers. No control subjects.	Isokinetic strength & endurance tests in sound and amputated limb	In trans-tibial amputees, the maximal strength in the residual limb is lower than in the sound limb. Recommends trans-tibial amputees should do strengthening exercises for residual limb. Small number of subjects. Results of individuals heterogeneous, ? due to differing age groups, time since amputation & stump length. Follow-up long enough & complete.	3a
38	Dingwell, J.B., Davis, B.L., Prosthet. Orthot. Int., 1996	Prospective Case control	6 unilateral amputees. Aged 31–69 yrs. Established users. 6 matched controls	CCF treadmill walking. Visual feedback training	Visual feedback training is an effective means of producing short term reductions in gait asymmetry. Non-blinded randomised controlled trial with intention-to-treat. Very small sample.	4
39	Geurts, A.C., et al., Arch Phys Med Rehabil, 1991	Prospective Case control	10 unilateral lower limb amputees	Balance assessment	Amputees show a lower level of postural efficiency during attention demanding tasks, this decreased with rehabilitation. Can't tell if adjustment made for other prognostic factors. Follow-up complete & long enough. Not blind, objective outcome criteria Small sample study.	4
40	Quinlivan, D.H., ISPO Conference Blackpool 1994	Prospective Case control	8 unilateral transtibial amputees, 8 matched controls	Biofeedback and visual feedback.	Biofeedback training can assist in re-educating equal weight bearing. Small number in study. Non-blinded, non-randomised.	4

Ref No	Citation	Study Design	Characteristics	Subject of Study	Comments	Level of Evidence
41	James, U., Scand J Rehabil Med, 1973	Prospective Case control	11 unilateral above-knee amputees in Sweden. Control group, matched for age, height & weight and health & employment.	Walking and cycling	Asymmetry of gait decreases with training. Training increases muscle strength. Good analysis of results but conclusions didn't match results. No follow-up. Small trial.	4
42	Kegel, B., et al., Phys Ther, 1981	Prospective Case studies	4 trans-tibial amputees. No control group.	EMG biofeedback	Stump exercises enhance retention characteristics of the stump. Stump exercises should become an integral aspect of routine physiotherapy management. Small study, not blinded. No follow-up. No adjustment for other prognostic factors.	4
43	Powers, C.M., et al., Phys Ther, 1996.	Case series	22 well healed unilateral, dysvascular, diabetic transtibial amputees. No control subjects.	Gait analysis & muscle force measurements	Poor torque-producing capability is a major limiting factor in the gait ability of dysvascular trans-tibial amputees. Well-defined but small sample. Follow-up long enough and complete. Adjustment was not made for other prognostic factors	1c
44	Powers, C., Rao, S., Perry, J Gait & Posture, 1998	Case control	10 unilateral trans-tibial amputees matched to 10 'normal' subjects	Motion analysis & EMG	Understanding gait mechanics by the team in the defined population promotes greater independence and increased functional status. T-T amputees exhibit reduced knee movement and power. There is greater physiological demand in T-T amputees. Small study, not randomised or blinded.	4

Ref No	Citation	Study Design	Characteristics	Subject of Study	Comments	Level of Evidence
45	Bailey, M., C.MacWhannell, Physiotherapy, 1997	Case series	10 consecutively presenting amputees with pvd, able to use Ppam Aid. No control group.	Walking	Resting ECG alone may be inadequate for safe prescription of exercise. Moderate walking exercise produces myocardial ischaemia in 30% of patients, despite 70% presenting with cardiac anomalies at rest. Small study, not blinded.	4
46	Christensen, B., et al., Prosthet Orthot Int, 1995	Retrospective Case series	29 Danish, prosthetic transtibial & transfemoral amputees – all causes. 18 transtibial, 1 bilateral and 10 transfemoral amputees.	Rehabilitation with prosthesis	Transtibial amputees achieve a higher level of prosthetic skill than transfemoral. Non-validated questionnaires (response rate not given) and unstructured interviews. Small sample, no adjustment made for other prognostic factors. Not blinded, over a short period of time (10 months).	4
47	Beekman, C.E. and L.A. Axtell Phys Ther, 1987	Case series	55 trans-femoral or knee disarticulation amputees. Aged over 50 with NIDDM or PVD in USA		TF and TKD amputees perform at a functionally lower level than bi-pedal subjects. There are no factors that predict functional outcome. Functional peak is reached at discharge from rehabilitation. No account made for domestic situation. Wide variety of patients in study group, no differentiation for independent factors. Follow-up was complete and long enough. No blind, objective outcome criteria. No adjustment for other prognostic factors. No validation in independent test-set of patients.	2c

Ref No	Citation	Study Design	Characteristics	Subject of Study	Comments	Level of Evidence
48	Houghton, A., et al., Br J Surg, 1989	Retrospective Cross section	169 unilateral amputees under 3 DSC's. 88 transfemoral, 54 knee disarticulation, 27 Gritti-Stokes.	Functional use of prosthesis	Amputees with a knee disarticulation rehabilitate better than those with a transfemoral or Gritti-Stokes level of amputation. Non-validated questionnaire, response rate 74%. Selected responders were used by matching for age & duration of amputation. Not blinded. Adjustment made for prognostic factors. Due to selection for matching numbers were small in each group.	4
49	Wolf, E., et al., Int J Rehabil Res, 1989	Retrospective Case series	18 Israeli, bilateral vascular amputees, aged > 55 yrs. No control group.	Rehabilitation	Rehabilitation of bilateral lower limb amputees can lead to independent function. Small number of subjects. Cannot tell if the follow-up was long enough, but was complete. Adjustment was made for other prognostic factors. Not blinded.	4
50	Sapp, L. and C.E. Little, Prosthet Orthot Int, 1995	Retrospective Cohort	132 lower limb amputees in Nova Scotia entering rehabilitation programme. No control group.	Rehabilitation programme	A rehabilitation program for lower limb amputees leads to functional prosthetic use. Poorly defined intervention. Review of charts and non-validated questionnaire (85% return). No blind, objective outcome criteria. Adjustment was not made for other prognostic factors.	2c

Ref No	Citation	Study Design	Characteristics	Subject of Study	Comments	Level of Evidence
51	Gauthier-Gagnon, C., et al., Physiotherapy Canada, 1986	Prospective Random control	11 unilateral elderly trans-tibial amputees with pvd or diabetes. 30 controls.	Use of mirrors combined with verbal and augmented sensory feedback	Mirrors, verbal and augmented sensory feedback are equally effective in the re-education of weight bearing & balance. Control of sway in amputees is dependent upon vision. When planning rehabilitation, exercises with & without visual feedback should be incorporated. Weight bearing on the prosthetic limb should be emphasised to reduce pressure on an already compromised circulatory system Non-blinded randomised controlled trial with intention-to-treat. Good methodology & random selection of patients but poor analysis of results. Small group, not followed up.	4
52	Kulkarni, J., et al., Physiotherapy, 1996	Prospective Cross sectional	164 consecutive lower limb amputees presenting to UK DSC. No controls.	Falls	Lower limb amputees are at risk from falling. Amputees should be educated what to do in the event of a fall, with written instructions provided. No differentiation made between pathologies, some may be at greater risk than others. Not blinded. Not randomised, no controls. Structured questionnaire expanded in light of pilot study.	4
53	Jayantunga,U., et al., ISPO October 1999	Prospective Cohort	21 unilateral, diabetic trans-tibial amputees with no existing plantar ulceration Control group not used.	Foot orthoses & footwear	Natural feet in this group are subject to abnormal loading forces. These can be reduced by the provision of orthoses and proper footwear. The foot should be monitored and referred early for an orthosis. Well defined sample at uniform (early) stage. Follow-up complete & long enough. Can't tell if blind, objective outcome criteria. No adjustment for other prognostic factors. No validation in independent test-set of patients. Useful study but no figures shown to support claim that Orthotics reduced abnormal forces in diabetic foot.	4

Ref No	Citation	Study Design	Characteristics	Subject of Study	Comments	Level of Evidence
54	Hubbard, W., Aust J Physiother, 1989	Retrospective Case series	92 vascular amputees in Ballarat, Australia.	Rehabilitation and prosthetic fitting	Below knee amputees gain a higher level of mobility than above knee amputees. 20% amputees died within two years of primary amputation. All patients had been accepted into a rehabilitation programme. Not all assessed at similar stage of rehabilitation. Discusses earlier studies but not all use the same classification.	4
55	Houghton, A.D., et al., Br J Surg, 1992	Retrospective Case series	102 Vascular lower limb amputees operated on in 1986 and 1988 in London.	Amputation	Rehabilitation is more successful in transtibial than transfemoral amputees. Non-validated rehabilitation questionnaires were sent to 179 patients, response rate was 81 per cent. Not blinded or randomised. No standardised rehabilitation programme.	4

Appendix 9:

Delphi Questionnaires

1st Questionnaire

Please read the questions in conjunction with the evidence based draft guidelines

Please put an x on the dotted line where you feel you are most in agreement .

For example:

Should all physiotherapists have a pay rise?

No, definitely should not Yes, definitely should

0----------10

Comment……We deserve every penny……

This means 100% agreement with this statement.

The above scale appears after each question except 4.1, 4.2, 4.12 & 5.20

1. The Multidisciplinary Team

1.1 Should the physiotherapist contribute to MDT audit?

1.2 Should the physiotherapist contribute to MDT research?

1.3 Should the physiotherapist contribute to MDT education?

Should any other statements be added to this MDT section? If so what?

Should any wording be changed in this section? If so how?

Do you know of any other published evidence to support this section? Please supply references.

2. Prosthetics

2.1 Should the physiotherapist contribute to the decision-making process regarding prosthetic prescription?

2.2 Should the physiotherapist understand the pressure tolerant and pressure sensitive areas of the residual limb in relation to prosthetic fit?

2.3 Should the physiotherapist check the prosthesis for correct and comfortable fit, prior to each treatment?

2.4 Should the physiotherapist examine the residual limb before and after prosthetic use?

2.5 Should the patient examine the residual limb before and after prosthetic use?

2.6 Should the physiotherapist know the different methods of donning and doffing prostheses?

2.7 Should the prosthetic centre be contacted if there is malfunction of any componentry?

2.8 Should the prosthetic centre be contacted if the socket requires adjustment in order to achieve a correct and comfortable fit?

Should any other statements be added to this Prosthetic section? If so what?

Should any wording be changed in this section? If so how?

Do you know of any other published evidence to support this section? Please supply references.

3. Assessment

3.1 Should the physiotherapist record the prosthetic componentry, type of socket and method of suspension?

Should any other statements be added to this Assessment section? If so what?

Should any wording be changed in this section? If so how?

Do you know of any other published evidence to support this section? Please supply references

.....

4. The Prosthetic Rehabilitation Programme

4.1 Within a maximum of how many days should physiotherapy begin after delivery of the prosthesis? (please state how many days)

……..days

4.2 How frequently should patients receive physiotherapy at the start of prosthetic rehabilitation?

(please tick as appropriate or fill in 'other')

Daily .....

Minimum of three times a week .....

Minimum of twice a week .....

As often as possible .....

Other (please state) .....

.....

4.3 Should rehabilitation be functional and integrated with activities of daily living?

4.4 Should gait re-education commence within the parallel bars?

4.5 Should gait re-education progress to walking within the hospital environment?

4.6 Should gait re-education progress to walking outside the hospital environment?

4.7 Should walking aids be provided to ensure that prosthetic users, where possible, progress to being fully weight bearing through their prosthesis?

4.8 Should the physiotherapist, alongside other professionals, treat wound problems when these occur during rehabilitation?

4.9 Should the physiotherapist, alongside other professionals, treat scar problems when these occur during rehabilitation?

4.10 Should the physiotherapist contribute to the management of residual limb pain?

4.11 Should the physiotherapist contribute to the management of phantom sensation/pain?

4.12 Should the physiotherapist instruct the patient in appropriate functional tasks: (Please tick the activities you agree should be taught and cross (x) those activities you do not agree should be taught)

on/off floor _

in/out car _

up/down stairs, curbs, ramps, slopes _

carrying objects _

uneven ground outdoors _

changing speed and direction _

picking objects up from the floor _

open/closing door _

public transport _

escalators _

Comment .....

Should any other statements be added to this Prosthetic Rehabilitation section? If so what?

Should any wording be changed in this section? If so how?

Do you know of any other published evidence to support this section? Please supply references.

5. Patient Education

5.1 Should patients be given information about the type of prosthesis issued?

5.2 Should patients be given information about the functions of the prosthesis issued?

5.3 Should patients be given information about the limitations of their prosthesis?

5.4 Should patients be given information about the maintenance of their prosthesis?

5.5 Should patients be given instruction on achieving correct socket fit, including pressure tolerant & sensitive areas of their residual limb?

5.6 Should the reasons for fluctuations in residual limb volume and its management be explained?

5.7 Should the physiotherapist give guidance on how long to wear the prosthesis and how this should be increased?

5.8 Should an explanation be given on how changing footwear may alter prosthetic alignment and the distribution of pressure within the socket?

5.9 Should the patient receive instruction in the use and care of prosthetic socks? 5.10 Should instruction be given in the correct use of the type of suspension used?

5.11 Should techniques for the management of phantom pain/sensation be taught?

5.12 Should the physiotherapist give advice on the factors influencing wound healing?

5.13 Should instruction be given on the methods to prevent and treat adhesion of scars?

5.14 Should the patient and/or carer be taught to monitor the condition of the remaining foot?

5.15 Should physiotherapists establish links with their local podiatry/chiropody services to ensure that information and education given to patients and carers is consistent?

5.16 Should patients be made aware that concurrent pathologies and previous mobility will affect goal setting and outcomes?

5.17 Should patients be made aware of the possible psychological effects following amputation and how and where to seek advice and support?

5.18 Should all patient information be available in written format?

5.19 Should patients be educated in how to prevent secondary disabilities that may occur as a result of prosthetic use?

5.20 Should information on the following be made available: (Please tick the information you agree should be made available and cross (x) the information that should not)

National & local amputee support & user groups _

Health promotion _

Sporting & leisure activities _

Driving after amputation _

Employment/Training _

Comment .....

Are there any other agencies/topics you would add to the above list? If so what? .....

Should any other statements be added to this patient education section? If so what?

Should any wording be changed in this patient education section? If so how?

Do you know of any other published evidence to support this section? Please supply references.

6. Discharge and Maintenance

6.1 Should a summary of the patient's function and mobility at transfer or discharge from active rehabilitation be documented in the treatment notes?

6.2 Should a system exist for the review of patients after discharge from regular physio-therapy?

6.3 Should there be a process in place for the patient/carer to self-refer to physiotherapy after initial rehabilitation?

6.4 Should additional rehabilitation be made available when an individual's circumstances change: i.e. medical, environmental, prosthetic, physical, return to work or sport?

6.5 If prosthetic use is abandoned during the rehabilitation programme should the reasons be documented?

Should any other statements be added to this Discharge and Maintenance section? If so what?

Should any wording be changed in this section? If so how?

Do you know of any other published evidence to support this section? Please supply references.

Any further comments :

2nd Questionnaire

Please put an x on the dotted line where you feel you are most in agreement. For example:

Should all physiotherapists have a pay rise?

No, definitely should not — Yes, definitely should

0----------X----------10

The above scale appears after each numbered question except 4.5 and 5.4

1. The Multi-Disciplinary Team

Consensus has been gained

2. Prosthetic Knowledge

It is essential for the physiotherapist to have an understanding of prosthetic design, componentry and function to facilitate rehabilitation.

2.3 Should the physiotherapist check the prosthesis for correct and comfortable fit, prior to each treatment until the patient is able to do this for him/herself?

2.4 Should the physiotherapist examine the residual limb before and after prosthetic use until the patient is able to do this for him/herself?

3. Assessment

Consensus has been gained

4. The Prosthetic Rehabilitation Programme

4.1 Should prosthetic rehabilitation begin within a maximum of 5 working days after receipt of the prosthesis?

4.2 At the start of prosthetic rehabilitation should patients receive physiotherapy as often as their needs and circumstances allow?

4.3 Should gait re-education progress to walking within the home environment?

4.8 Should the physiotherapist, alongside other professionals, contribute to the care of wounds during rehabilitation?

4.12 Should the physiotherapist instruct the patient in functional tasks appropriate to the goals set with the individual? (Please tick the activities you agree should be taught and cross (x) those activities you do not agree should be taught)

on/off floor _

in/out car _

up/down stairs, kerbs, ramps, slopes _

a crowded environment _

carrying objects _

uneven ground outdoors _

changing speed and direction _

picking objects up from the floor _

open/closing door _

public transport _

escalators _

Comment.....

5. Patient Education

5.1 Should patients be given information about their prosthesis, its functions and limitations?

5.4 Should patients be given information about the care of their prosthesis?

5.18 Should patient information be available in a format suitable to that individual?

5.20 Should information on the following be made available: (Please tick the information you agree should be made available and cross (x) the information that should not)

National & local amputee support & user groups _

Health promotion _

Mobility issues _

Sporting & leisure activities _

Driving after amputation _

Employment/Training _

Comment .....

6. Discharge and Maintenance

6.5 If prosthetic use is discontinued during the rehabilitation programme should the reasons be documented?

Any further comments:

Appendix 10:

Delphi Questionnaire Results

Percentage of respondents in 75% (or greater) agreement to Delphi questions

1st Questionnaire Results

Question	% Agreement
1.1	97
1.2	91
1.3	100
2.1	91
2.2	97
2.3	91
2.4	76
2.5	100
2.6	97
2.7	100
2.8	97
3.1	91
4.1	list
4.2	list
4.3	100
4.4	91
4.5	91
4.6	85
4.7	94
4.8	73.5
4.9	91
4.10	94
4.11	94
4.12	list

Question	% Agreement
5.1	82
5.2	94
5.3	91
5.4	94
5.5	94
5.6	97
5.7	100
5.8	100
5.9	100
5.10	100
5.11	94
5.12	88
5.13	94
5.14	100
5.15	88
5.16	100
5.17	97
5.18	70.5
5.19	90
5.20	list
6.1	100
6.2	94
6.3	100
6.4	100
6.5	100

2nd Delphi Questionnaire results

Question	% Agreement
2.3	100
2.4	97
4.1	94
4.2	94
4.5	91
4.8	89

Question	% Agreement
4.12	see below
5.1	94
5.4	97
5.18	100
5.2	see below
6.5	100

The two open questions gained agreement as below:

4.12 Should the physiotherapist instruct the patient in functional tasks appropriate to the goals set with the individual?

	% agreement
on/off floor	100%
in/out car	97%
up/down stairs, kerbs, ramps, slopes	100%
a crowded environment	91%
carrying objects	97%
uneven ground outdoors	100%
changing speed and direction	97%
picking objects up from the floor	97%
open/closing door	97%
public transport	78%
escalators	76%

5.2 Should information on the following be made available:

	% agreement
National & local amputee support & user groups	100%
Health promotion	97%
Mobility issues	92%
Sporting & leisure activities	100%
Driving after amputation	100%
Employment/Training	95%

These two questionnaires provided a high level of agreement and consensus was gained.

Appendix 11:

External Reviewers

Ralph Hammond:	Professional Adviser, Chartered Society of Physiotherapy
Elizabeth McInnes:	Head of Research, Royal College of Nursing Institute Radcliffe Infirmary, Oxford
Juliet Miller:	Director of The Scottish Intercollegiate Guidelines Network (SIGN)
Michael Rhodes:	Technical Editor, Scientific Press

Appendix 12:

Peer Reviewers

Lynn Hirst MCSP, SRP.	Senior II Physiotherapist, Dewsbury District Hospital
Anne McGhee MCSP, SRP, MSc.	Senior I Physiotherapist, Loughborough Community Hospital
Catherine Morgan MCSP, SRP.	Junior Physiotherapist, Royal National Orthopaedic Hospital
Laurie Savidge MCSP, SRP.	Junior Physiotherapist, Chapel Allerton Hospital, Leeds
Jane Saunders MCSP, SRP.	Senior I Physiotherapist, Manchester Disablement Centre
Josie Wilcox MCSP, SRP.	Senior II Physiotherapist, Luton & Dunstable Limb Fitting Centre

Appendix 13:

Audit Data Collection Form

Date:

Re-audit date:

Recommendation		Yes	No	N/A	Action Points
1.2	There is evidence that the physiotherapist contributes to MDT audit, research and education	❑	❑		
2.1–2.6	There is documented evidence of on-going formal and informal training and CPD in prosthetics and prosthetic rehabilitation and reflective practise by the physiotherapist.	❑	❑		
2.7, 2.8	There is a protocol for checking the prosthesis and residual limb before, during and after treatment.	❑	❑		
3.1–3.5	There is documentation in the patients physiotherapy notes of: · A physical examination and assessment of previous and present function. · The patients social situation · Psychological status · Goals and expectations · Relevant pathology including diabetic status · Present and past Prosthetic componentry, type of socket and method of suspension · Problem list and treatment plan formulated in partnership with the patient	❑ ❑ ❑ ❑ ❑ ❑ ❑	❑ ❑ ❑ ❑ ❑ ❑ ❑		
4.5	There is written evidence that prosthetic physiotherapy began within a maximum of 5 working days after receipt of the prosthesis	❑	❑		

Recommendation		Yes	No	N/A	Action Points
4.7–4.14	There is written evidence of prosthetic rehabilitation based on the treatment plan that includes: · Increasing time of prosthetic use · Gait re-education commenced in the parallel bars · Functional tasks relevant to the goals set with the patient · Progression from walking within the hospital environment to walking within the home environment · Hobbies · Sport · Social activities · Driving · Return to work	❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑	❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑	❑ ❑ ❑	
4.15–4.18	There is written evidence of the contribution of the physiotherapist to: · Care of wounds · The treatment of scars · The management of residual limb pain · The management of phantom limb sensation/pain	❑ ❑ ❑ ❑	❑ ❑ ❑ ❑	❑ ❑ ❑ ❑	
5.1.1–5.1.8	There is written evidence of information being given to the patient/carer in regard to: · The prosthesis, it's functions and limitations · Care of the prosthesis · Achieving correct socket fit · Management of volume fluctuations of the residual limb · The length of time the prosthesis should be worn and how this should be increased. · Changing footwear and the effect on alignment · Use and care of prosthetic socks · Correct use and care of suspension	❑ ❑ ❑ ❑ ❑ ❑ ❑	❑ ❑ ❑ ❑ ❑ ❑ ❑	❑ ❑ ❑ ❑	

Recommendation		Yes	No	N/A	Action Points
5.2.1–5.2.8	There is written evidence of information being given to the patient/carer in regard to: · The prosthesis, it's functions and limitations · Care of the prosthesis · Achieving correct socket fit · Management of volume fluctuations of the residual limb · The length of time the prosthesis should be worn and how this should be increased. · Changing footwear and the effect on alignment · Use and care of prosthetic socks · Correct use and care of suspension	❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑	❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑		
5.3.1	There is evidence that the patient/carer is taught to monitor the condition of the remaining limb	❑	❑		
5.3.2	There is evidence that the information given to patients regarding care of the remaining limb is consistent with the local podiatry/chiropody service	❑	❑		
5.3.3	There is evidence that vascular and diabetic patients are made aware of risks to their remaining foot	❑	❑	❑	
5.4.1–5.4.4	There is written evidence of information being given to the patient/carer with regard to: · The effect of concurrent pathologies and previous mobility on realistic goal setting and final outcome of rehabilitation · Expected levels of function and mobility in relation to different levels of amputation · The reduction in levels of function compared to bipedal subjects · The energy cost of prosthetic walking in relation to different levels of amputation	❑ ❑ ❑ ❑	❑ ❑ ❑ ❑		

Recommendation		Yes	No	N/A	Action Points
5.5.1–5.5.4	There is written evidence of: · Information provided on the increased risk of falls following amputation · Education on preventing falls and coping strategies should a fall occur · Instruction on how to get up from the floor · Advice given in the event the patient is unable to rise from the floor	❑ ❑ ❑ ❑	❑ ❑ ❑ ❑	❑	
5.6.1–5.6.2	There is written evidence of advice to the patient/carer on: · How and where to seek psychological advice and support · Prevention of secondary disabilities that may occur as a result of prosthetic use	❑ ❑	❑ ❑	❑ ❑	
5.6.3	Patient information is available in a format that is suitable for the patient	❑	❑		
5.6.5	Information is available on the following: · National and local amputee support and user groups · Health promotion · Sporting and leisure activities · Driving after amputation · Employment/training	❑	❑	❑	
6.1	There is evidence of a summary of the patients function and mobility at transfer or discharge from active rehabilitation documented in the treatment notes	❑	❑		
6.2	There is evidence that the patient has been provided with contact details to seek help and advice when required	❑	❑		

Recommendation		Yes	No	N/A	Action Points
6.3–6.5	There are protocols for: · The review of patients after discharge from regular physio-therapy · The patient to self-refer to physiotherapy after initial rehabilitation · Accessing rehabilitation if an individuals circumstances change	❑ ❑ ❑	❑ ❑ ❑		
6.6	If prosthetic rehabilitation has been discontinued during the rehabilitation programme the reasons are documented.	❑	❑		

Appendix 14:

Definition of a Clinical Specialist in Prosthetic Rehabilitation

Based on the 3 key components which indicate a clinician is practising at an advanced grade as defined in the 1996 PTA Whitley Council Grading Agreement and recognised by the CSP (Advanced Grades Document September 02)

a) The physiotherapist is recognised as an expert practitioner [(1)].

There is evidence of:

- A relevant post-graduate accredited qualification eg CSP Validated course, post-graduate diploma/certificate/MSc in related studies
- Continual professional development
- The physiotherapist maintains a weekly clinical case load

b) The physiotherapist/post is a resource in terms of education, training, and development of senior physiotherapists and other professional staff.

c) The post/physiotherapist carries responsibilities for developing and utilising research evidence, current national guidelines and recommendations and integrating this into service delivery to ensure that practice is evidence based.

[1] The expert in the Dreyfus model has extensive experience, an intuitive grasp of the situation, and focuses intervention without wasteful consideration of other possibilities (Railstone 1994)

BACPAR

September 2002

Appendix 15

Glossary of Terms

The following recognised terminology and abbreviations were used in the guideline document.

Terminology deployed in the field for a particular patient or population, do what they are intended to do, maintaining health and securing the greatest possible health gain from the available resources

Discharge Summary	summary of the episode of care
Clinical Effectiveness	the extent to which specific clinical interventions, when are, usually describing the treatment given and the follow up care required.
Doffing	removing the prosthesis
Donning	putting on the prosthesis
Evaluation	review and assessment of the quality of the care for the purpose of identifying opportunities for improvement.
Goal setting	establishing the desired end points of care.
Hip Disarticulation	amputation involving disarticulation of the femur from the acetabulum.
Knee disarticulation	amputation by disarticulation of the tibia from the femur
Multidisciplinary team	a group of people (e.g. healthcare staff, patients and others) who share a common purpose.
Outcome measures	a 'test or scale administered and interpreted by physical therapists that has been shown to measure accurately a particular attribute of interest to patients and therapists and is expected to be influenced by intervention' (Mayo 1995)
Patient Record	refers to any record containing patient details. Can be separate physiotherapy record or within multidisciplinary case notes.
Peer review	assessment of performance undertaken by a person with similar experiences and knowledge.
Prosthesis	artificial replacement of a body part
Socket	component of the prosthesis that contains the residual limb.
Suspension	component of the prosthesis attaching it to the body.
Symes	amputation by disarticulation of the ankle with removal of the medial malleolus and resection of the tibia
Transfemoral Amputation	amputation through the femur
Transfer of care	the process of transferring the responsibility for care from one service to another. It includes secondary referrals and discharges.
Transpelvic	an amputation when approximately half the pelvis is removed.
Transtibial Amputation	amputation through the tibia
Residual limb	remaining part of the leg on the amputated side

Abbreviations

ADL	Activities of Daily Living
DSC	Disablement Services Centre
DGH	District General Hospital
EWA	Early Walking Aid
GP	General Practitioner
JAMA	Journal of American Medical Association
OT	Occupational Therapist

Appendix 16

Useful Resources

Organisations

Contact details for BACPAR through the CSP or www.bacpar.org.uk

The Chartered Society of Physiotherapy (CSP)

The CSP, 14 Bedford Row, London WC1R 4ED

British Association of Prosthetists & Orthotists (BAPO)

Sir James Clark Building, Abbey Mill Business Centre, Paisley PA1 1TJ

International Society for Prosthetics & Orthotics UK NMS (ISPO)

ISPO, PO Box 26528, London SE3 7WF

Scottish Physiotherapists Amputee Research Group (SPARG)

c/o Liz Condie

National Centre for Training & Education in Prosthetics & Orthotics

The Curran Building, 131 St. James Road, Glasgow G4 0LS

The College of Occupational Therapy (COT)

106–114 Borough High Street, London SE1 1LB

Contact details for CIGOPW through the COT

Community agencies: List of Social Services available in local telephone directories

The Limbless Association

Roehampton Rehabilitation Centre, Roehampton Lane, London SW15 5PR

EmPower

c/o Roehampton Rehabilitation Centre, Roehampton Lane, London SW15 5PR

Special Interest Group for Amputee Medicine for the British Society of Rehabilitation Medicine (SIGAM of the BSRM) (formerly AMRS)

c/o Royal College of Physicians

11, St Andrews Place, London NW1 4LE

British Limbless Ex-Servicemen's Association (BLESMA)

Frankland Moore House, 185 High Road, Chadwell Heath, Essex RM6 6NA

Disabled Drivers Association

Ashwell Thorpe, Norwich NR6 1EX