

AMPUTEE REHABILITATION

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

CSP CLINICAL GUIDELINE 03

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

About this document: This document describes the evidence based clinical recommendations for best Physiotherapy management of Adults with Lower Limb Prostheses as described in the literature and expert opinion.

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CSP-endorsed evidence guidance seeks to provide recommendations for clinical practice and further research. This clinical guideline presents the best available evidence in the view of the authors. This follows careful consideration of all the evidence available. The CSP's "SKIPP" process has been developed to provide a structure for the development of evidence-based documents in physiotherapy. For more information on the SKIPP work programme, see www.csp.org.uk. All products undergo a process of independent review before endorsement by the Chartered Society of Physiotherapy's Endorsement Panel. Healthcare professionals are expected to take it fully into account when exercising their clinical judgment. However, the clinical guideline does not override the individual responsibility of healthcare professionals to make decisions appropriate to the circumstances of the individual patient, in consultation with the patient and/or guardian or carer. Implementation of this guidance is the responsibility of local commissioners and/or providers.

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Preface

The British Association of Chartered Physiotherapists in Amputee Rehabilitation (BACPAR) is a professional network recognised by the Chartered Society of Physiotherapy (CSP). BACPAR encourages its members to use the biopsychosocial model of care and aims to promote best practice in the field of amputee and prosthetic rehabilitation, through evidence and education, 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.

Aims of the Guideline

This guideline update has been produced to:

- facilitate best practice for physiotherapists working in lower limb prosthetic rehabilitation
- identify and incorporate new published evidence into the guideline recommendations
- assist clinical decision-making based on the best available evidence.
- inform prosthetic 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 across NHS services
- facilitate audit and research
- reduce unproven and ineffective practice

Objectives of the Guidelines

This guideline update has 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 audit and benchmarking of local service provision against national best practice recommendations
- identify any gaps in the evidence/areas for further research work

The first edition of this guideline was published in 2003⁽¹⁾. This second edition seeks to integrate new scientific evidence and current best practice into the original recommendations using similar methodology. The Delphi consensus method was replicated to ensure that recommendations based upon expert opinion capture and continue to reflect current thinking and best clinical practice. Some previous consensus recommendations have been converted to Good Practice Points due to the nature of the recommendation. All changes made within this second edition have been summarised at the end of the introduction in Table 2.

The impact of the new evidence and the 2012 Delphi consensus exercise are detailed at the beginning of each recommendation section; all new recommendations are marked (**) after the recommendation numbering and amended recommendations marked (~) for ease of identification.

Supplementary documents have been developed to support this guideline update; these are a quick reference guide detailing the recommendation and an implementation guide detailing the audit tools developed for individual practitioner use.

Both the first and second editions have been produced by members of the Chartered Society of Physiotherapy who hold State Registration with the Health Professions Council. At the time of production all members of the Guideline Update group were practising physiotherapists.

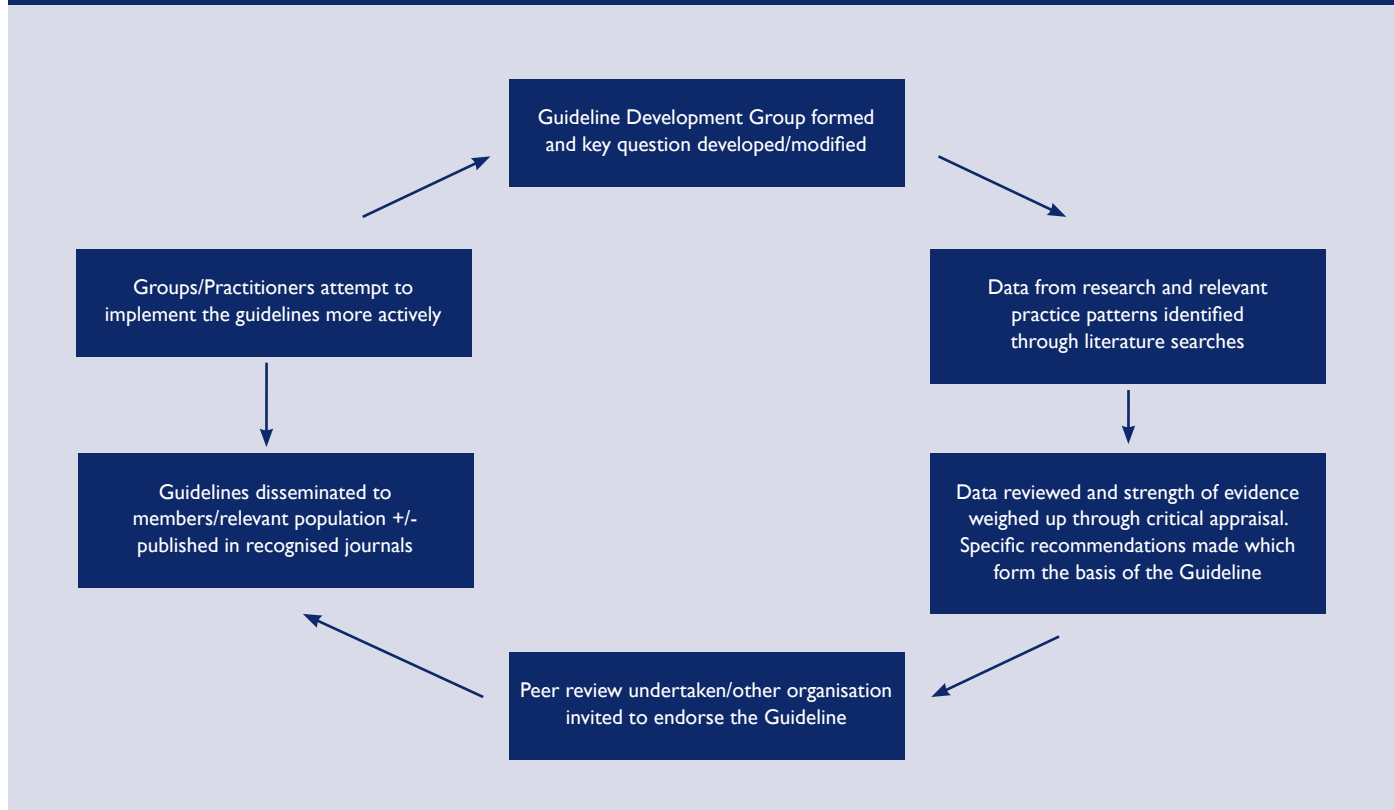
BACPAR acknowledges that not everyone who undergoes a lower limb amputation will benefit from a prosthesis. These guidelines are intended for those adults who do receive a prosthesis.

No sponsorship or funding was received during the development of this guideline and no conflicts of interest have been declared by the authors.

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. These guidelines should always be utilised in conjunction with the CSP Quality Assurance Standards⁽²⁾. If this document is being used for the purpose of prosthetic service planning it should be read alongside other amputee specific guidelines and documents developed by other healthcare professions^(3,4,5) and groups representing service user views⁽⁶⁾ along with pertinent government publications whose findings can be extrapolated to the lower limb amputee population (the National Service Framework for Long-Term Conditions⁽⁷⁾ is one such example).

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

Figure 1: Key stages of the Guideline Development Process⁽¹⁴⁾



Introduction

The need to drive up clinical standards and the quality of clinical services so that meaningful improvements for the patient are seen, whilst maintaining cost effectiveness, is a central theme found in all recent government publications pertaining to the NHS^(8,9). Therapists need to prove that they are providing clinically effective interventions and demonstrate their ongoing commitment to Continuing Professional Development (CPD) in order to maintain state registration.⁽¹⁰⁾

Clinicians working within amputee rehabilitation have reported using the first edition in many different ways⁽¹¹⁾:

- as a reference tool to guide best recognised clinical practice.
- to aid in the identification of personal and team learning needs specific to physiotherapy treatment of adults with lower limb prostheses.
- to benchmark local services against national, evidence based recommendations and use the findings as drivers in the development of local service provision and local protocols.

BACPAR have therefore decided to instigate the updating of this guideline to support and facilitate the ongoing hard work

of its membership striving to achieve best clinical outcomes and secure the optimal local service provisions for patients who have undergone lower limb amputation.

Evidence Based Clinical Guidelines

■ Definition of Clinical Guidelines:

Evidence Based Guidelines (EBGs) are ‘Systematically developed statements to assist practitioner and patient decisions about appropriate health care for specific circumstances’⁽¹²⁾.

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.⁽²⁾

The practice of evidence based medicine means integrating

individual clinical expertise with the best available external evidence from systematic research⁽¹²⁾. Figure 1 highlights the key stages undertaken by the authors of the first edition of this guideline. The filtering and refining of research information to create a 'knowledge product' with clear, concise and explicit recommendations and aims, follows the knowledge translation model proposed by Graham et al⁽¹³⁾. The previous and updated guidelines seek to guide the clinician/stakeholder through steps of knowledge acquisition and transfer and facilitate instrumental use of this new knowledge by actioning changes in clinical behaviour.

■ Clinical Governance & Professional Responsibility:

Clinical Governance has been a central theme promoted within the NHS since the publication of 'The New NHS- Modern, Dependable'⁽¹⁵⁾. This government white paper not only emphasised the concept of 'Evidence Based Practice' but placed a statutory duty on health organisations to examine the quality of healthcare provided⁽¹⁶⁾.

Although many political and policy changes have been undertaken since this time the elements of clinical governance continue to drive many changes within the Physiotherapy profession. Successive Governments have recognised the need for health care professionals to be informed of change and improvements within clinical practice and to remain in touch with current research findings that affect clinical decision-making⁽¹⁷⁾. The Health Professions Council have now made continuing professional development a regulatory requirement for physiotherapists and, through commitment to lifelong learning, physiotherapists are required to be reflective practitioners and base clinical judgements on the most appropriate information available⁽¹⁰⁾.

■ Resource Implications

In the year ending 31st March 2007 there were 4957 new referrals to NHS (non-military) prosthetic service centres in the United Kingdom⁽¹⁸⁾. Military veterans are treated within the NHS once they are discharged from the forces. The Audit Commission identified the provision of equipment services, including prostheses, as an area for investigation, resulting in the report 'Fully Equipped'⁽¹⁹⁾. 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⁽²⁰⁻²⁶⁾. The number of people undergoing amputation is small in terms of overall national health need, affecting 51,000 of the population⁽¹⁹⁾.

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.

■ Identifying the need for guidelines specific to physiotherapy treatment of adults with lower limb prostheses:

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. There is a wide variation nationally in the quality, type of service and care offered by physiotherapists to adults with lower limb amputation^(19,27).

'Senior colleagues' are the most relied upon source to inform and develop many clinicians practice within specific areas of amputee rehabilitation⁽²⁸⁾. It is however recognised that a high number of these senior staff specialising in amputee and prosthetic rehabilitation are lone practitioners⁽²⁹⁾ and that specific CPD opportunities for more experienced clinicians may be limited. It is therefore important to ensure that professional expertise is integrated with scientific evidence to promote truly 'Evidence Based Practice'⁽³⁰⁾. In these instances guidelines may be helpful in assisting the clinician access the research base, eliminate unacceptable local/national practice variations and improve the quality of clinical decisions by promoting reflection upon therapeutic strategies currently utilised.

There is resistance amongst some practitioners towards adoption of EBGs as there is a fear that diminished personal autonomy, restriction of clinical freedom and resource limitations may lead to 'average' clinical practice being widely promoted rather than clinical excellence^(12,31,32).

These guidelines are not mandatory and BACPAR recognise that local resources, clinician prioritisation, as well as the rehabilitation environment in which the practitioner works, will influence their implementation. It is however encouraging that senior clinicians currently practicing in the field of amputee/ prosthetic rehabilitation do report using the first edition of this guideline in a number of ways as identified in the introduction⁽¹¹⁾.

Methods Used to Update the Guideline

The NICE Guideline manual⁽³³⁾ suggests that

"..Any decision to update a guideline must balance the need to reflect changes in the evidence against the need for stability."^(p.14)

The first edition was published with the expectation that

Figure 2: Summary of the six basic steps identified in the updating of a Guideline⁽³³⁾



it would be reviewed and updated as required. In 2009 the BACPAR Executive Committee decided to review and update the guidelines. This was perceived as necessary due to potential changes in physiotherapy management over time and the possible new evidence available. Priority was given to this update to ensure the work remained relevant and valid.

■ The Guideline Update Group

A working party of BACPAR members was formed reflecting the necessary experience and skills needed to compile clinical guidelines (Appendix 1a). All members had an understanding of the use of guidelines in assisting and informing clinical practice, with some members having post graduate experience of guideline development. The BACPAR Guideline Co-ordinators led the working party. No member declared a conflict of interest.

Details of the 2003 working party involved in the development and writing of the first edition are detailed in Appendix 1b.

No physiotherapy specific literature/information regarding the update of clinical guidelines was identified. The methods utilised during the updating process have therefore been drawn from those outlined within ‘The Guideline Manual’

developed by NICE⁽³³⁾ (Figure 2). The CSP were kept informed at regular intervals of the progress of the update.

■ Professional Advisers

During the update of these guidelines the views of professional advisers recognised as being stakeholders/interested parties, were sought – see Appendix 2a. Their comments and suggestions informed the guidelines. Although users views were not taken at this time the first edition had sought user involvement during the development of the guideline – see Appendix 2b.

■ Funding

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

Scope of the Guideline

The scope of this guideline remains purposefully broad. It is not BACPAR’s intention to include prescriptive details of specific physiotherapy management as these would detract from the broader overview that these guidelines present. They are intended to be a framework for best practice that all physiotherapists should aspire to achieve as part of their professional responsibilities.

These guidelines are applicable to all major levels of amputation, including bilateral amputation, regardless of the underlying aetiology or age.

These guidelines commence when the patient receives their first lower limb prosthesis (for that particular residual limb) and conclude when the patient is discharged from active treatment to a maintenance/review programme.

The levels of amputation **covered** by the guidelines are:

- transpelvic
- hip disarticulation
- transfemoral
- knee disarticulation
- transtibial
- ankle disarticulation

These guidelines **do not** cover:

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

The Clinical Question

The clinical question is unchanged from the first edition of these guidelines:

What is best practice in the physiotherapy management of adults with lower limb prostheses?

The Guideline Update Group sought to assess whether new evidence and/or clinical/prosthetic developments have changed what is considered to be best physiotherapy practice.

The Literature Search

■ Aims of the Search

To identify literature relating to physiotherapy management of adults with lower limb prostheses from July 2002 to September 2010.

■ Inclusion Criteria

Articles were included if they were:

- published from July 2002
- relevant to lower limb amputees/subjects with limb loss
- relevant to adults, 18 years of age and older
- relevant to all pathologies/causes of amputation
- relevant to all major levels of amputation i.e. Transpelvic, hip disarticulation, transfemoral, knee disarticulation, transtibial and ankle disarticulations (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

■ Method

Literature searches were conducted in February 2009 and again in September 2010 under the supervision of a librarian using the search protocol and key words detailed in the first edition of the guidelines. The following databases were searched: AMED, BioMed Central, British Nursing Index, Cinahl, Cochrane, DARE, Embase, King's Fund, Medline, OT Seeker, PEDRO, RECAL and REHABDATA.

■ Selection of relevant articles

The results from each database search were assessed for all potentially relevant articles by reading the titles. All potential articles were copied onto clipboard and duplicates removed. The abstracts were then studied to ensure the article met the inclusion criteria. All articles that were relevant were obtained in full to be critically analysed.

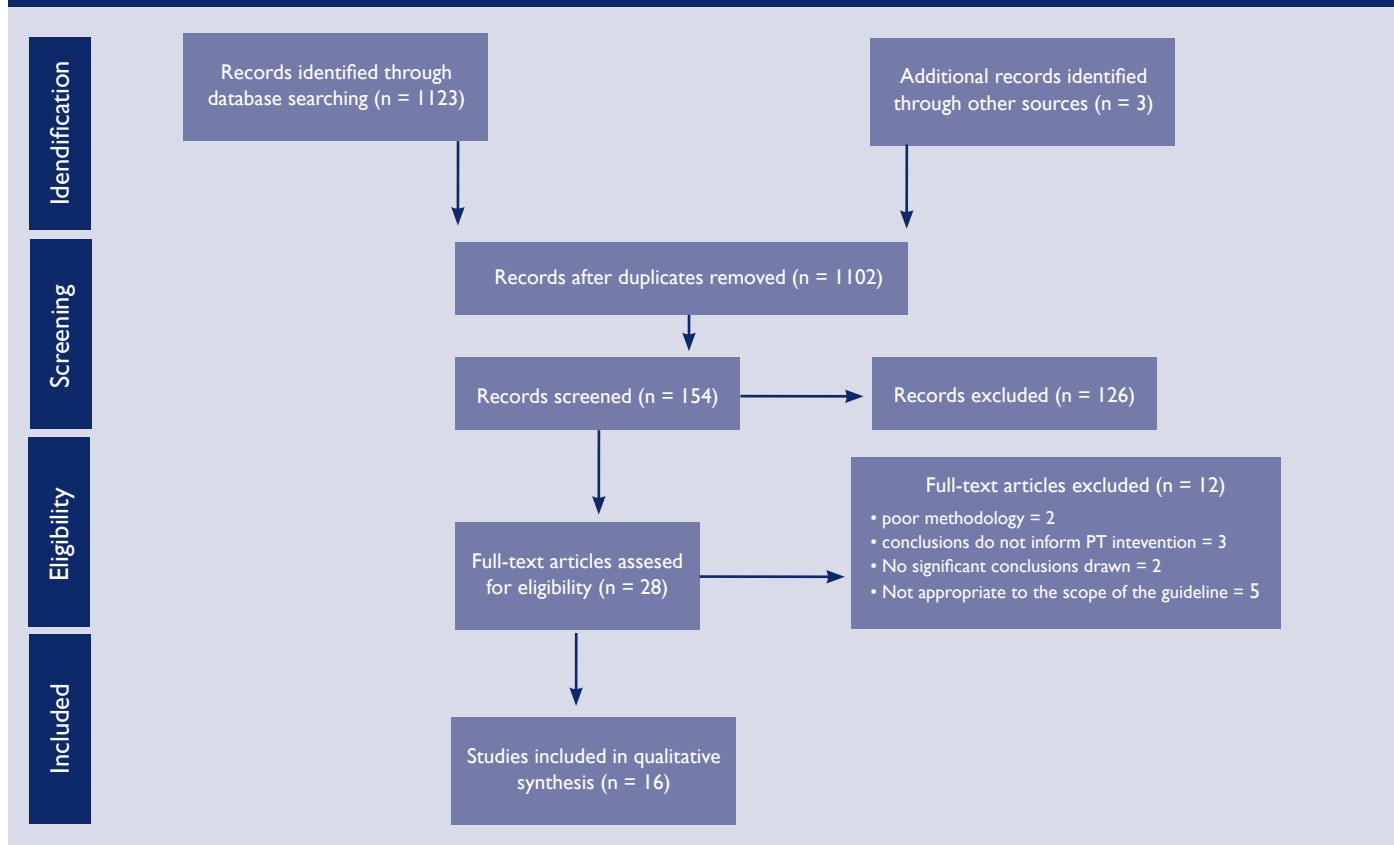
Three extra articles were sourced from suggestions by external reviewers. This increased the number of articles analysed to 28.

Moher et al⁽³⁴⁾ state that poor reporting diminishes the value of systematic reviews and subsequent guidelines developed from such evidence. The PRISMA statement has been developed and distributed internationally and suggests many points to improve reporting quality and transparency. Figure 3 details a completed PRISMA flow diagram illustrating the flow of information through the different phases of literature identification and review.

Table 1: Number of articles found from each database search

Database	Number of results	Articles identified as potentially relevant from reading title	Number of articles analysed after reading abstract
AMED	151	48	7
BioMed	0	-	-
BNI	119	2	0
CINAHL	92	16 (6 duplicate)	1
Cochrane	84	1	1
OT Seeker	13	1 (duplicate of above result)	0
RECAL	270	48 (11 duplicates)	7
Embase	169	6 (4 duplicates)	1
King's Fund	0	-	-
Medline	199	51	8
DARE	5	0	-
PEDRO	13	3 (2 duplicates)	0
REHABDATA	8	0	-
Total	1123	151 (no duplicates)	25

Figure 3: PRISMA (2009) Flow Diagram illustrating the flow of information through the different phases of the literature identification and review process



Reference: Moher et al⁽³⁴⁾. Template accessed via www.prisma-statement.org

The Appraisal Process

The CASP (Critical Appraisal Skills Programme) tools⁽³⁵⁾, specifically developed to help evidence-based analysis in health and social care settings, were selected to guide article appraisal. There are seven separate tools devised to help appraise different types of research methodology (see Appendix 4 for an example); each has simple applicability and all appraisers were familiar with their use. Appendix 5 details the literature reviewers who took part in the appraisal process.

28 articles were critically appraised between three appraisal groups; each group consisted of two appraisers.

Articles were excluded if both of the appraisers felt the study was

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

Details of the articles excluded after full review are displayed in Appendix 6.

■ Classification of included articles:

The individuals in each appraisal group carried out separate reviews on full text articles prior to discussing it in order to minimise potential bias. For each article the appraiser completed an 'evidence table' detailing the study design, characteristics, subject of study, comments, potential use in guidelines and level of evidence. The quality of each article was classified using the SIGN grading tool⁽³⁶⁾ (Appendix 7). Any differences of opinion were resolved by consensus agreement of the Guideline Update Group detailed in Appendix 1a.

16 articles were identified as providing new evidence.

Completed evidence tables were reviewed by the Guideline Update Group and, where ambiguous or contradictory comments were found, the full text article was revisited and further detail added. The evidence tables for all articles utilised in the previous and current edition of this guideline are found in Appendix 8.

The Consensus Process

It was recognised in the first edition⁽¹⁾ that, in some clinical areas, the literature did not provide sufficient evidence to develop recommendations; the authors therefore chose the Delphi Technique to obtain consensus opinion where the literature was lacking.

Given the length of time that had elapsed since publication it was felt by the Guideline Update Group important that the expert opinion (from which 'D' graded recommendations had been developed) be scrutinised to ensure they continue to be a true reflection of current ideas and clinical practice.

■ The Delphi Technique

The Delphi Technique 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⁽³⁸⁾.

It is a widely utilised methodology within healthcare for gathering expert opinion and turning it into group consensus⁽³⁹⁾ and, although more time consuming and labour intensive than a conference, the Delphi Technique ensures:

- all contributors have an equal voice.
- that geographical barriers do not prevent participation.
- consideration of all possible options for treatment.
- practicing clinicians have the opportunity to contribute to and develop the guidelines.

■ The Delphi Process

In the original process two rounds of postal questionnaires were sent out before recommendations were written. It was decided that these recommendations would be the starting point for the Delphi questionnaire for the second edition (Appendix 9).

No literature could identify a universally acceptable percentage at which it could be determined that consensus agreement had been reached. Previously, it was 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 would be refined for a second round. If consensus could not be reached after all the rounds of questionnaires then no recommendation would be written.

■ The Consensus Panel

No specific panel size has been identified as being optimal for the Delphi process; representation should be assessed by 'qualities of the expert panel rather than it's numbers'⁽³⁹⁾.

The consensus panel utilised in the updating process consisted entirely of physiotherapists because the Delphi questions were

directly related to physiotherapy practice.

Invitations to participate were sent out to 50 clinicians who were recruited either by an appeal on the amputee network on the iCSP website⁽⁴⁰⁾ or identified by the BACPAR and SPARG membership secretaries.

The panel inclusion criteria remain unchanged-Physiotherapists who:

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

Two clinicians who replied excluded themselves as they no longer met the inclusion criteria; a return rate of 77% was achieved with thirty-seven out of the eligible forty eight 'experts' returning a completed Delphi questionnaire. No literature reviewed could identify an acceptable return rate for the Delphi Technique; as subject numbers closely reflect those gained in the first edition, any bias introduced by a difference in response rate is unlikely to be significant.

■ Delphi Results

No questions produced consensus of less than 75%; therefore a further round of postal questionnaires was not indicated.

Good Practice Points (GPPs)

"On occasions, guideline development groups find that there is not, nor is there likely to be any research evidence. This will typically be where the treatment is regarded as such sound clinical practice that nobody is likely to question it"⁽³⁶⁾.

Following initial discussions with the CSP advisers it was felt that there were some consensus recommendations in the previous guidelines that should be distinguished as GPPs. The points turned into GPPs in many instances are considered by the authors to reflect a 'common sense' approach to intervention; any recommendations that reflected any element of clinical reasoning were not converted to GPP's but put forward to be re-examined by the consensus panel selected for the guideline update.

When writing the GPPs the authors have ensured that they are realistic, integral to the patient's treatment and that the expert consensus panel agreed with the conversion (Appendix 11).

Appendix 10 displays the breakdown of the results and comments that were received from the consensus panel.

Three participants cited funding or resources as a reason for lesser agreements with some Delphi statements. In taking potential barriers and 'real life' application issues into account it is possible that they are not representing their opinion of 'best practice' but stating 'what can be' rather than 'what should be' but, due to the anonymous nature of the questionnaires there was no way of seeking clarification. After discussion between the Guideline Update Group and members of the BACPAR Executive Committee it was decided that the low frequency of this issue did not support the financial and resource implications of launching a second round of Delphi questionnaires.

Drafting the Updated Guideline

A considered judgement of all new evidence identified was made by the Guideline Update Group (see Appendix 1a) and reviewed in light of the section headings utilised in the guidelines first edition.

■ Section headings:

The original authors (see Appendix 1b) had decided upon section headings for the recommendations using:

- CSP Standards of physiotherapy practice for the management of patients with amputations⁽⁴¹⁾
- CSP Quality Assurance Standards⁽²⁾
- Knowledge and expertise of the working party

It was agreed that the six section headings utilised in the guidelines first edition remained clinically relevant and representative of the evidence; the title of section 6 was expanded upon in response to the comments made by an external reviewer.

■ Updating the guideline and incorporating new evidence

The introduction was reviewed and updated to reflect changes within NHS and professional policy; additions and changes to the methodology utilised were made.

Following appraisal of the new evidence each section of the previous guideline was re-examined by the Guideline Update Group; consensus was gained within the group as to whether the new evidence strengthened previous recommendations or supported a new recommendation being developed. Once the new literature was amalgamated, levels of evidence for each recommendation were allocated (see Appendix 12) reflecting the strength of the supporting evidence from which they were formulated.

The recommendation grading system utilised gives guideline users information about the quality of evidence upon which each recommendation is based; it does not rank recommendations in the authors' perceived level of importance. It is acknowledged that it is sometimes not appropriate to use a randomised controlled trial (RCT) to answer therapy research questions^(30,31,36) hence there are very few 'A' graded recommendations. The authors continue to find that there are large areas of physiotherapy input with prosthetic users where no supporting published evidence exists; in these instances expert opinion has been revisited and recommendations derived from this can only receive a 'D' grading.

Results & comments from the 2012 Delphi consensus⁽¹¹⁾ were reviewed and, where indicated, minor rewording was undertaken. Agreed GPPs were inserted into the text.

Guideline Audit Tools

It is recognised by validated guideline appraisal tools (i.e. the AGREE tool) that a guideline should present key review criteria that individual practitioners could utilise in the monitoring and auditing of their own service/practice.

■ Updating the Audit tool

The previously developed audit tool was reviewed as part of the updating process; comments were sought via the consensus panel and users of iCSP website⁽⁴⁰⁾ about their practical experience of using the tool clinically. Comments received and actions taken by the authors whilst updating the audit tools are detailed in Appendix 13.

The revised audit tool has been split into 3 parts, giving three distinct tools:

- service led recommendations (Appendix 14a)
- personal achievement of GPPs (Appendix 14b)
- patient notes audit form (Appendix 14c)

It is hoped that these stand alone audit tools will decrease some of the time burden on the auditor/clinician as they can be completed at separate times and could be utilised as evidence of continued professional development – e.g. completion of audit tool 2: Personal achievements of GPPs- may provide evidence for the NHS Knowledge and Skills Framework⁽⁴²⁾ Core Dimensions 1,2,3,4 & 5.

Local standards need to be set regarding the audit targets but BACPAR feel it is reasonable to expect that any clinician providing physiotherapy treatment to adults using a prosthesis should adhere to 100% of the GPPs presented in this document as a minimum for safe practice.

Seeking feedback from Stakeholders/Interested parties, Implemented & Dissemination of the Updated Guideline & Barriers to Implementation

Seeking feedback from Stakeholders/Interested parties

The AGREE guideline appraisal tool was used as a tool to assist the reviewers deliver a quality judgement about these guideline's usefulness and validity; see Appendix 15 for the specific domains examined^(33,36).

■ Internal Review of the drafted guideline update:

Once a full draft was completed this was sent to:

- Authors of the guidelines 1st edition (Appendix 1b)
- BACPAR representatives (Appendix 2)
- CSP professional adviser (Appendix 2)

The recommendations & comments from the above were assimilated to produce the second draft that was passed for review by the accreditation team at the CSP, external review (Appendix 16) and peer review (Appendix 17).

One concern raised by the CSP and BACPAR representatives was the fear that the length and depth of information included within this document would detract from its accessibility and usability for clinicians. To address this concern the Guideline Update Group decided to create three separate documents:

- **Full text** of Evidence Based Clinical Guidelines for the Physiotherapy Management of Adults with Lower Limb Protheses (2nd Edition) that details the full methodology employed to create the guideline update.
- **Quick reference guide** summarising the evidence based recommendations.
- **Audit & Implementation guide** – helping users implement the recommendations into practice and presenting the updated audit tools to assist the individuals evaluate service provision and their own learning needs.

■ Professional Advisors:

Professional advisors (Appendix 2a) from LLPOT, BAPO, SIGAM arm of the BSRM and the Trent Amputee Nurses Network were invited to comment upon the recommendation sections which were felt to be most pertinent to their areas of clinical expertise.

■ The External Review:

The external reviews were organised and collated by the Research Advisor based at the CSP. They have been undertaken by a relevant third sector organisation and by 3 practicing physiotherapists treating people with amputation: a generalist, an expert and a manager of an amputee service. Reviewers were asked to comment on the process of development, its validity and applicability, format and presentation, using the AGREE appraisal instrument recommended by the CSP.

The collated comments and suggestions were considered by the Guideline Development Group and a further group of BACPAR representatives who had not been involved in the writing or peer review of the guideline update; this was done to try and ensure maximum objectivity. Where there was consensus to accept the external reviewers comments the document was amended accordingly – see Appendices 16 a and b for further details of this process and actions/amendments taken.

■ Peer Review:

Both specialist and non specialist Physiotherapy staff with experience of lower limb amputees +/- prosthetic rehabilitation were invited to comment upon the draft guideline. A mixture of staff grades, clinical specialities and geographical location was sought to maximise the strength of the peer feedback process; Appendices 17a & b details the peer reviewers and their feedback.

Review and Further Updates of the Work

BACPAR will assess the need to update these guidelines after a period of 5 years. At this point BACPAR's executive committee will perform a literature search to assess the amount of new evidence. A discussion will be held regarding whether there is sufficient new evidence or there has been a change in clinical practice by either healthcare professions and/or patient and carer organisations. A decision will then be made either to update the guideline or produce a statement detailing the reasons why it will be postponed.

During the next update of the guideline the new Guideline Development Group will ensure that there is user involvement throughout the update process. As prosthetic commissioning is evolving the Guideline Development Group will also consider producing an audit tool for local implementers/managers.

Health Benefits, Side Effects and Identified Risks

The recommendations within the guidelines are evidence based and support best practice. No side effects or risks were identified from the literature, professional advisers, reviewers or consensus panel.

Implementation & Dissemination of the Updated Guideline

■ Publication and Presentation:

It is good practice that all guidelines be free to all who wish to access them as established by the Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities (<http://oa.mpg.de/openaccess-berlin/berlindeclaration>). The guideline is accessible from the CSP website. An ISBN number has been allocated to the updated guideline, and therefore catalogued with the British Library.

BACPAR will fund the publication and dissemination of the 'Quick Reference Guide' and 'Audit and Implementation Guide' as short documents (at the request of its membership) to improve accessibility of the information.

The regional networks of BACPAR membership will support the implementation and promotion of this guideline update at a local level by supporting various CPD opportunities.

The Guideline update Group will also seek to present at relevant national conferences to disseminate to multi professional audiences.

Barriers to Implementation

In order to adopt the recommendations in these guidelines a number of factors should be considered which may act as barriers to their implementation. Although implementation

of these guidelines may have cost implications a cost benefit analysis could not be undertaken as 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; many of the barriers faced by individual practitioners have been discussed previously in this chapter. It is unfortunately outside the scope of this work to directly address the limited local resources or financial constraints repeatedly referred to in the Delphi consensus exercise; the authors suggest that the evidence based recommendations could assist in presenting a 'case of need' to healthcare managers in areas where non-compliance is can be demonstrated.

Table 2

Table 2: Summary of the Main Changes From the Previous Guideline ⁽¹⁾	
Contents within 'Background and Development of the Guideline' Summary	Change and rationale
Introduction	Preface added and introduction updated to reflect current changes in NHS
The need to Evidence Based Clinical Guidelines	Updated. New evidence utilised to support the continuing need for physiotherapy guidelines in the field of amputee rehabilitation
Aims/Objectives/Scope of the Guidelines	Unchanged
The Development Process	Section removed – information amalgamated within the need for evidence based guideline section and the methods used to update sections
Methods used to Update the Clinical Guideline	New section added to detail the work of the 2012 Guideline developmental group
The Literature Search	Updated to detail the update process
The Literature Appraisal process	Updated to detail the update process. PRISMA diagram inserted
The Consensus process	Updated to reflect the results of the 2011 Delphi consensus questionnaire
Good Practice Points	New section
Audit	Introduced the three updated audit tools in response to comments about usability of the previous audit tool
Drafting the Guidelines	Updated to detail the update process
The External Review	Updated to detail the update process
Implementation & Dissemination	Minimal changes
Review	Updated to reflect BACPAR current thinking
Health benefits, side effects and risk	Unchanged
Barriers to implementation	Minimal changes
Table A: Summary of changes to original Guideline	New table added as an easy reference guide summarising the main changes from the 2003 Guideline document
Contents within 'Recommendations of the Guideline'	Change
Introduction	Key to new/amended recommendations included
Section 1: The Multi Disciplinary Team	GPP added
Section 2: Prosthetic Knowledge	Some re wording of recommendation and GPP added
Section 3: Assessment	New evidence discussed. New recommendations and GPPs added
Section 4: The Prosthetic Rehabilitation Programme	New evidence discussed. New recommendations and GPPs added
Section 5: Patient Education	New evidence discussed. New recommendations, GPPs and local implementation points added.
Section 6: Discharge, Maintenance and Long Term needs	New evidence discussed. Alteration in title in response to one external review's grave concerns that the long term prosthetic users needs are not clearly identified. Some re wording of recommendations. New recommendation, GPPs and local implementation points added.
Contents within 'References and Appendices'	Change and rationale
References	New references inserted and all references renumbered accordingly

Appendix 1a	Guidelines Update Group
Appendix 2: Professional advisers	Updated to include the Professional Advisors involved in the 2012 update work
Appendix 3: Literature search strategies	Demonstrating the search string utilised with the Medline database
Appendix 4: CASP Appraisal tool	This replaces previous Appendix 6: JAMA Appraisal tool
Appendix 5: Literature appraisers	Updated to include the literature reviewers of the 2012 Guideline alongside those of the original document
Appendix 6: Table of excluded papers	New appendix detailing the articles that were excluded from use after full review
Appendix 7: SIGN Levels of Evidence	Appendix updated to reflect current definition of the levels of evidence
Appendix 8: Table of papers referenced in Guidelines	Table updated and new evidence incorporated
Appendix 9: Delphi and Good Practice Point Questionnaire	Copy of the questionnaire sent out to the 2012 expert consensus opinion
Appendix 10a: Delphi results	Appendix completely rewritten to reflect the results of the expert opinion collected by the 2012 GDG
Appendix 10b: Expert Comments and the Impact upon the 2012 Guideline Update Process	
Appendix 11: Delphi Results – Guideline Good Practice Points (GPPs)	New appendix – displaying the Expert opinion and comments received about the conversion of some 2003 recommendations into GPP's
Appendix 12: Definition of SIGN's 'Grades of Recommendation'	Updated to include current definitions
Appendix 13: User comments – Audit tool	New appendix – displaying comments received about the usefulness and usability of the audit tool in the previous guideline
Appendices 14 a,b and c: Audit Collection Forms	New audit tool presented – updated to reflect user comments and improve usability in clinical practice
Appendix 15: AGREE Guideline Review Tool	New appendix – displaying the validated tool used to guide the external reviewers feedback
Appendix 16a: BACPAR Representatives Involved in Creating the Response to the External Reviewers Comments	New appendix listing the names of reviewers involved
Appendix 16b: Impact of the Comments from External Reviewers upon the 2012 Guideline Update Process	Highlights the amendments made to the guideline following external review
Appendix 17a: Peer Reviewers	Updated to identify the Peer Reviewers of the 2012 Guideline
Appendix 17b: Comments from Peer Reviewers – their impact upon the 2012 Guideline Update process	Displays the comments and the changes made to the guideline
Appendix 18: Definition of a Clinical Specialist in Prosthetic Rehabilitation	Appendix updated to reflect the workforce changes imposed by the adoption of 'Agenda for Change' across the NHS
Appendix 19: Glossary of terms	Updated to reflect any new terminology introduced with the new literature
Appendix 20: Useful Resources	Appendix updated: all existing contact details checked and corrected where necessary and new contacts inserted

*Structure of this table adapted from the 'Main changes' table, NICE⁽³³⁾.

Guideline Recommendations

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

- The Multidisciplinary Team
- Prosthetic Knowledge
- Assessment
- The Prosthetic Rehabilitation Programme
- Patient Education
- Discharge, Maintenance and Long term needs.

Each section includes an introduction, a summary of the evidence, the relevant recommendations, good practice points (GPPs) and suggestions for local implementation.

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

Recommendations were developed and graded according to the level of evidence (Appendix 7). After each recommendation the letter in brackets refers to the evidence grade allocated (Appendix 12). Where a number of different evidence sources were used to develop a recommendation the grade is based on the highest level of evidence used. This grade reflects the quality of the evidence reviewed and should not be interpreted as the recommendation's clinical importance.

The table of the papers utilised in developing the recommendations and their allocated level of evidence is in Appendix 8.

■ Key to the Guideline Update:

Where recommendations have been amended or added for this update symbols are displayed next to the recommendation numbering for ease of identification.

New recommendations in this guideline update are marked **. Amended recommendations are marked ~.

Section I: The Multidisciplinary Team

■ Introduction

A specialist multidisciplinary team (MDT) achieves the best prosthetic outcomes^(38, 39). 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^(44,45).

CSP Physiotherapy Quality Assurance 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 MDT may include: specialist physiotherapist, occupational therapist, prosthetist, rehabilitation doctor, counsellor and nurse⁽³⁾.

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; the involvement of these will depend upon the patient's specific rehabilitation needs and circumstances.

■ 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^(44, 45) 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⁽⁴³⁾ 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⁽¹⁾.

■ Recommendations

I.1 A physiotherapist specialising in amputee rehabilitation (Appendix I8) should be responsible for the management of physiotherapy care. (B)^(43, 44, 45)

■ Good Practice Point (GPP)

GPP I – The physiotherapist should contribute to MDT audit, research and education

■ Local Implementation

- The MDT should agree its approach to the rehabilitation process to holistically identify & address the prosthetic users ongoing biopsychosocial needs.
- Local service standards should be agreed which reflect the recommendations of this and other published professional guidelines pertaining to the prosthetic rehabilitation of adult lower limb amputees^(3,4,5).
- Channels of communication and opportunities for education and discussion should be established.
- A format for MDT 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⁽¹¹⁾.

The physiotherapist is responsible for keeping up to date with advances in prosthetic technology⁽¹¹⁾ and identifying/ addressing personal learning needs in order to maintain safe and effective clinical practice⁽²⁾.

To provide an efficient, patient centred service the physiotherapist should maintain a close liaison with the prosthetic providers at the prosthetic centre and other MDT members.

■ 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⁽⁴⁶⁻⁵¹⁾.

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.

■ 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.
- The review of 'Prosthetic Best Practice Guidelines'⁽⁷⁾ may be one resource that assists the physiotherapist in identifying and addressing their own specific prosthetic learning needs.

■ Recommendations

- 2.1 The physiotherapist should understand the theory of prosthetic componentry and the effects of prosthetic rehabilitation on the remaining body systems. (B)⁽⁴⁶⁻⁵¹⁾
- 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)^(47, 48, 49, 51)
- 2.3 The effects of prosthetic alignment on pressure distribution within the socket should be understood. (C)⁽⁵¹⁾
- 2.4 The management of residual limb volume changes in relation to socket fit should be understood. (D)⁽⁵²⁾
- 2.5 The physiotherapist should understand the pressure tolerant and pressure sensitive areas of the residual limb in relation to prosthetic fit. (D)⁽¹¹⁾
- 2.6 ~ The physiotherapist should check the prosthesis for correct and comfortable fit prior to each treatment, until the patient (+/- their carer) is able to do this for him/herself. (D)⁽¹¹⁾
- 2.7 ~ The physiotherapist should examine the residual limb before and after prosthetic use, until the patient (+/- their carer) is able to do this for him/herself. (D)⁽¹¹⁾
- 2.8 ~ The patient (+/- their carer) should examine the residual limb before and after prosthetic use. (D)⁽¹¹⁾
- 2.9 ~ The physiotherapist should contribute to the decision-making process regarding prosthetic prescription taking into account specific assessment findings such as the patient's musculoskeletal function, cognition and exercise tolerance. (D)⁽¹¹⁾

■ Good Practice Points (GPPs):

GPP II: The physiotherapist should understand the different methods of donning and doffing prostheses.

GPP III: The prosthetic centre should be contacted if there is malfunction of any componentry.

GPP IV: The prosthetic centre should be contacted if the socket requires adjustment in order to achieve a correct and comfortable fit.

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; 'shared decision making' is a key recommendation in the 2010 White paper – Equality & Excellence: Liberating the NHS⁽⁸⁾ – which emphasises the concept 'no decision about me without me'.

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⁽²³⁾, 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.

Wan Hamzy et al⁽⁵³⁾ conducted a small cross sectional survey (n=30) which found that the presence of diabetes and related diabetic co-morbidities can lead to sub optimal use of a prosthesis; there is however limited scope to generalise their results due to subject recruitment issues and significant cultural differences regarding prosthetic provision between Malaysian and UK practice.

Collin et al in 1995⁽²⁴⁾ concluded, from a case series of poorly defined elderly individuals, that this patient population will be less mobile following a lower limb amputation so a wheelchair should be routinely provided. In 1992, Collin et al⁽⁵⁴⁾ 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⁽⁵⁵⁾ 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⁽⁵⁶⁾. 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⁽⁵²⁾ 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⁽²⁰⁾ and Waters et al⁽⁵⁰⁾ 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⁽⁵⁷⁾ 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. Later papers^(58, 59) suggest that the results of an intellectual assessment on elderly patients soon after amputation can predict the level of mobility likely to be achieved after 6 months.

Neuromuscular status was found by Altner et al⁽⁶⁰⁾, 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.

The CSP Quality Assurance Standards⁽²⁾ state that: *'An appropriate measure is used to evaluate the effect of physiotherapeutic intervention(s); and the measure chosen is published, standardised, valid, reliable and responsive.'* (Quality Assurance Standard 9.4.2.1.)

Condie et al⁽⁶¹⁾ performed a systematic review of literature (1995- 2005) pertaining to prosthetic outcome measures. They identified a vast number being utilised within the literature but concluded that there currently is no 'Gold Standard' outcome measure. They suggest that mobility, function and Quality of Life be measured by the Prosthetic MDT using validated measures but acknowledge that more than one measure may need to be applied to obtain this information.

Recommendations

- 3.1 There should be written evidence of a full physical examination and assessment of previous and present function (A)^(20, 23, 24, 48, 50, 52, 56)
- 3.2 The patients' social situation, psychological status, goals and expectations should be documented. (B)^(20, 23, 24, 54, 55, 57, 58)
- 3.3 ~~ Relevant pathology including diabetes, impaired cognition and hemiplegia should be noted. (C)^(46, 52, 56-59)
- 3.4 A problem list and treatment plan, including agreed goals, should be formulated in partnership with the patient. (D)⁽²⁰⁾
- 3.5 ** There should be evidence of the prosthetic MDT applying valid, reliable and responsive outcome measures to collect baseline data for each patient during the assessment period. (B)⁽⁶¹⁾

■ Good Practice Point (GPP)

GPPV: The physiotherapist should be aware of the prosthetic componentry, type of socket and method of suspension being utilised and this information documented within the patient's notes.

■ 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.
- There should be local agreement as to the outcome measure(s) which will be utilised within clinical practice and the timescales over which they will be applied and retested.
- There should be a locally agreed protocol to follow should any diabetic patient experience symptoms of a 'hypo' during physiotherapy assessment or subsequent treatment.

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; what is selected will depend upon the therapists assessment of the patient's physical ability, risk factors (especially regarding the status of the contralateral leg) and the environment in which they will be mobilising.

■ 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⁽⁵⁶⁾ and case controlled study⁽⁶²⁾ also describing the problems encountered by the amputee population as regards peripheral neuropathy and torque producing capability.

Two new studies examining the impact of Early Walking Aids (EWAs) upon prosthetic gait and function were identified. Van Ross et al⁽⁶³⁾ conducted a case series study (n=56) examining the effects of early mobilisation (utilising the PPAM aid and definitive prosthesis) on unhealed, dysvascular trans tibial residual limbs; they concluded that the presence of unhealed wounds was not an absolute contraindication to progressing with full weight bearing mobility training. Despite this promising initial work, the presence of very specific wound monitoring protocols, the competency skill set required and the prolonged follow up of patients will affect reproducibility of this regime (especially in rehabilitation settings outside of regional prosthetic centres) and therefore a recommendation cannot be currently drawn from this work. In 2009 Barnett et al⁽⁶⁴⁾ examined the use of PPAM and AMA on transtibial amputees and found no clear advantage of using either EWA as the most significant gait adaptations occurred after prosthetic delivery; no statistically significant differences in the level of measured walking ability and quality of life were noted between the groups at discharge from physiotherapy.

Miller et al⁽⁶⁵⁾ comment that patients who undergo amputation due to peripheral vascular disease are likely to display weakness and generalised deconditioning secondary to a sedentary lifestyle. Three studies, all using small subject numbers^(48,64,66), are more explicit in recommending that specific muscle strengthening for the amputated and contralateral side and additional exercises to increase muscle

length and joint mobility of the lower limbs be instigated within an individual's prosthetic rehabilitation programme.

A semi structured questionnaire (n=202) established significantly higher incidence of low back pain (LBP) in the traumatic amputee (prosthetic using) population within one UK prosthetic centres catchment area compared to subjects without limb loss⁽⁶⁸⁾. Trans femoral amputees were found to be more likely than trans tibial amputees to suffer from back pain (81% v's 62%) but the analysis of the underlying aetiology of the amputees LBP should be interpreted with caution as funding limitations allowed only small subject numbers to undergo the MRI scanning extensively referred to in their conclusions. It has been hypothesised that iliopsoas dysfunction may play a role in the incidence of back pain in amputees^(68,70) but methodological limitations mean that further research amongst larger cohorts of subjects is required before specific recommendations can be made. An unpublished systematic review⁽⁶⁴⁾ was unable to identify any RCTs that examined the effectiveness of treatment options for LBP amongst amputees without extrapolating from studies examining different patient populations.

Gailey⁽⁷⁰⁾ concludes that 'quality' prosthetic care could be important in the prevention of secondary musculoskeletal issues but there is no definition of 'quality' included and it is outside the scope of this guideline to attempt to establish what constitutes best prosthetic practice.

Case control studies suggest^(48,67,71-74) that functional skills of increasing complexity should be taught within the patients' limits. Consensus opinion⁽¹¹⁾ was sought to determine and detail the specific more complex tasks that may be taught, depending on the patients' ability and personal goals. There was strong agreement for the activities listed, though teaching the use of public transport and escalators was qualified by many respondents as being desirable but impractical due to time and resource constraints.

Three studies^(83,84,89) examined the return to work of adults post amputation. One literature review identified 31 studies that focused upon the reintegration of lower limb amputees to work but identified that the poor control of variables and differing inclusion criteria made meta analysis and comparison of the studies difficult.

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. These recommendations caused the greatest controversy in the Delphi questionnaire (Appendix 9) with some respondents highlighting that not all practitioners have the clinical expertise to safely input into the specified areas of patients care; it is therefore essential that practitioners work only within the scope of their own competency and work to identify their personal learning needs as per CSP Quality Assurance Standards⁽²⁾.

Recommendations

- 4.1 Prosthetic rehabilitation should aim to establish an energy efficient gait based on normal physiological walking patterns. (A)^(50-51, 62, 75, 76)
- 4.2 ~ The physiotherapist should be aware that level of amputation, pre-existing medical conditions and social environment will affect rehabilitation. (A)^(23, 54-56, 58, 76-81)
- 4.3 During rehabilitation the physiotherapist should take into account that prosthetic gait demands higher energy expenditure than physiological gait. (C)⁽⁵⁰⁾
- 4.4 ** The physiotherapist should prescribe a personalised exercise programme incorporating specific muscle strengthening and stretching exercises and maintaining/improving joint mobility (A)^(48, 64, 66)
- 4.5 The physiotherapist should teach efficient control of the prosthesis through postural control, weight transference, use of proprioception and exercise to prevent and correct gait deviations. (B)^(67, 71-73, 80, 82)
- 4.6 ** The physiotherapist should be aware of the incidence of low back pain amongst prosthetic users and work alongside the prosthetic MDT to optimise prosthetic alignment, fit and minimise postural asymmetries (D)^(68, 70)
- 4.7 Prosthetic rehabilitation should begin within a maximum of 5 working days after receipt of the prosthesis (D)⁽¹¹⁾
- 4.8 During prosthetic rehabilitation patients should receive physiotherapy as often as their needs and circumstances dictate. (D)⁽¹¹⁾
- 4.9 The prosthesis should be worn for short periods of time initially, increasing in use as exercise and skin tolerance allow. (D)⁽⁵²⁾
- 4.10 ~ Gait re-education should commence within the parallel bars unless there are specified reasons documented for utilising alternative strategies. (D)⁽¹¹⁾
- 4.11 ~ Gait re-education should progress through walking within a supported rehabilitation setting to walking within the home environment. (D)⁽¹¹⁾
- 4.12 Walking aids should be provided to ensure that prosthetic users, where possible, progress to being fully weight bearing through their prosthesis. (D)⁽¹¹⁾
- 4.13 Functional skills progressing in complexity should be taught within the patients' limits. (B)^(48, 67, 71-74, 82-84)
- 4.14 Rehabilitation should be functional and integrated with activities of daily living. (D)⁽¹¹⁾
- 4.15 ~ The physiotherapist should instruct the patient in a range of functional tasks which
 - i) are relevant to the goals set with that individual
 - ii) deemed by the Physiotherapist as being within the patient's physical capabilities to safely undertake a trial of the task. These activities may include:
 - obstacle crossing (C)⁽⁸⁵⁾
 - 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)⁽¹¹⁾
- 4.16 Prosthetic users should be encouraged and assisted to resume hobbies, sports, social activities and driving. (C)^(82, 55, 86)
- 4.17 ** Where applicable prosthetic users should be encouraged and assisted to return to work. (B)⁽⁸⁷⁻⁸⁹⁾
- 4.18 ** Prosthetic users progress throughout the rehabilitation programme should be measured using outcome measures validated for lower limb amputees. (B)⁽⁶¹⁾
- 4.19 The physiotherapist, alongside other professionals, should contribute to the care of wounds during rehabilitation. (D)⁽¹¹⁾
- 4.20 The physiotherapist, alongside other professionals, should treat scar problems when these occur during rehabilitation. (D)⁽¹¹⁾
- 4.21 The physiotherapist, alongside other professionals, should contribute to the management of residual limb pain. (D)⁽¹¹⁾
- 4.22 The physiotherapist, alongside other professionals, should contribute to the management of phantom sensation/pain. (D)⁽¹¹⁾

Good Practice Points (GPP)

GPP VI: Where a prosthesis is provided for transfers only (or to assist with Nursing care) instruction and advice on its safe use should be given by the Physiotherapist.

Local Implementation

- Resources, including staffing, and facilities that allow full functional rehabilitation are necessary and may act as barriers to achieving guideline recommendations.
- Local protocols should be referred to or developed to cover specific treatment modalities.
- There should be local agreement as to the outcome measures selected and the timescales over which they will be applied and

retested. The BACPAR endorsed 'Toolbox of Outcome Measures'⁽⁹⁰⁾ may be a useful document to assist the MDT in this process.

- Patients receiving cosmetic limbs (i.e. those who do not undertake any element of weight bearing through their prosthesis) will require instruction and guidance regarding its use and care; local protocols should be developed to cover which MDT member will provide this input.

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

Depending upon the environment that the prosthetic rehabilitation is being undertaken in, other MDT members (aside from the Physiotherapist) may lead/contribute to the achievement of the guideline recommendations. Where there is overlap of professional roles local agreement should exist as to which MDT member will lead the patient input; unnecessary duplication should be avoided, where possible, to allow effective and efficient service delivery.

5.1 Use of the Prosthesis

■ Evidence

The Delphi process⁽¹¹⁾ was used to provide evidence and develop

■ Recommendations

- 5.1.1 Patients/carers should be given information about the prosthesis, its functions and limitations. (D)⁽¹¹⁾
- 5.1.2 Patients/carers should be given information regarding the care of their prosthesis. (D)⁽¹¹⁾
- 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)⁽¹¹⁾
- 5.1.4 Fluctuations in residual limb volume and its management should be explained. (D)⁽¹¹⁾
- 5.1.5 Guidance should be given on the length of time the prosthesis should be worn and how this should be increased. (D)⁽¹¹⁾
- 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)⁽⁶⁾
- 5.1.7 ~~ The patient/carer should receive instruction in the use and care of prosthetic socks and liners. (D)⁽¹¹⁾
- 5.1.8 Instruction should be given in the correct use of the type of suspension used. (D)⁽¹¹⁾

recommendations for this section as the literature search found no relevant references.

■ Local Implementation:

- The Physiotherapist needs to ensure that all information given by the Physiotherapy team is accurate and complements the advice and information given by other members of the Prosthetic MDT.
- Where there is overlap of professional roles local agreement should exist as to which MDT member will lead specific aspects of patient care.
- A locally agreed system should be in place regarding the provision of a wheelchair for patients during times where they are unable to use their prosthesis.

5.2 Care of the Residual Limb

■ Evidence

Levy et al in 1995⁽⁵²⁾ 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)⁽¹¹⁾
- 5.2.2 Advice should be given to the patient/carer on the factors influencing wound healing (D)⁽¹¹⁾
- 5.2.3 Instruction should be given to the patient/carer on methods to prevent and treat adhesion of scars (D)⁽¹¹⁾
- 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)⁽⁵²⁾
- 5.2.5 Patients/carers should be informed that sockets that no longer fit correctly, for whatever reason, can cause skin problems. (D)⁽¹¹⁾

5.3 Care of the Remaining Limb

■ Evidence

Potter et al⁽⁵⁶⁾, 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⁽⁹¹⁾, 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 subsection.

■ Recommendations

- 5.3.1 The patient/carer should be taught to monitor the condition of the remaining limb. (D)⁽¹¹⁾
- 5.3.2 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)^(52,58)

■ Good Practice Points (GPP)

GPP VII: Physiotherapists should establish links with their local podiatry/chiropractic services to ensure that information and education given to patients and carers is accurate and consistent.

■ Local implementation:

The BACPAR endorsed evidence based guideline –‘Risks to the Contralateral foot of unilateral lower limb amputees: A Therapist’s guide to identification and management’ (2010)⁽⁹²⁾ may help guide the clinician as to the recommended areas a therapy assessment of the remaining foot should cover.

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⁽⁹³⁾ 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⁽⁷⁸⁾ and Grieve & Lankhorst⁽²³⁾ 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^(77-79,94), all concluded that the lower the level of amputation the greater the chance of succeeding with a prosthesis. Wolf et al⁽⁸⁰⁾, in a retrospective case series of 18 elderly vascular patients, observed that 50% of those who had had bilateral transtibial amputations became independently mobile with prostheses. 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⁽⁵⁰⁾. 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⁽⁵⁰⁾.

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)⁽¹¹⁾
- 5.4.2 Patients/carers should be made aware that the level of amputation affects the expected level of function and mobility.(C) ^(77, 79, 80, 84, 94)
- 5.4.3 Patients/carers should be made aware that they will experience lower levels of function than bipedal subjects. (B) ^(22, 23, 78)
- 5.4.4 Patients/carers should be informed that the energy cost of prosthetic walking is related to the amputation level. (C) ⁽⁵⁰⁾

5.5 Coping Strategies Following Falls

■ Evidence

Three articles relevant to this section were found. Kulkarni et al in 1996⁽⁸⁴⁾ reported an increased risk of falls following amputation in a cross-sectional study of 164 lower limb amputees. However, this study did not include a comparison group and gives only limited evidence. Miller & Deathe⁽⁶⁵⁾ examined balance confidence in 245 unilateral lower limb amputees over a two year follow up period and found that the incidence of falling was 52% in their study population compared to a fall rate of 32% in their control group of community dwelling elders.

There was conflicting evidence regarding whether trans femoral amputees were at significantly higher risk of falling than the trans tibial population^(65,84,95).

■ 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)⁽⁸⁴⁾
- 5.5.2 Rehabilitation programmes should include education on preventing falls and coping strategies should a fall occur. (C)^(65, 84, 95)
- 5.5.3 Instructions should be given on how to get up from the floor. (C)⁽⁸⁴⁾
- 5.5.4 Advice should be given in the event that the patient is unable to rise from the floor. (C)^(84, 95)
- 5.5.5 ** All patients should be asked if they have a fear of falling and, if indicating that they do, further therapy incorporating balance work should be considered (C)⁽⁶⁵⁾
- 5.5.6 ** Where a reduction in the individuals balance confidence is observed all of the Prosthetic MDT should be made aware of the issue and, where indicated, further therapeutic input provided to address modifiable factors. (C)⁽⁶⁵⁾

■ Local implementation:

The BACPAR endorsed 'Guideline for the prevention of falls in lower limb amputees' (2008)⁽⁹⁶⁾ may help guide the clinician with recommendations suggesting what a holistic falls prevention programme should encompass.

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)⁽¹¹⁾
- 5.6.1 Patients/carers should be educated in how to prevent secondary disabilities that may occur as a result of prosthetic use. (D)⁽¹¹⁾
- 5.6.1 ~ Information on the following should be made available:
 - National and local amputee support and user groups
 - Health promotion
 - Sporting and leisure activities
 - Driving after amputation
 - Employment/Training
 - Benefits
 - Access to local Social Services (D)⁽¹¹⁾

■ Good Practice Points (GPP)

GPP VIII: Patient information should be available in a format suitable to that individual.

GPP IX: All advice/information given to the patient should be recorded.

■ 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, Maintenance and Long Term Needs

■ 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; this notion of improved ease of access and promotion of self-referral is promoted within the Allied Health Professional (AHP) service offer⁽¹⁷⁾.

It is reasonable to expect prosthetic usage to change with time and user experience and inevitable that some prosthetic users will experience health decline significant enough to prevent them using or continuing to use a prosthesis. Where feasible, the timely reapplication of selected outcome measures should be performed to monitor prosthetic function and further rehabilitation considered if the prescribed prosthetic componentry is changed or the patient's status alters, i.e. if a patient has fallen or has developed a new medical condition.

■ Evidence

The poorly defined literature search presented by Gailey et al⁽⁷⁰⁾ concluded that secondary musculoskeletal and degenerative changes can occur in the traumatic amputee population some time after injury and acute prosthetic rehabilitation. It is widely discussed within the literature that chronic low back pain is a significant problem in traumatic amputees⁽⁶⁸⁻⁷⁰⁾. In 2005 Kulkarni et al⁽⁶⁸⁾ used a semi structured questionnaire (n=202) and established that the peak incidence of LBP amongst their cohort occurred within the first two years post amputation. It is not clear whether these findings can be extrapolated to the dysvascular amputee population and there is no published evidence of rigorous methodology utilising subjects with lower limb loss that supports the efficacy of any specific treatment protocol for low back pain.

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.

Very high levels of support for the implementation of a review system was gained through consensus⁽¹¹⁾ although a number of respondents highlighted that available staffing and resources are barriers to employing a self-referral system in some rehabilitation settings. There was no evidence identified which could predict whether specific patient 'subgroups' were most at risk of deterioration after completing the acute stage of prosthetic rehabilitation; to therefore avoid discrimination a standardised approach to monitoring/ reviewing patients must be promoted.

■ Recommendations

- 6.1 A system should exist for the review of patients after discharge from regular Physiotherapy (D)⁽¹¹⁾
- 6.2 There should be a process in place for the patient to self-refer to physiotherapy after initial rehabilitation. (D)⁽¹¹⁾
- 6.3 ~ The physiotherapist should be aware that secondary musculoskeletal disorders (such as low back pain) can develop over time and adversely affect prosthetic functioning (C)^(68,70).
- 6.4 ~ Access to further physiotherapy assessment should be made available if an individual's circumstances change (i.e. medical, environmental, prosthetic, physical, return to work or sport) to determine if further rehabilitation is indicated (D)⁽¹¹⁾

■ Good Practice Points (GPP)

- GPP X: A summary of the patient's function and mobility at transfer or discharge from active rehabilitation should be documented in the treatment notes⁽²⁾.
- GPP XI: The prosthetic user should be provided with the necessary contact details to seek help and advice when required
- GPP XII: If prosthetic use is discontinued during the rehabilitation programme the reasons should be documented by the MDT.

■ Local Implementation

- Systems for patient review should exist.
- Where there is overlap of professional roles local agreement should exist as to which MDT member will lead specific aspects of patient care.
- Agreed criteria should exist to guide other MDT members in referring established prosthetic users back for further specialist physiotherapy assessment.

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Appendix 1a: Guidelines Update Group

■ Karen Clark

Joint BACPAR Guidelines Co-Ordinator/Joint Chair of Guideline Update Group

Karen has worked as lead physiotherapist based at Derby's Amputee Rehabilitation Centre since 2006. Her role covers the assessment and treatment of amputee outpatients both within the centre and the community setting alongside her MDT colleagues. Prior to this Karen gained experience in acute amputee care and discharge planning whilst working within large NHS teaching hospitals based at Leicester and London.

Karen has been involved in BACPAR since 2007 and has held the role of Diversity Officer before becoming joint Guideline Co-Ordinator with Tim Randell in 2009.

She has completed a Post Graduate Certificate in Amputee Rehabilitation from Bradford University (2009) and, alongside Tim, was part of the Guideline Development Group who created 'Risks to the contra-lateral foot of unilateral lower limb amputees: A therapists guide to identification and management'.

Karen also works as a Clinical Educator undertaking the teaching of amputee rehabilitation to final year medical students studying at Nottingham University and is co-author of a publication discussing the teaching of rehabilitation skills to medical students. She is involved in the teaching and training of Therapists across Southern Derbyshire and has guest lectured on the Physiotherapy Undergraduate programme at Manchester Metropolitan University.

■ Tim Randell

Joint BACPAR Guidelines Co-Ordinator/ Joint Chair of Guideline Update Group

Tim has worked as an amputee specialist at the Dorset Prosthetic Centre at Royal Bournemouth Hospital for the last six years. He treats prosthetic amputees as outpatients and in the community and co-ordinates their care within the region.

The role also involves being responsible for all new lower limb amputees within the trust and is working with the vascular team to refine an integrated care pathway for amputees.

He has successfully completed a Post Graduate Certificate in Amputee Rehabilitation at Bradford University. As part of this course along with his colleagues he developed a short guideline titled: Risks to the contra-lateral foot of unilateral lower limb amputees: A therapists guide to identification and management.

He is involved in teaching throughout the region covered by the

Dorset Prosthetic Centre and guest lectures at Bournemouth University

■ Jessica Withpetersen

Former BACPAR Guidelines Co-Ordinator.

Jessica has worked with amputees since she qualified as a physiotherapist in 1999. She currently works as a Clinical Specialist in Vascular Surgery and Amputees for Peterborough and Stamford Hospitals NHS Foundation Trust. She works with in and out-patient amputees and helps run a weekly satellite prosthetic clinic, working closely with the rehabilitation consultant and prosthetist.

Jessica has been a regional representative for BACPAR before taking up the post of Clinical Guidelines Co-ordinator which she held for over two years.

She has an MSc Rehabilitation from Strathclyde University (2009) and completed her dissertation on the ongoing mobility of transtibial amputees.

As the lead for audit within her team, Jessica ensures evidence based clinical practice is maintained and she is currently working on a project to bring unity to the amputee outcome measures used within her region.

Appendix 1b: Working Party for 1st Edition of the Guideline

(Information reprinted from Appendix 1 of the 1st edition)

■ Penny Broomhead

Chairman of 2003 working party

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 its 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 Chairman

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

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

Amanda has worked in her present post since 1992. As Clinical Specialist Amputee Rehabilitation she has 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

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 eight years.

■ Robert Shepherd

Honorary Public Relations Officer

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 six 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 and 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 2a: Professional Advisors

These professionals were approached for their support and comment during the production of this guideline update.

■ British Association of Chartered Physiotherapists in Amputee Rehabilitation (BACPAR)

- Louise Tisdale: BACPAR Chairperson
- Alex Weden: BACPAR's Research Officer
- Mary Jane Cole: BACPAR's Vice Chairperson (previous tenure as BACPAR chairperson)

■ Chartered Society of Physiotherapy (CSP)

- Ralph Hammond
- Rachel Garrod

■ Scottish Physiotherapists in Amputee Research Group (SPARG)

- Louise Whitehead: SPARG liaison with BACPAR

■ British Association of Prosthetists & Orthotists (BAPO)

■ Lower Limb Prosthetics in Occupational Therapy (LLPOT)

■ SIGAM (Specialist Interest Group in Amputee Medicine) arm of BSRM

Appendix 2b: Professional Advisors in First Edition

■ 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 RS Hanspal FRCP, FRCS, Consultant in Rehabilitation Medicine

■ Scottish Physiotherapy Amputee Research Group (SPARG)

Morag McNaughton, MCSP, SRP Chartered Physiotherapist

Appendix 3: Literature Search

This appendix documents the original search which was recreated by the GDG performing the update of this guideline.

Search – Results: 7947 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: X

Any Language: X

Publication Year: Any Year

Search History

Combine Checked searches using: AND

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 subheadingd 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 (Speciality)/all subheadings in MIME/MJME	99
	#1	Explode 'Amputation'/all subheadings in MIME, MJME	1082

Appendix 4: Example of the CASP⁽³⁵⁾ Literature Appraisal Tool Utilised

There are seven different appraisal tools available on the website; which one is selected depends upon the methodology utilised within the appraised piece of literature. Below is an example of the tool that was utilised by the Literature Reviewers for new literature identified which applied cohort study methodology.

These tools can be accessed via www.caspinternational.org.

CASP tool example: Appraising cohort studies.

■ Critical Appraisal Skills Programme: making sense of evidence

12 questions to help you make sense of a cohort study

General comments

- Three broad issues need to be considered when appraising a cohort study.
Are the results of the study valid?
What are the results?
Will the results help locally?
The 12 questions on the following pages are designed to help you think about these issues systematically.
- The first two questions are screening questions and can be answered quickly. If the answer to those two is “yes”, it is worth proceeding with the remaining questions.
- There is a fair degree of overlap between several of the questions.
- You are asked to record a “yes”, “no” or “can’t tell” to most of the questions.
- A number of italicised hints are given after each question. These are designed to remind you why the question is important.

A: Are the results of the study valid

Screening questions

- 1 Did the study address a clearly focused issue? Yes Can't tell No
HINT: A question can be focused in terms of:
 - the population studied
 - the risk factors studied
 - the outcomes considered
 - is it clear whether the study tried to detect a beneficial or harmful effect?

- 2 Did the authors use an appropriate method to answer their question? Yes Can't tell No
HINT: Consider
 - Is a cohort study a good way of answering the question under the circumstances?
 - Did it address the study question?

Is it worth continuing?

Detailed questions

- 3 Was the cohort recruited in an acceptable way? Yes Can't tell No
HINT: We are looking for selection bias which might compromise the generalisability of the findings:
 - Was the cohort representative of a defined population?
 - Was there something special about the cohort?
 - Was everybody included who should have been included?

- 4 Was exposure accurately measured to minimize bias? Yes Can't tell No
HINT: We are looking for measurement or classification bias:
 Did they use subjective or objective measurements?
 Do the measures truly reflect what you want them to (have they been validated)?
 Were all the subjects classified into exposure groups using the same procedure?

5 Was the outcome accurately measured to minimize bias? Yes Can't tell No

HINT: We are looking for measurement or classification bias:

Did they use subjective or objective measurements?

Do the measures truly reflect what you want them to (have they been validated)?

Has a reliable system been established for detecting all the cases (for measuring disease occurrence)?

Were the measurement methods similar in the different groups?

Were the subjects and/or the outcome assessor blinded to exposure (does this matter)?

6 A. Have the authors identified all important confounding factors? Yes Can't tell No

List the ones you think might be important, that the authors missed.

B. Have they taken account of the confounding factors in the design and/or analysis? Yes Can't tell No

HINT:

- Look for restriction in design, and techniques e.g. modelling, stratified, regression or sensitivity analysis to correct, control or adjust for confounding factors

A. Was the follow up of subjects complete enough? Yes Can't tell No

B. Was the follow up of subjects long enough? Yes Can't tell No

HINT: The good or bad effects should have had long enough to reveal themselves

The persons that are lost to follow-up may have different outcomes than those available for assessment

In an open or dynamic cohort, was there anything special about the outcome of the people leaving, or the exposure of the people entering the cohort?

What are the results of this study?

HINT: What are the bottom line results?

Have they reported the rate or the proportion between the exposed/unexposed, the ratio/the rate difference?

How strong is the association between exposure and outcome (RR)?

What is the absolute risk reduction (ARR)?

How precise are the results?

How precise is the estimate of the risk?

HINT: Size of the confidence intervals

Do you believe the results? Yes Can't tell No

HINT: Big effect is hard to ignore!

Can it be due to bias, chance or confounding?

Are the design and methods of this study sufficiently flawed to make the results unreliable?

Consider Bradford Hills criteria (eg time sequence, dose-response gradient, biological plausibility, consistency).

Is it worth continuing?

C: Will the results help me locally?

Can the results be applied to the local population? Yes Can't tell No

HINT: Consider whether

The subjects covered in the study could be sufficiently different from your population to cause concern.

Your local setting is likely to differ much from that of the study

Can you quantify the local benefits and harms?

Do the results of this study fit with other available evidence? Yes Can't tell No

One observational study rarely provides sufficiently robust evidence to recommend changes to clinical practice or within health policy decision making. However, for certain questions observational studies provide the only evidence. Recommendations from observational studies are always stronger when supported by other evidence.

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Appendix 5: Literature Appraisers

■ 2012 Guideline Update Appraisal Group:

- Graham Boniface
- Penny Broomhead
- Natalie Christmas
- Karen Clark
- Jennifer Hayward
- Nadia Paris
- Tim Randell
- Joanne Teesdale
- Jess Withpetersen

■ 2003 Guideline Appraisal Group:

- Gillian Atkinson
- Jolly Barrow
- Penny Broomhead
- Jo Burton
- Lesley Cass
- Vanessa Davies
- Diana Dawes
- Anne Roberts
- Robert Shepherd
- Nicola Walsh

■ Additional Support for 2003 group:

- Martin Dawes
Director of the Centre for Evidence-based Medicine, Oxford.

Appendix 6: Articles Excluded After Review of Full Text by the Literature Appraisal Groups

Reference	Study Design	Comments	Reason for Exclusion
Cumming J, Barr S, Howe TE. Prosthetic rehabilitation for older dysvascular people following a unilateral transfemoral amp. <i>Cochrane Database of Systematic Reviews</i> 2006, Issue 4.	Systematic Review	Only one trial included in the review	Findings relate to prosthetic weight and so inform prosthetic prescription rather than physiotherapy practice.
Deans S, McFadyen, Rowe P (2008) Physical activity and quality of life; a study of a lower-limb amputee population. <i>P & O Int</i> ; 32(2); 186-200	Cross section, mixed method	Poorly designed study. Small, unbalanced sample, poor explanation of interventions, flawed hypothesis	Study not robust enough for inclusion.
Dillingham, T, Pezzin, L (2005) Postacute care services use for dysvascular amputees: A population-based study of Massachusetts. <i>American Journal of Physical Medicine and Rehabilitation</i> . 84(3) pp. 147-152.	Retrospective notes audit	Study mainly assessing post operative care	Not applicable to scope of the guidelines
Evans, S, Buttenshaw, P, Bineham, G (2003) Do rehabilitation and intermediate care services fail patients with primary lower limb amputation? <i>Physiotherapy</i> . 89(1) pp. 30-38	Retrospective cohort	Study focused on the pre-prosthetic phase	Not applicable to scope of the guidelines
Horne CE, Neil JA, (2009) Quality of life in patients with prosthetic legs: A comparison study. <i>JPO</i> . 21/3 pp. 154-159.	Descriptive observation and survey design	Poorly described methodology. No significant findings.	No findings relevant to these guidelines
Jelic M, Eldar, R, (2003) Rehabilitation Following Major Traumatic Amputation of Lower Limbs – A Review. <i>Critical Reviews in Physical and Rehab Medicine</i> . 15 (3&4) pp. 235-252.	Literature Review	Very poor methodological detail, with no search strategy stated or description on how the literature was appraised.	Study not robust enough for inclusion
Jung, H, (2007) Comprehensive post-op management after lower limb amp. <i>Current concepts in rehab</i> . 16 (2) pp. 58-62	Literature Review	Out of scope of guidelines – only covered the immediate post-op phase.	Not applicable to scope of the guidelines
Lin SJ, Bose NH (2008) Six minute walk test in persons with transtibial amputation. <i>Arch Phys med Rehabil</i> 89;2354-2359	Cohort, test-retest	Small sample of young, good prosthetic limb users	No findings relevant to guideline
Meikle, B et al. (2003) Does increased prosthetic weight affect gait speed and patient preference in dysvascular transfemoral amputees? <i>Arch Phys Med Rehabil</i> . 84 (Nov), pp. 1657-61	Randomised, crossover, double blinded trial	No significant results found	No findings relevant to the guideline
Springer and Gill (2007) Characteristics of lateral abdominal muscle thickness in persons with lower extremity amputations. <i>Journal of Sports and Orthopaedic Physical Therapy</i> . 37(10) 635-643	Retrospective case series	Methodological flaws – poor control of confounding factors. Amputees were being treated with a specific exercise programme – unlikely to be replicated elsewhere	No significant or relevant findings
Stokes, D, et al (2008) A UK Survey of therapists' perspectives on post-amputation hopping. <i>Int. J. of Therapy and Rehab</i> . 15/12 pp. 551-560	Survey	Study focused on pre-prosthetic amputees	Not applicable to scope of the guidelines
Williams et al (2004) A two year longitudinal study of social support following amputation. <i>Dis and Rehab</i>	Longitudinal prospective study	Used dimensional scale of social support. Overall social integration did not change over time	Not applicable to scope of guidelines – does not inform prosthetic therapy

Appendix 7: Definitions of the Scottish Intercollegiate Guideline Network (SIGN) Levels of Evidence⁽³⁶⁾

These levels of evidence were assigned by sub groups of the Guideline Development Group (GDG) after review of the individual pieces of literature.

Any contentious issues between these sub groups which meant that a level of evidence could not be decided upon was resolved by getting the whole GDG to review the article and gaining consensus from this additional input.

Quality rating of the Subsections:

++, + or – are allocated by the reviewers according to whether all, some or few of the criteria specified in the validated SIGN checklists (SIGN, 2008) have been fulfilled & whether the methodology has been adequately described and is sound enough to control/eliminate bias in the findings of the literature.

Levels of Evidence	
1++	High quality meta-analyses, systematic reviews of RCTs, or RCTs with a very low risk of bias
1+	Well-conducted meta-analyses, systematic reviews, or RCTs with a low risk of bias
1-	Meta-analyses, systematic reviews or RCTs with a high risk of bias
2++	High quality systematic reviews of case control or cohort studies / High quality case control or cohort studies with a very low risk of confounding or bias and a high probability that the relationship is causal
2+	Well conducted case control or cohort studies with a low risk of confounding or bias and a moderate probability that the relationship is causal
2-	Case control or cohort studies with a high risk of confounding or bias and a significant risk that the relationship is not causal
3	Non-analytic studies, e.g. case reports, case series
4	Expert opinion

Appendix 8: Table of Papers Referenced Within the Updated Guideline

This table list the evidence appraised and used to inform the recommendations. The references are in alphabetical order with the reference number in brackets.

Each entry details a reference, a brief description of the design, the sample studied, the subject of the study (e.g. the

intervention), and a conclusion or comment.

Evidence appraised for the first edition of the guideline is in black text; evidence appraised for the second edition is in blue text. Readers are recommended to read the original references for more detail.

Citation	Study Design	Characteristics	Intervention	Comments	Level of Evidence
Altner, P.C [60]	Retrospective Case series	52 double-disability patients (hemiplegia and 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 non ambulatory. Cannot tell if follow-up was long enough, but was complete. No blind, objective outcome criteria. Adjustment was not made for other prognostic factors.	3
Bailey, M [76]	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.	3

Citation	Study Design	Characteristics	Intervention	Comments	Level of Evidence
Barnett C [64]	RCT	15 unilateral trans tibial in early rehab, randomly assigned to use PPAM aid or AMA	Effect of 2 types of EWA on prosthetic gait patterns during rehab	Length of treatment and influence of individual rehab programmes was not explained. Gait adaptations occurred once prostheses received. Different adaptations caused by PPAM-aid & AMA but walking performance and walking ability improved once prosthesis used. Study didn't show clear benefit of either EWA on gait patterns with prostheses but did mention documented benefits of accelerated healing and reduced time to casting from surgery using EWAs. Also suggested trans tibial amputees may benefit from additional exercises to increase muscle length & strength and joint mobility of lower limb.	1-
Bath A [69]	Systematic review	Analysing RCT's	Core stability training for low back pain	The author found no articles studying the effectiveness of core stability training specifically in amputee subjects. Studies demonstrating the benefit of core stability training in low back pain were found, but these needed to be extrapolated to the amputee population.	1+
Beekman C.E [78]	Case series	55 trans-femoral or knee disarticulation amputees. Aged over 50 with NIDDM or PVD in USA		Trans femoral and knee disarticulation 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.	3
Bruins, M [87]	Retrospective semi structured questionnaire	Study based in the Netherlands. 32 lower limb amputees aged between 18-60 yrs working before and after amputation. Subjects had to be at least 2 yrs post amp (aetiology- 5 vascular and 34 traumatic amputees). Equal numbers of trans tibial and trans femoral amputees.	Reintegration to work after amputation	The mean time between amputation and return to work was 11.5 months. 50% of participants returned to different work tasks or different job. Poor support of the implementing body which takes care of job re-integration and employer (34%) was the most mentioned obstacle to job reintegration. 56% of subjects thought that more co-operation between professionals would improve the reintegration process. Differences between Dutch and British social/ health systems may make extrapolating the results difficult. Some possibility of recall bias.	3
Brunelli, S [78]	Retrospective review of notes	45 unilateral Trans femoral amputees. 30 male & 15 female subjects with vascular disease and Mild/moderate hemiparesis.	Dual impairment: Amp and hemi paresis	A retrospective study where only trans femoral amputees were studied. It is unclear whether CVA occurred before or after amputation. Uses Barthel outcome measure which assess lower and upper limb but only lower limb amputees included in the study. LCI measure also used & resultant scores were better in patients with ipsilateral impairment rather than contra lateral. Patients with 'mild' impairments scored better than those deemed as having 'moderate' impairment. Study excluded amputees with poor cognition.	2+

Appendix 8

Citation	Study Design	Characteristics	Intervention	Comments	Level of Evidence
Burger, H [89]	Literature Review	31 studies on reintegration of LLAs to work, with different inclusion criteria making meta analysis impossible and comparison difficult	Return to work after lower limb amputation	Return to work rate was approx 66% (but increased to 100% for patients with amputations due to tumour). Unfortunately the aetiology of amputation not always discussed. Percentage of those not able to work post amputation stated from 3.5-8%. Time to return to work was between 9mths-2.3yrs. 55% of amputees stopped working within 2 years (78% of these due to amputee related issues). They concluded that those with higher amputation level had a lower return to work rate. It was stated that return to work was affected by cause of amputation but no further details given.	4
Christensen, B [77]	Retrospective Case series	29 Danish, prosthetic transtibial & transfemoral amputees – all causes. 18 transtibial, 1 bilateral and 10 transfemoral amputees.	Rehabilitation with prosthesis	Trans tibial amputees achieve a higher level of prosthetic skill than trans femoral. 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).	3
Collin, C [24]	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.	3
Collin, C [54]	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.	3
Condie, E [61]	Systematic review	Review of outcome measures used in lower limb prosthetics between 1995 and 2005. 340 articles identified	All appropriate measures were assessed for reliability and validity, scaling and potential for bias.	Element of subjectivity as their appraisal tool did not appear to be validated. It was found that there are many measures in use with little agreement regarding which to use and when. There is no 'gold standard'. For measuring mobility the timed up and go test is highly appropriate for amputees. The report suggests that mobility, function and Quality of Life are measured when assessing lower limb amputees. It was concluded that generic, non amputee specific measures of function and quality of life are inappropriate for lower limb amputees.	1-

Citation	Study Design	Characteristics	Intervention	Comments	Level of Evidence
Couture M [86]	Mixed method	15 Unilateral vascular amputees	Leisure activities post amputation, and constraints to participation and leisure satisfaction	Small sample 8 out of 15, commenting on leisure activities only 2-3 months post rehab. Describes the constraints to leisure post amputation. Change in leisure participation doesn't automatically mean less leisure satisfaction. Health care professionals need to understand the forces behind changes in leisure activities post amputation to support rehab efforts	3
Dingwall J.B [67]	Prospective case control	6 unilateral amputees, aged 31-69 yrs. Established users. 6 matched controls.	CCF treadmill walking and visual feedback training.	Visual feedback training is an effective means of producing short term reductions in gait asymmetry. Non blinded RCT with intention to treat. Very small sample.	3
Dite, W, [95]	Prospective cohort Non-random	47 initial, 40 completed. Unilateral Trans tibial prosthetic users. 18yrs + from a rehabilitation centre who were discharged with a prosthesis. Mainly PVD ± diabetes	Falls. Can Outcome Measures identify fallers and non-fallers in unilateral trans tibial amputees.	The study assessed trans tibial amputees only The 4 square step test. TUG, 180° turn, LCI. were all completed with a falls history interview at rehabilitation discharge and 6/12 after. It was found that 33% experienced multiple falls. Of the amputees with over 4 co-morbidities – 62% multiple fallers & 19% non-fallers. The TUG successfully identified 85% of multiple fallers.	2+
Fisher, K. [88]	Qualitative face to face questionnaire	100 unilateral lower limb amputation. Aged 17-65. Amp >1yr. Prosthetic user. 1 centre.	Return to work following lower limb amputation.	The Socket comfort, Harold Wood Stanmore and London Handicap scores were used in addition to an employment questionnaire. It was found that no vocational rehab is available and that return to work should be encouraged.	2+
Gailey [70]	Literature review	Review of literature	None	Poorly explained literature search methods and no analysis of the strength of the literature but it did exclude non analytical studies from the review. A wide range of topics were covered with discussion. It was found that amputees have a high incidence of back pain.	3
Gauthier-Gagnon, C, [83]	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.	3
Geurts, AC [71]	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.	3

Appendix 8

Citation	Study Design	Characteristics	Intervention	Comments	Level of Evidence
Greive, AC [23]	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.	2-
Ham, RO [44]	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.	3
Ham, R [45]	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%CI. 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	3
Hanspal, RS [57]	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.	3
Hanspal, RS [58]	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.	3
Houghton, AD [94]	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.	3
Houghton, A [79]	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.	3

Citation	Study Design	Characteristics	Intervention	Comments	Level of Evidence
Hubbard, W, [93]	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
James, U, [73]	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.	3
Jayantunga, U [91]	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.	3
Kegel, B [74]	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.	3
Kulkarni, J [84]	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.	3
Kulkarni, J [68]	Prospective Case Series	202 Traumatic amputees completed a semi-structured questionnaire. 20 amputees with back pain and 20 without underwent clinical examination and MRI scanning	Incidence of low back pain	Two distinctive parts of the paper – questionnaire establishing incidence of LBP and the scan findings of traumatic amputees with and without back pain. 69% of the amputees reported having back pain. No difference on MRI assessment in disc pathology between back pain and pain free subjects. Pain in the contra-lateral knee was also found to be common. Small subject numbers due to funding restrictions may have introduced bias. Only performed on traumatic amputees therefore could not extrapolate these findings to dysvascular patients.	2-

Appendix 8

Citation	Study Design	Characteristics	Intervention	Comments	Level of Evidence
Lachman, SM [46]	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.	3
Levy, SW, [52]	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.	4
Miller, W [65]	Prospective correlation study. Cohort	245 unilateral lower limb amputees. Daily prosthetic users. Users >6/12 Postal survey. Data collected twice, 2yrs apart. Community living amps	Balance confidence	It was found that trans femoral amputees did not significantly differ from trans tibial amputees in relation to balance confidence. In their cohort 52% of amps fell once a year (compared with 30% of community dwelling elders). The study did not fully describe outcome measures and had some areas poor methodology.	3
Moirenfeld I [66]	Case series	11 trans tibial Israeli amputees aged 22-68. Regular independent walkers. No control.	Isokinetic strength and endurance tests in sound and amputated side.	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 heterogenous ?due to differing age groups, time since amputation and stump length. Follow up long enough and complete.	3
Nicholas, J [20]	Case series	94 consecutive amputees in Pittsburgh answered questionnaires.	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.	3
O'Neill, B [59]	Prospective cohort study	34 amputees from a single limb centre. Multiple cognitive tests used to try and predict mobility after lower limb amputation. Follow up was 6 months	Adult amputees referred to limb centre deemed suitable for limb wearing	It was unclear when the outcome measures were applied. The study did not account for some confounding factors e.g. medical and prosthetic problems and follow up was not long enough (– only 6 months). There was some difficulty in selecting relevant results due to the amount of variables and therefore many calculations displayed. The cohort appeared to have a high number of amputees due to drug use when compared to the national statistics from UK limb centres.	4
Pernot, HF [43]	Literature overview	71 studies concerning predictive or prognostic factors. Lower limb amputees 1983-1994 due to PVD		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.	2++

Citation	Study Design	Characteristics	Intervention	Comments	Level of Evidence
Pinzur, MS [51]	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.	3
Potter, PJ, [56]	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.	2+
Powers, C, [62]	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.	3
Powers, CM [75]	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	2+
Quinlivan, DH [72]	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.	2-
Rush, PJ [49]	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.	3
Sapp, L [82]	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.	3
Seroussi, RE [48]	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 > 1 month)	2-

Appendix 8-9

Citation	Study Design	Characteristics	Intervention	Comments	Level of Evidence
Steinberg, FU [47]	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	2-
Wan-Hazmy CH, [53]	Cross sectional survey of amputations carried out over a three year period.	Data collected from all patients who had a lower limb amputation at a Malaysian hospital. Out of 213 patients 41 were continuing with rehabilitation and able to be contacted. N=30 at the end of the study. Transtibial and transfemoral included.	Functional outcome post amp	A self constructed, unvalidated questionnaire (including the Barthel index) was applied. The study found that 67% used prosthesis <6hrs a day, but it was found that diabetes co-morbidities can lead to suboptimal use of prosthesis. 77% of the amputations were for diabetic related causes and 23% for trauma. Differences between Malaysian and British social/health systems makes extrapolating the results to the UK amputee population difficult.	3
Waters, R, [50]	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.	2-
Wolf, E [80]	Retrospective Case series	18 Israeli, bilateral vascular amputees, aged > 55yrs. 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.	3
Van De Ven, CM, [55]	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.	3

■ **Good Practice Points (GPPs):**

At the CSP’s suggestion some of the 2003 Guideline recommendations have been changed to GPPs where they have been deemed to meet the definition provided by SIGN 50⁽³⁶⁾ – “GPPs are developed/provided where the group wishes to highlight specific areas of accepted clinical practice”. Often these are important practical points for which there is no, nor

is there likely to be, any research evidence; they should be regarded as stating such sound clinical practice that no-one is likely to question it.

Please indicate if you agree with a recommendation being converted into a GPP by marking either the box ‘yes’ or ‘no’ and provide additional comments where applicable.

Section 1: The Multidisciplinary Team

Recommendation 1.1 is evidenced.

1.2 Converted to a ‘Good Practice Point’.

Do you agree? Yes No

Comment

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.

Section 2: Prosthetics

Recommendations 2.1-2.4 have been evidenced.

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

2.6 Converted to a ‘Good Practice Point’

Do you agree? Yes No

2.7 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/her self?

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

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

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

2.11 Converted to a ‘Good Practice Point’.

Do you agree? Yes No

2.12 Converted to a ‘Good Practice Point’.

Do you agree? Yes No

Section 3: Assessment

Recommendations 3.1 – 3.3 are evidenced

3.4 Converted to a ‘Good Practice Point’.

Do you agree? Yes No

Recommendation 3.5 is evidenced.

Section 4: The Prosthetic Rehabilitation Programme

Recommendations 4.1, 4.2, 4.3, 4.4 are all evidenced.

- 4.5 Should prosthetic rehabilitation begin within 5 working days of receiving a prosthesis?
- 4.6 During prosthetic rehabilitation patients should receive physiotherapy as often as their needs and circumstances dictate?

Recommendation 4.7 is evidenced

- 4.8 Should gait re-education commence within the parallel bars?
- 4.9 Should gait re-education progress through walking within the hospital environment to walking within the home environment?
- 4.10 Should walking aids be provided to ensure that prosthetic users, where possible, progress to being fully weight bearing through their prosthesis?

Recommendation 4.11 is evidenced.

- 4.12 Should rehabilitation be functional and integrated with activities of daily living?
 - 4.13 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 | <input type="checkbox"/> | in/out car | <input type="checkbox"/> |
| up/down stairs, curbs, ramps, slopes | <input type="checkbox"/> | carrying objects | <input type="checkbox"/> |
| uneven ground outdoors | <input type="checkbox"/> | changing speed and direction | <input type="checkbox"/> |
| picking objects up from the floor | <input type="checkbox"/> | open/closing door | <input type="checkbox"/> |
| public transport | <input type="checkbox"/> | escalators | <input type="checkbox"/> |

Comment

Recommendation 4.14 is evidenced.

- 4.15 Should the physiotherapist, alongside other professionals, treat wound problems when these occur during rehabilitation?
- 4.16 Should the physiotherapist, alongside other professionals, treat scar problems when these occur during rehabilitation?
- 4.17 Should the physiotherapist contribute to the management of residual limb pain?
- 4.18 Should the physiotherapist contribute to the management of phantom sensation/pain?
- 4.19 Converted to a 'Good Practice Point'. Do you agree? Yes No

Section 5: Patient Education

- 5.1.1 Should patients be given information about the type of prosthesis, it's function and limitations?
- 5.1.2 Should patients be given information about the care of their prosthesis?
- 5.1.3 Should patients be given instruction on achieving correct socket fit, including pressure tolerant and sensitive areas of their residual limb?
- 5.1.4 Should the reasons for fluctuations in residual limb volume and its management be explained?
- 5.1.5 Should the physiotherapist give guidance on how long to wear the prosthesis and how this should be increased?
- 5.1.6 Should an explanation be given on how changing footwear may alter prosthetic alignment and the distribution of pressure within the socket?
- 5.1.7 Should the patient receive instruction in the use and care of prosthetic socks?
- 5.1.8 Should instruction be given in the correct use of the type of suspension used?
- 5.2.1 Should techniques for the management of phantom pain/sensation be taught?
- 5.2.2 Should the physiotherapist give advice on the factors influencing wound healing?
- 5.2.3 Should instruction be given on the methods to prevent and treat adhesion of scars?

Recommendation 5.2.4 is evidenced

- 5.2.5 Should Patients/carers be informed that sockets that no longer fit properly, for whatever reason, can cause skin problems?

- 5.3.1 Should the patient/carer be taught to monitor the condition of the remaining limb?

- 5.3.2 Converted to a 'Good Practice Point'. Do you agree? Yes No

Recommendation 5.3.3 is evidenced.

Recommendations 5.4.1 – 5.4.4 & 5.5.1 – 5.5.4 are evidenced.

- 5.6.1 Should patients be made aware of the possible psychological effects following amputation and how and where to seek advice and support?
- 5.6.2 Should patients be educated in how to prevent secondary disabilities that may occur as a result of prosthetic use?
- 5.6.3 Converted to a 'Good Practice Point'. Do you agree? Yes No
- 5.6.4 Converted to a 'Good Practice Point'. Do you agree? Yes No

- 5.6.5 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 | <input type="checkbox"/> | Health promotion | <input type="checkbox"/> |
| Sporting & leisure activities | <input type="checkbox"/> | Driving after amputation | <input type="checkbox"/> |
| Employment/Training | <input type="checkbox"/> | | |

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

Section 6: Discharge and Maintenance

- 6.1 Converted to a 'Good Practice Point'. Do you agree? Yes No
- 6.2 Converted to a 'Good Practice Point'. Do you agree? Yes No
- 6.3 Should a system exist for the review of patients after discharge from regular physiotherapy?
- 6.4 Should there be a process in place for the patient/carer to self-refer to physiotherapy after initial rehabilitation?
- 6.5 Should additional rehabilitation be made available when an individual's circumstances change: i.e. medical, environmental, prosthetic, physical, return to work or sport?
- 6.6 Converted to a 'Good Practice Point'. Do you agree? Yes No

General Comments

Please could you comment on your experience of using the 2003 Guideline (was it easy to read? Could you find the section you needed? etc etc)

Have you used the audit tool suggested? Yes / No *(please delete as necessary)*

If yes please comment on the audit tool's usability and usefulness:

Any other comments that you wish to make?

Appendix 10a: Results from the Delphi Questionnaire

Some consensus questions that were posed by the original guideline development group have been excluded from this list as:

- i) There is new evidence that supports the recommendation and expert opinion is therefore not required or
- ii) The statement has been converted to a Good Practice Point (see Appendix 11)

The two open questions gained agreement as below:

■ 4.13# Should the physiotherapist instruct the patient in appropriate functional tasks?

	% agreement
on/off floor	98%
in/out car	99%
up/down stairs, kerbs, ramps, slopes	100%
a crowded environment	96%
carrying objects	98%
uneven ground outdoors	100%
changing speed and direction	98%
picking objects up from the floor	98%
open/closing door	98%
public transport	81%
escalators	76%

■ 5.6.5# Should information on the following be made available?

	% agreement
National & local amputee support & user groups	100%
Health promotion	99%
Sporting & Leisure Activities	100%
Driving after amputation	98%
Employment/Training	95%

Questionnaire Results (n=37)	
Question Number	% Agreement
2.5	97.6
2.7	96.7
2.8	96.3
2.9	96.5
2.10	92.5
4.5	95.7
4.6	98.5
4.8	93.4
4.9	92.2
4.10	97
4.12	97.8
4.13	List
4.15	79.6
4.16	90.4
4.17	89.5
4.18	91.5
5.1.1	91
5.1.2	96.3
5.1.3	97.8
5.1.4	97.3
5.1.5	98
5.1.6	98
5.1.7	97.7
5.1.8	92.3
5.2.1	94.9
5.2.2	93.8
5.2.3	94.4
5.2.5	97.8
5.3.1	97.2
5.6.1	94.6
5.6.2	90.8
5.6.5	List
6.3	92.1
6.4	93.7

Appendix 10b: Experts Comments and Their Impact Upon the 2012 Guideline Update Process

All comments made by the respondents to the Delphi questionnaire were read and, where appropriate, grouped together with others of a common theme.

Below are the themes identified that occurred with a frequency of 5+ responses.

Please note that this numbering system corresponds to the recommendations as published in the previous guideline ⁽¹⁾.

Related Guideline Section Number	Common themes identified	Action taken by Guideline Development Group
2.9	Carers may need to be involved in this activity due to patient limitations attributed to a variety of reasons (i.e. – limited eyesight)	Reword the recommendation to include carers input.
2.9	It was felt that there should be more specific guidance about the frequency of checking the residual limb.	Too prescriptive to be included in the guideline; individual practitioners clinical judgement required. No changes made.
2.10	Specific factors (musculoskeletal function, cognition & exercise tolerance) which influence the physiotherapists contribution to the prosthetic decision making process should be identified.	Reword the recommendation to incorporate these key factors.
Section 3	The use of validated outcome measures to provide baseline information and monitor progress should be promoted.	New evidence has been appraised which supports these comments therefore a new recommendation shall be added into Section 3.
4.5-4.6	Funding/resources may mean that these recommendations are very difficult to meet in some rehab settings.	Acknowledge as a potential barrier in the 'Local implementation' bullet points at the end of Section 4.
4.8	Some occasions identified where gait retraining/transfer practice would not commence within parallel bars.	Reword this recommendation
4.13	Need to emphasise that the functional tasks taught need to be relevant to the individual goals set and realistic given the patient's physical status/ predicted rehab potential.	Reword this recommendation to emphasise these issues and consider splitting the activities into basic and advanced.
4.15-4.18	Not all practitioners will have the expertise to be able to contribute to these recommendations.	Reword this recommendation to emphasise the need for practitioners to work within their own scope of practice.
5.1.7	Patients require instruction in the use of liners as well as prosthetic socks.	Reword this recommendation to include liners in this statement.
5.1.1-5.1.8	These recommendations need to be done in conjunction with Prosthetists	Add a statement into the section introduction emphasising that other MDT members may lead/contribute to the achievement of the recommendations depending upon staffing levels and mix within the rehab settings.
5.6.5	Add: i) Benefits ii) Social Services to the list of information that should be made available.	Add these points to the recommendation.
Section 6	The use of validated outcome measures to objectively monitor progress should be promoted.	This has been discussed in the introduction to the section
6.4	Funding/resources may mean that this recommendation are may be difficult to meet in some rehab settings.	Discussed in guideline introduction
6.4	Concerns raised that some referrals back to Physiotherapy may not be appropriate- discrepancies highlighted between patient and MDT perceived needs.	Recommend that a locally negotiated protocol which documents criteria for re-referral. Consider rewording recommendation to encourage access to 'specialist Physiotherapy assessment' to determine therapy needs rather than assuming 'additional rehab' is required or appropriate.
6.4	Concerns raised that some established patients who would benefit from extra physiotherapy input are not being referred back into services.	As above.

Appendix 11: Expert Consensus Upon the Proposed Good Practice Points (GPPs)

Advisors have suggested that some of the recommendations within the original guideline⁽¹⁾ become GPPs as they fulfil the definition given by SIGN⁽³⁵⁾. Agreement with this proposal was sought amongst the Expert Practitioners completing the Delphi consensus process.

GPP	% Agreement	Comments from Delphi Respondents	Responses/actions from the Guideline Development Team
I	100	N/A*	-
II	87.5	"KISS' system is not known yet is important."	Many different suspension systems exist and it is the Clinicians responsibility to develop their knowledge and skills via CPD** to keep abreast of new prosthetic developments.
III	93.8	N/A*	-
IV	100	N/A*	-
V	87.5	"Use of ICP's mean there is no need for this as information is duplicated"; "it is the Prosthetists responsibility."	Reword GPP to ensure that this information is not duplicated but is recorded in environments where ICP's not utilised.
VI	80	"Physio intervention not required if cosmetic limb provided but essential if transfer"	Agreement rises to 96% if referring only to prosthetic limbs being used for transfers therefore consider re-wording GPP.
VII	96	N/A*	-
VIII	92	"Appropriate communication is imperative"	Agreed
IX	96	"It is not a legal requirement and could form part of the treatment outcome"	CSP core standards (2005) states that "all advice/information given to the patient is recorded" so it is felt this is a reasonable recommendation.
X	100	N/A*	-
XI	96	"It is the responsibility of the DSC to give prosthetic information"	Locally this needs to be negotiated to ensure that the most appropriate MDT member is providing the information. In some rehab settings the Physiotherapist will be the most appropriate person.
XII	96	"Change of status should be documented by the most appropriate MDT member not just Physio's".	Add a statement into the section introduction emphasising that other MDT members may lead/contribute to the achievement of the recommendations depending upon staffing levels and mix available within the rehab settings. Need to emphasise the importance of making sure that all information/ advice given by the MDT is accurate, correct and complements that given by other professionals.

* N/A indicates that no comments were received.

** CPD = Continuing Professional Development.

Appendix 12: Definition of SIGN's 'Grades of Recommendations'⁽³⁵⁾

These grades are allocated by the GDG to the recommendations of the completed Guideline and based on the strength of the supporting evidence from which they were formulated.

The aim of these grades is to give the Guideline user important information about the quality of evidence upon which each recommendation is based; it is **not** ranking the recommendations in the authors' perceived level of importance to clinical practice.

Grade of Recommendation	Level of Evidence Found	Definition
A	1++ or 1+	Must have at least 1 meta analysis, RCT or systematic review rated 1++ that is directly applicable to the Guideline population Or A body of evidence rated as 1+ directly related to Guideline population with consistency in the results presented.
B	2++ or Extrapolated from 1++ or 1+ studies.	Must have a body of evidence rated as 2++ directly related to Guideline population with consistency in the results presented. Or Results extrapolated from 1++ or 1+ studies.
C	2+ or Extrapolated from 2++ studies.	Must have a body of evidence rated as 2+ directly related to Guideline population with consistency in the results presented. Or Results extrapolated from 2++ studies.
D	3 or 4	Evidence is gained from literature rated as 3 or 4 Or Results extrapolated from 2+ studies.

Appendix 13: Audit Tool – Clinician Comments

Comments received re: Audit tool Usefulness

Audit outcomes led to changes in documentation / ICP development
Used for individual clinicians appraisal
Helpful in auditing and benchmarking services
Used to check compliance of services and compare to others in BACPAR region
'Did lead to changes in documentation and patient information to ensure we met the recommendations'

Comments received re: Usability	Actions by Guideline Development Team
Not used due to time limitations / lengthy to complete	The Audit tool has been split into 3 distinctive parts- 1) Service led recommendations (Appendix 14a) 2) Personal achievement of GPP's (Appendix 14b) 3) Patient notes audit form (Appendix 14c).
'Service' objectives (i.e – is there a protocol in place...) did not need to be answered for every patient.	
'Difficult document to use on a number of patients' / 'Different format would help with multiple data collection'	- Each section could be completed at separate times to minimize time burden upon clinicians. - Every section has been reviewed and reformatted to enhance ease of data collection
Not aware of audit tool in original document	Continue to introduce the reader to the audit form within the introduction.
Some 'N/A' boxes need removing	All N/A boxes scrutinized and removed where appropriate.
Should have 'action plan' attached to identify areas requiring improvement and state how they should be addressed.	Each audit tool has an 'Action' section beside the data to encourage the timely creation of an action plan.
'.suggest that GPP's are included in the new audit tool.'	See Audit form 2 - Personal achievement of GPP's (Appendix 14b)

Appendix I 4a: Audit Data Collection Form – Service Evaluation

Date Audit data collected Name of Auditor

Recommendation	Yes	No	N/A	Comments/Evidence	Actions
2.1-2.5	<input type="checkbox"/>	<input type="checkbox"/>			
2.7,2.8	<input type="checkbox"/>	<input type="checkbox"/>			
2.10	<input type="checkbox"/>	<input type="checkbox"/>			
3.1-3.4	<input type="checkbox"/>	<input type="checkbox"/>			
3.5	<input type="checkbox"/>	<input type="checkbox"/>			
4.1-4.15	<input type="checkbox"/>	<input type="checkbox"/>			
5.6.5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
5.6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
6.3-6.5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		

Planned Re-audit date

Appendix 14b: Audit Tool – Achievement of Good Practice Points (GPPS)

Completion of this audit of personal/MDT practice may provide evidence for the NHS Knowledge and Skills Framework⁽⁴²⁾ Core Dimensions 1,2,3, 4 & 5.

Details of the GPP	Yes	No	N/A	Supporting Evidence	Actions
GPP I: The Physiotherapist(s) should contribute to MDT audit, research and education					
GPP II: The Physiotherapist should understand the different methods of donning and doffing prostheses.					
GPP III: The Prosthetic centre should be contacted if there is a malfunction of any componentry					
GPP IV: The Prosthetic centre should be contacted if the socket requires adjustment in order to achieve a correct and comfortable fit.					
GPP V: The Physiotherapist should record the prosthetic componentry, type of socket and method of suspension			*		
GPP VI: Where a prosthesis is provided for transfers, instruction and advice on its safe use should be given.			**		
GPP VII: Physiotherapists should establish links with their local podiatry services					
GPP VIII: Patient information should be available in a format suitable to that individual.					
GPP IX: All advice/information given to the patient should be recorded.					
GPP X: A summary of the patient's function and mobility at transfer or discharge from active rehabilitation should be documented in treatment notes.					
GPP XI: The prosthetic user should be provided with the necessary contact details to seek help and advice where required.					
GPP XII: If prosthetic use is discontinued during the rehabilitation programme the reasons for abandoning should be documented.					

It is anticipated that most GPPs should be achieved regardless of the clinical setting that the physiotherapist works within.

The exceptions to this are:

* GPP V – Where Integrated Care pathways are in use it may not be necessary for the Physiotherapist to duplicate this information.

** GPP VI – Outside of the Prosthetic Centre setting there may be limited scope for physiotherapists to come into contact with patients who have been provided with a prosthetic limb for transfer use only.

Appendix 14c: Audit Tool – Patient Notes Audit

Date: Name of Auditor

There should be documentation found within the patient notes to support the recommendations.
Where this information is found a tick (✓) should be inserted; where the information is absent a cross (X) should be inserted.

Recommendation		Patient 1	Patient 2	Patient 3	Patient 4	Patient 5	Actions
3.1- 3.3	<ul style="list-style-type: none"> • A physical examination and assessment of previous and present function. • The patients social situation • Psychological status • Patient Goals and expectations • Relevant pathology including diabetic status • Present and past Prosthetic componentry, type of socket and method of suspension 						
3.4	A problem list, treatment plan and goals have been formulated in partnership with the patient.						
4.4	There is evidence of a personalised exercise programme being devised for the patient.						
4.7	Prosthetic physiotherapy began within a maximum of 5 working days after receipt of the prosthesis						
4.10	Gait re-education was commenced within the parallel bars (if not then a reason for the variance should be documented)						
4.12	Walking aids are provided to ensure, where possible, that prosthetic users progress to being fully weight bearing through their prosthesis.						
4.7-4.17	There is written evidence of prosthetic rehabilitation based on the treatment plan that includes: <ul style="list-style-type: none"> • Increasing time of prosthetic use • 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 						
4.18	There is evidence of the patient's progress being measured throughout their prosthetic rehabilitation programme with validated amputee/prosthetic specific outcome measure(s).						
4.19-4.22	There is written evidence of the contribution of the physiotherapist to: <ul style="list-style-type: none"> • Care of wounds • The treatment of scars • The management of residual limb pain • The management of phantom limb sensation/pain 						

Recommendation		Patient 1	Patient 2	Patient 3	Patient 4	Patient 5	Actions
5.1.2-5.1.8	There is written evidence of information being given to the patient/carer in regard to: <ul style="list-style-type: none"> • Care of the prosthesis & suspension • Achieving correct socket fit/use of prosthetic socks & liners • 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 alignment • Use and care of prosthetic socks & liners • Correct use and care of suspension 						
5.2.1-5.2.5	There is written evidence of information being given to the patient/carer with regard to the following: <ul style="list-style-type: none"> • Techniques for the self-management of phantom pain/sensation • Factors influencing wound healing • Methods to prevent and treat adhesion of scars • Residual limb skin care • The potential for skin problems caused by incorrect socket fit 						
5.3.1	There is evidence that the patient/carer is taught to monitor the condition of the remaining limb						
5.4.1-5.4.4	<ul style="list-style-type: none"> • 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 						
5.5.2-5.5.6	There is evidence of falls coping strategies being discussed/taught. <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • How and where to seek psychological advice and support • Prevention of secondary disabilities that may occur as a result of prosthetic use 						
6.1	A summary of patient function & mobility at transfer or discharge is documented in the treatment notes.						
6.1-6.4	There should be evidence of the patient being reviewed after discharge from regular physiotherapy intervention.						

Date Name of Auditor

Appendix 15: Domains of the Appraisal of Guidelines, Research and Evaluation (AGREE) Instrument

This international, validated tool is designed to assess the overall quality of a Guideline. The tool contains 23 items and is split into six theoretical quality domains:

Domain	Definition
Scope and Purpose	Clarity is needed about the overall objectives of the Guideline being developed and the potential impact on society & patient populations. There should be a clear description of the patient population to which the guideline is applicable to.
Stakeholder Involvement	Description of all of the authors involvement needed (including those just used for consultation or expert advice). A range of authors from differing professional backgrounds is thought to be essential to control potential biases. Stakeholders should have appropriate clinical skills and/or experience and/or technical expertise to justify their involvement in the formulation +/- implementation of the Guideline (patients views should be included in this process). Target user are unambiguously identified and the Guideline piloted amongst this group.
Rigour of Development	Systematic review and rigorous appraisal of the available evidence should be demonstrated. The methods used for formulating the recommendations are clearly described. External review of the Guideline has been undertaken by appropriate group of individuals.
Clarity and Presentation	Recommendations should be clear & unambiguous. Key recommendations are easy to identify and support material for application is included (i.e. – patient information, quick reference guide etc)
Applicability	Potential organisational barriers to implementation of the Guideline have been discussed with cost implications identified. Guideline also suggests identifies audit criteria so that the Guidelines use and effect in clinical practice may be measured by the Practitioner.
Editorial Independence	Is there independence from the Editorial group from any Funding committee & any conflicts of interest have been declared.

■ AGREE Scoring system:

Each domain should be scored by at least 2 reviewers and it is the standardised score.

In scoring each specific item can be rated on a scale of 1-4 (1= Strongly Disagree, 4= Strongly Agree); there are specific guidance criteria offered by the AGREE Collaboration to try and minimise subjectivity. That should be used to form the judgement as to the overall quality of the guideline.

Calculate a Standardised Domain Score:

Maximum (Max.) Score = 4 x No. of items in the Domain x No.

of Appraisers

Minimum (Min.) Score = 1 x No. of items in the Domain x No. of Appraisers

Standardised Domain Score = $\frac{\text{Obtained score} - \text{Minimum possible score}}{\text{Maximum possible score} - \text{Minimum possible score}} \times 100\%$

Using the Standardised Domain Score:

The totals allocated to each of the six quality domains help to form the overall quality rating of the Guideline being assessed.

Rating allocated to Guideline	AGREE guidance and definition
'Strongly Recommend'	Scores highly (3-4) on a majority of items and most domains score > 60%.
'Recommend with provisos/ alterations'	Guideline is scored as high (3-4) and low (1-2) on a similar number of items; each domain's score is between 30%-60%. If provisos or alterations were made the Guideline could still be considered for clinical use.
'Would not Recommend'	Guideline is rated as low (1-2) in many of the items and most domain's score < 30%. The overall quality has been deemed as low and so the Guideline should not be recommended for use in Clinical Practice.

Appendix 16a: BACPAR Representatives Involved in Creating the Response to the External Reviewers Comments

BACPAR Representatives involved in creating the response to the external reviewers:	Involvement in the Guideline development process prior to reviewing the external reviewers comments:
Penny Broomhead	Co-Author of the original guideline document
Karen Clark	Member of the Guideline Update group / co-author of the updated document.
Mary Jane Cole	BACPAR Vice Chair – involved in the initial project planning & peer review process.
Sarah Drury	No previous involvement
Julia Earle	Member of the peer review group
Amy Jones	No previous involvement
Tim Randall	Member of the Guideline Update group / co-author of the updated document
Louise Tisdale	BACPAR Chair – involved in ongoing support and review throughout the update process.

Appendix 16b: Impact of the Comments from External Reviewers upon the 2012 Guideline Update Process

Amendments made to the document following the review of the collated comments from the external reviewers .

- Guideline aims and objectives moved to aid earlier identification by the reader.
- Preface amended to signpost readers to other professional guidelines, patient charters & NSF document as it was never the intention to imply that all of the patients psychosocial needs will be met by physiotherapy intervention alone.
- Clarification that the clinical guidelines commences at the provision of the first prosthetic leg for each residual limb as the reviewer felt the guidelines application with bilateral lower limb amputees was ambiguous.
- Clarification that the guidelines apply to young amputees as well as ex-military amputees as it was suggested that this wasn't clear.
- User views were sought in the development of the guideline (1st ed) and a sentence has been added to ensure this is clear and the professional advisers used in that edition have been added in appendix 2b. Our target audience was physiotherapists but we accept that there is limited user involvement in forming this update & have suggested that future work should look to capture users views earlier in the development process.
- Other documents and guidelines have been highlighted within the text (usually under 'local application' at the end of each recommendation section) and expressly suggested they should be used alongside this document to address the holistic needs of the prosthetic user and assist the physiotherapist in identifying and addressing their personal learning needs.
- Addition made to the title of section 6 to highlight how concerned one external reviewer was about lack of follow up for prosthetic users but no evidence re: how to run a review programme was found so unable to expand upon this point further.
- All typographical and grammatical errors identified were amended.

Appendix 17a: Peer Reviewers

Peer Reviewer	Employing NHS Trust/Organisation	Clinical Specialty	AfC Banding/Job title
Sandra Chaplin	Dorset Primary Care Trust (Dorchester)	Community Rehabilitation	Band 6 Physiotherapist
Charlotte Church	Royal Bournemouth & Christchurch NHS Trust	Rotational post- Respiratory/ Vascular	Band 6 Physiotherapist
Mary Jane Cole	School of Physiotherapy, St George's University of London	Amputee Rehabilitation	Lecturer in Physiotherapy education
Matt Denton	Nottingham University Hospitals NHS Trust	Musculoskeletal outpatients	Band 6 Physiotherapist
Julia Earle	Medway NHS Trust	Amputee/Prosthetic Rehabilitation	Band 7 Physiotherapist
Julie Knapp-Wilkinson	East Kent University Hospitals NHS Foundation Trust	Not specified	Band 5 AHP Technical Instructor 1
Jake Lawrence-Carty	Recently graduated Physiotherapy student	N/A	Student Physiotherapist
Chantal Osler	Portsmouth Hospital NHS Trust	Amputee/Prosthetic Rehabilitation	Band 7 Physiotherapist
Édáin Quinn	Recently graduated Physiotherapy student	N/A	Student Physiotherapist
Dianne Thomas	Abertawe Bro Morgannwg University Health Board, Wales	Amputee/Prosthetic Rehabilitation	Band 7 Physiotherapist
Jo Wilkinson	Heatherwood & Wexham Park Hospitals NHS Foundation Trust	Vascular & amputees	Band 7 Physiotherapist
Elizabeth Williams	Derby Hospitals NHS Foundation Trust	Rotational post – Rehabilitation/Community	Band 6 Physiotherapist
Louise Whitehead	NHS Tayside, Scotland	Vascular & amputees	Band 7 Physiotherapist
Barrie Wood	NHS Lothian, Scotland	Community/Admission prevention	Band 6 Physiotherapist

Appendix 17b: Comments from Peer Reviewers and Their Impact Upon the 2012 Guideline Update Process

Related Guideline Section	Comments received	Action taken by Guideline Development Group
Introduction, Sections 1-6 & Appendices	Various typographical errors identified	Issue rectified
Sections 1-6 & supplementary documents	Numbering issue identified within recommendation sections	Issue rectified
Preface	Request that the supplementary documents be introduced in the preface so clinicians aware of the resource.	Preface altered
Section 1	Suggestion that physiotherapists should be encouraged to undertake some form of counselling training.	No definitive evidence found so cannot be added; this issue was not highlighted within the Delphi process.
Section 1	Impact of budget cuts, time and staffing restraints raised in relation to being able to undertake GPP I.	Barriers acknowledged within the introduction.
Section 2	Request further guidance regarding what constitutes best practice in the assessment of residual limb and contralateral leg.	Outside of the scope of this piece of work but other documents which may assist the clinician signposted.
Section 3	Request further guidance regarding which validated outcome measures should be employed clinically.	No definitive evidence available so recommendation cannot be more specific; other documents which may assist the clinician signposted.
	Request the addition of juzu socks to the recommendations.	No definitive evidence found so cannot be added; possibly more relevant to be linked to 'pre prosthetic' guidelines?
Section 4	Request that the risks of hopping +/- crutches are highlighted.	No definitive evidence found so cannot be added; possibly more relevant to be linked to 'pre prosthetic' guidelines?
Glossary	Suggested additions to the glossary	Additions included
	Definition of 'clinical effectiveness' did not make sense.	Definition altered and quoted from external source.
Quick Reference Guide	Multiple requests that the GPP's be placed within the relevant recommendation sections rather than in a list at the end of the document.	GPP's placed within the relevant recommendation sections in both full guideline document and supplementary documents.
Audit & Implementation Guide	Multiple positive comments received regarding the restructure of the audit tools.	No action required

Appendix 18: Definition of a Clinical Specialist in Prosthetic Rehabilitation

Since the first edition a new pay structure (Agenda for Change) has been introduced to all NHS staff. Due to national variations in the banding allocated to similar jobs it is no longer possible to define a Clinical Specialist by banding alone.

The following description has been formed by clinicians and managers involved in amputee rehabilitation.

Specialised physiotherapists should:

- Be experienced in amputee management, including lower limb prosthetic training
- Have a good understanding of prosthetics
- Be able to look after amputees with complex problems
- Be conversant with evidence –based clinical guidelines produced by BACPAR
- Ideally have a relevant post-graduate accredited qualification.
- Be a resource in terms of education, training, and development of senior physiotherapists and other professional staff.
- Carry responsibility for developing and utilising research evidence, current national guidelines and recommendations and integrating this into service delivery to ensure that practice is evidence based.

The CSP⁽⁹²⁾ define a specialist physiotherapist as one who works at an advanced clinical level within a specific clinical field. Their practice will be underpinned by advanced clinical reasoning and will encompass four elements, but the weighting attached to each element will vary to reflect the service need and organisational structure and the practitioner's own expertise/interests.

The four elements of 'advanced' clinical reasoning were defined as:

- **Clinical Practice**
 - Demonstrates advanced knowledge/skills and clinical reasoning;
 - Evidence of dealing with complex cases within a particular field of physiotherapy practice;
 - Provision of advice/support to physiotherapy colleagues on clinical practice issues.
- **Evaluation**
 - Active participation in research and/or clinical evaluation and audit;
 - Evidence of critically appraising the knowledge base and applying relevant high quality evidence to change practice;
 - Publication(s) within the clinical field in peer recognized journals/periodicals.

- **Teaching**
 - Delivery of physiotherapy in-service education across the region;
 - Acting as a mentor or supervisor for physiotherapy colleagues;
 - Participation in developing post-qualification education packages;
 - Involvement in the delivery of teaching to physiotherapy and/or other professions at a qualifying and post qualifying level.
- **Practice/service development**
 - Development of the clinical field with colleagues;
 - Clinical supervision of senior members of the physiotherapy team within the clinical domain;
 - Involvement in the local clinical governance agenda;
 - Involvement in professional networks;
 - Leading the physiotherapy service within a particular clinical field.

Appendix 19: Glossary of Terms

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

■ Terminology:

Clinical Effectiveness	<i>“the extent to which specific clinical interventions do what they are intended to do”</i> ⁽⁹⁸⁾
Clinical Governance	<i>“the system through which NHS organisations are accountable for continuously improving the quality of their services & safeguarding high standards of care”</i> ⁽⁹⁹⁾
Componentry	the different parts of a prosthesis (i.e – knee, foot) specifically prescribed the prosthetic MDT to match a patients predicted or actual functional level.
Discharge Summary	summary of the episode of care
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.
Hemi pelvectomy	amputation of the whole leg plus the pelvis on that side; also known as a ‘hindquarter’ amputation.
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’ ⁽⁹⁸⁾
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
Residual limb	remaining part of the leg on the amputated side
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
Trans femoral 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.
Trans tibial Amputation	amputation through the tibia

■ Abbreviations

ADL	Activities of Daily Living
AfC	Agenda for Change
AMA	Amputee Mobility Aid
BACPAR	British Association of Chartered Physiotherapists in Amputee Rehabilitation
CASP	Critical Appraisal Skills Programme
CPD	Continuing Professional Development
CSP	Chartered Society of Physiotherapy
DSC	Disablement Services Centre
DGH	District General Hospital
EWA	Early Walking Aid
GP	General Practitioner
MRI	Magnetic Resonance Imaging
OT	Occupational Therapist
PPAM aid	Pneumatic Post Amputation Mobility Aid
PVD	Peripheral Vascular Disease
RCT	Randomised Controlled Trials
SIGN	Scottish Intercollegiate Guideline Network
TES	Total Elastic Suspension (type of belt suspension for a T-F prosthesis)

Appendix 20: Useful Resources

■ Professional Organisations:

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

British Association of Prosthetists & Orthotists (BAPO)

Sir James Clark Building,
Abbey Mill Business Centre,
Paisley PA1 1TJ
www.bapo.org

The Chartered Society of Physiotherapy (CSP)

14 Bedford Row,
London WC1R 4ED
www.csp.org.uk

International Society for Prosthetics & Orthotics UK NMS (ISPO)

PO Box 2781,
Glasgow, G61 3YL
www.ispo.org.uk

The College of Occupational Therapy (COT)

106-114 Borough High Street,
London SE1 1LB

Scottish Physiotherapists Amputee Research Group (SPARG)

c/o Helen Scott (Chairman)
Westmarc,
Southern General Hospital,
1345 Govan Road,
Glasgow, G51 4TF.

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

■ Community agencies:

List of Social Services available in local telephone directories

■ Other useful organisations:

Associate Parliamentary Limb Loss Group (APLLG)

British Amputee & Les Autres Sports Association
www.balasa.org.uk

British Limbless Ex-Servicemen's Association (BLESMA)

Frankland Moore House,
185 High Road, Chadwell Heath,
Essex RM6 6NA
www.blesma.org

Disabled Drivers Association

Mobilise Organisation National Headquarters,
Ashwell Thorpe,
Norwich NR6 1EX
www.dda.org.uk

Disability Living Foundation

www.dlf.org.uk

Douglas Bader Foundation

www.douglasbaderfoundation.co.uk

The Limbless Association

Jubilee House, 3 The Drive,
Warley Hill,
Brentwood, CM13 3FR
www.limbless-association.org

Limb Power – The British Ambulant Disabled Sports and Arts Association.

www.limbpower.com

Limb Loss information Centre

www.limblossinformationcentre.com



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