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ORIGINAL REPORT

REHABILITATION IN SKILLED NURSING CENTRES FOR ELDERLY PEOPLE WITH LOWER LIMB AMPUTATIONS: A MIXED-METHODS, DESCRIPTIVE STUDY

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Objectives: **To describe the current set-up, barriers and potential for providing rehabilitation to people with lower limb amputation in skilled nursing centres.**
Design: **Survey and interviews.**
Subjects/participants: **Elderly care physicians, physiotherapists.**
Methods: **In 2011, clinicians from 34 skilled nursing centres participated in a semi-structured interview covering rehabilitation and daily care, personal skills and training, team work and communication, and discharge processes.**
Results: **Each centre sees only a small proportion of people with amputation (a maximum of 3.6% of all admissions). This limited number of patients appears to be the main barrier in providing care, as it is difficult for clinicians to maintain knowledge, and resources are spread widely. Two main areas of improvement were suggested by participants: (*i*) use of guidelines in care; and (*ii*) collaboration with specialized team members.**
Conclusion: **The spread of patients across many centres makes it difficult for professionals working in skilled nursing centres to obtain the necessary skills and knowledge for care of people with amputation. A designated skilled nursing centre for amputation rehabilitation is presented as a solution, but smaller clinical changes are also suggested, including improvements in communication and training.**

Key words: amputation; aged; long-term care.

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INTRODUCTION

After a lower limb amputation (LLA), many people enter a rehabilitation programme with the aim of learning how to manage changes in physical, psychological and social functioning. Rehabilitation can take place in a number of settings. People who are enrolled for specialized inpatient rehabilitation programmes tend to have better outcomes than those who receive rehabilitation in other settings, such as home or nursing home. These outcomes include longer survival, a higher chance of receiving a prosthesis, improved mobility, being more likely to return to independent living, greater medical stability, a lower number of subsequent amputations, or a higher quality of life (1–5). Inpatient rehabilitation programmes are generally targeted toward a population who are able to manage an intensive level of training. However, LLA frequently has an underlying cause, such as peripheral vascular disease or diabetes mellitus, and most patients are over the age of 65 years (6, 7). Additional co-morbidities and changes due to ageing often result in cognitive and cardiovascular co-morbidity that impact on a person's ability to meet the demands required for participation in high-intensity rehabilitation. A lower intensity rehabilitation programme, undertaken in a skilled nursing centre, might offer a reasonable alternative to traditional inpatient programmes for elderly people with LLA.

Admission to a skilled nursing centre for rehabilitation after LLA is common in the Netherlands, with 55% of all people who survive the acute hospital phase discharged to this setting (8). In addition to more traditional nursing care, many of these centres also offer onsite multidisciplinary rehabilitation programmes. As many as 65% of people return home within 1 year of admittance for amputation rehabilitation (9). The mean length of rehabilitation is 81.5 days, which is longer than patients with other pathology, including stroke (69.1 days) and elective orthopaedic surgery (40.6 days) (10). Around 150 people undergo vascular-related amputations per year in the Northern Netherlands (11). However, with more than 34 skilled nursing centres in the region, very few patients with LLA are seen at any single centre. This leads to questions concerning the clinicians' ability to maintain adequate skills and knowledge in treatment of this population (12).

Given the large proportion of patients with LLA discharged to this setting, the relatively long length of stay and the high costs associated with providing their care, it is surprising that so little is known about the actual rehabilitation treatment provided. For example, what are the rehabilitation aims and expectations on admission? What type of training is provided and with what frequency? Do clinicians have the relevant expertise for treating someone with LLA? With an increasing

expectation to provide evidence-based care, this lack of information is insupportable. As a starting point, the rehabilitation programme that is currently provided to people with LLA in skilled nursing centres needs exploration. The aim of this study was to describe the current set-up, barriers and potential for providing rehabilitation to people with LLA in Dutch skilled nursing centres.

METHODS

The Medical Ethics Committee of the University Medical Center Groningen determined that formal approval was not required for this study conducted with health professionals and administrative data.

Setting

There are 34 skilled nursing centres with a geriatric rehabilitation unit in the 3 northern provinces of the Netherlands. The area has a population of around 1.7 million people, of which 17% are over the age of 65 years (13). Elderly care physicians (ECP) are a specialization in the Netherlands, responsible for the treatment and support of elderly and chronically ill patients. The project was introduced through presentations at the ECP regional professional meetings and in their association newsletter, as well as meetings with the ECP and physiotherapists (PT) in their workplace.

Design

A mixed-methods design was used. Part 1 of the study involved a questionnaire sent to all skilled nursing centres in December 2009. The questionnaire asked how many admissions the centre had in total, how many people were admitted with LLA, and the characteristics of this population (sex, date of birth, reason for and level of amputation). The period surveyed was from 1 January 2008 to 31 December 2009. A reminder letter to return the survey was sent in early 2010 to all non-respondents. Descriptive data are presented.

Part 2 of the study involved interviews with the ECPs and PTs in 2011. A series of open questions was developed, based around 5 key themes: rehabilitation and daily care procedures; personal skills and training; communication; the multidisciplinary team; and care after discharge. Themes were developed in discussion with rehabilitation physicians and ECPs over the most common issues encountered in clinical practice. Participants were encouraged to respond with their own line of thinking on each theme, with prompts given where needed (see Appendix I). The interviewer (AW-K) was a qualified ECP who was undergoing training to become a rehabilitation physician. The interview procedure was piloted with rehabilitation physicians from our centre, to ensure there was clear understanding of the questions and continuity of the interview. Participants were chosen using research-based recruitment (14), from the survey responses concerning admission numbers and location. This strategy was designed to include centres with relatively frequent admissions with LLA and others with infrequent admissions, as well as an even geographical representation across the 3 provinces. The interviewer contacted each professional, explained the project in full, and asked if they were able and willing to participate. All those approached gave consent. Interviews were completed throughout 2011, with an ECP and PT from the same centre, separately. The interviews lasted approximately 60 min and were conducted in the participant's workplace during their regular work hours. After 3 centres per region (9 interviews with ECPs, 9 interviews with PTs), no new information or topics were discussed and data saturation was deemed complete. No further interviews took place.

Analysis

The interviews were recorded on tape and transcribed verbatim. Identifying information was replaced with descriptors to ensure anonymity for participants. Interview transcripts were read by 2 investigators (LF and GR) to familiarize themselves with the data. A coding book was developed by one investigator (LF) (using a constant comparison approach) and tested by a second (GR) on a full transcript. Discrepancies were discussed; these mainly concerned overlap between the codes. Three interviews were then coded in full, independently, and inter-coder agreement was reviewed for consistency (14). No substantial differences were apparent and the remaining transcripts were coded in full by LF and reviewed by GR. Data were then arranged in a matrix according to their codes and linked to the different themes. Two investigators (JG and PD), who did not participate in the initial coding, reviewed these themes and the data, adding their interpretations. A native English speaker (LF) translated all quotes presented in results, together with a native Dutch speaker (PD) to ensure that context and nuances were maintained.

RESULTS

Survey of centres

Seventeen (52%) skilled nursing centres responded to the survey, reporting on 90 people admitted after LLA in a 2-year period. Fifty-nine (66%) of the admissions were men and 82 (91%) amputations resulted from a vascular cause. The median age at admission was 77 years (interquartile range; IQR 14; range 46–100 years). Individual centres admitted between 0 to 19 people with LLA in the 2-year period surveyed, which represented a maximum of 3.6% of all admissions to a centre.

Interviews

A total of 19 people participated, 9 ECPs and 10 PTs (in 1 centre 2 PTs participated together). Participants had a mean age of 44 years (standard deviation; SD 8), worked 30 h per week (SD 7) and had 12 years of experience (SD 8). Seven participants had undergone postgraduate training in LLA rehabilitation and prosthetics. The main findings from the interviews are presented below, under the subtitles of the key themes investigated. "Teamwork"' and "Communication" were combined due to overlap in the results, and an additional theme "Elderly person with amputation" is presented. The results are presented using the words and perspective of the participants.

Elderly person with amputation

Independent return to home is the main goal of admission to rehabilitation in skilled nursing centres. Patients would otherwise be directed immediately to a long-stay ward. Clinicians are aware that rehabilitation outcomes are dependent on many factors, including the availability of family and home-care. People also need a high level of intrinsic motivation. If a patient can return home independent in transfers and household walking, rehabilitation is considered successful. However, most "independent" people still need substantial help with, for example, putting on their prosthesis.

The expectations of rehabilitation from patients and their families often exceed their likely potential. People have little understanding of the physical capacity that is required to walk with a prosthesis, or the cognitive capacity for understanding how to use it safely. However, realizing the difficulties they face may be part of accepting their LLA.

"People often have very high expectations. They have their operation and think they then just get a prosthesis and walk again. And sometimes its not going to succeed or it is not what they hoped for. So that's difficult." [PT8]

In contrast to younger patients, older patients with LLA tend to present with a more complex range of comorbidities. Clinicians acknowledge that an older patient's life-experience can bring value to their rehabilitation. Treatment is approached from an open perspective, giving attention to what the patient wants to happen. Essentially, you have to look at the person, not their (missing) limb.

"Well, the main difference is that in this population there are more things at play. The high biological age often has consequences, such as deconditioning, older people move less and then even more so after the amputation. You often see people are immobile for a long period beforehand. So their whole fitness level is much lower. Then there are still other diseases and disorders, and a poor psychosocial network. Hey, if people live alone and need a prosthesis to go home, that's somewhat more complex." [PT1]

Rehabilitation and daily care

Although some clinicians describe the older person with LLA as being no different to other patients in skilled nursing centres, differences in treatment were evident. The intensity of care, both in time and energy, was a major discussion point. Funding is provided for 4 h of treatment to each patient per week. This time is for all treatment: medical, physiotherapy and other para-medical treatment. There is no strict adherence to the time allocations, nor is there pressure from management staff to adhere; some patient groups simply need more time, some less. It was felt that the person with LLA requires more time, particularly in the beginning phases of care. The PT alone takes up most or all of the 4 h, in stump management, strengthening exercises and so forth.

The application of standard protocols or care plans is hampered by both the amputation population and by frequently changing clinicians (Table I). The population differs too greatly in their presentation, particularly the range of comorbidities and cognitive abilities, to apply protocols. However, a basic set of guidelines from which to work would be useful. It should be flexible, enabling independent choices for individual patients. One example where protocols are not used is clinimetric measures. They are used for other conditions, particularly stroke. The reliability of performing the tests with a prosthesis was questioned, but also the overall value for a patient's treatment was not seen.

Personal skills and training

The ECPs/PTs described knowledge as being more important than any specific skill. Attendance at a training course in prosthetics and amputation was a stand-out factor for gaining this knowledge. The people who have participated in a course for amputation rehabilitation have confidence in what they are doing, and are more informed and interested in amputation-specific factors (volume control, technical aspects of prostheses, etc.), frequently helping colleagues with problems. Patients may even be referred to a particular centre because of this knowledge and experience.

General skills that are important in treatment of people with LLA included geriatric assessment skills and, specifically, assessment of patients from a "geriatric" viewpoint. Assessment

Table I. *Barriers in provision of amputation rehabilitation described by participants*

Weakness	Comments from respondents
Difficulty implementing and using guidelines	1. (Amputation rehabilitation) is based a lot on clinical intuition. We have to wait a bit and just see what happens. [PT1]
	2. We need a much stricter protocol. Then we could take admission and discharge measurements, yes, I think that would actually be very good. But again it takes time and I think the current quality of rehabilitation depends on the fact we only see 3 or 4 (amputation) patients per year. That's not many; perhaps if we saw more patients, we would be more inclined to change. [ECP4]
Lack of involvement and specialization from multidisciplinary team members	3. Well for us what is very clear in the nursing home is that the rehabilitation physician and physiotherapist take care of someone with amputation. We (elderly care physicians) take care of the wound. [ECP3]
	4. Better training of clinicians in the department is needed. This is actually very important; it's what I really miss. Things are often missed simply because people don't know, for example how the liner should be fitted or how the prosthesis should sit. Yes, these things mostly, these are things that quite often go wrong. [PT5]
	5. I would like better cooperation with occupational therapy. I don't mean to say that it is their fault, but working together as a team we could better assess what is necessary for someone to go home, use of a wheelchair and also the prosthesis, and we could better streamline their care. [PT8]
Case mix – lack of patients with amputation seen in each centre	6. I'd like to see more patients with amputation. I would really like to encourage more to come here. With experience, we get more experienced. [ECP9]
	7. I'd like to see better training of the nurses, but then you run into the problem of seeing so few patients (with amputation), simply because there is only 5 or 6 per year, and with the varying nursing staff, it's just a question of which patients they happen to see. [PT3]
	8. Well the best thing really would be if you could have a little section where the care is very specialized, because every time (there is an amputation admission) we spend quite a lot of time teaching others how to care for those (patients) in the right way. It costs a lot of energy, but there are just too few people with amputation admitted here. [PT2]

PT: physiotherapist; ECP: elderly care physicians.

should include questions about the patient's wishes, the home situation and function prior to LLA. Thinking from a functional perspective was emphasized, so not always focusing on what might be technically correct, but rather what is important or needed for the patient. For example, the ability to perform independent transfers and walking to get from A to B is more important than how well they do it. Patience is a vital skill, as this population need intensive care for their rehabilitation training, which can continue for a long time. Skills in working as a team are needed with colleagues frequently discussing situations and problem-solving together.

To maintain knowledge and skills it is important that people with amputation are seen on a regular basis. Participants found it difficult to answer the question "what is the minimum number of patients needed per year to maintain skills and knowledge?" and responses ranged from unknown, 2, 5 and up to 20 per year or even weekly. Seeing more patients with amputation might help to maintain the working partnerships with other (external) professionals. The problem of too few patients was consistent throughout all centres, with no major differences seen in the responses given throughout the interviews by clinicians' working where relatively more or fewer people are admitted with LLA.

Teamwork and communication

The PTs have a key role in the care of people with amputation. They take charge of decisions concerning amputation rehabilitation. In particular, they act to refer patients in a timely manner to an appropriate professional, such as the surgeon or wound-care specialist. This "signalling role" occurs naturally, as they spend the most time with the patients. The ECP is responsible for medical care, directing family meetings and external communication, including discussion with other medical specialists, the general practitioner (at admission and discharge) or the surgeon (rarely, as needed e.g. wound-healing problems). Some ECPs describe wound care as the limit of their "amputation role" and beyond that they are responsible only for medical management. They were quick to refer any and all amputation issues to the rehabilitation physician or PT. This was also apparent in the interviews, with amputation questions answered with "you can better ask the PT". Other ECPs tried to ensure that they have a wider range of amputation knowledge, such as basics of prostheses and biomechanics.

The role of the rehabilitation physician varies, from having all decisions and issues concerning the LLA referred directly to them and being in demand for an increased presence, to the feeling that the clinicians in the skilled nursing centres can manage most issues themselves, questioning how much value for money having a more intense presence from the rehabilitation physician would provide. Other allied health professionals are available onsite in the centres. Occupational therapists have only a small role in the care of people with amputation, covering wheelchair prescriptions and a home visit before discharge. Social workers, psychologists, dieticians, and other therapists are consulted if needed, but the general feeling is that there is a lack of knowledge about amputation and most care falls back on to the PT.

There is a weekly multidisciplinary team meeting in all centres, with patients discussed regularly. The rehabilitation physician and prosthetist attend fortnightly or monthly clinics. Most discussion occurs between these structured meetings. A feature of communication was the informal nature of relationships and flexibility from team members. The PTs and ECPs approach each other freely at any time enabling prompt resolutions to problems. The whole team goes out of their way to assist others, with training, advice or flexibility in care, such as the prosthetist dropping by the nursing home before or after work.

Many of the nursing professionals work part-time or shift work. Knowledge may be passed on, e.g. a nurse is instructed by the PT in bandaging or safe-transfers, but that person may not encounter the patient again. This is one of the main differences from inpatient rehabilitation, where an entire unit may be dedicated to LLA with all nursing, medical and paramedical professionals "specialized" in the condition.

Care after discharge

The general practitioner, rehabilitation physician and prosthetist are the key contacts for patients after discharge. Some patients continue in outpatient care. Others are referred to community PT. The relationship with external clinicians is good, with referrals and handover back and forth. External health providers are generally chosen by locality. Some people had concerns over not knowing about the community PT's skills or interest areas, and that once a patient is discharged they would not hear anything more. Having the option to bring patients back 2–3 months after discharge would be good to "top-up" their rehabilitation. In other disciplines, particularly stroke, there is more coordination in the community setting, but there are too few people with LLA for this to work.

DISCUSSION

This study aimed to provide an overview of the current rehabilitation programme for people with LLA admitted to skilled nursing centres in the northern Netherlands, in order to identify the barriers and potential for providing evidence-based rehabilitation in this setting. Internationally, there is an increasing need to find cost-effective rehabilitation options for people with amputation with different approaches of current interest and importance. Dutch skilled nursing centres differ from other systems, in particular the medical specialization of ECPs and presence of onsite multidisciplinary teams offering geriatric rehabilitation. The influence of rehabilitation setting on outcomes has been investigated in reference to other conditions in older people, mostly orthopaedic disorders and stroke. The clinicians interviewed recognized that treatment for these other conditions, particularly stroke, is stronger with better planning and coordination of care. Outcomes of amputation rehabilitation have been looked at mainly from the perspective of traditional inpatient care. Two recent studies showed that good outcomes from rehabilitation in skilled nursing centres can be achieved, particularly in terms of independent discharge to home, with

rates of 57–65% within 1 year, greater pre-amputation function being a key factor for success (12, 15). Despite these positive outcomes, it appears that the current rehabilitation process in skilled nursing centres is largely unsustainable, certainly within the Dutch setting, with the burden of care falling largely on PTs.

Two key areas to improve stood out: (*i*) the need for use of guidelines in care; and (*ii*) a wider collaboration with specialized team members. There were no protocols or guidelines in use for people with amputation attributed to the highly variable nature of the patients. However, the idea of having some guidance was very much supported. Guidelines for management of people with amputation are available (16) and these guidelines should be reviewed for their applicability to this setting. Rehabilitation after LLA benefits from a multidisciplinary team (16). The set-up of Dutch skilled nursing centres with an onsite multidisciplinary team enables comprehensive provision of a range of services specific for the geriatric population. Despite this team available, PTs work largely in isolation concerning issues related to patients with amputation, with referral to rehabilitation physician and prosthetist when necessary. The PTs find it quicker and easier to do something themselves, for example, they take charge of bandaging the limb rather than re-training nursing staff with each new amputation admission. Other potentially valuable professions, in particular nursing and occupational therapy, lack knowledge of amputation rehabilitation. Nurses can provide essential support between PT sessions and occupational therapists play an important role in functional training (17). The tendency for the PT to take on a substantial amount of the responsibility is perhaps one of the reasons why the "intensity" of care was described so strongly for this population.

The issues raised make it difficult to provide efficient rehabilitation to people with amputation in this setting. A solution would be to designate one skilled nursing centre in each province to have an amputation rehabilitation unit. This would offer advantages, such as an increased number of patients with amputation, more specialization by professionals, and stronger relationships with external colleagues. However, the aversion of people to travel away from their local area may prevent this success, particularly if applied to a larger geographical setting. Other small changes can be readily implemented, for example annual training for the PTs and the set up of a partnership with a larger rehabilitation centre. This training and formalized access to support from a specialist can address weaknesses in the PT skills and knowledge. It will not reduce the burden in care provision, but provide tools for them to better manage. Finding methods to capitalize on other multidisciplinary team members available in skilled nursing centres should be a priority.

The high expectations of the patient and family were one of the only negative aspects described. Early involvement of the rehabilitation physician is recommended, including preoperative consultation, where appropriate (16). Although a successful outcome cannot be reliably predicted, the rehabilitation physician has the experience to provide education and advice to the patient about likely outcomes and what to expect from the rehabilitation process.

We investigated centres with many and few amputation admissions, expecting to see differences in the issues raised. Surprisingly, this was not the case, with all more or less in agreement. The issues described by participants were remarkably similar across the different centres, with data saturation reached after 18 interviews. We suspect that this is because even those centres with relatively more amputation admissions still only see one patient every few weeks or months, so the problem of having too few patients remains.

Some limitations of the study need consideration. The response to the survey was low, at only 50%. Nevertheless, it provided the insight we needed to ensure that centres that admitted a larger and smaller number of people with LLA were included for interviews. The study was conducted in Dutch skilled nursing centres, which offer onsite rehabilitation, and this approach differs from other developed countries, thus limiting generalization to other settings. Finally, there was a potential for bias introduced by the interviewer, who was a rehabilitation specialist in training, but also a former ECP. Given the descriptive nature of the questions we do not think that this connection had any substantial influence on the participant's responses.

In conclusion, this study shows that, although current care of people with amputation is associated with good outcomes, it is, to a large extent, dependent on the problem-solving abilities, energy and empathy of the individual clinicians involved. With funding agents requiring greater evidence and accountability in decision-making, the current care appears unsustainable. Each centre sees a relatively small proportion of people with amputation. This spread of patients across many centres makes it difficult for professionals to obtain and maintain skills and knowledge for amputation rehabilitation. A designated skilled nursing centre for amputation rehabilitation is presented as a solution, but also smaller clinical changes are suggested, including improvements in communication and training.

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APPENDIX I. Interview guide

1. Describe the aims of the interview and ask if there are questions.
2. Remind participants that their responses are given in confidence and will be anonymous.
3. Ask permission to record interview.

Demographic data
- Personal details – age, sex, etc.
- Working details – years in present position, hours worked, etc.
- Specialization – training and additional relevant information.

Topic 1: Personal skills and training
- Are there any special skills needed for treatment of elderly people with amputation? Descriptions.
- Have you and where did you learn these skills?
- Do you feel that you have sufficiently mastered these skills? Have you followed any extra training?
- How many patients do you think you need to treat to maintain these skills?

Topic 2: Rehabilitation and daily care
- Who is involved in rehabilitation? What are their tasks? Who is responsible for the patient's treatment?
- Do you think there are arguments for special treatment of the elderly with LLA? Or not?
- Do you use treatment protocols/guidelines?
- What is the frequency of therapy? Who determines the frequency?
- Are patients encouraged to use a prosthesis? Who decides whether the patient will be fitted with a prosthesis? Who prescribes?
- How involved are the nursing/care staff in the rehabilitation? Examples: wound care, bandaging, compression, stump inspection, donning and doffing prosthesis, transfer training.
- What do you see as the main goals of rehabilitation for people with LLA in this setting?
- Do you use outcome measurements? Berg balance scale, sit-up-and-go, Barthel index.
- What resources are available for rehabilitation of people with LLA? What is missing? Do you have a wish list?

Topic 3: Communication
- How does the team communicate over patient's rehabilitation? Consults, writing, telephone, e-mail, in person?
- How is the relationship with physiotherapist and ECP? Other team members? Professional or personal?
- Are there any problems in communication? With patient, nursing, family…
- What happens if there are problems? Would you like to see anything different?

Topic 4: Team-work/collaboration (external to team)
- Who else is involved in the rehabilitation of the person with LLA?
- What is the role of the general practitioner when their patient is admitted for rehabilitation? Are they involved?
- How is the cooperation/communication between yourself and other team members?

Topic 5: Discharge/and follow-up
- What/who determines when the patient can be discharged?
- Where is discharge paperwork/letter distributed?
- Are there any problems/difficulties with discharge process?
- Who is responsible for follow-up care if problems arise after discharge? According to your experience does the patient know who to contact with questions or problems?

Concluding…
Do you have other issues/suggestions related to the care of the elderly patient with amputation, which you think should have been discussed?