




RESEARCH ARTICLE

Physical therapists demonstrate clinical behaviors consistent with established clinical practice guidelines in managing individuals following amputation

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Abstract

Background and Purpose: Investigating physical therapy in amputation management offers insights into clinical practice. This study explores the self-reported clinical practice of physical therapists in amputation management and compares it to established clinical practice guidelines to determine whether physical therapists are delivering care that is considered recommended clinical practice.

Method: An online survey of Australian physical therapists with limited or extensive experience in managing individuals following amputation.

Results: A total of 110 responses were received. The majority of Australian physical therapists (83%) reported their skills were adequate however, reported a lack of professional development opportunities. Physical therapists reported coordinating care with other health and medical professionals across all phases of care. They report providing comprehensive care in the following areas: residual limb management, pain management, falls prevention, education, counselling, psychological and peer support, and discharge planning. The majority of physical therapists were not aware if a comprehensive care plan was in place following a transition of care from a previous health service.

Discussion: Overall, physical therapists displayed clinical practice meeting the guidelines across most areas of amputation management. Future research into alternate data collection of clinical practice, and the development of physical therapy-specific clinical practice guidelines is needed.

KEYWORDS

amputation, clinical practice, physical therapy, practice guideline

1 | INTRODUCTION

Amputation refers to the surgical removal of part or all of a limb, performed to preserve life following traumatic or disease-related causes (Turner & Colvard, 2020). Diabetes is the main disease-

related cause of limb amputation globally (Moxey et al., 2011), accounting for 85% of lower limb amputations in Australia (Australian Institute of Health and Welfare, 2017).

Amputation undoubtedly results in lifelong physical changes to the individual, impacting every aspect of daily living (Hale, 2013).

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Mobility limitations are reported as one of the greatest impacts on quality of life (Suckow et al., 2015). Physical therapists are commonly involved in assessment and intervention to address mobility limitations, but may also contribute in addressing the psychological and social participation impacts of amputation at different phases of care; from pre-operation, rehabilitation, discharge, and life thereafter (Hale, 2013).

These broader psychological and social participation impacts have been recognised in clinical practice guidelines internationally in an attempt to provide a framework for healthcare providers to evaluate, treat, and manage the complex care requirements following amputation (Department of Veterans' Affairs et al., 2017). Physical therapy-specific clinical practice guidelines have also been established to describe the role and contribution of physical therapists in amputation management (Smith et al., 2016). However, physical therapy contributions in areas that may not be typically considered within the physical therapy scope of practice, such as understanding prosthetic limb management, counselling and psychology, have been recommended (Smith et al., 2016).

Despite these guidelines existing, whether physical therapists are aware of and meet established clinical practice guidelines is not known. Therefore, investigating the professional background and clinical practice of physical therapists in amputation management is important to compare against clinical practice guidelines (Paton et al., 2015). The purpose of the study is to describe the professional background of physical therapists involved in amputation management. Secondly, to describe the self-reported clinical practice of physical therapists in amputation management, and thirdly, compare the self-reported clinical practice with an established clinical practice guidelines.

2 | METHODS

2.1 | Study design

The study design is a quantitative, descriptive cross-sectional survey conducted to describe the self-reported clinical practice of physical therapists in amputation management. The survey results were then compared with established clinical practice guidelines to determine any similarities and differences in the self-reported clinical practice and recommended clinical practice stipulated under clinical practice guidelines. An online survey was selected because it was recognised as a method to increase participation and completion rates (Sebo et al., 2017). This study design draws upon previous cross-sectional studies that investigate the attitudes and beliefs of physical therapists, and studies that compare clinical practice with established clinical practice guidelines (Battista et al., 2021; Derghazarian & Simmonds, 2011; Morrow et al., 2017).

Ethics approval was obtained by the Macquarie University Human Ethics Committee (Ref: 52020907822985). Prior to commencing the survey, participants were instructed to read a

participant information and consent form (PICF), which was also available for download. Consent was obtained from participants upon continuation into the survey.

2.2 | Subjects

Purposive sampling of registered physical therapists was conducted. Physical therapists with experience in amputation care were included in the study. This provided a cross-section of the physical therapy profession who were likely to offer detailed, relevant and diverse reporting of their clinical practice (Tong et al., 2007). Considering this, an arbitrary target of 50 survey responses was set, given that a previous survey of Australian physical therapists revealed that a very limited number of physical therapists (1.1%, $n = 10$) indicated 'amputees' as their predominate physical therapy practice (Noblet et al., 2019). Therefore, including physical therapists with experience in amputation management was needed to preserve purposive sampling whilst achieving the target survey responses.

To be eligible to participate in this survey, respondents needed to be an Australian Health Practitioner Regulation Agency (AHPRA) registered physical therapist and have experience in managing people with amputation. Physical therapy students and physical therapy assistants were excluded because they are not considered to be involved in clinical decision-making as an independent clinician.

2.3 | Materials

The *Care of the Person Following Amputation: Minimum Standards of Care* was selected as the clinical practice guideline because it comprehensively outlines the important relationship between the care delivered by the individual clinician and the health service, through its use of service- and person-centred standards of care (NSW Agency for Clinical Innovation, 2017). Therefore, these guidelines provided a theoretical basis for survey question development and a comparison clinical practice guideline against the self-reported clinical practice of physical therapists in amputation management. The online survey was created and delivered using a web-based application (Qualtrics®, SAP, Seattle, Washington, United States). Descriptive statistics were obtained using a data analysis program (IBM® SPSS® Statistics for Windows, version 25, IBM Corp., Armonk, N.Y., United States), while responses to open-ended questions were tabulated onto a spreadsheet program (Microsoft® Excel®, version 16.49, Microsoft Corp., Redmond, Washington, United States) to allow for thematic analysis.

2.4 | Procedure

Survey questions were developed using information drawn from 'Applying the standard in practice' and supplementary resources

contained within the clinical practice guideline (see Appendix 1). A draft list of questions was reviewed by two researchers, one with methodological expertise and another with clinical expertise in amputation. The survey was piloted on a small group of physical therapists ($n = 11$) and feedback sought. Based on respondent feedback, the survey length was reduced, and questions modified for clarity. A total of 48 questions were finalized (see Appendix 2): 2 eligibility questions to determine eligible participants, 11 professional questions to gain insight into the education and clinical experience of physical therapists in amputation care, and 35 clinical questions to determine the clinical behavior of physical therapists. The finalized questions were collated onto a web-based survey application (Qualtrics®, SAP, Seattle, Washington, United States) to form the online survey. An electronic advertisement contained an anonymous web link that directed potential participants to the online survey, and was distributed through social media, the Australian Physiotherapy Association, and email distributions within public and private health services that provide physical therapy, between December 2020 and February 2021.

All survey responses, including incomplete responses, were analyzed. Responses from close-ended questions were analyzed using descriptive statistics through a data analysis program (IBM® SPSS® Statistics for Windows, version 25, IBM Corp., Armonk, N.Y., United States), as appropriate. Responses from open-ended questions were analyzed using thematic analysis by tabulating responses onto a spreadsheet (Microsoft® Excel®, version 16.49, Microsoft Corp., Redmond, Washington, United States). The main investigator (JBS) summarized each response from an open-ended question using one or more descriptors, such as 'employment', 'experience' or 'learning', followed by a secondary reading to determine similarity between descriptors to create main theme(s), such as 'employment experience' and 'learning opportunities.' When a response from an open-ended question contained two or more main themes, a frequency count was provided against each theme to allow for descriptive statistical analysis.

3 | RESULTS

A total of 110 survey responses were received, providing 85 complete responses (77%) and 25 incomplete responses (23%). The average response rate for eligibility was 95%, professional background was 77%, and clinical practice was 71% (see Appendix S3).

3.1 | Professional background

Most respondents worked in the public health sector (74%, $n = 67$) and reported their skills in managing individuals with amputation as either 'somewhat' or 'extremely' adequate (83%, $n = 75$). Further details about the survey respondents can be seen in Table 1. Approximately 51% of respondents reported using

TABLE 1 Professional background of respondents

Characteristic	
Years of clinical practice, <i>mean</i> (SD)	14 (11)
Country of qualification <i>n</i> (%)	
Australia	82 (87)
Overseas	12 (13)
Percentage of amputation caseload <i>mean</i> % (SD)	30 (29)
Main employment sector <i>n</i> (%)	
Public	67 (74)
Private	23 (26)
Main employment role <i>n</i> (%)	
As part of a multidisciplinary team in acute hospital setting	13 (14)
As part of a multidisciplinary team in inpatient rehabilitation	36 (40)
As part of a multidisciplinary team in community rehabilitation	20 (22)
Practitioner in a physical therapy service and interacts with other external health providers	7 (8)
Other	14 (16)
Education	
Estimated proportion of physical therapy degree on amputation specific theoretical content expressed as a percentage <i>mean</i> % (SD)	6.4 (8.1)
Estimated percentage of time spent during student clinical placement on amputation experience <i>mean</i> % (SD)	5 (6.5)
Self-reported skill adequacy in amputation management <i>n</i> (%)	
Extremely adequate	30 (33.3)
Somewhat adequate	45 (50.0)
Neither adequate nor inadequate	5 (5.6)
Somewhat inadequate	8 (8.9)
Extremely inadequate	2 (2.2)

clinical guidelines/standards 'most of the time' or 'always' to assist them in their clinical decision making. Respondents were provided an opportunity to openly comment on their professional background. Employment experience ($n = 31$) and learning opportunities ($n = 25$) were identified as the two most common themes (Table 2).

3.2 | Care coordination

Respondents reported they 'frequently' interacted with other allied health professionals such as a prosthetist (60.7%, $n = 54$), occupational therapist (59.6%, $n = 53$), nurse (42.0%, $n = 37$), and another physical therapist (69%, $n = 60$). Close to half of respondents

TABLE 2 Respondent comments about their professional background with identified themes and illustrative quotations

Theme	Number of comments (n)	Illustrative quotations
Employment experience	31	<p>'Amputee management is an area that most clinicians have little experience.' (Comment 1)</p> <p>'The best knowledge, guidance and practical ideas came from amputees who had already been through the journey.' (Comment 14)</p> <p>'Most experience obtained through exposure at work.' (Comment 15)</p> <p>'I work with some very experienced therapists who are my first priority for advice for complex presentations.' (Comment 34)</p> <p>'I believe in the public hospital system, the designated amputee physiotherapist for the department individually manages most amputees, there is limited scope for other therapists to learn and gain clinical experience.' (Comment 41)</p>
Learning opportunities	25	<p>'Highly desirable to have a Physio Amputee Rehab expert from a major centre that is available, via telehealth, in on sessions as a formalised process.' (Comment 3)</p> <p>'Limited ongoing PD or mentoring for people working in amputee rehab.' (Comment 7)</p> <p>'I attended a 5-day course on prosthetics and amputation to update my knowledge a few years ago. This made a huge difference in my confidence in treating amputees.' (Comment 18).</p> <p>'As a graduate physiotherapist I attended an advanced training course for the treatment of both upper and lower limb amputees.' (Comment 42).</p>
University education	7	<p>'Was not taught anything about amputees at uni.' (Comment 6)</p> <p>'Inadequately covered at uni. But you learn by doing.' (Comment 22)</p> <p>'When I did my undergrad degree, our amputee content (but) very outdated and not practical. I am now responsible for the undergrad amputee training at 4 local universities- but the only time allocated is between 3 and 6 h' (Comment 28)</p> <p>'Universities offer little (1 lecture) to no amputee content within the undergrad courses.' (Comment 38)</p> <p>'Less theory in courses now, seen as a specialist area.' (Comment 40)</p>
Skills	5	<p>'Lower limb amputee rehab skills are hard to acquire in mixed rehab wards due to the frequency of presentations compared to other diagnoses.' (Comment 3)</p> <p>'I developed my skills in this field (amputation) through observing other physiotherapists, self-initiation for learning by searching and attending courses, updating myself with guidelines, policies and procedures.' (Comment 20)</p>

reported to 'frequently' interact with a rehabilitation physician (48%, $n = 43$), while 61% ($n = 54$) 'never' interacted with the 'doctor who performed the amputation'.

3.3 | Comprehensive care

Most respondents (59%, $n = 51$) reported that they were not aware if a comprehensive care plan was developed before their care starts. Of those who indicated that they were aware of a care plan, 83% ($n = 29$) reported that they contribute or update this care plan during their care.

3.4 | Counselling, psychological and peer support

Most respondents (67%, $n = 58$) reported having the ability to refer to a psychologist. Over half of respondents (57%, $n = 49$) are

involved in interventions that explore coping strategies. About 65% of respondents ($n = 56$) indicated that they started or have been involved in a referral to a peer support program, with 77% ($n = 66$) indicating that such a referral should be made 'as early as possible.'

3.5 | Falls prevention

Respondents nominated the Timed Up and Go ($n = 32$), Berg Balance Scale ($n = 21$), AMPPro ($n = 18$) and the 10-m walk test ($n = 11$) as the four most common outcome measures for falls risk. Most respondents (89%, $n = 73$) indicated their balance and falls prevention program involved practice with and without a prosthesis. Respondents working in an acute health service report commencing gait training in the acute phase of care (50%, $n = 9$), with those working in inpatient rehabilitation indicating that gait training should commence during inpatient rehabilitation (60.5%, $n = 23$). Over half of

respondents (55%, $n = 45$) provided gait aids on commencement of gait training. Over a third (36%, $n = 29$) involved the individual with amputation's valued other in the falls program 'most of the time.'

3.6 | Discharge planning

Respondents reported liaising with another physical therapist (58%, $n = 64$) when transferring care onto another service across all phases of care. In terms of follow-up, 67% ($n = 43$) indicated that weekly follow-up as an outpatient should occur immediately after discharge from inpatient rehabilitation. After this period, 51% ($n = 37$) indicated 3- or 6-monthly follow-up. Approximately 49% ($n = 36$) of respondents indicated that their health service provided lifelong follow-up.

3.7 | Care of the residual limb

Respondents identified chronic conditions ($n = 62$), lifestyle ($n = 23$) and adherence ($n = 22$) as risk factors for further amputation. Close to 60% ($n = 46$) indicated that education about the risk factor for further amputation should commence in the acute phase of care and reinforced throughout all phases of care (66%, $n = 57$). Most respondents (83%, $n = 65$) indicated that limb protection should be emphasized 'immediately post-operation' with 60% ($n = 48$) applying a rigid dressing after a transtibial amputation. The surgeon was reported to make the decision to apply a rigid removeable dressing (57%, $n = 36$) with 55% ($n = 36$) stating that the physical therapist applies it 'immediately post-operation' or 'within 3-day of surgery' (62%, $n = 47$).

3.8 | Education

The majority of respondents reported provision of education related to the *prevention of contracture* (95%, $n = 74$), *residual limb management* (88%, $n = 67$) and the *phases of care* (81%, $n = 61$). A large proportion of respondents were also aware that education related to nutrition (80.0%, $n = 60$), diabetes management (86.5%, $n = 64$) and driving (80.0%, $n = 60$) was provided by other members in their multidisciplinary team.

3.9 | Pain

Most respondents identified pain to come from one or more sources, such as the initial injury (63%, $n = 69$), amputation surgery (65%, $n = 71$), phantom limb pain (71%, $n = 78$), residual limb pain (66%, $n = 72$), secondary musculoskeletal pain (66%, $n = 72$), and chronic pain (66%, $n = 72$). The visual analogue scale (VAS) ($n = 50$) was nominated as the most common pain measurement tool. Approximately 57% ($n = 44$) of respondents were aware of a pain

management plan before their care commenced. Reported interventions to manage residual limb pain include massage ($n = 16$), exercise ($n = 14$), desensitisation ($n = 12$), while mirror therapy ($n = 34$), graded motor imagery ($n = 23$) and sensory training ($n = 21$) were reportedly used to manage phantom limb pain. Respondents indicated that they would refer the individual with amputation to a health service experienced with amputation management (30%, $n = 47$) and/or a pain medicine specialist (28%, $n = 44$) and/or opinion from a prosthetist (27%, $n = 42$) should pain changes arise due to changes in life role, prosthetic use, or functional ability.

3.10 | Special consideration for specific populations

For individuals with amputation engaged in high-functioning activities, 59% ($n = 43$) of respondents indicated that their health service does not have access to an exercise professional, however for those who indicated that they have access to an exercise professional (41%, $n = 30$), respondents specified a physical therapist ($n = 21$), an exercise physiologist ($n = 20$) and a personal trainer/coach ($n = 4$).

3.11 | Comparison between the clinical practice of Australian physical therapists in amputation management and relevant aspects of the clinical practice guidelines

A comparison between the main findings and relevant aspect of clinical practice guideline descriptors is provided in Table 3. The self-reported clinical practice of Australian physical therapists in amputation management is consistent with most aspects of the clinical practice guideline.

4 | DISCUSSION

This study provides valuable information about the professional profile and clinical practice of physical therapists in amputation management. In terms of professional profile, a majority of respondents reported being adequately skilled in amputation management, however a very small percentage of time was spent on amputation specific theoretical and practical content during higher education. This contrast is likely explained by physical therapists using skills that are core competencies of physical therapy practice, acquired during higher education and clinical experience. This was noted in open-responses, with most respondents describing how they acquired their skills in amputation through clinical exposure. Despite this, respondents provided a conflicting opinion about their ongoing learning needs, highlighting the limited availability of professional development courses, however valued the knowledge of senior colleagues and from people with amputation, in shaping their clinical practice.

TABLE 3 Comparison between relevant aspects of the clinical practice guidelines and main findings

Clinical practice guideline	Descriptor	Main finding
S1 care coordination	Care is coordinated, multispecialty, and interdisciplinary across all phases	Physical therapy care was reported to involve multispecialty and interdisciplinary medical and allied health interactions.
S2 comprehensive care	A comprehensive care plan is developed and updated throughout the care journey	Most physical therapists reported not to be aware of a comprehensive care plan being developed before their care starts, but those who were aware updated this care plan during their care.
S3 counselling and psychological support	Counselling and psychological support is available across all stages of care	Most physical therapists indicated that they would refer the individual with amputation to a psychologist and provide coping strategies.
S4 peer support	Referral is offered to a managed peer support group	About 65% of respondents started or have been involved in a peer support program referral.
S5 falls prevention	Education and training on falls prevention and safety, including how to get up from the floor in the event of a fall is provided to persons and their valued others	Most physical therapists provided a balance and falls prevention program with and without a prosthesis. About half involved the valued other in the falls program 'most of the time' or 'always'.
S6 discharge planning	Discharge planning and transfer of care arrangements commence as early as possible with communication between all key stakeholders	Most physical therapist report to communicate with another physical therapist during transfer of care arrangements and indicated a weekly follow-up post-rehabilitation with half of respondents indicating a 3- or 6-monthly reviews thereafter.
P1 – Care of the residual limb	Care of the residual limb and management of risk factors for further amputation are addressed	Chronic conditions, lifestyle and adherence were the three most commonly identified risk factors for further amputation. Close to 60% agreed that education addressing the risk factor for further amputation should commence in the acute phase of care.
P2 – Education across all stages of care	Education begins in the preoperative phase and continues across all phases of care	Contracture prevention, residual limb management and the phases of care were the three most common provision of education that respondents provided.
P3 – Pain	Pain is assessed, managed, and monitored at all stages of care	The visual analogue scale (VAS) was nominated as the most common outcome measure for pain. Over 60% of respondents identified pain to come from multiple sources, indicating the use of different interventions for residual limb and phantom limb pain.
P4 – Special consideration for specific populations	Special consideration is given to the needs of specific populations when managing the person with amputation	About 40% of physical therapists referred onto an exercise professional for high-functioning individuals with amputation.

In terms of clinical practice, physical therapists self-reported care provision consistent with most aspects of the *Care of the Person following Amputation: Minimum Standards of Care*. For example, physical therapists reported interactions with a variety of health professionals, engaging in activities that facilitates access to broader areas of care, such as referring to psychology, peer support groups and high physical function training. This suggests that physical therapists create meaningful care relationships between multiple health and medical specialities to coordinate their care. This is consistent in a study by Sansam and colleagues who revealed that physical therapists contributed to prosthetic prescription decision making (Sansam et al., 2014). However, creating these relationships requires comprehensive assessments to determine the person's physical, psychological and social conditions, clinical need, and

comprehensive care planning (NSW Agency for Clinical Innovation, 2017). Our study found that a majority of physical therapists were not aware of a comprehensive care plan being in place before their care starts, however, this finding is inadequate to suggest that the care delivered by physical therapists is not comprehensive.

This study offers insight into why clinical practice guidelines influence physical therapy clinical practice. For example, clinical practice guidelines may be beneficial in situations where the clinical presentation is common, however, in those that are complex, the need for highly individualised care may be better facilitated by independent clinician decision making (Treby & Main, 2007). Therefore, clinical practice guideline may offer physical therapists strategies to enhance comprehensive and coordinated care within the context of individualised care delivery.

The interpretation of the findings in this study must be considerate of several limitations. Firstly, the cohort surveyed was strongly representative of inpatient rehabilitation physical therapists who work as part of a multidisciplinary team. This suggests that care is likely to be more coordinated and comprehensive because of their close access to such teams. Secondly, self-reported surveys may not have captured a true reflection of clinical practice as it presents biases related to respondents describing ideal clinical practice. Thirdly, the length of the survey was considerable (15–30 min), contributing to respondent fatigue which impacted on the response rate in the latter stages of the survey (see Appendix S3).

This study also has implications for future research. Further exploration of clinical practice is needed using alternate methods of assessment, such as auditing tools, which are often contained in clinical practice guidelines as implementation strategies. Alternatively, future research into the development of a physiotherapy-specific guideline in amputation management can add to the landscape of resources available to physical therapists, serving as a source of education about amputation management and defining a scope of practice for physical therapists (Breen et al., 2006).

AUTHOR CONTRIBUTION

Jeremy Bernal Salcedo: Conceptualization, Methodology, Formal Analysis, Investigation, Writing – original draft, Writing – review and editing, Visualization, Project Administration, Data Curation. Daniel Treacy: Validation, Writing – review and editing, Supervision. Tim Noblet: Writing – review and editing. Kate Scrivener: Validation, Resources, Writing – review and editing, Supervision. Not applicable: Funding Acquisition, Software.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

ETHICS STATEMENT

This study was approved by Macquarie University Human Ethics Committee (Ref: 52020907822985).

PATIENT CONSENT STATEMENT

Participants were provided with a participant information and consent form. Consent was obtained upon their continuation in the survey.

PERMISSION TO REPRODUCE MATERIAL FROM OTHER SOURCES

Not applicable.

STUDY REGISTRATION

Not applicable.

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