

Key Factors in Creating Model of Rehabilitation for Lower Limb Amputees

Zlata Jelacic

Department of Mechanics
University of Sarajevo
Sarajevo, Bosnia and Herzegovina

Abstract — Rehabilitation is part of all patient care, including acute care, and involves the prevention, assessment, management and supervision of a person with a disability until that person has attained an adequate and appropriate level of performance. Rehabilitation provided in acute care is ideally for a short length of stay with a focus on straight forward programs prior to discharge home or transfer to a specialist rehabilitation unit for ongoing input to facilitate independence and attainment of goals.

Keywords— *Rehabilitation model, amputation, lower limb amputation*

I. INTRODUCTION

This document outlines a model for the provision of care to lower limb amputees in Bosnia and Herzegovina over the next five years that is client centered, sustainable and effective across the continuum of care. It aims to improve the quality, safety, equity and consistency of services provided to this client group.

The amputee model of care should provide guidance to organizations and health professionals in the planning, development, provision and monitoring of services for lower limb amputees in Bosnia and Herzegovina.

The model focuses on lower limb amputations. Primary prevention is acknowledged as an important aspect in driving a decrease in the incidence of lower limb amputations. It is anticipated that the Health Primary Prevention Plan will address health promotion, prevention and at risk populations for amputations. Secondary prevention chronic disease self-management has also been shown to improve outcomes in patients following amputation [1].

Publicly provided services are the focus of this model, however the development of equivalent services by private providers and non-government organizations using this model would be advantageous as this would ensure equity of access and consistency of service delivery to all citizens.

II. BACKGROUND

Amputation is the term given to the severance of a limb, or part of a limb, from the rest of the body. Above or below knee amputations are termed major, with minor amputations involving partial removal of a foot, including toe or forefront resections.

A lower limb amputation may be experienced by people of all ages for a variety of reasons including due to accident, congenital birth defect or disease.

A. Key facts

There are a number of phases that an individual moves through pre and post lower limb amputation. This includes the decision-making phase regarding the need for amputation, the surgery, post operative recovery, rehabilitation and re-integration back into the community. Regardless of aetiology resulting in the need for lower limb amputation, the community integration is usually at least 12 to 18 months (Smith et al, 2003).

Rehabilitation of individuals post amputation is critical to maximize their physical, psychological and social wellbeing, thereby optimizing their independence, function and life roles. Many amputees will be assisted to regain their independence by the prescription and fitting of prostheses. Amputation, in particular in the aged, can be linked with deterioration in functional ability and residential status. Grief of the loss of the limb is common and may require counselling support.

The improvement of an individual post amputation is impacted on by age, physical and mental health, nutritional status, tissue perfusion, complications post amputation, their motivation, level of amputation, presence of other medical conditions/disability, smoking habits, suitability for prosthesis and the availability of rehabilitation programs.

B. Key data

People of all ages may experience amputation of a limb due to a variety of reasons including accident, congenital birth defect or disease. The most common reason for amputation in adults, especially in the aged, is due to peripheral vascular disease often associated with diabetes mellitus. The risk of amputation of the lower limb increases 15-fold in people with diabetes [2].

The number of amputations undertaken in regional public hospitals ranges from 200 to 250 each year, for the time period 2006 to 2010. Transfemoral (TFA) amputations and Transtibial (TTA) amputations account for the majority of amputations performed. The 'other' types of amputations include transmetatarsal or midtarsal amputations, numbering approximately 50 per year. Although rehabilitation and ambulatory retraining is reduced with the partial-foot amputee, these clients still require prosthetic and podiatric services and are eligible for Artificial Limb Scheme funding for prostheses. Even though the number of individuals requiring lower limb amputation is relatively low, the demand on health care services is high due to their complex needs, associated comorbidities and need for long term support

including specialized equipment. Survival rate for lower limb amputees in Bosnia and Herzegovina is 73.2% alive at one year post amputation, based on 2001-2007 data.

The majority of transfemoral or transtibial amputations undertaken during the period were for people over 60 years of age. There has been some increase in recent years in transfemoral or transtibial amputations in the 40-59 year age group, most notably in 2010, however there is no significant increase in transfemoral or transtibial amputations over time across the age groups. The 0-19 year age group has remained within the range of zero to four transfemoral or transtibial amputations per year. The 20-39 year age group ranges from four to twelve transfemoral or transtibial amputations per year. The 40-59 age group ranges from 18 to 54 transfemoral or transtibial amputations per year. The 60-79 age group ranges from 64 to 92 transfemoral or transtibial amputations per year. The 80 year plus age group ranges from 49 to 63 transfemoral or transtibial amputations per year.

C. Current services

Major amputations are mostly conducted at the public hospitals. At completion of the acute phase the amputee patient is transferred to affiliated or regional rehabilitation service. The acute rehab phase commences where interim limbs are fitted and sockets replaced if required, either as inpatients, or outpatients accessing day rehabilitation or outpatient therapy. Community rehabilitation commences with patients discharged from the interim service and a definitive prosthetic prescription raised in the accredited prescription clinic.

The uneven provision of interim prostheses and support from prosthetists for prompt modification of interim prostheses across the state is resulting in differing use of inpatient beds.

The critical pathway for lower limb amputees involves: the acute phase consisting of operative and post-operative medical care until medically stable; the rehabilitation phase including pre-prosthetic and interim prosthetic and advanced rehabilitation within the community setting accessing definitive services. Patient flow through these phases needs to be integrated and seamless. Specific goals for each phase are defined, with end-points monitored to identify phase completion. Amputees will need to continually be reviewed and re-assessed throughout their lives as ultimately self-progression rehabilitation takes place. Access to structured center-based or community based rehabilitation services needs to be available for remainder of the amputee's life.

D. Current service delivery issues

There are significant variations and inconsistencies across health, disability and community services in the provision of care to this client group, impacting on service efficiency, effectiveness, continuity of care and patient outcomes.

The provision of interim prostheses and support from prosthetists for prompt modification of interim prostheses is uneven across the state resulting in differing use of inpatient beds.

Discharge to country regions remains complex and contributes to longer length of stays. It is recommended that a detailed business case be prepared for a transition facility which will provide sub-acute care rehabilitation services for rural and remote amputee patients and patients from outer metropolitan areas, until the patient is sufficiently functionally independent to be discharged and appropriate support services have been arranged.

E. Gaps in the current service provision

Analysis of the data and consultation with key stakeholders indicates that the current service delivery arrangements for amputee patients across Bosnia and Herzegovina can be characterized by:

Inequity of access to:

- Consultative specialist amputee physician services in country hospitals.
- On-site prosthetic services in hospitals undertaking amputations.
- Prosthetic services across rural areas.
- Amputee rehabilitation services across rural areas.
- Rehabilitation and prosthetic services rural areas.

The system is also characterized by:

- Acute average length of stay of 24 – 38 days. (For 2010, the acute median length of stay in metropolitan area was 20 days, and in country 11.5 days.)
- The lack of transitional care rehabilitation services for amputee patients from country and outer metropolitan areas until they are sufficiently functionally independent to be discharged and appropriate support services have been arranged.
- Inability to discharge country amputee patients directly from acute to home due to limited access to support services.
- The lack of resources to coordinate the transfer of patients between metropolitan and country resulting in increased inpatient length of stay.
- The lack of standardized integrated pathway/treatment plan.

III. MODEL DEVELOPMENT

An Amputee Rehabilitation Workgroup was established between the University of Sarajevo and Trakya University of Health Sciences and Rehabilitation to develop a Model of Amputee Rehabilitation in Bosnia and Herzegovina.

The Amputee Workgroup was multi-disciplinary, consisting of experts in the field of amputee care and provided representation from a range of interested organizations across the continuum of care, including acute and rehabilitation hospitals, community, private and country based services.

Consultation on the model extended beyond the Amputee Workgroup to other health professionals, organizations and consumers for consultation to inform the final model.

IV. AMPUTEE REHABILITATION MODEL

Key requirements

- Amputations shall occur at various hospital sites depending on if the amputation is an emergency or elective procedure. Sites may include acute major hospitals, general metropolitan hospitals and country hospitals.
- Hospitals undertaking amputations must have clear referral pathways and links to hospitals providing specialist amputee rehabilitation services and a rehabilitation medicine consultant service should be available.
- Amputee rehabilitation should occur as close as possible to a patient's home, and as such general hospitals with a rehabilitation service should be capable of delivering inpatient and ambulatory rehabilitation (center-based day and home based rehabilitation) to its local amputee population, and be able to provide a suitable rehabilitation plan regardless of whether the individual is prescribed a prosthesis. In addition, each region should offer a regular multi-disciplinary clinic for individuals who have had a lower limb amputation to prescribe new limbs, review pain issues, review and intervene appropriately following a decline in independence.

Amputee rehabilitation services should include:

- inpatient rehabilitation services
- center based day rehabilitation supported by adequate transport systems to ensure reliable attendance
- home based rehabilitation for those unable to travel to the center or for whom rehabilitation is more appropriately conducted in the context of their normal home environment
- prompt access to prosthetists to deal with manufacture, fitting, adjustment and repair of prostheses
- environment and space requirements guided by with the Faculty of Rehabilitation Medicine standards for amputee rehabilitation sites
- defined inclusion criteria and written procedures for referral and assessment
 - this should be consistent across all rehabilitation sites, and
- the overall goal of aiming to maximize and individual's physical, psychological and social wellbeing post lower limb amputation.
- Day rehabilitation programs for amputees should be integrated with inpatient programs and offered within

the same service to promote peer support and create staff efficiencies.

- Prosthetic services should be available on an equitable basis.
- The appointment of a multi-classified amputee coordinator role or current position assigned is considered to allow central coordination for the patient across the continuum of care. The amputee coordinator should be a clinician with specific expertise and interest in the management of the amputations. The amputee coordinator will provide varied levels of care coordination depending on the specific needs of the individual to ensure compliance and good outcomes for the amputee over the long term. This role will act as a key contact person for patients, careers and their families to provide information and support as required, coordinate referrals and pull in services and expertise as necessary across the integrated pathway, including liaison with ongoing community services. The amputee coordinator will also undertake a surveillance role and assist in the management of the central amputee register. It is envisaged that this role will progress to that of a Nurse Practitioner.
- Suitable rehabilitation services must be available within a reasonable travelling distance. This is of particular importance for individuals living in countryside. Outreach teams will be needed to facilitate this.
- Suitable transition accommodation must be available, providing sub-acute care and rehabilitation services for rural and remote amputee patients and patients from outer metropolitan areas, until the patient is sufficiently functionally independent to be discharged and appropriate support services have been arranged.
- Equipment needs to be available and easily accessible at all amputee rehabilitation services and at all hospitals undertaking amputations, to support lower limb amputees in their recovery and rehabilitation. Equipment should include bandages, residual limb socks, shrinkers, mobility aids, wheelchairs, residual limb supports, pressure cushions and self-care equipment. Soft bandages are inferior to rigid removable dressings in terms of oedema control [3]. To ensure the effective management of an increasing demand for equipment, it is recommended that a proportion of funds generated from private practice/compensable clients be redirected for the provision of replacement rehabilitation equipment.
- Timely access to home modifications and equipment provision is required for all age groups and regardless of place of residence. Appendix 1 outlines a proposed integrated clinical pathway that supports individuals undertaking amputation. The framework describes a system which includes assessment, intervention and regular review and monitoring to maximize an individual's independence, physical and psychosocial

wellbeing, functioning and quality of life; and ability to manage exacerbations so as to minimize the need for hospitalization.

V. CONCLUSION

It is expected that organizations involved in providing services across the continuum of care to individuals with an amputation will actively support and encourage their staff to participate in professional development activities and further education. This will aid in the provision of high-quality services by competent and experienced staff to the amputee population.

It is essential that amputee rehabilitation specific training is included in undergraduate university courses as well as opportunities being available for individuals once qualified to continue to maintain up to date knowledge and skills through ongoing professional development activities. These activities need to be available to staff from various backgrounds including medical (specialists, trainees and general practitioners, nursing, allied health, assistant staff and carers).

Research and quality activities are seen as an essential element of this model as it ensures the ongoing improvement of patient care and drives excellence in care delivery.

Strategies/systems for recording outcomes and key performance indicators in these areas require consideration. These may include length of stay in acute, number of existing comorbidities, complication rates, discharge destination and mortality.

REFERENCES

- [1] Wegener ST, Mackenzie EJ, Ephraim P, Ehde D, Williams R. Self-Management Improves Outcomes in Persons with Limb Loss. Archives of Physical Medicine and Rehabilitation. 2009; 90: 373-80.
- [2] Edmonds M, Boulton A, Buckenham T, Every N, Foster A, Freeman, D et al. Report of the diabetic foot and amputation group. Diabetic Medicine. 1996; 13 (9 Suppl 4): S27-42.
- [3] Foster A, Freeman, D et al. Report of the diabetic foot and amputation group. Diabetic Medicine. 1996; 13 (9 Suppl 4): S27-42.