

Model of Amputee Rehabilitation in South Australia

February 2012

Contents

Executive summary	1
Key recommendations	3
1. Introduction	10
> Purpose and scope	10
> Policy context	10
> Key principles	11
2. Background	13
> Defining amputations	13
> Key facts	13
> Key data	13
> Current services	20
> Current service delivery issues	24
> Gaps in the current service provision	25
3. Model development	26
4. Amputee rehabilitation - A model for SA	27
> Organisation of services	27
> Service elements	29
• Access and equity	29
• Access and triage	29
• Shared care models in acute	30
• Inpatient rehabilitation	31
• Ambulatory rehabilitation	33
• Community and transition services	34
• Patient and carer/family support	35
• Prosthetic services	35
• Paediatric services	36
5. Specific Populations	37
> General hospitals	37
> Rural and remote	37
> Aboriginal and Torres Strait Islanders	37
> Culturally and linguistically diverse backgrounds	38
6. Partnerships	39
7. Workforce	40
8. Education & training	42
9. Quality & research	43

Appendix 1: Steering Committee, Amputee Workgroup, consultation	44
Appendix 2: World Health Organisation ICF Framework - amputee elements	46
Appendix 3: Crude incidence of lower limb amputations	47
Appendix 4: Prosthetic/Orthotics FTEs providing services to SA Health	49
Appendix 5: An integrated clinical pathway	50
Appendix 6: Pathway checklist	51
Appendix 7: K levels	53
Appendix 8: Glossary (of selected terms)	54
Appendix 9: References	55

Executive summary

This model of care has been developed by the Statewide Rehabilitation Clinical Network. There has been investment in rehabilitation services across South Australia and this model is intended to be used to support service change and best practice within the funds that have been allocated. The model is expected to challenge how any current funds for this area are spent ensuring that the allocated funds are reviewed and used to deliver this best practice model of care. The model is not a tool to seek funds over and above what is allocated now or into the future for these services.

Approximately 180 lower limb amputations are undertaken in South Australian public hospitals each year. The period of inpatient and ambulatory rehabilitation post acute is approximately two to six months, with community integration between 12 to 18 months. The majority of individuals who have had a lower limb amputation are prescribed an initial interim prosthesis, following which the timeframe for fitting their definitive prosthesis is determined by their complexity. The demand on health care services is high due to their complex needs, a high risk of falls, associated co-morbidities and need for life time support including specialised equipment.

Individuals needing to undergo the physical and emotional demands of amputee surgery need to be supported by a model that enhances their functional potential and independence. Significant variations and inconsistencies across the health and community service systems in the provision of care to individuals requiring amputation have been acknowledged by the Statewide Rehabilitation Clinical Network. These factors impact on service efficiency, effectiveness, continuity of care and client outcomes.

The Model of Amputee Rehabilitation is patient centred, based on the best available evidence and aims to achieve consistency of practice, equity of access and sustainability of rehabilitation and prosthetic services.

The primary focus of this model is on specialist rehabilitation and management of amputees post surgery, whilst acknowledging that the provision of rehabilitation in acute care is critical to facilitate early intervention and effective, efficient flow of patients through the health system. The term specialist rehabilitation refers to those episodes of care where a formal multidisciplinary program is provided.

The Model of Amputee Rehabilitation aims to improve integration of care and consistency in the delivery of standardised amputee services by:

- > Providing inpatient and ambulatory amputee rehabilitation services and a multi-disciplinary outpatient clinic in each Local Health Network, which entails the establishment of services at Modbury Hospital. Specialist rehabilitation services are being established in country.
- > Ensuring there is at least one on-site prosthetist located at each metropolitan amputee rehabilitation service, which entails a re-alignment of services and an outreach service provided to Berri.

- > Developing and implementing evidence based guidelines and protocols, suitable for use in EPAS, for the seamless delivery of services which includes: an agreed pathway and interdisciplinary care check-list; a rigid removal dressing protocol and a supported pathway for accessing ambulatory rehabilitation and prosthetic services for metropolitan and country Aboriginal clients.
- > Consider appointing/assigning an amputee co-ordinator to provide central coordination for the amputee patient across the continuum of care, initially with two positions appointed in metropolitan Adelaide and one position appointed in country.
- > Redirecting funds to ensure the availability and accessibility of a range of equipment required for the provision of amputee rehabilitation services, to aid recovery and rehabilitation and provide service efficiencies.
- > Developing and maintaining strong partnerships and collaborations across the continuum with other government, non government and private organisations to ensure achievement of the best possible outcomes for individuals experiencing an amputation, and provide service efficiencies.
- > Collaborating with partner agencies to review and manage processes for the prescribing of definitive prostheses, to ensure cost effectiveness and equitable access.

Responsibility for implementation is detailed against the key recommendations. The Model of Amputee Rehabilitation in South Australia will inform regional implementation planning for amputee rehabilitation services, ensuring the provision of equitable, accessible and effective services to South Australians.

Key Recommendations

Recommendations are grouped under the following categories:

- A – Organisation / system
- B – Prosthetics
- C – Specific Populations
- D – Workforce
- E – Research & Development

A - Organisation / System

Model of care

Hospitals undertaking elective lower limb amputations should be linked to specialist rehabilitation services providing amputee rehabilitation and a rehabilitation medicine consultation service should be available, for pre and post amputation consultation.

Amputee rehabilitation services should be provided in general hospitals in each Local Health Network, ensuring services as close as possible to people's homes. As outlined in the Rehabilitation Service Plan, Modbury Hospital requires the establishment of inpatient and ambulatory amputee rehabilitation services. The majority of amputee patients have vascular disease and ischaemic heart disease and early patient transfer post surgery will require access to specialist medical services (including overnight) and diagnostics. Prosthetic services shall be included in the rehabilitation team for Modbury (see Prosthetics recommendations).

Specialist amputee rehabilitation services should include inpatient and ambulatory rehabilitation (centre based day and home based rehabilitation) and be able to provide a suitable rehabilitation plan regardless of whether the individual is prescribed a prosthesis.

Each Local Health Network (North, South, Central and Country) shall consider a multi-disciplinary amputee outpatient clinic. Services shall be equitable and include prosthetics, amputee rehabilitation specialist and physiotherapy, with access to psychology services.

There are currently variations in services provided in each metropolitan region (Table 5, page 24). Specialist rehabilitation services are being established in country. A monthly visiting rehabilitation specialist and prosthetist service is required in Berri, which will be provided by the Repatriation General Hospital (as outlined on page 27).

Refer: *Page 27*

Responsibility: *Endorsement – SA Health*

Planning & Implementation – Local Health Networks

Guidelines/processes

Developing and implementing evidence based guidelines and protocols, suitable for use in EPAS which:

- facilitates seamless delivery of services through adopting of an agreed pathway and interdisciplinary care check-list
- facilitates a supported pathway for accessing ambulatory rehabilitation and prosthetic services for metropolitan and country Aboriginal clients
- ensures the adoption of a rigid removable dressing protocol in all South Australian hospitals undertaking inpatient and amputee, to reduce the time until the stump is ready for casting and therefore reduce rehabilitation inpatient length of stay, and to protect the stump if a fall occurs

Refer: *Section 5 (pages 27-28; Appendix 5 & 6 (pages 50, 51), page 35*

Responsibility:

Endorsement - SA Health

Development & implementation – CALHN / SASCIS in consultation with Rehabilitation Clinical Network

A Falls Prevention protocol specific to amputees should be developed and implemented in all South Australian acute and inpatient rehabilitation hospitals.

Refer: *Page 31*

Responsibility: *Endorsement – SA Health*

Development - SA Health Safety & Quality / Rehabilitation Clinic Network

Implementation – Local Health Networks

Coordination

Amputee coordinators be appointed to provide a central coordination for the amputee patient across the continuum of care, as described in this model. It is recommended that amputee coordinators initially be appointed for Northern Adelaide Local Health Network, Southern Adelaide Local Health Network and country region (3FTE in total).

Refer: *Page 28, 40*

Responsibility:

Endorsement/funding- SA Health

Implementation – Local Health Networks

Recognising that workforce shortages exist amongst prosthetists, rehabilitation medicine specialists and senior physiotherapists with amputee experience, and the importance of a dedicated position responsible for coordinating services for the amputee patient, a business case shall be prepared to progress this role to that of a Nurse Practitioner. For the future Nurse Practitioner role it is envisaged that, amongst other roles, the Nurse Practitioner should be capable of running community wound and amputee clinics, making country visits, assisting families and patients with forms for mobility allowances and equipment.

Refer: *Page 40*

Responsibility:

Endorsement - SA Health

Implementation – Rehab Clinical Network to develop the Business Case.

Partnerships

Strong partnerships and collaborations should be developed and maintained to ensure improved integration of care and achieve the best outcomes for individuals experiencing amputations. In particular, discussions with partner agencies should address the need for timely access to home modifications and equipment provision.

Refer: *Page 33 – 35, 39*

Responsibility:

Endorsement – SA Health

Development of partnerships - CALHN and Rehabilitation Clinical Network

Patient information

As a priority, a formal process should be implemented to ensure patients, carers and families receive information and support regarding all aspects of the patient's journey/care, including links to peer support groups. Information resources should include written and web based materials.

Refer: *Page 30*

Responsibility:

Endorsement – SA Health

Implementation - Local Health Networks – Process

Development of materials and web information – Local Health Networks in consultation with Rehabilitation Clinical Network; linking with SA Health Communications Division.

Data

All inpatient and ambulatory amputee rehabilitation services should report data to AROC to enable national benchmarking and transparent comparative public reporting to occur.

Refer: *Page 43*

Responsibility:

Endorsement – SA Health

Implementation - Local Health Networks in consultation with Rehabilitation Clinical Network

Transition

A detailed business case should 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. The business case will incorporate a description of services to be provided for patients requiring transitional services for other conditions (such as acquired brain injury).

Refer: *Page 28*

Responsibility:

Endorsement to proceed with development of business case – SA Health

Development of business case – CALHN in consultation with Rehabilitation Clinical Network

Equipment

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. This equipment includes bandages, residual limb socks, shrinkers, mobility aids, wheelchairs, residual limb supports, pressure cushions and self care equipment. 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.

High technological amputee rehabilitation equipment is becoming standard, for example robotics, and is associated with service efficiencies. It is recommended that the funding models are reviewed for these services as currently the State has two public and one private service.

Refer: *Pages 13, 28, 30, 32*

Responsibility:

Endorsement – SA Health

Management of funds – Local Health Networks

Lifestyle intervention strategies should be developed and implemented in rehabilitation settings to reduce preventable amputations in high risk patients (that is, those with metabolic conditions).

Refer: *Page 42*

Responsibility:

Endorsement – SA Health

Planning & Implementation - Local Health Networks

B – Prosthetics

All hospitals undertaking amputations should have equitable access to prosthetic services including early Rigid Removable Dressing fitting. It is recommended that 0.5FTE prosthetist be considered in each amputee rehabilitation service (north, central and south).

As outlined in the Statewide Rehabilitation Service Plan, The Queen Elizabeth Hospital (TQEH) and Modbury Hospital (MH) will have amputee rehabilitation beds by 2016. Currently, TQEH has a visiting prosthetic service and a private provider of interim prosthesis. A significant number of amputations are undertaken at TQEH (page 18). MH will have amputee rehabilitation beds by 2016 and prosthetic services will need to be incorporated into this planning.

Prosthetic services to the Paediatric Clinic at the Women's and Children's Hospital (WCH) are currently provided by Prostek. Additional services by a visiting prosthetist are required, on a request basis. A process should be agreed and implemented.

These recommendations are realignment of current services – no additional FTE required.

Refer: Page 22, 23, 24, 25, **35**; Appendix 4 (page 39). (Paediatric, page 36)

Responsibility:

Endorsement - SA Health

Implementation – Local Health Networks

To ensure equity of access to services in country, visiting amputee rehabilitation and visiting prosthetic services shall be provided in Berri. This would entail a rehabilitation specialist and a prosthetist from the Repatriation General Hospital (RGH) providing a monthly visiting service.

Refer: Page 22, 35-36

Responsibility:

Endorsement – SA Health

Implementation – Southern Adelaide Local Health Network

The provision of interim prostheses immediately post amputation will remain the responsibility of the rehabilitation hospital (public or private).

Refer: Page 22

Responsibility:

Endorsement - SA Health

Implementation – Local Health Networks

The Department for Families and Communities currently operate the SA Artificial Limb Service (SAALS), who oversees the funding of definitive prostheses. Data indicates there will inevitably be waiting lists for definitive prostheses in the future due to processes for prescribing of definitive prostheses. Cost implications are likely should this occur. Clinical engagement, monitoring of data, and the process for prescribing of definitive prostheses, including regular reviews, is imperative to ensure that only accredited amputee rehabilitation services are authorised to prescribe.

There are alternative approaches to the provision of definitive prostheses and economic modelling should be undertaken to assess the various models, likely growth, costs and budget needed to effectively manage the allocation of definitive prostheses into the future. It is recommended that SA Health consider a health database, comprising a 0.6FTE data officer, to undertake this work.

The provision of recreational limbs is essential as children grow, to assist with development and lifestyle choice.

It is recommended that SA Health and the Department for Families collaborate regarding the management of the SAALS.

Refer: Pages 23, 24, 35

Responsibility:
Endorsement - SA Health
Planning re collaboration – SA Health with Rehabilitation Clinical Network

C – Specific populations

Ongoing training and development opportunities need to be available to country staff to ensure development and maintenance of a skilled workforce to provide amputee care across the continuum.

Refer: *Page 42*
Responsibility:
Endorsement – SA Health
Implementation - Country Health SA Local Health Network

Paediatrics

To ensure equity of access to paediatric rehabilitation clinic services, uniform data reporting should be agreed and implemented.

It is important that medical information accompany the patient when referred for rehabilitation. A referral protocol should be developed and implemented in relevant paediatric departments including orthopaedics and pre-clinics.

Refer: *Page 36*
Responsibility:
Endorsement – SA Health
Development and Implementation – Womens and Childrens Health Network

D – Workforce

Staffing of inpatient and ambulatory rehabilitation services to be guided by the Australasian Faculty of Rehabilitation Medicine guidelines. In implementing the Model of Care for Amputee Rehabilitation in South Australia, detailed workforce modelling shall be undertaken to ensure services are appropriately resourced. Access to psychology services in each Local Health Network for all amputees should be mandatory.

Refer: *Page 40-41*
Responsibility:
Endorsement – SA Health
Implementation – SA Health Workforce Development and Local Health Networks

E – Research and development

Engagement should occur in planning processes for the new EPAS electronic health records system, to enable care pathways to be developed and ensure this system has the function to collect information on key milestones (for example, time to cast, time to first walk, mobility outcomes). Audit, research and quality activities are essential for the future

planning of these services.

Refer: *Page 43*

Responsibility:

Endorsement – SA Health

Engagement in ePAS planning - SA Health / Rehabilitation Clinical Network

Research and development activities should be actively encouraged to facilitate continuous improvement of amputee rehabilitation services. It is essential that prosthetists undertake professional development to maintain technical speciality. Service KPIs should include staff presentations at the two national conferences (ISPO and AFRM) which focus on amputee rehabilitation. It is recommended this be resourced through the redirection of a proportion of funds generated from private practice/compensable work.

Refer: *Page 43*

Responsibility:

Endorsement – SA Health

Implementaiton - Local Health Networks

Partnerships should be developed with the universities to support research students and evaluate service model changes.

Refer: *Page 43*

Responsibility:

Endorsement – SA Health

Implementation - Local Health Networks

1. Introduction

Purpose and scope

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 performance¹. 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.

This Amputee Model of Care document outlines a model for the provision of care to lower limb amputees in South Australia over the next seven years that is client centred, 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 provides guidance to organisations and health professionals in the planning, development, provision and monitoring of services for lower limb amputees in South Australia.

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 SA 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 (Wegener et al, 2009²).

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

Policy context

The Government's commitment to health reform is clearly articulated in the SA Health Care Plan 2007-2016³ with the expansion of rehabilitation services outlined as a key priority. This is further supported by the establishment of the Statewide Clinical Networks, commencing in May 2007.

In developing this model, a number of South Australian strategic plans and policies have been considered as outlined below:

- > South Australia's Strategic Plan, 2007-2009
- > SA Health Strategic Plan, 2007-2009
- > SA Health Care Plan, 2007-2016
- > Strategy for Planning Country Health Services in South Australia

- > GP Plus Health Care Strategy, 2007
- > SA Health Aboriginal Health Care Plan, 2010 - 2016
- > SA Health Aboriginal Cultural Respect Framework
- > The National Strategic Framework for Aboriginal and Torres Strait Islander Health 2003-2013
- > The Cultural Respect Framework for Aboriginal and Torres Strait Islander Health 2004–2009
- > SA Health Statewide Health Plans
- > Chronic Disease Action Plan for South Australia, 2009-2018

Additionally, this report acknowledges the World Report on Disability 2011, jointly produced by World Health Organisation (WHO) and the World Bank Group, which provides the evidence for innovative policies and programs that can improve the lives of people with disabilities, and facilitates implementation of the UN Convention on the Rights of Persons with Disabilities which came into force in May 2008.

The World Report on Disability suggests steps for all stakeholders – including governments, civil society organisations and disabled people’s organisations – to create enabling environments, develop rehabilitation and support services, ensure adequate social protection, create inclusive policies and programmes, and enforce new and existing standards and legislation, to the benefit of people with disabilities and the wider community. People with disabilities should be central to these endeavours.

The World Health Organisation’s (WHO) international classification of functioning, disability, and health (ICF) was implemented in 2001 and has been applied in a variety of settings at national and international levels. Appendix 2 outlines the key features of WHO’s ICF model and covers all relevant elements relating to amputees.

It is also recognised that the Productivity Commission’s final report into Disability Care and Support is being submitted to government at the end of July 2011. The report suggests new arrangements so that all Australians who have a significant disability would be able to get essential care and support. The Commission is recommending two schemes, being the National Disability Insurance Scheme, similar to Medicare, and a smaller scheme to cover the lifetime care and support needs of people with a catastrophic injury from an accident of any kind, based on the motor accident compensation schemes that currently operate in Australia. If these schemes are endorsed the impact of implementation will require consideration in the context of this model.

Key principles

The guiding principles utilised in the development of this model are consistent with the Model for Rehabilitation in South Australia (as outlined in the Statewide Rehabilitation Service Plan, 2009-2017⁴) and based on SA Health’s aim to optimise patient care outcomes by providing the ‘right care at the right time and in the right place first time’. This model is further enhanced by the key principles of the Rehabilitation Model: client centred care, maximising function and independence, access and equity, service consistency, seamless service, partnerships, standards of care, and support and value of staff.

Services provided to those that have had an amputation shall be patient-centred and sensitive to their needs. Individuals and their families need to be actively involved in their rehabilitation, setting of realistic goals and in optimising their recovery and lifestyle following amputation. Education, emotional support and counselling are essential components to facilitate this.

Organisations providing acute, rehabilitation and/or ongoing care to individuals experiencing amputation across the continuum shall be able to meet the service elements of access and equity, triage, shared care models in the acute setting, inpatient rehabilitation, ambulatory rehabilitation and transitional services.

2. Background

Defining amputations

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.

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; consensus statement).

Rehabilitation of individuals post amputation is critical to maximise their physical, psychological and social well being, thereby optimising 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 programmes.

Key data

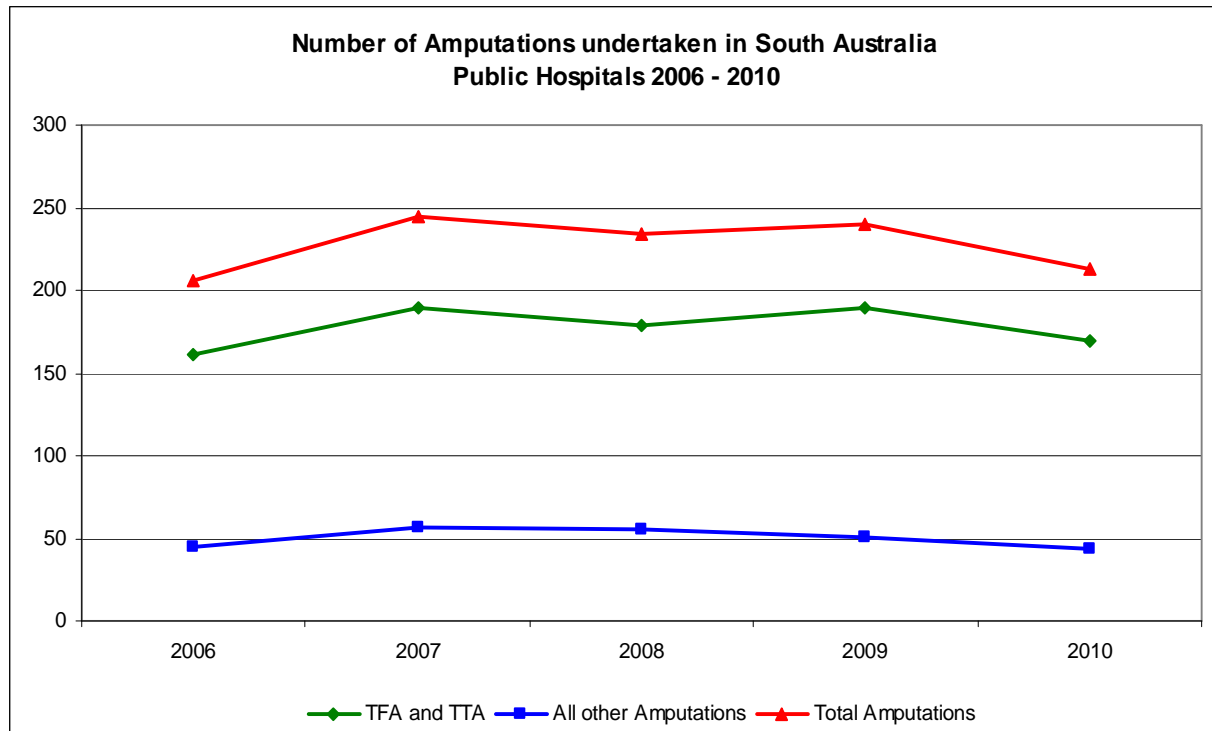
People of all ages may experience amputation of a limb due to a variety of reasons including accident, congenital birth defect or disease. The most common reason for amputation in adults, especially in the aged, is due to peripheral vascular disease often associated with diabetes mellitus. The risk of amputation of the lower limb increases 15-fold in people with diabetes⁵.

The number of amputations undertaken in South Australian public hospitals ranges from 200 to 250 each year, for the time period 2006 to 2010 (Figure 1). Transfemoral (TFA) amputations and Transtibial (TTA) amputations account for the majority of amputations performed. The 'other' types of amputations (Figure 1) 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 co-morbidities and need for long term support including specialised equipment. Survival rate for

lower limb amputees in South Australia is 73.2% alive at one year post amputation, based on 2001-2007 data.

Figure 1

Source: ISAAC

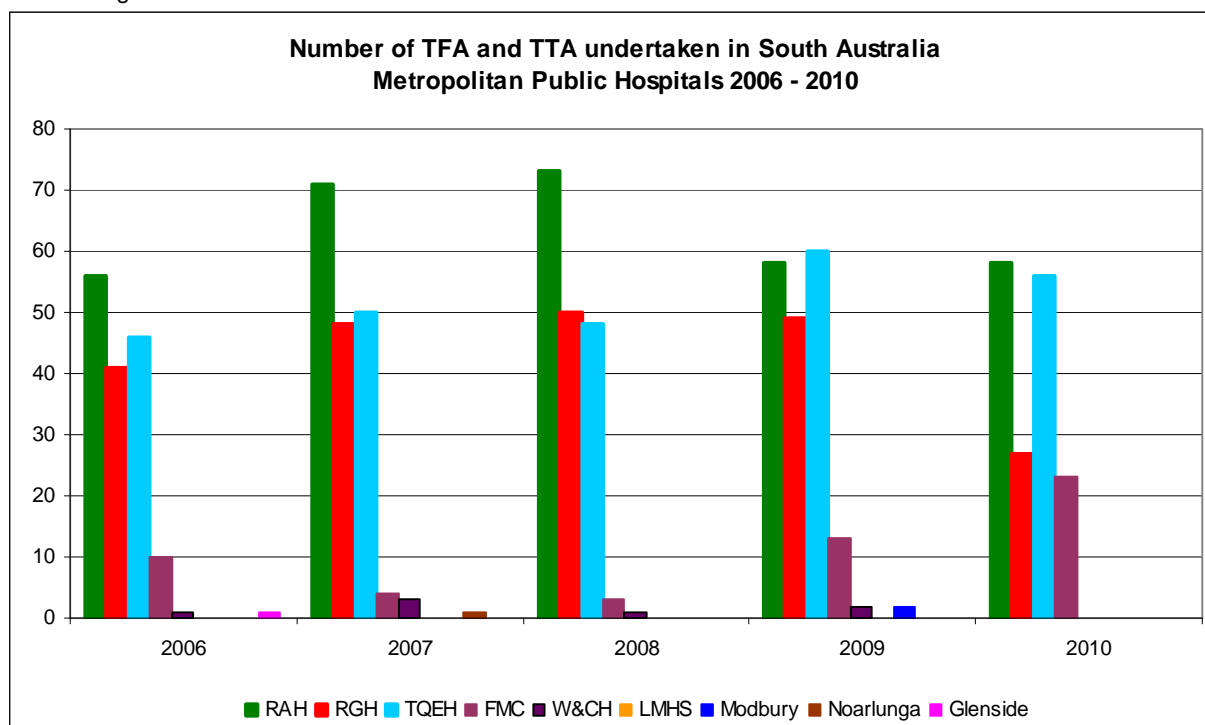


Crude incidence of lower limb amputations in metropolitan and country South Australia are contained in Appendix 3. The incidence in metropolitan Adelaide does not follow an obvious pattern in line with age. In country areas, a high incidence in Gawler-Barossa, Riverland and Fleurieu regions is shown.

The majority of limb amputations are undertaken at the Royal Adelaide Hospital (RAH), the Queen Elizabeth Hospital (TQEH) and the Repatriation General Hospital (RGH) (Figure 2). In the period 2006-2010 there have been between three and thirteen transfemoral/transtibial amputations performed each year at Flinders Medical Centre. This has climbed to over twenty in 2010. In January 2010 vascular services relocated from RGH to Flinders Medical Centre (FMC) making FMC the acute centre for orthopaedic trauma related and vascular related amputations, with rehabilitation for amputees conducted at the RGH. Since 2003 there have been no transfemoral or transtibial amputations performed at the Lyell McEwin Hospital (LMH). In the period 2006-2010 there has been a total of three transfemoral or transtibial amputations performed at Modbury Hospital (MH) (both in 2009). In the same period there has been one transfemoral or transtibial amputations performed at Noarlunga Hospital (NH) (2007).

Figure 2

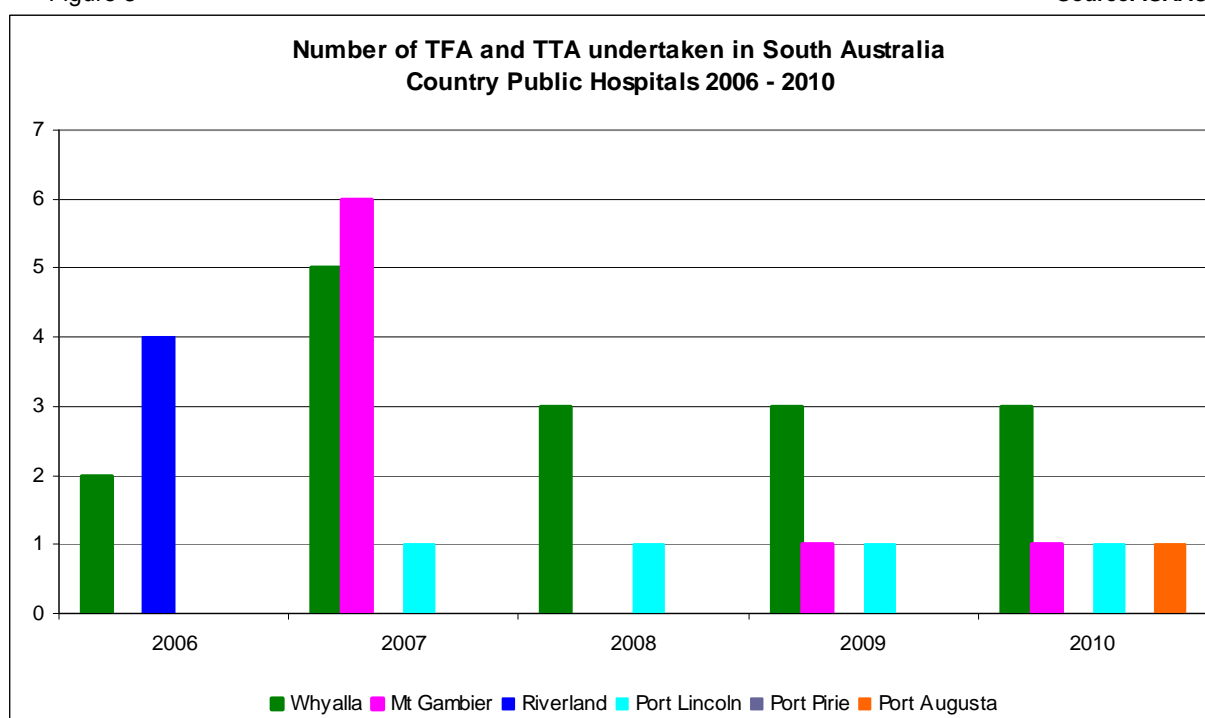
Source: ISAAC



There have been a number of transfemoral or transtibial amputations performed at country hospitals in South Australia in the years 2005 - 2010 (Figure 3). Most of the amputations during this period have been performed at Whyalla Hospital, Mt Gambier Hospital and (until 2007) the Berri Hospital. In the period 2006-2010 there have been a total of four transfemoral or transtibial amputations performed at Port Lincoln Hospital. In the same period there has been a total of one transfemoral or transtibial amputation performed at both Port Pirie Hospital and Port Augusta Hospital.

Figure 3

Source: ISAAC

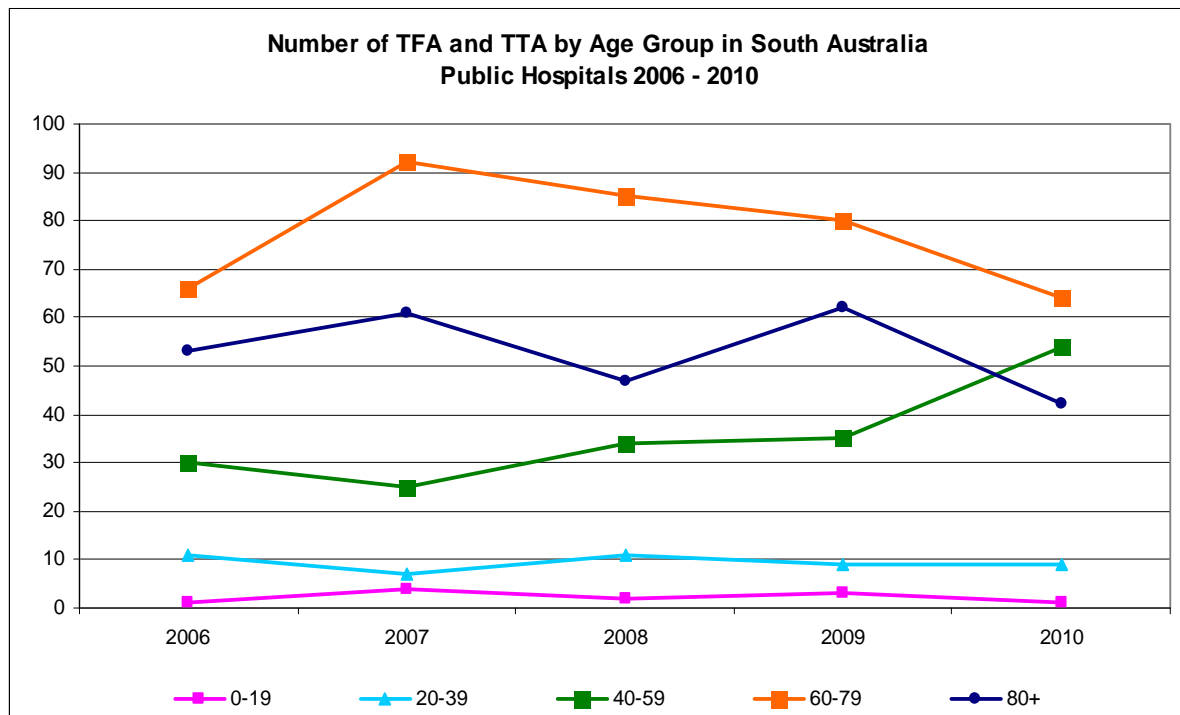


In South Australia from 2006 – 2010, two thirds (66.7%) of the lower limb amputations were of males. This is consistent with national and international trends. Higher incidence for men may be related to the levels of adherence to advice, the amount of available social support and psychological factors such as denial.

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 (Figure 4), 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.

Figure 4

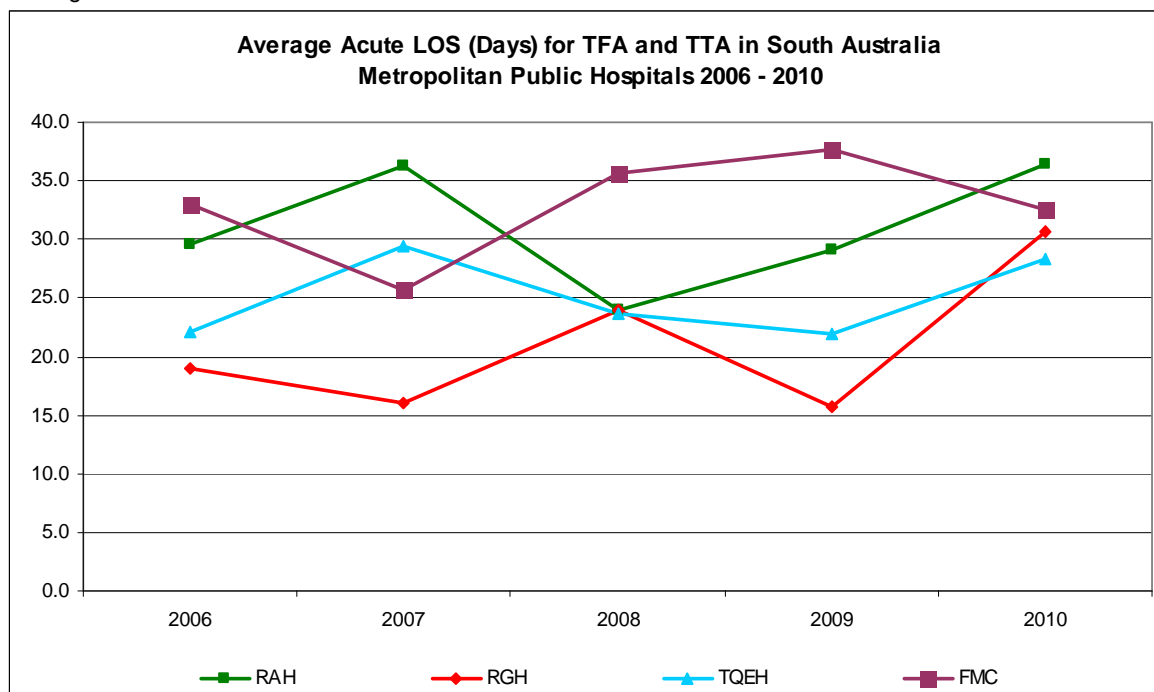
Source: ISAAC



The average length of stay (ALOS) for the acute component of the patient's stay for a transfemoral or transtibial amputation (and other co-morbidities) is provided for metropolitan public hospitals with the highest throughput of transfemoral or transtibial amputations (Figure 5). The ALOS has remained within the range of 24-36 days for RAH, 16-30 days for RGH, 20-30 days for TQEH and 26-38 days for FMC. The median length of stay in 2010 in metropolitan SA was 20 days.

Figure 5

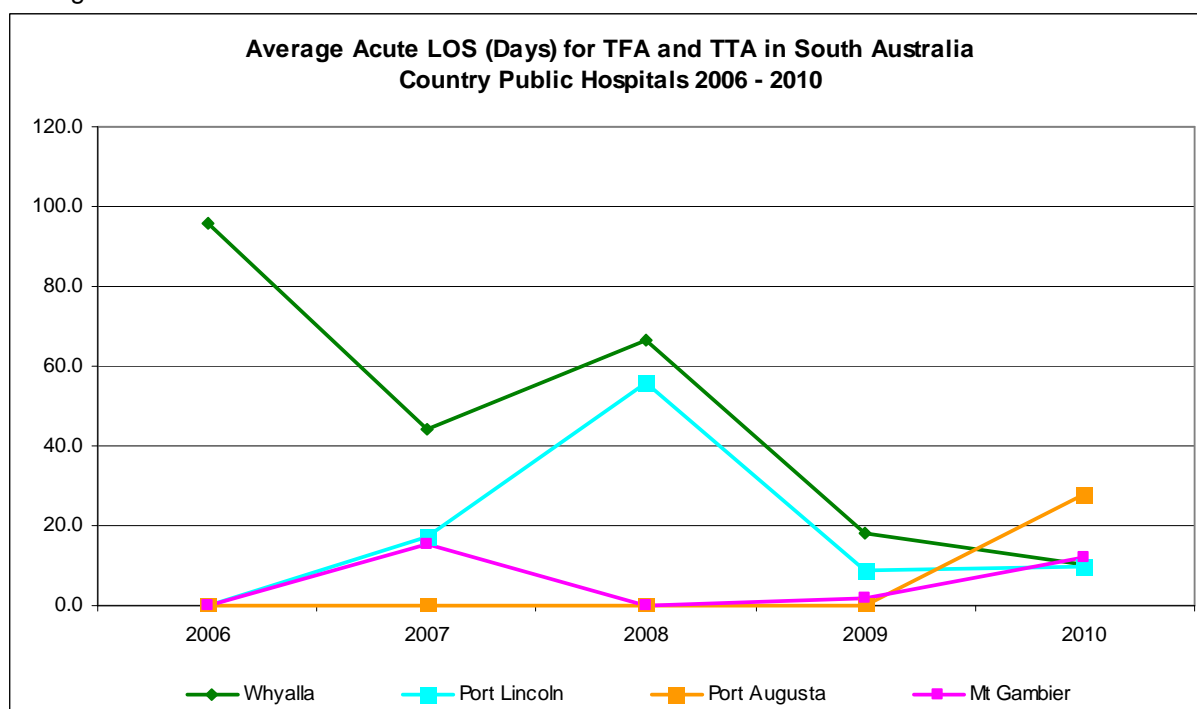
Source: ISAAC



The average length of stay (ALOS) for the acute component of the patient's stay for a transfemoral or transtibial amputation (and other co-morbidities) is provided for country public hospitals with the highest throughput of transfemoral or transtibial amputations (Figure 6). It is difficult to analyse ALOS for country clients as the number of transfemoral or transtibial amputations is small and the client may be transferred to a metropolitan hospital as a component of their acute care. A study in New Zealand reported longer lengths of stay for those who reside in regional areas⁶, probably attributable to service accessibility and clinical practice. It is expected that this would also be true for regional areas of South Australia. The median length of stay in 2010 in country was 11.5 days.

Figure 6

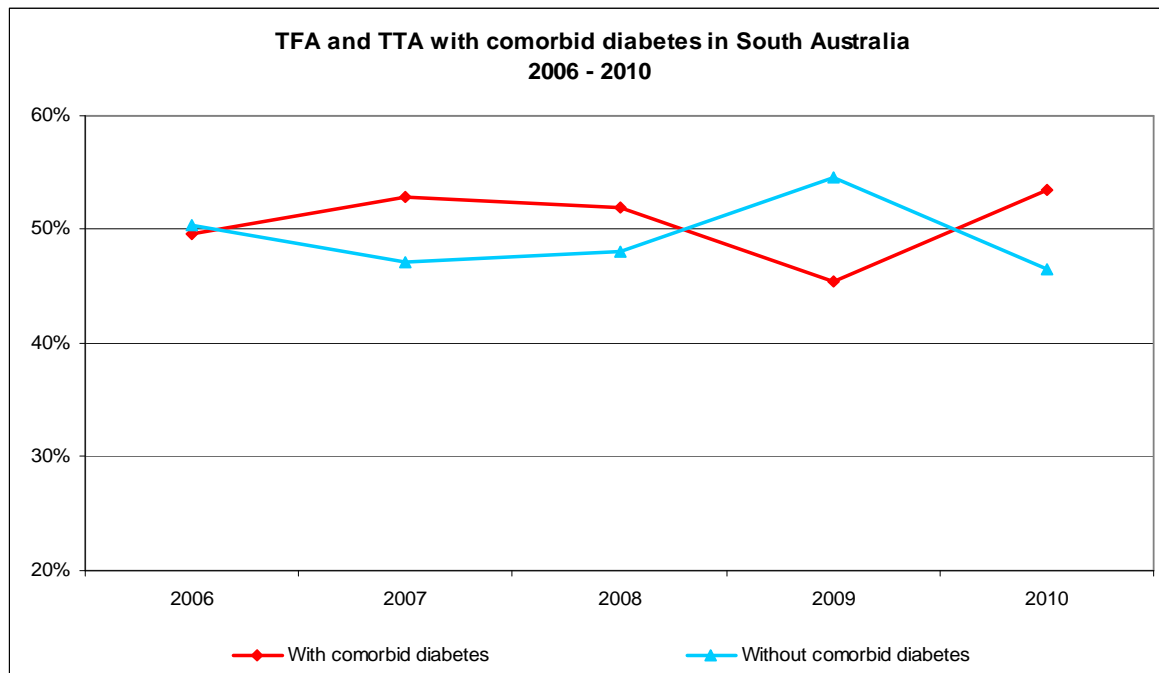
Source: ISAAC



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. Approximately 50% of people undergoing a transfemoral or transtibial amputation also have co-morbid diabetes recorded as one of 25 diagnoses on discharge (Figure 7). The cost of diabetes related lower limb amputations to the Australian health system is significant, estimated at \$48 million in 1985 and projected to have risen considerably since then.

Figure 7

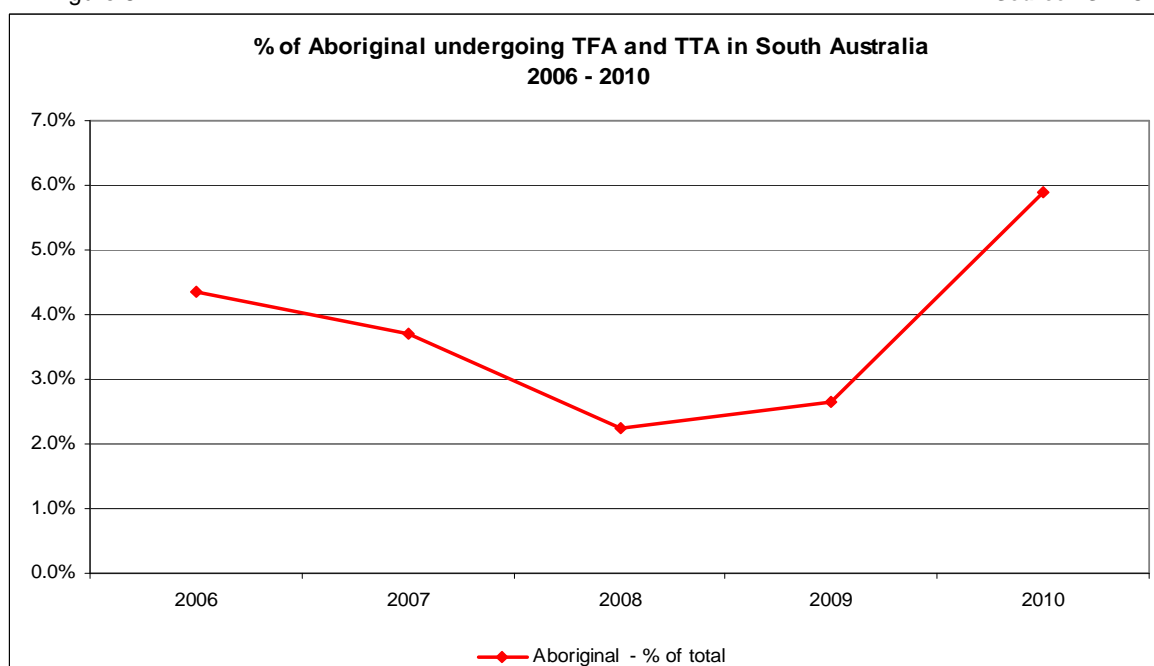
Source: ISAAC



The proportion of people having transfemoral or transtibial amputations who are recorded as being Aboriginal has remained within the range of 2.2% to 4.3% in the period 2005-2009 (Figure 8), however increased to 6% in 2010. The estimated proportion of indigenous population in South Australia is 1.7%.

Figure 8

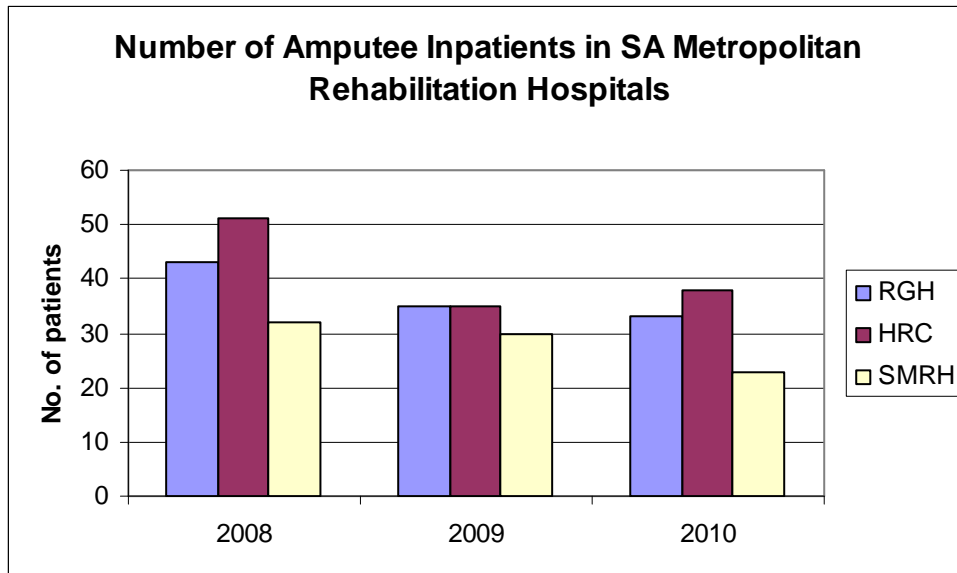
Source: ISAAC



Inpatient amputee rehabilitation is primarily conducted at Hampstead Rehabilitation Centre (HRC), St Margaret's Rehabilitation Hospital and the RGH. The number of patients undertaking inpatient rehabilitation for amputation has reduced from 2008 to 2010, although HRC showed a small increase from 2009-2010 (figure 9). New inpatient and ambulatory services at Whyalla and Mount Gambier have been in place since May 2010 and are actively taking clients from those regions for specialised rehabilitation.

Figure 9

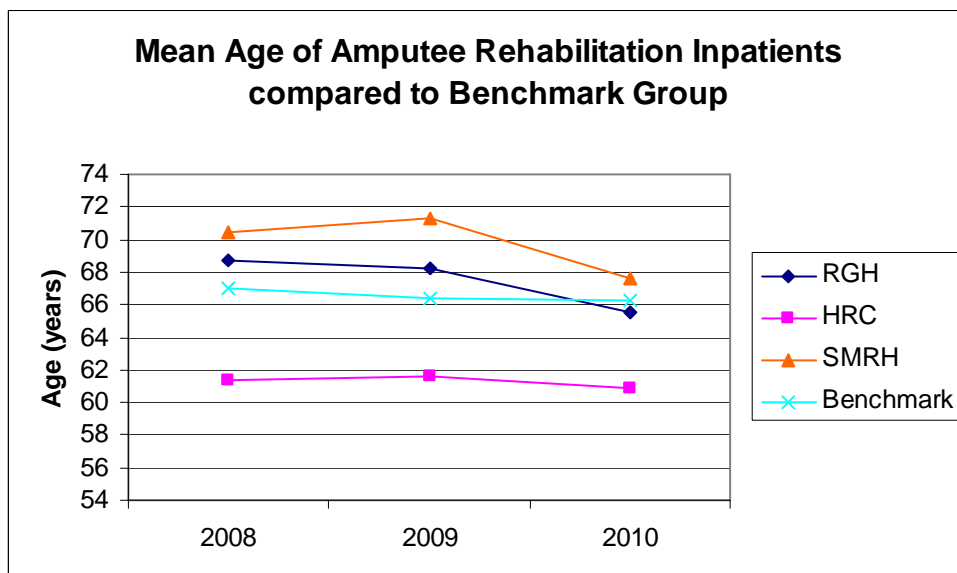
Source: AROC



Patients admitted to the HRC tend to be younger than the benchmark group and other SA rehabilitation hospitals (Figure 10).

Figure 10

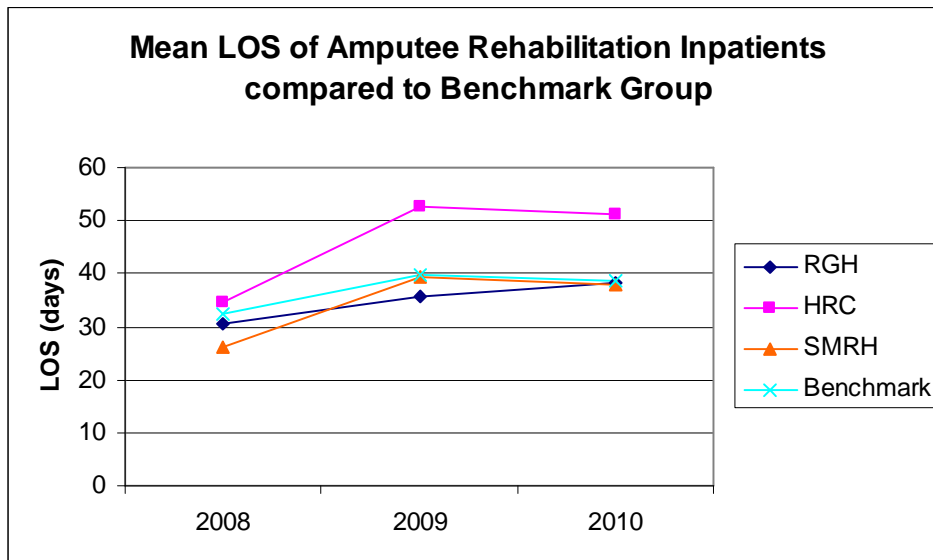
Source: AROC



The length of stay reported by AROC for rehabilitation has increased since 2008 (figure 11). The length of stay for HRC is currently above the benchmark and may reflect the lack of suitable discharge services for ongoing amputee care, especially given the difficulty gaining services and equipment for patients under 65 years of age. Discharge to country regions also remains complex and will contribute to the longer length of stay for those clients.

Figure 11

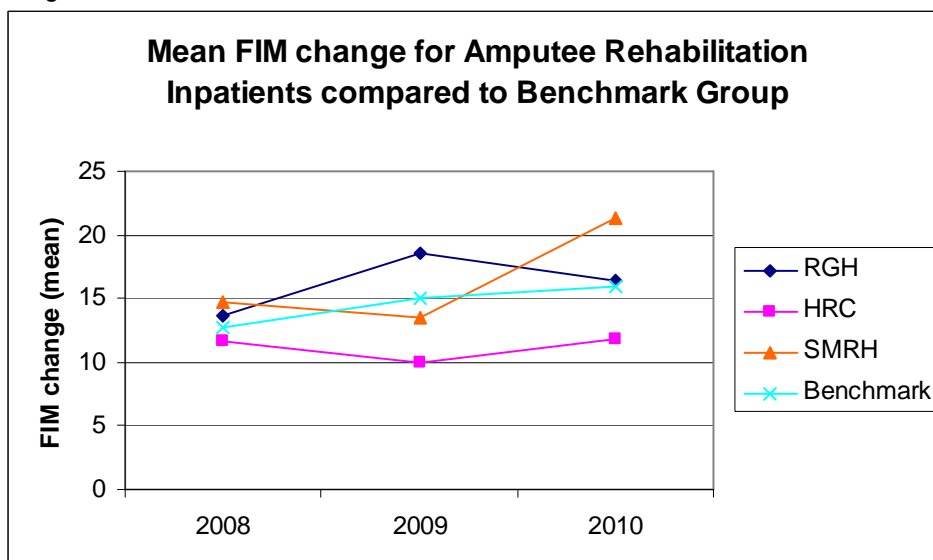
Source: AROC



St Margaret's Rehabilitation Hospital has increased the mean FIM change from 2009 to 2010, whilst the RGH's mean FIM change is just above the benchmark. (Figure 12).

Figure 12

Source: AROC



Current services

Lower limb amputations are currently undertaken by surgeons at acute tertiary and some metropolitan general hospitals, and some private hospitals. As outlined in figure 3 above, very few lower limb amputation surgeries take place in country South Australia. A proportion of the clients undergoing amputations in metropolitan hospitals are country residents.

Major amputations are mostly conducted at the public hospitals identified in Table 1. 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.

Tables 1 and 2 reflect the approximate number of amputees who transition through each phase of acute, sub-acute, rehab and community care.

Table 1: Major amputations, 2010 (TFA/TTA only)

ACUTE SERVICE	TOTAL AMPUTEES	TOTAL TRANSFERRED TO REHAB
Flinders Medical Centre	43	21 to RGH
Royal Adelaide Hospital	58	1 to RGH 29 to HRC 2 to St Margarets
The Queen Elizabeth Hospital	56	1 to RGH 5 to HRC 15 to St Margarets
Repatriation General Hospital	1	
Whyalla	3	Nil
Mt Gambier	1	2 from RGH (surgery at FMC) 1 from RAH
Private	N/A	12 to RGH 5 to HRC

Table 2: Limb fitted amputees 2010

ACUTE SERVICE	TOTAL INTERIM LIMB FITTED AMPUTEES	TOTAL INTERIM SOCKETS PER AMPUTEE (Median)	TOTAL WITH DEFINITIVE PROSTHESIS (Median)
Flinders Medical Centre	42	1.6	36
Royal Adelaide Hospital	35	2.4 *	31
The Queen Elizabeth Hospital	33	1	28
Whyalla	Approx 10 **	2-3	37
Mt Gambier			

* Approximate number due to reliability of data

** Limited number of interim limbs fitted as many cases are fitted in metropolitan areas prior to transfer

Note: as this data covers lower limb TTA & TFA amputee numbers only, will distort analysis of the relative activity/complexity of prosthetic services

Adult amputee rehabilitation is currently provided at the RGH, St Margaret's Hospital and HRC (Figures 9-12) with varying levels of ambulatory and community based rehabilitation post discharge from these facilities. Some private rehabilitation hospitals also provide amputee rehabilitation. Ongoing care in the community is provided by a number of agencies, with Domiciliary Care SA, Community Health CHSA and Disability SA, the primary providers to this client group.

The paediatric rehabilitation department at the Women's and Children's Hospital (WCH) runs a multidisciplinary clinic six to eight times per year, which includes an orthotist and prosthetist, physiotherapist, occupational therapist, rehabilitation and orthopaedic consultant. Additionally there is access to consultative services including social worker and psychological medicine. Individual clinic appointments are also held to assist children and adolescents with limb deficiency, and includes sessions to manufacture and fit prostheses, counselling, and other requirements.

Specialised amputee rehabilitation services are currently available in Whyalla involving onsite prosthetic practitioners and visitations by a rehabilitation specialist. Prosthetists based at Whyalla provide a visiting service to Pt Lincoln and Pt Augusta, with no prosthetic service available in Berri. Mount Gambier has access to prosthetic practitioners and a rehabilitation specialist via visiting clinics. All other regional areas need to be supported from the metropolitan based amputee services for prosthetics services and specialist consultations. Ongoing care in the community and general rehabilitation services are available in all areas.

There are four main prosthetic providers:

- > Orthotics and Prosthetics SA based at the RGH (now providing outreach to Mount Gambier)
- > Adelaide Orthotics and Prosthetics based at the RAH, also providing services to HRC and MH, and interim services to TQEH.
- > Prosthetic services at Whyalla Hospital.
- > Private company Prostek, who provide prosthetic services to some public hospitals, including a visiting interim service to TQEH, St Margaret's and the WCH.

Manufacturing services for interim and definitive prostheses are currently at three public hospitals (RGH, RAH and Whyalla).

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. Appendix 4 outlines Prosthetic/Orthotics FTEs providing services to SA Health and indicates the services provided at each facility.

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 centre-based or community based rehabilitation services needs to be available for remainder of the amputee's life. Table 3 outlines the current practice at SA acute and rehabilitation facilities relating to critical pathway phases.

Table 3:

		FMC / RGH	RAH / HRH / St Margaret's	TQEH /St Margaret's	Whyalla
Pre-op	Pre-amputation consultation	When notified; Rehab Spec & Prosthetist	√	As requested	As requested, depending on notification
Acute Phase: Day 1-7	Acute consultation	√	√	As requested	√
	Multi-D management, day 2	√	√	√	Not consistent. Still in development
	RRD < 48 hours	√	√	Yes if requested	Not consistent. On request
	RRD Reviews (Day 1, 2 then every second day)	Yes	daily	Review by hospital prosthetist as required	Yes, if requested
Rehab Phase: Day 7-28	Transfer to inpatient rehab < 7 days	Possible	Possible	Possible	Possible
	Commence active compression therapy -Shrinkers	Yes	Yes	Yes	Yes
	Casting commences day 21-28 (assume primary closure)	Yes	Yes	When healed and volume stabilised	Assuming closure, yes
	Interim prosthesis fitted –aim within 48 hours of casting	Yes	Yes	Yes – 48 hours ?	Goal, but not always possible due to outreach commitments
Rehab Phase: Day 28 - discharge	Commence gait training	Yes	Yes	Yes	Yes
	Continue strengthening, conditioning, gait training, donning/doffing, stump care, footwear,	Yes	Yes (typically post discharge)	Yes	Goal
	Second socket fitting following residuum volume decrease	Yes	Yes	As required following socket adjustment	As required
	Incl replacement socket fittings with further residuum volume decrease as required	Yes	Yes	?	Regular physio sessions
Definitive program	Scripting for first definitive, Multi-D clinic	Yes	Yes	Usually well after discharge	After discharge
	Continue review and long-term follow up	Yes	Yes	Yes	

The South Australian Amputee Limb Service, Artificial Limb Scheme (SAALS) oversees the funding of limb prosthesis (definitive). Limb prostheses are prescribed and manufactured by prosthetists/prosthetic companies for eligible non-DVA and non-compensable amputees, with the aim to make limb prostheses accessible to those South Australians who require them. SAALS is currently managed by Domiciliary Equipment Service, part of Department for Families and Communities. Funding is capped and therefore limits provision of some componentry. Table 4 outlines the number of prostheses supplied and number of repairs undertaken from 2008 – 2010, indicating an increase in demand for prostheses during this period.

Table 4: SAALS prostheses supplied and number of repairs

	Total prostheses supplied	Major repairs
2010	447	128
2009	387	134
2008	355	130

Current SAALS clients total 1648. The average number of current prostheses is 1.54 per client. SAALS clients numbers according to post-code clusters are shown below:

Adelaide metro, outer and hills	1125 (200 clients from northern Adelaide)
Whyalla/Eyre/East	247
Riverland	90
South East	75
Broken Hill/other NSW	34
Mildura/other Vic	25
NT	8
Roxby	1
Unknown	19

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.

Tables 5, 6 and 7 outline the variations of current services and workforce provided in metropolitan and country South Australia, across the rehabilitation continuum of care.

Table 5: Current services offered across the continuum of care in Metropolitan SA

Service	Acute	Shared Care Models in Acute	Specialist Rehab	Rehab in the Home	Day/Centre based Rehab	Transitional Services
Southern	Yes	Yes	Yes	Yes	Yes	Yes
Central	Yes	No	Yes	No	Yes	No
Northern	No	No	No	No	No	No

Table 6: Current services offered across the continuum of care in country SA

Service	Acute	Shared Care Models in Acute	Specialist Rehab	Rehab in the Home	DRS	Transitional Services
North Western Rehab Service (incorporating Whyalla, Port Lincoln and Port Augusta)	Yes	Yes	Yes	N/A	Yes	Yes
Mount Gambier	Yes	Yes	Yes	N/A	Yes	Yes
All other country regions	Yes	No	No	N/A	No	Yes

Table 7: Current workforce availability across Metropolitan SA

Service	Rehab Phys	Amputee Coord	Physio	OT	SW	Clinical Psych	Prosthetist/ Orthotist	Dietitian
Southern	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
Central	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
Northern	No	No	No	No	No	No	No	No
Country	Yes	No	Yes	Yes	Yes	No	Yes	Yes

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 South Australia can be characterised by:

Inequity of access to:

- > Consultative specialist amputee physician services in country hospitals.
- > On-site prosthetic services in hospitals undertaking amputations.
- > Prosthetic services across country South Australia.
- > Amputee rehabilitation services across country South Australia.
- > Rehabilitation and prosthetic services in northern metropolitan Adelaide.

The system is also characterised by:

- > Acute average length of stay of 24 – 38 days (Figure 5). (For 2010, the acute median length of stay in metropolitan SA 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 SA and country resulting in increased inpatient length of stay.
- > The lack of standardised integrated pathway/treatment plan.

3. Model development

An Amputee Rehabilitation Workgroup was established by the Statewide Rehabilitation Clinical Network to develop a Model of Amputee Rehabilitation in South Australia (Appendix 1: Steering Committee, Amputee Workgroup, Consultation).

The Amputee Workgroup was multi-disciplinary, consisting of experts in the field of amputee care and provided representation from a range of interested organisations 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, organisations and consumers for consultation to inform the final model.

4. Amputee rehabilitation- a model for South Australia

Organisation of services

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 TQEH, RGH and MH, 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 (MH, TQEH, RGH) should be capable of delivering inpatient and ambulatory rehabilitation (centre 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.
- > Specialised rehabilitation services are being established in Whyalla, with a Hub and Spoke model to support ambulatory rehabilitation services in Port Lincoln and Port Augusta and Mount Gambier. Whyalla and Mount Gambier will both have inpatient, outpatient and ambulatory rehabilitation services. Whyalla has an onsite prosthetic service, whilst Mount Gambier has a visiting prosthetic service from RGH. Expansion of the rehabilitation service to another site will be in 2011-12 with a like service being established in the Riverland (Berri).
- > Amputee rehabilitation services should include:
 - inpatient rehabilitation services
 - centre based day rehabilitation supported by adequate transport systems to ensure reliable attendance
 - home based rehabilitation for those unable to travel to the centre 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 Australasian Faculty of Rehabilitation Medicine (AFRM)⁷ 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 maximise and individual's physical, psychological and social well being 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, carers 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. Amputee coordinators should initially be considered for Northern Area Health Service, Southern Area Health Service and country region (3FTE in total). 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 country South Australia. 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 (Smith et al 2003; consensus statement). 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 5 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 maximise an individual's independence, physical and psychosocial wellbeing, functioning and quality of life; and ability to manage exacerbations so as to minimise the need for hospitalisation.

Appendix 6 provides an example of the pathway check-list for the delivery of amputee services. It is recommended this pathway be adapted for South Australia and implemented state-wide with the aim to achieve benchmarks set by AROC.

Service elements

Access and equity

- > The care continuum is presented as a linear process for clarity, although this does not usually occur in reality and is dependent on the individual's needs. Therefore the need for multiple access points to services and the ability to move back and forward between services depending on the individual's specific needs is critical. Integration of services across the continuum is the key, not how and when services are accessed.
- > Access and equity of service for clients living in country regions not currently supported by a specialised team is an issue. There are issues of transport, management of medication, regular reviews by prosthetists, and access to local rehabilitation services, particularly for clients with special needs (such as remote, ATSI, CALD in regional areas) that require consideration.

Access and triage

Key requirements

- > A consultation should occur with a member of the rehabilitation team providing in-reach prior to amputation with potential for rehabilitation and anticipated discharge options noted.
- > A consultation re pain management should occur prior to amputation.
- > The team should be coordinated by the amputee coordinator assigned to the patient and will work across the continuum of care. The team may include surgeon, anaesthetist, rehabilitation medicine consultant, prosthetist, counsellors and other health providers involved in the patient's care.
- > The team, in collaboration with the patient and family/carers, should consider the patient's own wishes when setting goals and discharge plans as well as healing potential, rehabilitation potential, prosthetic options and the extent of non-viable tissue on the affected limb.
- > Assessment by surgeons, anaesthetists, and medical team of the patient's co-morbidities and potential for complications (such as myocardial infarction, deep vein thrombosis) with strategies to minimise these to be implemented.
- > The amputee coordinator will be available to offer the patient and family/carers the opportunity to meet with an established lower limb amputee before every case of elective amputation, to provide peer support and share experiences. Amputees can undertake a training course offered by 'Limbs 4 'Life' to ensure information provided is appropriately delivered in a sensitive manner.
- > Unless clinically contra-indicated a rehabilitation program should be started pre-operatively with focus on cardio-vascular endurance, strength and range of movement, particularly prevention/correction contractures.
- > A home assessment of the patient's anticipated discharge destination should be conducted early for all elective amputations.

- > Information about the amputation and usual path of recovery should be provided to the patient, family and carers both verbally and in writing by a member of the acute interdisciplinary team, with the opportunity for questions and concerns to be addressed.
- > Early referrals and consultation needs to occur with the relevant community health service providers and local services to ensure that the home environment is understood and to ascertain the access to ongoing services. This is particularly important for clients returning to country areas.
- > Emotional support and assistance to the patient, family and their carers as they work through issues of grief and loss of the limb to be amputated, and anxieties regarding the surgery and future. Referrals to social work intervention are recommended, but may include referral to counsellors, psychology and psychiatry.

Shared care models in the acute setting

Key requirements

- > A pre-operative assessment should be provided where possible by a rehabilitation physician.
- > The amputation must be performed by a suitably experienced surgeon using currently recognised operative techniques with due consideration of future rehabilitation potential including prosthetic use, except in cases of extreme urgency.
- > The application of a Rigid Removable Dressing (RRD) should be performed as soon as possible post operatively where appropriate. Within two hours of surgical completion is ideal to prevent post-operative oedema forming and when pain management is optimal. RRD application ensures residuum protection once the patient becomes more mobile between 12-24 hours post-operative. RRD protocol should be developed and implemented in all South Australian acute hospitals to: reduce the time until the stump is ready for casting, and therefore reduce the rehabilitation inpatient length of stay and to protect the stump if a fall occurs.
- > Wound care, residual limb dressing, controlling of limb volume changes, optimisation of blood glucose levels, pain management and education must be a focus post operatively. Bandages, shrinkers and residual limb socks need to be available to assist with this. Additionally chest care, trunk and body motor control and stability, bed mobility and transfers, early ambulation, promoting residual limb activity and prevention of contractures are also important aspects to be addressed.
- > Systemic complications post operatively such as deep vein thrombosis and pressure sores/ulcers should be identified and minimised.
- > Provision of a suitable amputee wheelchair, residual limb support and pressure cushion from the time of patient being medically cleared to be able to sit out of bed.
- > If a home assessment of the patient's anticipated discharge destination did not occur prior to amputation this should be arranged. This would usually be conducted without the patient at this time given the acute stage of their recovery and potential home access issues.
- > Early referral to some community agencies such as Domiciliary Care SA, Community Health Services in Country and Disability SA for equipment, home modifications and care attendant support may be required to ensure timely discharge from the acute or rehabilitation setting.

- > Ongoing emotional support and grief and loss counselling for the patient, family and their carers should be available.
- > Falls minimisation and education of patient and family on falls prevention strategies should be a focus of the inter-disciplinary team. A falls prevention protocol specific to amputees should be developed and implemented in all South Australian acute and inpatient rehabilitation hospitals.
- > Education regarding protecting the amputated and contralateral limb from external trauma should be provided to the patient, family and carers.
- > All amputees should be referred to an amputee rehabilitation service for consideration of rehabilitation, and should be assessed by a rehabilitation physician who specialises in amputee rehabilitation. Following consultation, if a patient is deemed not suitable for rehabilitation this must be communicated to the patient, family and acute multidisciplinary team and reasons why not suitable clearly documented in the patient's casenotes.
- > In consultation with the patient and family/carers, the rehabilitation team should determine realistic functional outcomes, anticipated discharge destination and provide the opportunity for the patient to discuss their expectations of rehabilitation.
- > If rehabilitation is planned, prosthetist consultations and patient education should commence immediately post-operatively, with physiotherapy commencing the next day.
- > All relevant clinical information together with special needs (such as the need for bariatric equipment) must be reviewed by the rehabilitation team prior to transfer and any necessary action taken prior to the arrival of the individual.
- > If the client is being discharged for a period of wound healing, either to home/country hospital/ residential TCP etc, then appropriate equipment needs to be provided, a program of strengthening and endurance needs to be implemented and a regular mechanism for review, upgrade and assessment to be set.
- > A copy of a discharge summary should be sent with the patient when transferred to the amputee rehabilitation unit. If the patient is discharged home or elsewhere such as a country hospital or residential aged care setting, a summary is to be sent directly to the general practitioner and other relevant agencies should be notified and receive a copy of the discharge summary.

Inpatient rehabilitation

Key requirements

- > Optimisation of their medical status including phantom pain management.
- > Residual limb care, wound management, controlling limb volume changes, and preventing contractures of the residual limb continue to be a priority during this phase of post amputation care.
- > It is a priority on admission to the unit that a suitable amputee wheelchair, residual limb support and pressure cushion is provided to the patient, if they do not transfer from the acute facility with these items.
- > Bed mobility, transfers and ambulation (with/without prosthesis), promotion of residual limb activity, trunk and body motor control and stability are all key areas of intervention during this phase.

- > If an assessment of the home environment has not been undertaken this needs to be undertaken as a matter of priority focusing on implementation of required home modifications by the appropriate agency, assessment and prescription of required equipment, intervention to aid independence in self care and performance of everyday activities and identification of services needed to support independence at home. Referrals to appropriate community agencies, such as Domiciliary Care SA, Country Health SA Community Health Services, Disability SA, Housing SA and Department of Veteran Affairs need to be made at this time (if not already completed) to implement the required home modifications and provide identified equipment needs (such as amputee wheelchair, pressure cushion, showering equipment), ensuring discharge delays are minimised.
- > Functional training to maximise independence in everyday activities including self care and domestic, recreational and community based activities need to be addressed and be both wheelchair and prosthetic based.
- > Wheelchair skills also need to be a focus, whether a prosthesis is to be prescribed or not. It is essential that a patient becomes competent in wheelchair use as even for those patients prescribed a prosthesis there are likely to be times when it is not possible to use the prosthesis for a range of reasons including poor fitting and injury to residual limb.
- > Patients must be prescribed appropriate equipment to foster their independence and rehabilitation including bandages, shrinkers, residual limb socks, mobility aids, wheelchair, residual limb support, pressure care in bed and when seated and self care aids.
- > A key focus is prosthetic services including training and patient education. Therefore it is essential that prosthetists are readily accessible to provide hospital funded interim prosthetic services.
- > Discussions between the patient, family/carers, rehabilitation physician and rehabilitation team is necessary to determine the suitability for providing a prosthesis. If the patient is not suitable, the rationale should be transparent and alternative rehabilitation plans implemented.
- > Ongoing pain management should be provided, with specialist input and advice as needed.
- > Strategies to minimise complications such as pressure ulcers and deep vein thrombosis should be implemented.
- > The inter-disciplinary team including the amputee coordinator, needs to build on goals set in the acute facility in collaboration with the patient and their family. Goals need to be relevant to the patient and realistic and focus on functional outcomes.
- > All patients and their carers/families should be made aware of the availability of counselling.
- > Access to a range of specialist health care services beyond those usually provided by the inter-disciplinary rehabilitation team should be available – including podiatrist, dietitian, diabetes services, plastic surgery, continence advice and mental health input.
- > Provision of information and education to patients and their families is critical and should include information about rehabilitation and lifestyle options as an amputee, including work options if relevant, and caring for the residual and contralateral limb.

- > Falls prevention and education should be provided to patients and their families. A falls prevention protocol specific to amputees should be developed and implemented in all South Australian acute and inpatient rehabilitation hospitals.
- > Driving, including both being a passenger and a return to licensed driving, needs to be explored. Transport options should be addressed with the patient/carer/family.
- > A family meeting should be arranged for patients with complex needs or where there is a lack of clarity regarding discharge destination and achievement of goals.
- > Short term leave from rehabilitation (such as overnight or for a day) should be considered for individuals who would benefit from a home trial of the skills gained in rehabilitation prior to discharge home to facilitate successful community re-integration.
- > Ambulatory rehabilitation or attendance at single discipline outpatient services should be organised, as required.
- > Referrals should be made to community agencies as appropriate, to provide ongoing support to patient/carer/family post discharge. These agencies may include Domiciliary Care SA, Disability SA, Country Health SA Community Health Services, Department of Veteran Affairs, Community Aged Care Packages and private nursing and care agencies.
- > The patient, family and carers should be provided with information and introduced to the Limbs 4 Life and any other amputee support groups in their local area.
- > Follow up services and equipment for the patient must be explained to the patient and family with written documentation provided.
- > At time of discharge or transfer from the amputee rehabilitation facility a clinical discharge summary must be completed by those members of the inter-disciplinary team involved in the patient's care and forwarded to the general practitioner and other agencies involved in the patient's ongoing care.

Ambulatory rehabilitation

Key requirements

- > On discharge from an amputee rehabilitation facility patients must have access to ambulatory rehabilitation (home based or centre (day) based) to enable them to continue to gain their independence.
- > Ambulatory rehabilitation needs to be provided by a multidisciplinary team and provided as close to the patient's home as possible or at home.
- > The ambulatory rehabilitation service provided should be responsive to the changing needs of the patient and accommodate other roles that may need to be fulfilled such as the worker role.
- > Goal setting and attainment should continue to be a key focus with clear realistic goals being set collaboratively with the patient and rehabilitation team.
- > The ambulatory rehabilitation team should regularly liaise with the patient's general practitioner and other community services such as Royal District Nursing Service (RDNS), Domiciliary Care SA and Disability SA, regarding the patient's progress in rehabilitation and ongoing medical and support needs.
- > Ongoing input for the management and prevention of contractures, controlling of residual limb volume changes and pain management should be provided by the inter-disciplinary

team as needed. Any post-operative complications or potential risk of developing further complications should also be monitored.

- > Prosthetists need to be readily available to monitor prosthetic fit and function on an ongoing basis and to make adjustments as needed, including educating the patient and family/carer in prosthetic application and use.
- > Other interventions should continue to build on previous inpatient input to facilitate re-integration into the community and include ambulation/mobility (with or without prosthesis), residual limb activity, maximising independence in activities of daily living, community transfers such as car, public toilets and in confined spaces, musculoskeletal re-conditioning, cardiopulmonary training, falls education with a focus on home and community environments, driving and transport issues, wheelchair, home modification and equipment needs.
- > Patient and family/carer education and support should continue and focus on protecting the residual and contralateral limb from trauma and adapting to new lifestyle changes.
- > Details of the Limbs 4 Life peer support program and other amputee support groups should be reiterated and the patient/family encouraged to attend if considered valuable to their recovery.
- > If a patient attending ambulatory rehabilitation chooses not to continue with the use of the prescribed prosthesis, the general practitioner and other community services involved in his or her care should be informed.

Community therapy programs and transition services

Key requirements

- > Individuals who have had an amputation will require ongoing support and management to differing levels, this will be impacted by their age, co-morbidities, social situations, confidence and adaptability post amputation.
- > A focus on monitoring of risk factors during this phase is advantageous. There is an expectation that amputees will continue to be followed up as an amputee outpatient and that all diabetic amputees will be referred to an area multidisciplinary foot clinic.
- > Medical, community, rehabilitation and prosthetic services need to be organised in a manner that will allow the amputee to easily re-access services if or when required. It is essential that ongoing specialist medical/rehabilitation assessment and review is available as the individual continues to recover and regain independence post lower limb amputation.
- > Input may involve management of ongoing pain issues (including phantom limb pain), counselling and support, driving and transport (if not previously addressed) and ongoing maintenance therapy. Some individuals may continue to attend either public hospital outpatient services or private clinics to receive these services.
- > Prosthetists will perform regular prosthetic reviews to ensure ongoing prosthetic fit and function. This may require adjustments, repairs and replacements including prescription of replacement prosthesis and issuing of essential supplies and consumables. Ongoing evaluation of an amputee's progress through rehabilitation with reference to home life activities, recreational and occupational activities, amputee activity level, impact level, and body weight will provide basis for componentry prescription changes to ensure maximum ambulation and participation potential is achieved.

- > Services and regular reviews of home environment and equipment to support the individual at home should be provided by community organisations. Services may include showering, cleaning and shopping assistance. Organisations providing this support may include Domiciliary Care SA, Disability SA, Department of Veteran Affairs, Community Aged Care Packages and private nursing and care agencies. The appropriateness of services provided to the individual with a lower limb amputation and their family needs to be reviewed on a regular basis.
- > Care of the contralateral limb that has not been amputated (unless a bilateral amputation) needs to be a focus of ongoing management. The individual's risk of developing further health issues or their current medical condition progressing will determine the type of follow up required for the contralateral limb. In particular, diabetics with a major lower limb amputation are at greater risk of contralateral major amputation at two to three years. Follow up may include regular reviews by a multidisciplinary foot clinic, podiatrist, vascular nurse or vascular surgeon, and regular planned amputee outpatient reviews should be provided.

Patient and carer/family support

Key requirements

- > Services provided to those who have had an amputation need to be client-centred and sensitive to their needs, given the physical and emotional difficulties that are a part of the amputation process. Family and carers also need to be supported through this process. Individuals and families may need support for a lengthy period of time given the impact of their amputation on their physical, psychological and emotional functioning and lifestyle.
- > It is important that health professionals work as a team in providing care to amputees and that the individual who has experienced an amputation and their family are seen as part of this team.
- > Individuals and their families need to be actively involved in their rehabilitation, setting of realistic goals and in optimising their recovery and lifestyle following amputation. Education, emotional support and counselling are essential components to facilitate the achievement of this.

Prosthetic services

Key requirements

- > All acute hospitals should have equitable access to prosthetic services. Visiting prosthetic services need to be available in Berri.
- > The provision of interim prostheses immediately post amputation will remain the responsibility of the rehabilitation hospital (public or private).
- > Amputee rehabilitation services shall include prompt access to prosthetists to deal with manufacture, fitting, adjustment and repair of prostheses. Each amputee rehabilitation service (north, central and south) will have a prosthetist embedded as part of the service.
- > Individuals shall be able to have a choice of prosthetic service provider for their definitive prosthesis.
- > Prosthetic services need to be planned for MH, which will have 20 orthopaedic/amputee beds by 2016.

- > Definitive prostheses shall only be prescribed by accredited amputee rehabilitation services.

Paediatric services

Key requirements

- > Data is limited, resulting in the inability to accurately ascertain numbers of children who have a limb deficiency. Consequently not all affected children are able to access clinic services. Uniform data reporting should be agreed and implemented.
- > Prosthetic services to the Paediatric Clinic at the WCH are currently provided by Prostek. Consideration for additional services by a visiting prosthetist is required, on a request basis.
- > A referral protocol should be developed and implemented to ensure that relevant medical information accompanies the patient's referral. The protocol should be implemented in relevant paediatric departments including orthopaedics and pre-clinics.
- > SAALS currently funds the provision of new prostheses as children grow, including the provision of recreational limbs. It is essential the system continues to provide the appropriate level of support the provision of recreational limbs as children grow, to assist with development and lifestyle choice.

5. Specific populations

Country general hospitals

Specialised rehabilitation services are being established in Whyalla, with a Hub and Spoke model to support ambulatory rehabilitation services in Port Lincoln and Port Augusta and Mount Gambier. Whyalla and Mount Gambier will both have inpatient, outpatient and ambulatory rehabilitation services. Whyalla has an onsite prosthetic service, whilst Mount Gambier has a visiting prosthetic service from RGHl. Expansion of the rehabilitation service to another site will be in 2011 or 2012 with a like service being established in the Riverland (Berri).

Rural and remote

The key requirements outlined in the above service elements are also applicable to country hospitals and health services providing care to individuals who have an amputation.

The nature, severity and risk of the amputation, need for specialist input and individual's wishes may influence if the amputation and subsequent rehabilitation occurs in a country or metropolitan based hospital.

Strong links between country services and metropolitan based hospitals will facilitate the delivery of care to individuals who undergo amputation and follow up rehabilitation in the country. Establishment of formal links between metropolitan and country rehabilitation sites are clearly articulated in the Statewide Rehabilitation Service Plan, 2009-2017; provide support regarding workforce, training, professional development and quality management.

Prior to individuals who have had their amputation and/or rehabilitation in metropolitan Adelaide transfer back to the country, whether it be to a hospital or directly home it is imperative that the individual's mobility, function and needs are at a level that can be managed by the country hospital or community health service to ensure ongoing optimal recovery of the individual.

Aboriginal and Torres Strait Islanders

There are significant inequities in health outcomes for Aboriginal Australians including lower life expectancy and poorer health outcomes. Hence specific strategies are needed to address this given the higher incidence of amputations in the Aboriginal Australian population.

Amputee services need to be developed across the continuum to meet the specific needs of the Aboriginal population and also for those individuals from culturally and linguistically diverse backgrounds.

Strategies to assist in delivering culturally appropriate services may include:

- > Working collaboratively with Aboriginal Health workers in delivery of care.

- > Ensuring health information is communicated in a manner that is acceptable and easily understood by Aboriginal Australians. Strategies to assist in engaging with Aboriginal communities include the use of visual aids (for example, picture books, posters), story-telling, word of mouth by members respected within the community and communication in their native language.
- > Involvement of extended family, Aboriginal Health workers and Aboriginal Patient Pathway Coordinators in consultations with the Aboriginal individual, that allow for clear explanation of presenting condition in culturally relevant manner and patient choice regarding management including the use of traditional medicine and healers as appropriate.
- > Use of early supported discharge programs to minimise length of stay in hospital and facilitate discharge to a more culturally appropriate environment.
- > Minimising the need for Aboriginal Australians to have to leave their communities through the use of telemedicine, e-rehabilitation and other developing technologies for management of their condition, where appropriate.
- > Providing flexibility of appointments and attendance at clinics, especially when post hospital follow up care is planned.
- > Acknowledging that many factors may influence ongoing health care choices including extended family relationships and home environment.
- > Building the cultural understanding and awareness of the non-Aboriginal health workforce when working with this population.
- > It is important to ensure the cultural requirements of Aboriginal Australian patients are met as best as possible. A supported pathway for accessing ambulatory rehabilitation and prosthetic services for metropolitan and country Aboriginal clients should be developed and implemented. Service planning shall include linking with regional Aboriginal health integrated planning processes undertaken as part of the implementation of the Aboriginal Health Care Plan 2010 – 2016⁸.

Culturally and linguistically diverse (CALD) backgrounds

South Australia has a high proportion of individuals from culturally and linguistically diverse backgrounds and this is expected to continue to rise with Planning SA projections that the State will attract the dominant share of overseas immigrants moving to Australia.

Therefore strategies to address the cultural and linguistic diversity of the population is important in the development of services for individuals experiencing amputations. Strategies for consideration should include:

- > Use of interpreters in the delivery of services across the continuum.
- > Availability of education materials in a range of languages.
- > Establishment of partnerships with community organisations that provide services to individuals from specific culturally and linguistically diverse backgrounds (for example, Ethnic Link, Italian Benevolent Fund).
- > Training to promote cultural competence in the workforce delivering care to these individuals from a range of diverse cultural backgrounds.

6. Partnerships

Strong partnerships and collaborations across the continuum with other government, non government and private organisations will be critical to achieving the best outcomes for individuals experiencing an amputation.

Strong partnerships and collaborations between metropolitan Level 6 services and Country Health SA services and clients must be developed and maintained.

Services provided to those that have had an amputation need to be patient-centred and sensitive to their needs. Individuals and their families need to be actively involved in their rehabilitation, setting of realistic goals and in optimising their recovery and lifestyle following amputation. Education, emotional support and counselling are essential components to facilitate this.

7. Workforce

The management of individuals who have experienced an amputation is a specialist area, therefore the workforce that provides assessment, intervention and care to these individuals across the continuum of care need to be appropriately skilled and qualified.

In addition to health professionals meeting their profession specific registration requirements, it is also expected that health professionals working in this area of specialist practice will be affiliated with their professional associations and relevant special interest groups.

Care to these individuals needs to be provided by an inter-disciplinary team who possess the required skill set to work with individuals to achieve maximum recovery and independence following lower limb amputation.

The inter-disciplinary team may include surgeon (vascular/orthopaedic), anaesthetist, rehabilitation specialist, specialist nursing including vascular, prosthetist, physiotherapist, occupational therapist, social worker, dietitian, psychologist, podiatrist, amputee coordinator and staff with expertise in pain management. The membership of the team will be influenced by the phase across the continuum and individual patient need. Access to psychology services in each Local Health Network for all amputees should be mandatory.

The appointment of amputee coordinators is considered as the key contact for an individual who requires lower limb amputation surgery. These positions will allow the patient to be followed along the continuum of care from pre-amputation to post amputation and recovery. Further, they will provide a key contact and support link for the individual and their family and ensure that their needs are addressed and that they are clearly informed of what to expect as they have surgery and then move into the acute, rehabilitation and recovery phases. The appointment of an amputee coordinator in country is recommended to facilitate and coordinate patient transfer between country and metropolitan SA.

Opportunities need to exist for the inter-disciplinary team to meet together in-person to ensure all are working towards common patient goals and that treatment recommendations are consistent. Written documentation in casenotes is also important.

All team members have an important role to play in optimising care of an individual before and after amputee surgery. Team members are responsible for educating patients/families/carers and other team members about their role.

Australasian Faculty of Rehabilitation of Medicine (AFRM) Standards⁷ can guide staffing of amputee rehabilitation services. In implementing a model of care for amputee rehabilitation in South Australia, workforce modelling should be undertaken to ensure services are appropriately resourced. Additionally the Victorian Guidelines for Allied Health: Resources Required for the Provision of Quality Rehabilitation Services⁹ should be used for professions not covered within the AFRM standards. Staffing levels are shown in Table 8 below. No guidelines exist for staffing of acute and community programs and services, development of such guidelines would be beneficial.

Table 8: Inpatient and Ambulatory Amputation Rehabilitation Staff to Patient Ratios for 10 Patients

	Nurses	PT	OT	SW	ClinPs	Prosthetist /Orthotist	Rehab Phy**	Dietitia n
Inpatients								
Amputation	11.75*	1.5	1.0	0.6	0.5	1.5***	0.4	0.4***
Ambulatory								
Amputation	0.3	0.7	0.5	0.2	0.1	1.0	0.1	0.3***

*Includes the nurse in charge

**In addition to rehabilitation physicians, additional medical staff are required for all rehabilitation units – registrars, training medical officers and interns

***Using the Victorian Allied Health guidelines given no provision made in the AFRM standards for these professions

8. Education and training

It is expected that organisations 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).

The Australasian Faculty of Rehabilitation Medicine guidelines⁶ recommend that a minimum of 3% of effective full-time hours is allocated for formal in-service training and development at no cost to staff, for medical, nursing and allied health staff. This recommendation should apply to all staff providing services to individuals involved in amputee rehabilitation across the continuum of care.

Organisations providing amputee services should also provide clinical placement and work shadowing opportunities and support to rural and remote areas using technology such as telemedicine.

To ensure appropriate management of amputee patients in country, ongoing up-skilling and education for all staff involved in amputee rehabilitation is essential.

Lifestyle intervention strategies should be developed and implemented in rehabilitation settings to reduce preventable amputations in high risk patients (that is, those with metabolic conditions).

9. Quality, research and development

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.

The Australasian Rehabilitation Outcomes Centre (AROC) provide a mechanism for inpatient and ambulatory rehabilitation sites to report nationally, thereby allowing national benchmarking and comparative public reporting to occur on a number of factors including demographics, length of stay and functional improvement. It is the expectation of the Statewide Rehabilitation Clinical Network that all rehabilitation sites in South Australia will report to AROC.

Similar systems for recording outcomes in acute units or community services providing services to individuals experiencing general orthopaedic trauma do not exist. 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 co-morbidities, complication rates, discharge destination and mortality.

Collaborative links should be made with other organisations that provide amputee services and also universities to facilitate research, benchmarking activities and service evaluation.

A central amputee register would also assist in undertaking research, audit and quality activities and assist with future planning of services.

Current areas identified as requiring further research include the development of wound healing and when it is most appropriate to fit a prosthesis; and management of pain post amputation.

Additional statewide staffing and resources are needed to fulfil the above noted quality and research activities.

It is recommended that a proportion of funds generated from private practice/compensable clients be redirected for the resourcing of professional development of prosthetists as it is essential for maintaining technical speciality.

Appendix 1: Steering Committee, Amputee Workgroup, Consultation

Statewide Rehabilitation Clinical Network Steering Committee

NAME	ORGANISATION
Maria Crotty (Chair)	Director, Rehabilitation, Repatriation General Hospital
Alwin Chong	Senior Research & Ethics Officer, Aboriginal Health Council of SA Inc
Amanda Crockett-Naini	Director Allied Health, Repatriation General Hospital
Vickie Castle	Consumer representative
Carol Coombs	Consumer representative
Lynne Cowan	General Manager, Modbury Hospital and Primary Health Care, Adelaide Health Service
Graham Fleming	General Practitioner, Tumby Bay
Vicki Hume	Principal Consultant COAG Sub Acute Initiatives Country Health SA
Anthea Hamilton	Network Development Manager
Miranda Jelbart	Medical Rehabilitation Consultant, Brain Injury Rehabilitation Service
Meredith Jolly	Manager, Day Rehabilitation Centre, Hampstead Rehabilitation Centre
Kae Martin	Director, Operational Strategy, Operations Division SA Health
Ruth Marshall	Head, SA Spinal Cord Injury Service, Hampstead Rehabilitation Centre
Nigel Quadros	Rehabilitation Physician, The Queen Elizabeth Hospital
Ray Russo	Director, Paediatric Rehabilitation, The Women's & Children's Hospital
Victoria Shtangey	Principal Data Analyst, SA Health
Sally Sobels	Program Manager, Intermediate Care, Primary Health Care Directorate, Central Northern Adelaide Health Service
Heather Vogelzang	A/Manager, Brain Injury Rehabilitation Service, Hampstead Rehabilitation Centre
PREVIOUS MEMBERS	
Jenny Bennett	Consumer representative
Philippa Both	Director, Community Health Services, Barossa Health
Sharyn Broer	A / General Manager, Client Services, Domiciliary Care SA
Frida Cheok	Manager, Injury Outcomes Unit, tracSA
Wendy Forster	Manager, Brain Injury Rehabilitation Unit, Hampstead Rehabilitation Centre
Adrian Heard	Biostatistician / Epidemiologist, Health Statistics Unit, SA Health
Josephine Kennett	Consumer representative
Josie Owens	Clinical Nurse Consultant, Aboriginal and Torres Strait Islander Unit, Royal Adelaide Hospital
Sandra Parr	Director, Allied Health and Occupational Therapy, Lyell McEwin Hospital
James Rice	Rehabilitation Consultant, Children, Youth and Women's Health Service
Judy Smith (Chair)	Executive Director of Nursing and Client Services, Royal District Nursing Service, South Australia
Kevin Webb	Clinical Nurse Manager, Aged Care and Neurology, The Queen Elizabeth Hospital
Rebecca Witkowski	Community Nurse, Royal District Nursing Service, South Australia
Karen Brown	Network Development Manager
Carlie Hopkins	A/Network Development Manager

Amputee Workgroup

NAME

Meredith Jolly (Chair)

Vicki Birks

Belinda Carpenter

Sally Cavenett

Steven Cox

Vicki Hume

Siobhan Jackson

Wendy McInnes

(proxy Eunice Kgatle)

Justin Prendergast

(proxy Julie Harding)

Charitha Perera

Pamela Spence

Allan Wicks

Anthea Hamilton

PREVIOUS MEMBERS

Karen Brown

Michael Fitzgerald

Agnieszka Kuna

Chooi Lam

Sandi Leith

Audrey Maloney

Chris McCann

Theron Philp

Sheri Sandison

Sally Sobels

Elaine Tooke

Adrian Winsor

ORGANISATION

Manager, Day Rehabilitation Centre, Hampstead Rehabilitation Centre

Principal Physiotherapist, Repatriation General Hospital

Team Leader, Specialist Equipment Services, Domiciliary Care

Manager, Orthotics and Prosthetics SA, Repatriation General Hospital

Prosthetist, Prostek

Principal Consultant COAG Sub-Acute Initiatives, Country Health SA

Clinical Practice Consultant (rehab), Repatriation General Hospital

Vascular Clinical Nurse Consultant, The Queen Elizabeth Hospital

Nursing Director, Rehab and Aged Care, Repatriation General Hospital

Rehabilitation Physician, Repatriation General Hospital

The Queen Elizabeth Hospital

Manager, Adelaide Orthotics and Prosthetics, Royal Adelaide Hospital

Network Development Manager

Network Development Manager

Clinical Nurse, Strathalbyn Hospital

Occupational Therapist, Domiciliary Care SA

Rehabilitation Consultant, The Queen Elizabeth Hospital

Vascular Nurse, Royal Adelaide Hospital

Rehab Unit Nurse Manager, Repatriation General Hospital

A/Director Allied & Community Health Prosthetist, Whyalla Hospital

A/Principal Physiotherapist, Hampstead Rehabilitation Centre

Vascular Nurse, Repatriation General Hospital

Program Manager, Intermediate Care, Primary Health Care Directorate,
Central Northern Adelaide Health Service

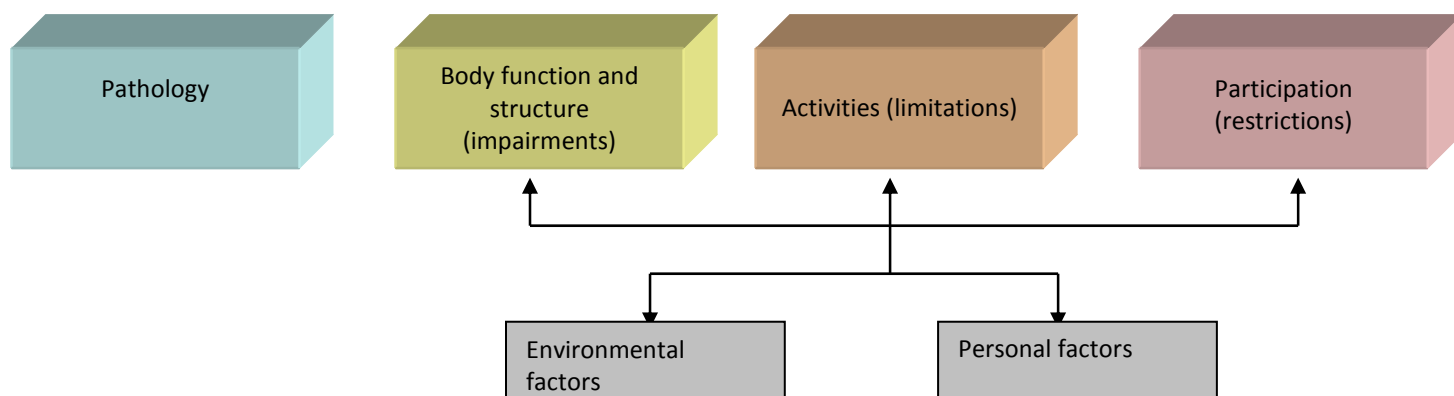
CNC Disabilities, Royal District Nursing Service

Senior Rehab Medicine Consultant, Hampstead / Royal Adelaide
Hospital

Consultation

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

Appendix 2: World Health Organisation ICF Framework - amputee elements



Contextual factors

Most relevant categories that are affected after amputation

Condition (ie. amputation) / detail

- Amputation of the upper or lower limb
- Lower limb more common at a ratio of 4:1
- Amputation can occur at various levels
- Most common are transtibial, then transfemoral
- Partial foot, ankle disarticulation, transtibial, knee disarticulation, transfemoral, hip disarticulation
- Partial hand, transradial, elbow disarticulation, transhumeral, shoulder disarticulation

Most relevant body functions affected

- Gait pattern and function
- Muscle endurance
- Gait metabolism and endurance
- Static and dynamic balance
- Sensory disturbance and pain states including phantom sensations, neuropathic pain, phantom pain

Most relevant activities affected

- Mobility
- Toileting
- Dressing
- Moving around, driving and transportation
- Washing and self-care
- Eating and drinking
- Hand and arm use
- Preparation of meals
- Use of transport
- Recreation and leisure
- Doing housework
- Undertaking single and multiple tasks
- Transferring oneself

Most relevant restrictions in participation

- Recreation and leisure activities
- Remunerative employment
- Instrumental activities of daily living or domestic tasks
- Basic interpersonal

Most common affected contextual factors (environmental and personal)

- Technology and products for personal use
- Health professionals
- Health services, systems, and policies
- Products or substances for personal communication
- House services, systems, and policies
- Support and relationships

Classification of commonly used scales for outcome

Diagnostics

- Ankle Brachial Pressure Index (ABPI)
- Imaging investigation CT Angio

Examinations

- Clinical Examination
- Patient History
- Medical History
- Peripheral Sensation

Body structure (impairments)

- Amputee Mobility Predictor Assessment Tool
 - AMP-PRO
 - AMPnoPRO
- Cumulative Illness Rating Scale
- Medical Research Council Scale for Rating Muscle Strength
- Fatigue Severity Scale
- Hospital Anxiety and Depression Scale
- Hamilton Rating Scale for Depression
- 10 point Numeric Rating Pain Scale
- The Leeds Assessment of Neuropathic Symptoms and Signs – Self Reported Tool (S-LANSS)
- McGill Pain Questionnaire

Activity (disability)

- Global ADL Scales
 - Barthel Index (BI)
 - Functional Independence Measure (FIM)
 - Frenchay (FAI)
 - Clinical Outcome Variables (COVS)
 - Lower Extremity Functional Scale (LEFS)
 - Rivermead Mobility Index (RMI)
- Amputee Specific
 - Prosthetic Profile of Amputees (PPA)
 - Locomotor Capabilities Index (LCI)
 - Functional Measure for Amputees (FMA)
- Other Scales Used by Amputee Team
 - Timed up and go
 - Timed walk tests
 - Distance walk tests

Participation (handicap)

- Generic Tools
 - Medical outcome study short form 36
 - Sickness Impact Profile (SIP)
 - General Health Questionnaire
 - Frenchay (FAI)
 - Nottingham Extended Activities of Daily Living
 - Nottingham Health Profile (NHP)
 - Reintegration to Normal Living (RNL)
- Amputee Specific Tools
 - Prosthesis Evaluation Questionnaire (PEQ)
 - SATISfaction with PROsthesis (SATPRO)
 - Orthotics and Prosthetics National Office Outcomes Tool (OPOT)
 - Prosthetic Problems Inventory Scale (PPIS)

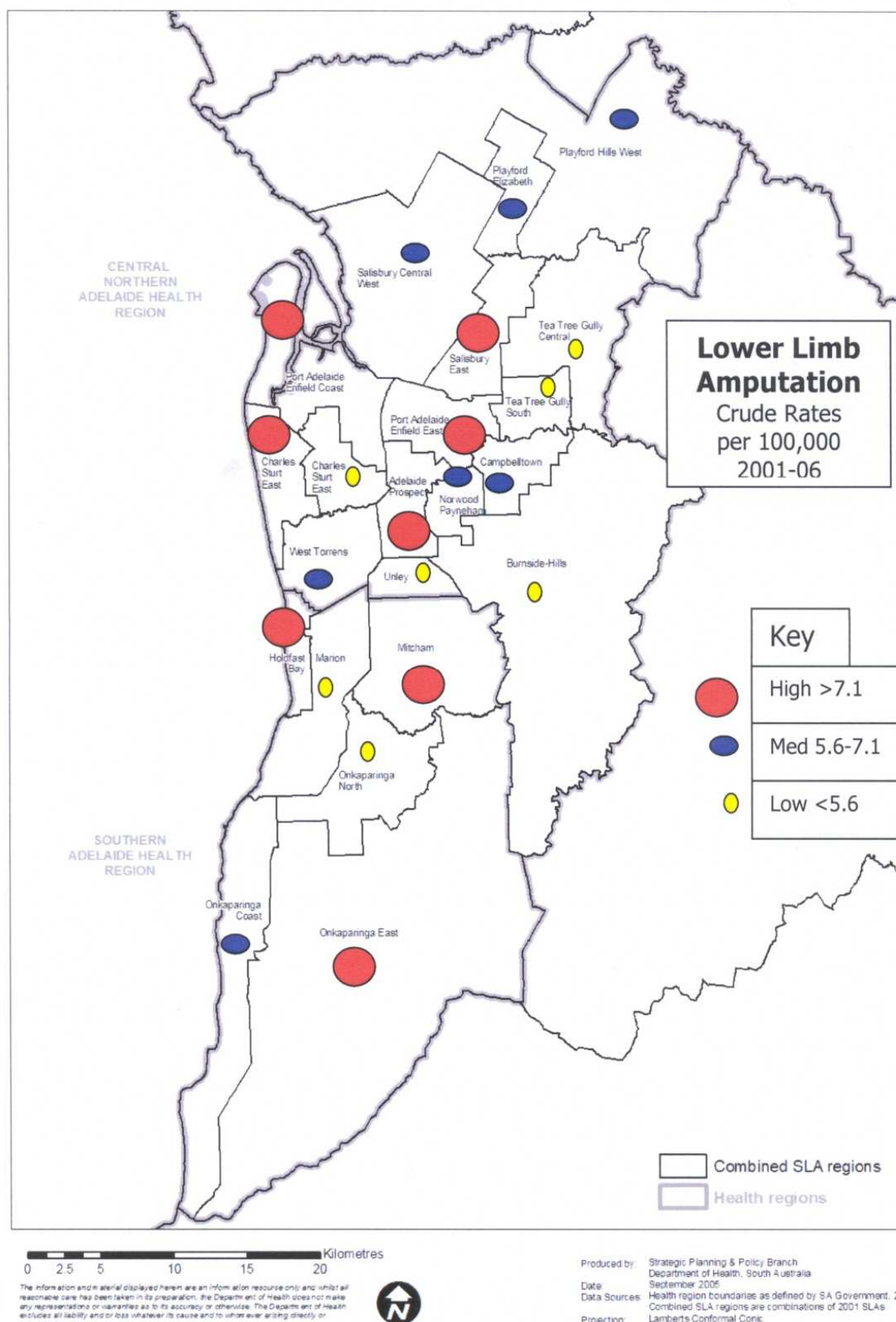
Adapted from: The Lancet 2011; 377:1693-702, Langhorne P. et al., *The international classification of function, disability, and health framework for the effect of stroke on an individual*. This figure summarises key features of WHO's international classification of function, disability and health model. <http://www.who.int/classification/icf/en/>

Appendix 3: Crude incidence of lower limb amputation

Crude Incidence of lower limb amputations

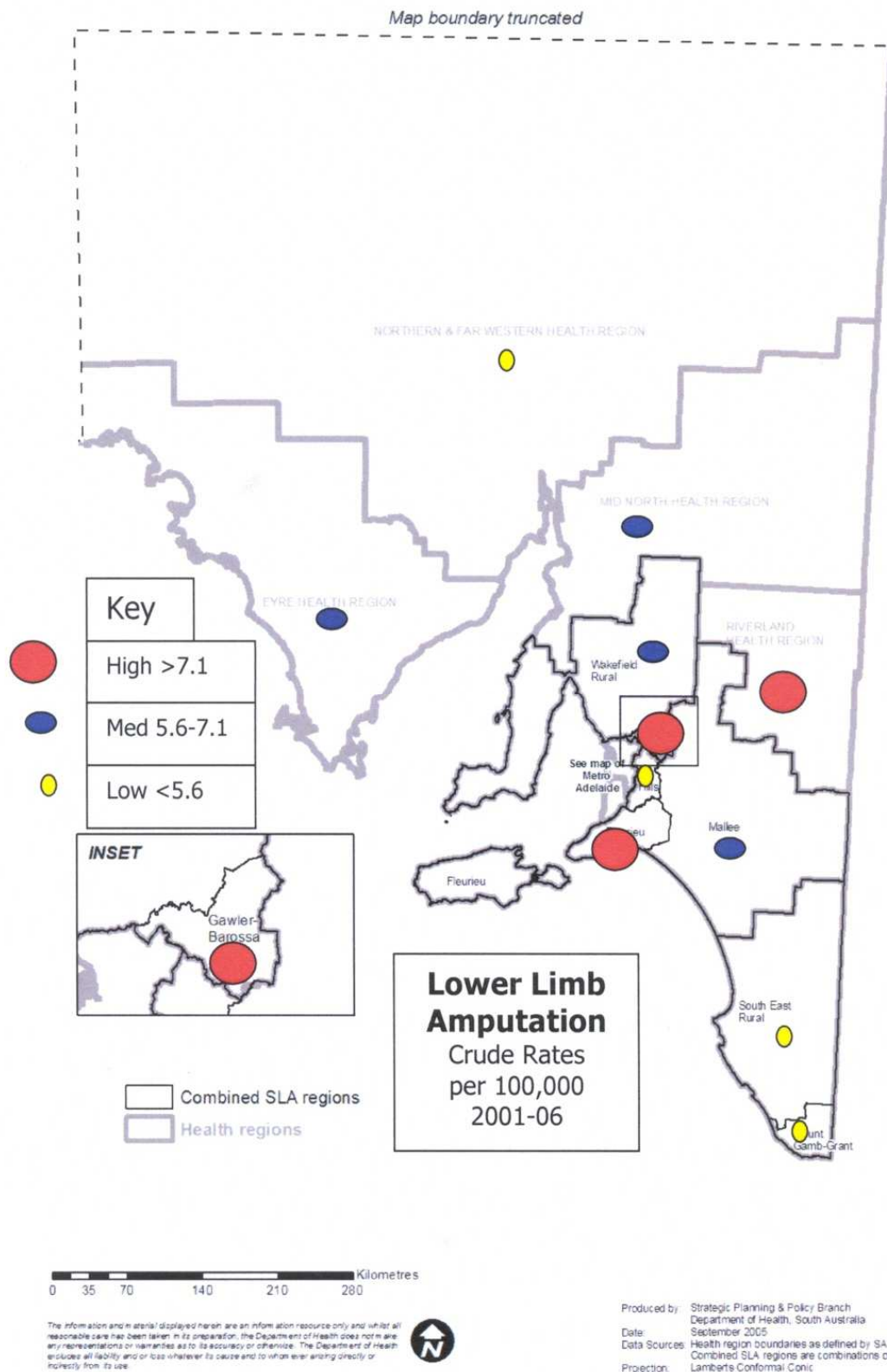
Combined SLA Regions metropolitan South Australia (minimum population 30,000)

July 2001-June 2006, based on matched acute and rehabilitation admissions



Crude Incidence of lower limb amputations

Combined SLA Regions Rural South Australia (minimum population 30,000)
July 2001-June 2006, based on matched acute and rehabilitation admissions



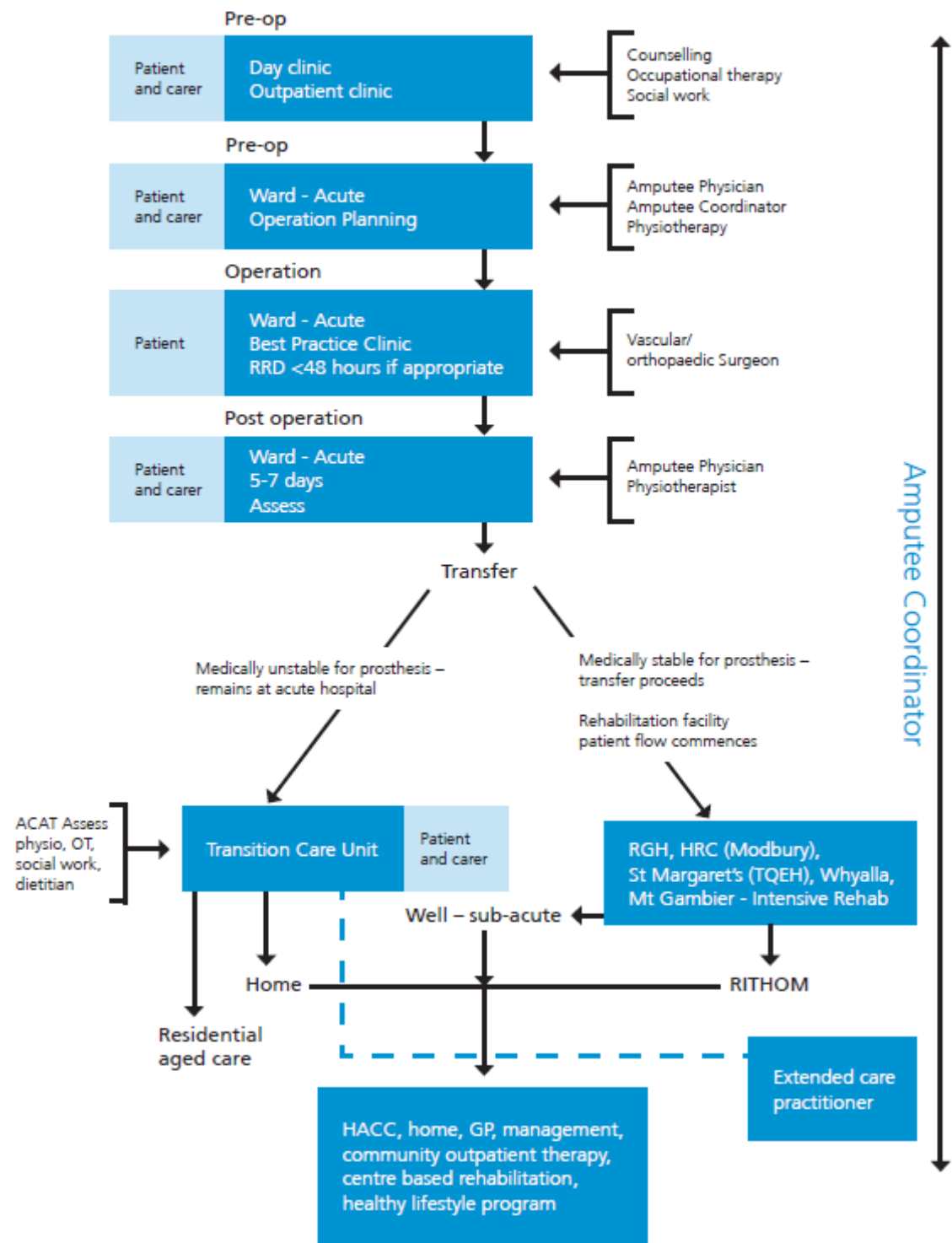
Appendix 4: Prosthetic/orthotic FTEs providing services to SA Health

Facility	Service	Service Frequency	Stream	Work Level
RAH	On-site	Daily		
Modbury	Visiting service provided by RAH			
TQEH	On site	Daily	Orthotics only	
	Visiting service provided by Prostek	Two weekly clinics and as required		
St Margarets	Visiting service provided by Prostek	Weekly ward round and as required		
RGH	On-site	Daily	Prosthetic/Orthotic Prosthetic Technician	1 x AHP3 2 x AHP2 3 x AHP1 1 x TGO3 2 x TGO1
FMC	Visiting service provided by RGH	Daily	Prosthetic and Orthotic	
Lyell McEwin	Visiting service provided by RGH	Weekly	Orthotics	
W&CH	On-site service	Daily	Orthotics	
	Visiting service provided by Prostek	Monthly clinic and as required	Prosthetics	
Whyalla	On-site service	Daily	Prosthetic/Orthotic Prosthetic/Orthotic Technician	1 x AHP3 3 x AHP2 2 x TGO-0
Prostek	Private service	Daily plus on call	Prosthetic/Orthotic Technician	X 5 X 3
Noarlunga Hospital	Visiting service provided by RGH	As requested	Prosthetic/Orthotic	
MtGambier	Visiting service provided by RGH	Monthly	Prosthetic/Orthotic	
Pt Augusta	Visiting service provided by Whyalla	Weekly	Prosthetic/Orthotic	
Pt Pirie	Visiting service provided by Whyalla	Every 3 weeks	Prosthetic/Orthotic	
Pt Lincoln	Visiting service provided by Whyalla	Every 3 weeks	Prosthetic/Orthotic	
Ceduna	Visiting service provided by Whyalla	Monthly	Prosthetic/Orthotic	
Coober Pedy	Visiting service provided by Whyalla	Monthly	Prosthetic/Orthotic	
Berri				

Appendix 5: An integrated clinical pathway

Proposed integrated clinical pathway that supports individuals undertaking amputation.

Integrated Clinical Pathway for Amputees



Appendix 6: Pathway checklist

The following provides an example of the pathway check-list for the delivery of amputee services. It is an adapted version of the New Zealand Amputee Inter-Disciplinary Care Checklist, access via WA Department of Health, Aged Care Network, Amputee Services and Rehabilitation Model of Care. It is recommended this pathway be further adapted for South Australia and implemented statewide.

PATIENT LABEL:			
INTER-DISCIPLINARY CARE TEAM MEMBERS (Print names)			
Doctor:		Aboriginal Health Worker:	
Social Worker:		Physiotherapist:	
amputee coordinator:			
PRE-OP	Key Tasks	√ or N/A	Date Completed
NURSING			
• Adequate pain relief administered			
• Early referral to PT – verbally at PT/Nurse Report or beep PT			
• Information folder given to patient and family			
• Transfer using ½ standing pivot transfer if unable to walk			
PHYSIOTHERAPY			
• Check patient has information folder			
• Order wheelchair with anti tips and stump rest. Order narrowest chair pt can fit, eg 16" rather than 18" if possible			
• Access respiratory status and educate as appropriate			
• Teach transfers if time allows			
INTRA-OP	Key Tasks		
MEDICAL / NURSING			
• Rigid removable dressing (RRD) applied in theatre			

Comment (if required):

POST-OP	Key Tasks	√ or N/A	Date Completed
NURSING			
• Referral to physio immediately if not possible pre-op (beep physio)			
• Ensure adequate regular and PRN pain relief taken on patient			
• Rigid Removable Dressing (RRD) and wound dressing left in situ for 48 hours or until specified by surgeons, <u>unless</u> concerns about residual limb ** Trans Tibial Amputee patient only			
• To reduce the risk of swelling, only remove RRD to view wound dressing and to remove drain <u>as</u> the vascular team arrives at bedside. Reapply RRD as soon as possible after viewing wound			
• Contact physio immediately if you are unable to reapply RRD after wound viewing because of increased swelling			

<ul style="list-style-type: none"> Use occlusive dressings (eg. Post op site) over mefix tape to prevent any leakage of wound exudates onto sock and RRD 			
<ul style="list-style-type: none"> Assist physio with delivery analgesic entonox to patient if required 			
<ul style="list-style-type: none"> Educate patient and family about rehabilitation process – refer to handout “What Happens After Amputation and How Long Does It Take” in amputee information folder 			
<ul style="list-style-type: none"> Shower patient with RRD in situ – cover with plastic bag 			
<ul style="list-style-type: none"> For below knee amputees, use ½ standing pivot transfer for bed to chair to bed (refer to photos in ward). Use banana board if necessary 			
<ul style="list-style-type: none"> For bilateral amputees, use forwards and backwards transfer (refer to photos). Use banana board to bridge gap between bed and chair 			
PHYSIOTHERAPY			
<ul style="list-style-type: none"> Ensure patient has amputee information folder. 			
<ul style="list-style-type: none"> Commence tasks identified on Physiotherapy Amputee Transfer Summary 			
<ul style="list-style-type: none"> Make RRD two or three days post-op, if not made in theatre. Use entonox and adequate pain relief. Ask patient’s nurse to administer entonox – this needs to be breathed continuously for at least two minutes <u>prior</u> to making RRD to allow gas to get to where it is needed in the body. 			
<ul style="list-style-type: none"> Practice bed to chair to bed transfers, using ½ standing pivot transfer for below knee amputee (BKA). Use banana board if necessary. (Refer to photos in ward) 			
<ul style="list-style-type: none"> Begin anti-contracture exercises 			
<ul style="list-style-type: none"> If patient limited by pain, liaise with nurse and doctor about most effective pain relief regime 			
<ul style="list-style-type: none"> For bilateral amputee, practice forward and backwards transfers using banana board if necessary to bridge gap between bed and chair. (Refer to photos in ward) 			
<ul style="list-style-type: none"> If RRD unable to be fitted onto residual limb after wound inspection, use blue line bandaging for a few hours to reduce oedema, then attempt to refit RRD 			
<ul style="list-style-type: none"> If patient already has a below knee prosthesis for the other leg, ensure patient wears it for transfers 			
<ul style="list-style-type: none"> Complete Amputee Transfer Summary and fax to destination 			
SOCIAL WORK			
<ul style="list-style-type: none"> Liaise with ward physiotherapist, Amputee Society, and Artificial Limb Centre if patient requires information to be able to make more informed decision about processing with amputation 			

SOURCE: Final Report to New Zealand Artificial Limb Board

Design and Implementation of Interdisciplinary Care Guidelines for Hospital Management of Amputees in Christchurch.2004. Appendix 2.

Project Author: Debbie Hockley. Project Advisor: Graham Flanagan

Trial Document 1/06/2005

Appendix 7: K Levels

Following are descriptive functional levels from the American Orthotic and Prosthetic Association (AOPA) used by manufacturers in classifying components. K Levels are widely recognised and used globally to recognise the potential for an amputee to mobilise or ambulate with a prosthesis.

Functional Level	Description
K0:	Does not have the ability or potential to ambulate or transfer safely with or without assistance and a prosthesis does not enhance their quality of life or mobility.
K1:	Has the ability or potential to use a prosthesis for transfers or ambulation on level surfaces at fixed cadence. Typical of the limited and unlimited household ambulator.
K2:	Has the ability or potential for ambulation with the ability to traverse low level environmental barriers such as curbs, stairs or uneven surfaces. Typical of the limited community ambulator.
K3:	Has the ability or potential for ambulation with variable cadence. Typical of the community ambulator who has the ability to traverse most environmental barriers and may have vocational, therapeutic, or exercise activity that demands prosthetic utilisation beyond simple locomotion.
K4:	Has the ability or potential for prosthetic ambulation that exceeds basic ambulation skills, exhibiting high impact, stress, or energy levels. Typical of the prosthetic demands of the child, active adult, or athlete.

(Yanke Bionics, 2005)

Appendix 8: Glossary (of selected terms)

Aboriginal	The term Aboriginal has been used to refer to people of Aboriginal and Torres Strait Islander descent.
Amputation	<p>Severance of a limb, or part of a limb, from the rest of the body due to accident, congenital birth defect or disease.</p> <p>With regards to the lower limb transfemoral or transtibial amputations are termed major with minor amputations involving partial removal of a foot, including toe or forefoot restrictions. Bilateral amputation is amputation of both legs or both arms.</p>
Australasian Rehabilitation Outcomes Centre (AROC)	The Australasian Rehabilitation Outcomes Centre (AROC) is a joint initiative of the Australian rehabilitation sector (providers, funders, regulators and consumers. It facilitates a national benchmarking system to improve clinical rehabilitation outcomes in both the public and private sectors.
Evidence Based Practice	Clinical decision making based on systematic review of the scientific evidence of the risks, benefits and costs of alternative forms of diagnosis and treatment.
K Levels	Functional levels developed in the USA for medicare purposes. K Levels are widely recognised and used globally to recognise the potential for an amputee to mobilise of amulate with a prosthesis.
Inter-disciplinary	Professionals from different disciplines combining skills and resources to achieve common goals and make care decisions regarding diagnosis, treatment planning and intervention collaboratively. Often what can be accomplished as an inter-disciplinary team is more than could be accomplished individually.
Quality of Life	The overall status of a combination of factors including a person's health, symptoms and level of physical and social functioning.
Rehabilitation	Rehabilitation aims to achieve optimal functioning and minimise the experience of developmental delay or loss of function and ability from any cause. This is usually achieved through physical and psychological methods, using medical, social, educational and vocational services, evidenced by a multi-disciplinary rehabilitation plan comprising negotiated goals and indicative timeframes that are periodically evaluated using outcome measures.
Rigid Removable Dressing	<p>Immediately following Transtibial (TT) amputation, the prosthetist will apply a Removable Rigid Dressing (RRD). An RRD is a hard synthetic dressing moulded to fit over the residuum. The RRD is necessary as it helps to:</p> <p>prevent excess swelling (oedema) in residuum, reduce pain in residuum, protect residuum from external trauma, assist in wound healing, shape and desensitise residuum in preparation prosthetic fitting.</p>
Secondary prevention	Secondary prevention aims to manage the early symptoms of a disease and preclude the development of possible irreparable medical conditions.
South Australian Artificial Limb Scheme (SAALS)	Oversees the funding of artificial limbs in South Australia, prescribed and manufactured by prosthetists/prosthetic companies for eligible residents (non-DVA and non-compensable). The scheme is managed by Domiciliary Equipment Service, part of Department for Families and Communities.

Appendix 9: References

Cited

- ¹ Marcovitch, H. Editor. *Black's Medical Dictionary*. 2005. A & C Black Publishers : London
- ² 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.
- ³ Department of Health. *South Australia's Health Care Plan, 2007-2016*. Government of South Australia: Department of Health, Adelaide. 2007.
- ⁴ Department of Health. *Statewide Rehabilitation Service Plan, 2009-2017*. Government of South Australia: Department of Health, Adelaide. 2009.
- ⁵ 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.
- ⁶ Payne CB, Scott RS, Moir C. *Hospital discharges for diabetic foot disease in New Zealand 1980-1993*. Diabetes Research & Clinical Practice. 1998; 39: 69-74.
- ⁷ AFRM. *Standards 2005: Adult Rehabilitation Medicine Services in Public and Private Hospitals*. 2005. Australasian Faculty of Rehabilitation Medicine: Sydney, Australia.
- ⁸ South Australia, Dept. of Health, Statewide Service Strategy Division, *Aboriginal Health Care Plan 2010-2016*, SA Health, Adelaide
- ⁹ Allied Health in Rehabilitation Consultative Committee. *Guidelines for Allied Health : Resources required for the provision of quality rehabilitation services*. 2007. Victoria, Australia

Non-cited

Broomhead P, Dawes D, Hale C, Lambert A, Quinlivan D, Shepherd R. *Evidence based clinical guidelines for the physiotherapy management of adults with lower limb prostheses*. 2003. British Association of Chartered Physiotherapists in Amputation Rehabilitation.

British Society of Rehabilitation Medicine. *Amputee and prosthetic rehabilitation – standards and guidelines*, 2nd edition. Report of a working party. 2003. British Society of Rehabilitation Medicine: London.

American Academy of Orthotists & Prosthetists. *Conference Proceedings*. Journal of Prosthetics and Orthotics. 2004; 16, 3S. www.oandp.org/jpo/library/index/2004_03S.asp Accessed April 2008.
Smith DG, Berke GM. *Clinical Standards of Practice on Postoperative Management of the Lower Extremity*. Journal of Orthotics and Prosthetics. 2004;16(3):2-27.

Hockley D, Flanagan G. *Design and implementation of interdisciplinary care guidelines for hospital management of amputees in Christchurch*. New Zealand Artificial Limb Board. 2005.

Smith et al 2003; consensus statement - *Postoperative dressing and management strategies for transtibial amputations: A critical review*, www.rehab.research.va.gov/jour/03/40/3/smith.html