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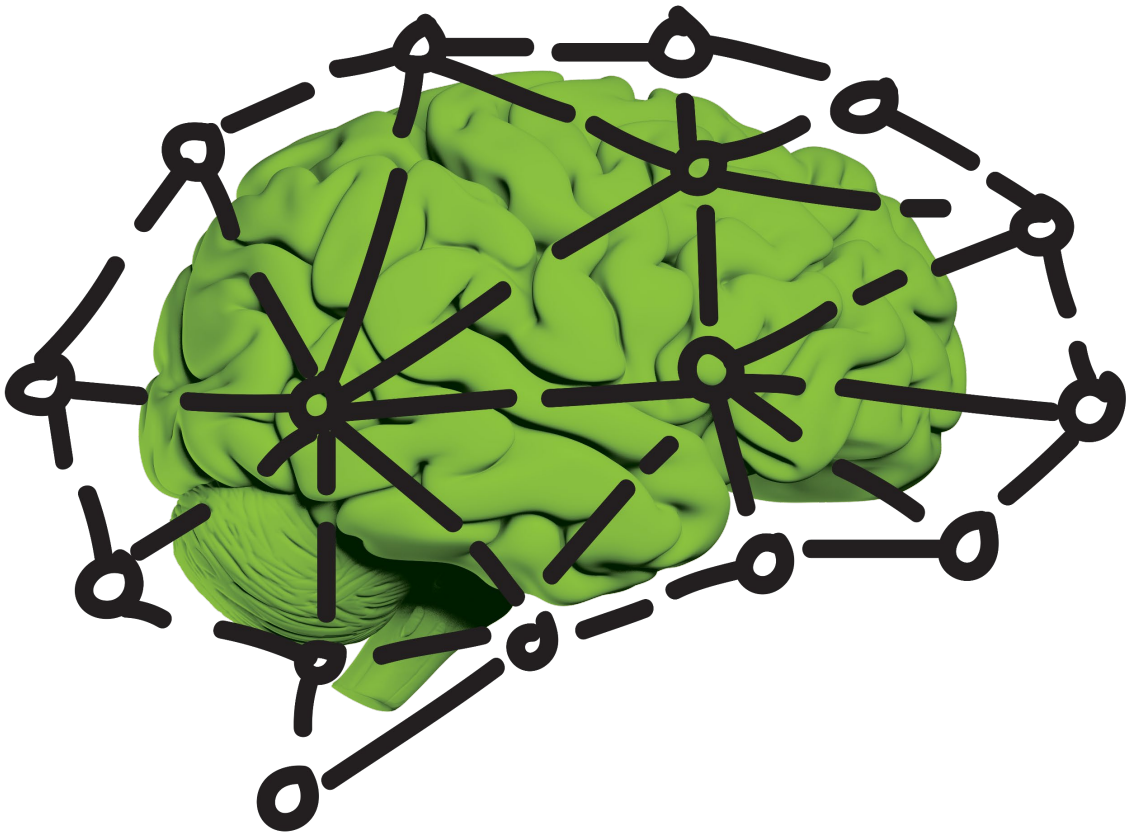

Orthotic and Prosthetic - Horizons Scanning and Scenario Generation Report

February 2020

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1 Executive Summary

The purpose of this document is to outline the methodology, approach and themes raised by the literature and orthotic and prosthetic stakeholders to inform the Workforce Modelling phase of the NSW Ministry of Health's Workforce Planning Methodology. It should be noted that the views expressed in the report are not necessarily those of the NSW Ministry of Health.

Workforce Planning and Talent Development (WP&TD) Branch of the Ministry of Health is responsible for developing and modelling projections for Allied Health workforces. The Orthotic and Prosthetic Horizons Scanning and Scenario Generation Project is driven by the NSW Health's *Health Professionals Workforce Plan 2012-22* (the Plan). It forecasted health service delivery requirements; providing the framework to address workforce implications from increasing demand for NSW Health.

Orthotists and prosthetists are allied health professionals who diagnose and treat physical or functional limitations resulting from illnesses, disability or amputation (AOPA, n.d.a). Orthotists and prosthetists are technically and clinically trained to assess, manufacture, prescribe, fit, and monitor orthoses and prostheses. The Orthotic and Prosthetic Workforce Horizons Scanning and Scenario Generation Project (the Project) supported stakeholders to participate in the development of a driver model that articulates key demand and supply drivers for the workforce in NSW.

This Project identified the key demand drivers for the orthotic and prosthetic workforce including:

- government funding, research, and policy
- population demographics and increasing complexities
- service and referral pathways
- changing recommendations for standards of care
- awareness of the profession
- service coverage and accessibility
- government and private funding.

The main supply drivers were identified for the orthotic and prosthetic workforce including:

- the profile of the profession
- workforce recruitment and retention in rural and remote areas
- workforce planning
- graduate numbers and availability of placements
- workforce culture
- skill mix
- career pathways and professional development
- funding of roles
- fabrication capacity and mode.

In addition to the drivers, throughout the Project several key challenges and opportunities were identified. Key challenges indicated by stakeholders included:

- financial access to services by patients to certain types of preventative orthotic care
- disruption through social enterprise and innovations

- lack of comprehensive workforce data
- limited service accessibility and availability in rural and remote areas

The opportunities identified by stakeholders included:

- establishment and use of central fabrication
- future inclusion of orthotic services under Medicare
- use of satellite and mobile clinics
- increasing prevalence of technological enhancements such as telehealth, emergence of robotics, 3D printing and 3D scanning.

2 Introduction

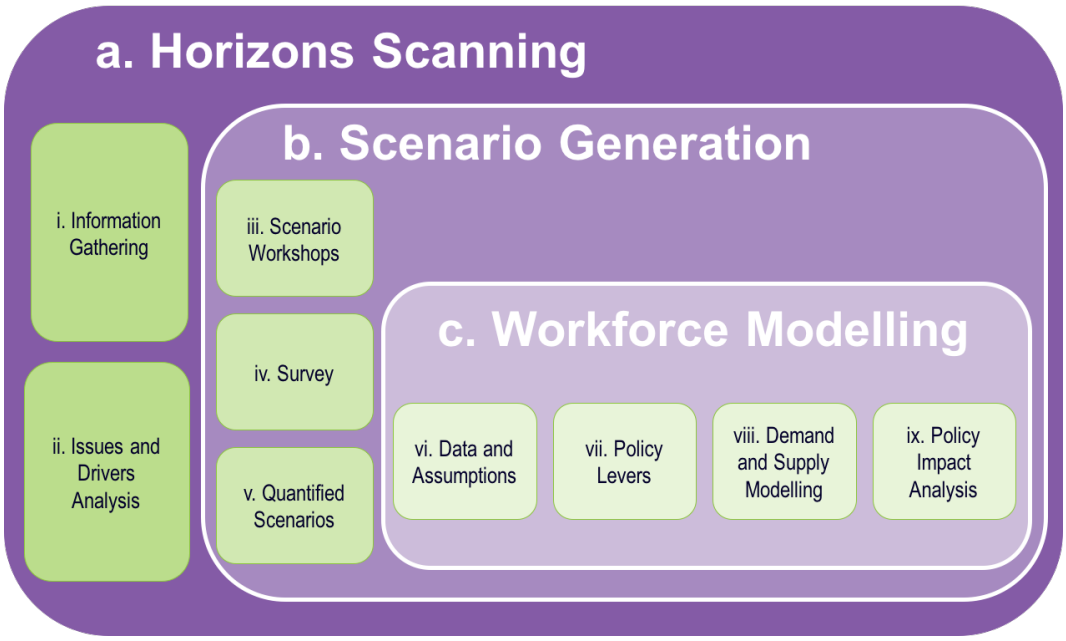
The Orthotic and Prosthetic Horizons Scanning and Scenario Generation Project (2019) was driven by the *Health Professionals Workforce Plan 2012-22* (the Plan). The Plan sets out the framework to address the workforce implications of increasing demand for health services in New South Wales (NSW). Given this increasing demand for health services, the Plan establishes that simply increasing staffing without considering changing workforce practices and introducing more efficient and effective models of care is financially unsustainable. The Plan outlines that the Workforce Planning and Talent Development Branch (WP&TD) is responsible for developing and modelling projections for the Allied Health workforce.

The Horizons Scanning and Scenario Generation project (the Project) represents an opportunity for the orthotic and prosthetic workforce to participate in the development of a short, medium and long-term vision for their profession. In developing this vision, NSW Health identified a number of system-wide drivers were require consideration, including (but not limited to):

- The need to shift the provision of service from an institutional focus, towards a patient-centric model
- An increasing focus on early intervention and prevention models of care
- The impacts of information and communication technology (ICT) on the profession, how technology supports their role, its capabilities and challenges with access, and the overarching state-wide eHealth and NSW ICT strategies
- An emphasis on collaborative, multidisciplinary teams across care settings and balancing health profession specialisation with generalisation to address the increased demand for care, particularly amongst patients with complex, long-term conditions and the ageing population
- A need to consider the geographic distribution of workforce to align with changing population demographics and health needs
- Broader NSW-wide and national programs of work including, for example, Leading Better Value Care and the National Disability Insurance Scheme (NDIS)
- Working towards achieving the objectives of the Health Professionals Workforce Plan Consultation Report

The purpose of this document is to outline the methodology, approach and themes raised in the literature and by orthotic and prosthetic stakeholders to inform the Workforce Modelling phase (Stage C in Figure 1) of the methodology. It should be noted that the views expressed in the report are not necessarily those of the NSW Ministry of Health.

Figure 1: Ministry of Health Workforce Planning Methodology



2.1 Methodology

This Project focuses on the Horizons Scanning and Scenario Generation phases of the NSW Ministry of Health's Workforce Planning Methodology.

The process used throughout the Project comprises four components: an information gathering phase, an issue and driver analysis phase, scenario workshops, and a workforce survey. Different approaches were used during each component to draw out relevant information as described below.

2.1.1 Literature search and review

An initial literature search was conducted using Google Scholar with supplementary searches on other major databases (including EBSCOhost, ProQuest and CINAHL). Key words relevant to the orthotic and prosthetic workforce were identified and utilised; such as orthotics and prosthetics, as well as more generalist searches around the therapeutical benefits of device interventions, determinates of disease and manufacturing. Recent publications were prioritised, and available published data were considered. In addition, to augment the initial findings, a comprehensive search of organisational and grey literature was undertaken.

2.1.2 One-to-one stakeholder interviews

A series of one-to-one interviews were conducted in the initial stages of the Project. The interviewees represented a cross section of stakeholders and included universities, the professional association, orthotists and prosthetists and technicians working across rural and metropolitan Local Health Districts (LHDs) and Specialty Health Networks (SHNs). These interviews provided the opportunity for a deeper exploration into what stakeholders perceived to be the key workforce drivers, challenges and opportunities. They also provided a focused framework for development of the horizons scanning and scenario generation workshops. Individuals who took part in the interviews also attended the horizons scanning and scenario generation workshops.

2.1.3 Horizon scanning workshop

The horizon scanning workshop was conducted on the 10th September 2019, this was the first of two workshops held during the project (see 2.1.5 below). Key orthotic and prosthetic stakeholders representing LHDs and SHNs, universities and representatives from professional bodies participated in the workshop and as a group identified overarching workforce demand and supply drivers. A list of the stakeholders engaged throughout the Project and those who attended both workshops is available in *Appendix 7.1.*

Issues raised by stakeholders in the workshop, augmented with themes from the literature review and survey results, informed the initial development of the orthotic and prosthetic driver model. The model was then validated at the following scenario generation workshop.

2.1.4 Stakeholder online survey

An online survey was designed to gather high-level views from the workforce. Distribution was targeted to all orthotists, prosthetists and technicians employed by NSW Health. Technicians, whilst not the focus of this Horizon Scan, were included in the survey as they have a critical role in the manufacture of orthotic and prosthetic devices. A total of 43 responses were collected, which was considered a relatively high level of engagement against the overall FTE numbers of the workforce. Of these 43 responses, 37 were received from an orthotist or prosthetist.

The survey contained a series of questions relating to potential workforce demand and supply drivers, as well as potential challenges and opportunities faced by the workforce. These questions were informed by the initial findings from the literature review and the first horizons scanning workshop. Respondents were asked to identify the level of significance of the drivers, potential challenges and opportunities in addition to prioritising them based on the perceived level of impact.

2.1.5 Scenario generation workshop

The scenario generation workshop was held on the 20th November 2019 and built upon themes that were explored in the horizons scanning workshop. To maintain consistency, the same participants from the horizons scanning workshop participated in the scenario generation workshop.

The orthotic and prosthetic driver model was validated with the participants. The driver model is based upon the emerging themes throughout the research processes. The scenario generation workshops gave stakeholders the opportunity to explored a series of future scenarios. This determined plausibility, potential impacts on the workforce and hypothesised potential call to actions.

3 Overview of the Workforce

Orthotists and prosthetists are Allied Health professionals who diagnose and treat physical or functional limitations resulting from illnesses, disability or amputation (AOPA, n.d.c). Orthotists and prosthetists are technically and clinically trained to manufacture, prescribe, fit and monitor orthoses and prostheses.

Orthotic and prosthetic devices serve different purposes. An orthosis is an external device that is designed and fitted against the body to support limb alignments, correct deformities, protect from post-surgical injuries, reduce pain, redistribute or apply pressure, and/or aid in rehabilitation efforts (AOPA, n.d.a). A prosthesis is an artificial device attached to the body to replace a missing body part, such as an arm, to restore a person's function or to provide cosmetic benefit (AOPA, n.d.a).

Orthotists and prosthetists can work in a variety of public and private settings, including hospitals, aged care facilities and clinics (AOPA, n.d.b). All clinicians pursuing the career study both orthotics and prosthetics at a university level, they typically specialise in one or the other upon graduation.

3.1 Scope of practice

The Australian Orthotic Prosthetic Association (AOPA) sets the minimum clinical standards for clinicians. The AOPA does this through clinical competencies within the obtainment of registration. By taking this approach it allows individuals to define and operate within their own scope of practice (AOPA, 2019a). The AOPA minimum clinical competency standards for those wishing to register include:

- ability to collect client information and appraise the validity of the information
- develop client centred treatment goals and care plans and document care
- evaluates, fits and/or modifies orthoses and prostheses, in relation to treatment goals
- undertakes and/or coordinates the manufacture of orthoses and prostheses
- ensures the safety of orthoses and prostheses.

3.2 Orthotic Prosthetic Technicians

Orthotic and Prosthetic Technicians, whilst not the focus of this report, are a valuable support for orthotists and prosthetists. Technicians use materials to manufacture prosthetic or orthotic devices under the supervision of orthotists and prosthetists (The Good Universities Guide, n.d.). Whilst technicians generally do not engage in direct patient care (although this does vary by organisation/workplace), they undertake much of the manual manufacturing to support the orthotists and prosthetists. This creates additional capacity for orthotists and prosthetists to deliver clinical care.

The NSW Health Orthotics and Prosthetics Technician Training Pathway is a NSW Health owned and managed technician training and assessment program. Delivery of the Pathway to NSW Health technicians commenced in March 2020 and consists of:

- 8 core subjects
- 4 Orthotics and Prosthetics Fundamental subjects
- 4 Advanced Orthotics subjects
- 6 Advanced Prosthetics subjects
- 2 elective subjects.

Training is provided through Learner Guides and completion of on-the-job work skills training. Learners are then assessed to confirm their competency with a Certificate awarded on completion of the Pathway.

Early feedback indicates that this approach to training and assessment is the right approach to ensure a quality workforce and service to patients. The Pathway ensures the sustainability of this important workforce supporting workforce continuity, safe work practices, improve workforce efficiency, cost effectiveness and the promotion of safe patient care now and into the future.'

3.3 Professional Bodies and Associations

One national professional body representing orthotists and prosthetists in Australia- the Australian Orthotic Prosthetic Association (AOPA). However, it is important to recognise International Society for Prosthetics and Orthotics (ISPO) and its role on a global scale. Across Australia clinicians are often variously members of either, or both the Australian Orthotic Prosthetic Association (AOPA) and/or the International Society for Prosthetics and Orthotics (ISPO). However, the AOPA is regarded as the more relevant membership in the recruitment context.

3.3.1 The Australian Orthotic Prosthetic Association (AOPA)

AOPA is the only peak professional body that represents orthotists and prosthetists in Australia (AOPA, 2017). The workforce is self-regulated, therefore has no requirement for the practicing individual to register as a clinician by the Australian Health Clinician Regulation Agency (AHPRA). AOPA sees itself as responsible for setting the professional development standards of their members, representing, advocating and lobbying, enhancing professional recognition and managing the self-regulation of the profession (AOPA, 2017).

Around 80% of the practicing workforce in Australia are registered with AOPA (AOPA, 2019a). There is no requirement to register with the AOPA to practice within Australia.

3.3.2 International Society for Prosthetics and Orthotics (ISPO)

Founded in the 1970s, ISPO is a global, multidisciplinary, non-governmental organisation aiming to improve the quality of life for persons who may benefit from prosthetic, orthotic, mobility and assistive devices. The Society has approximately 3,300 members of different professional disciplines in over 100 countries including: prosthetists and orthotists, prosthetic and orthotic technicians, orthopaedic surgeons, rehabilitation doctors, physiotherapists, occupational therapists, orthopaedic shoemakers, nurses and biomechanical/rehabilitation engineers.

3.4 Entry to the profession

Entry to the profession is achieved by successfully completing a Prosthetics and Orthotics degree (AOPA, n.d.d). Currently two Australian universities offer this qualification: La Trobe University, Victoria and the University of Sunshine Coast, Queensland. No universities in NSW currently offer any qualification in clinical prosthetics and orthotics.

Students studying from La Trobe University graduate with a Bachelor of Applied Science and a Master of Clinical Prosthetics and Orthotics. Postgraduates with an appropriate undergraduate degree may also study the Master of Clinical Prosthetics and Orthotics. Students studying at the University of Sunshine Coast in Queensland graduate with a Bachelor of Health Science with an extended major in Prosthetics and Orthotics (AOPA, n.d.d).

According to the NSW Health Service Health Professionals (State) Award of 2018, for an individual to work as an Orthotist or Prosthetist with NSW Health, they must complete a degree that gains eligibility for registration with the AOPA or another qualification deemed acceptable by NSW Health (NSW Health, 2018).

3.5 Workforce Characteristics

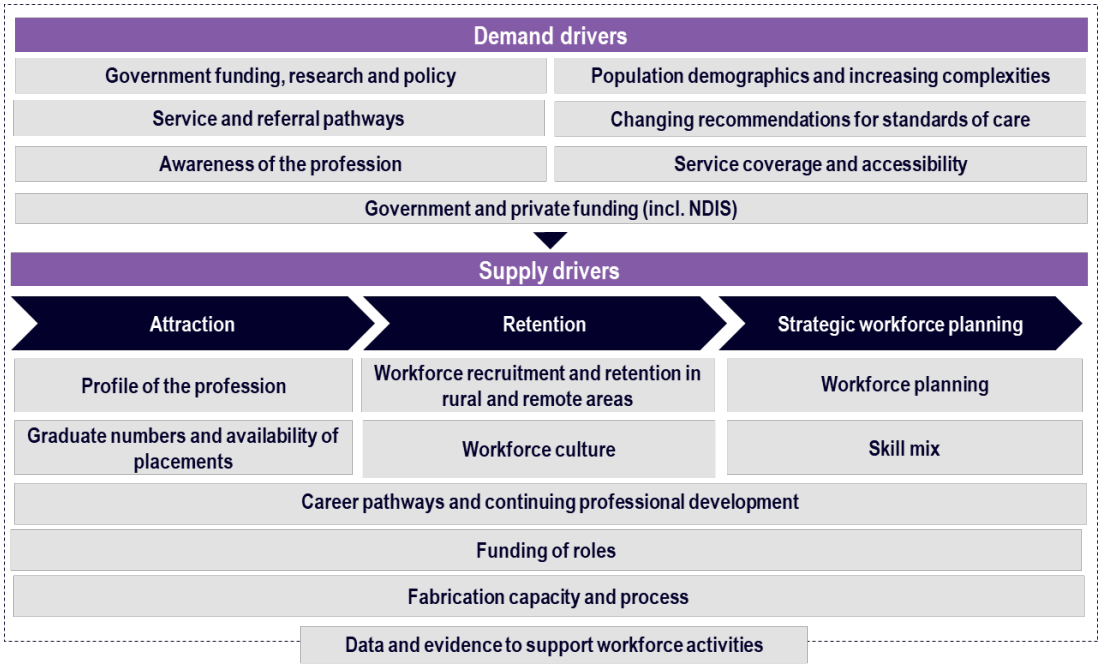
Within NSW Health, there are 37.24 FTE working as either a prosthetist or orthotist. Of those working for NSW Health, 21.53 FTE (58%) are men while 15.72 FTE (42%) are female.

According to the NSW AOPA Workforce Snapshot 2007-2012, there were 48 orthotists or prosthetists registered with the association in 2012. Between 2007 and 2012 the number of clinicians working in New South Wales remained static at 48 while the workforce grew by 37% nationally. During the same period the NSW population grew by roughly 470,000 people (NSW Government, 2019). This increase in population without an increase in workforce resulted in a dilution of clinician-population ratio (0.7 to 0.66) (AOPA, 2012).

4 Summary of the Key Demand and Supply Drivers

The driver model in *Figure 2* has brought together the key drivers that were identified, developed and validated through the workforce horizon scanning process with key orthotic and prosthetic stakeholders. These key drivers identified during the Project, impact demand and supply, on and for, the orthotic and prosthetic workforce.

Figure 2: Orthotic and Prosthetic – Demand and Supply Driver Model



4.1 Demand Drivers

Demand drivers are defined as the factors that shape and influence demand for the orthotic and prosthetic workforce. Demand drivers discussed in this section are a synthesis of themes identified by stakeholders and those collated from the literature.

Table 1 below provides a high-level overview of the demand drivers. A more detailed explanation and analysis of each driver follows.

Table 1: Overview of the key demand drivers for the orthotic and prosthetic workforce

Demand Driver	Description
Government funding, research and policy	Impact on orthotic and prosthetic services from research, government funding, and State/Commonwealth policy
Population demographics and increasing complexities	Incidence of complex developmental disorders, chronic disease and cancer based on population growth, demographic characteristics and geographic distribution
Service and referral pathways	The referral pathways and expectations for accessing orthotic and prosthetic services
Changing recommendations for standards of care	Body of evidence that is influencing standard of care recommendations to include orthotic and prosthetic involvement
Awareness of the profession	Patient and professional awareness of orthotic and prosthetic services based on consumer expectations, knowledge and perceptions
Service coverage and accessibility	The coverage and accessibility of orthotic and prosthetic services based on geographic (particularly rural) and economic distribution

4.1.1 Government funding, research and policy

Stakeholders identified that government funding and policies have a direct impact on the workforce as well as the direction and breadth of the services they provide within the public health system. During the stakeholder engagement sessions, stakeholders ranked government funding, research and policy as the driver with the strongest impact and likelihood to impact on the profession. Several state-wide and national policy areas impact on demand for the orthotic and prosthetic workforce.

National Disability Insurance Scheme

The National Disability Insurance Scheme (NDIS) is a new way of providing support for all Australians under the age of 65 who have a permanent and significant disability. It aims to assist people with disability to access the required mainstream and community services through insurance. In this way it provides people with individualised support and flexibility to manage their own care.

For example, the NDIS supports individuals with congenital or acquired limb loss or limb difference by allowing for device purchases and by assisting with consumable items and maintenance (NDIS, 2019). These devices can be either an orthotic or prosthetic item.

The access of devices under this scheme is likely to improve accessibility and increase demand for the services provided by orthotists and prosthetists.

EnableNSW Prosthetic Limb Service

The EnableNSW Prosthetic Limb Service provides custom-made upper or lower limb replacement for those with limb deficiency or following amputation (NSW Health, 2019). This government funded service does not include prosthetic devices for non-limb replacements

(such as eyes or nose) or recreational devices. Prosthetic limbs and assistive technology are means tested, but generally available for 20% or less, than the cost of the device.

It is anticipated that the work of EnableNSW will increase the uptake of prosthetics, driving demand for orthotic and prosthetic services.

Medicare Benefits Scheme

There are currently no orthotic or prosthetic interventions provided under the Medicare Benefits Scheme (MBS). The AOPA proposed inclusion of orthotic services in August 2018 which was subsequently endorsed by the MBS Review Taskforce in February 2019 (AOPA, 2019b).

Following a consultation period that ended in May 2019, the MBS Review Taskforce has recommended creation of new MBS items under the Allied Health Category. According to the AOPA, this will provide better access to care for 1.7 million Australians with diabetes, 450,000 stroke survivors and 3.9 million people living with arthritis (AOPA, n.d.e).

Improved access to MBS funding arrangements has the potential to drive an increase in demand to orthotic services in the future.

Leading Better Value Care

The increasing prevalence of diabetes and diabetic foot disease complications are driving a rise in amputation rates across Australia. The *High Risk Foot Service* tranche of the NSW Health Leading Better Value Care (LBVC) program is focused on avoiding hospital admissions by implementing strategies with the support of Local Health Districts (LBVC, 2019). These podiatrist-led services enable foot protection services for people diagnosed with diabetes. As this program has a focus on improving outcomes related to foot ulceration, LBVC have identified best practice as inclusion of orthotists in the multidisciplinary team (ACI, 2014).

By increasing orthotists involvement in programs focused on high risk feet, the demand for their services is similarly expected to grow.

The scope of LBVC also incorporates the Osteoarthritis Chronic Care Program (OACCP) which aims to better manage these patients via multi-disciplinary team model. Orthotists and prosthetists are involved as required, managing the care of those more acutely impacted patients. Population demographics and increasing complexities

Changing population demographics, particularly the effects of an ageing population and rising physical health issues such as obesity are driving conditions such as limb amputation, stroke and arthritis. Stakeholders ranked this demand driver as the second most likely to impact on their profession. Quality of life for people afflicted with these conditions can be significantly improved using an orthosis or prosthesis.

There are a number of specific population demographics driving demand for orthotists. These are outlined below.

Diabetic Foot Ulceration

Diabetic foot ulceration results from the application of high pressure on parts of the foot, or from injury and affects approximately 250,000 Australians. The annual incidence of developing a foot ulcer sits between 1-4% (Cheng, et al., 2016), and with a growing population of diabetics in NSW it is expected that the prevalence of foot ulcerations will increase comparatively. Foot ulceration is the leading cause of amputation in Australia and similarly is driving demand for prosthetists as outlined further below. Best practice treatment involves a

multidisciplinary approach which includes pressure offloading orthosis and custom-made footwear (AOPA, n.d.f).

Rates of diabetic foot ulceration are more prevalent in Aboriginal Australians due to increased rates of diabetes (SARRAH, 2016). Aboriginal Australians are more like to leave their diabetes undiagnosed, and if diagnosis occurs, it is more likely to happen at a younger age, further enhancing their risk of foot ulceration. The SARRAH (2016) report indicates that health programs for Aboriginal people are most effective when delivered close to home, promoting need for care delivery in all regions. A variety of programs of work are currently underway to address Aboriginal diabetic needs, such as the *Healthy Deadly Feet Program* in NSW.

Proactive management of diabetic foot ulcers is critical to minimise its severity and avoid the risk of amputation. Modelling of cost savings by providing 'optimal care' for diabetic foot ulcers estimated a nationwide saving of $2.7 billion over 5 years (Cheng, et al., 2016). As evidence grows on clear patient centred and financial advantages for early optimal care, further emphasis may be placed on clinicians to treat earlier. One example of this focus is the *Leading Better Value Care High Risk Foot project* in NSW.

Stroke

Around 55,000 Australians suffer a stroke annually (Brain Foundation, n.d.) and is the second leading cause of disability in Australia (ACI, 2019). As a consequence of a stroke, many individuals experience impaired walking and balance issues, which increases an individual's risk of falls (AOPA, 2016a). A systematic review found that 6-months post stroke, 21% of initially non-ambulatory patients did not regain the ability independently walk (Preston, Ada, Dean, Stanton, & Waddington, 2011). The risk of falls is increased as stroke survivors often develop altered positioning of their 'foot drop' which reduces the clearance their toe has to the ground whilst walking. This positioning makes it more likely for the toe to connect with the ground, resulting in a fall. Orthosis designed to reduce this foot drop has been shown to improve a person's mobility, walking, and aspects of balance (Tyson & Kent, 2013).

According to the Australian Clinical Guidelines for Stroke Management, fitting and use of lower limb orthoses may be used to reduce walking limitations in patients (Stroke Foundation, 2019). As orthotists are the only allied health profession skilled to prescribe, design and fit these devices, orthotist presence in primary health settings is critical.

As the prevalence and survival rates of stroke increases in Australia, it is likely to influence demand on orthotists.

Arthritis

Arthritis is a group of conditions affecting the joint and typically results in stiffness and pain (Arthritis Australia, n.d.). Arthritis is the second most common long-term disease in Australia affecting 3 million Australians, approximately 15% of the total population (AOPA, 2016b), and with a further 7 million Australians expected to be impacted by 2050 due to increasing rates of obesity and the ageing population. Orthotic intervention for those living with arthritis is used to relieve pain and improve mobility. Common orthosis include knee encompasses or shoe inlays to provide support and offer realignment. As the number of those living with arthritis is due to rise, it would be expected there is subsequent rise in demand for the assessment, design, fit and monitoring of orthotic devices.

OACCP (see 4.1.1 above) is a key program under LBVC aimed at delivering a multidisciplinary approach to arthritic care in NSW.

Cerebral Palsy

Cerebral palsy is a physical disability that affects movement as well as posture. Cerebral palsy is caused by events in a baby's developing brain before, during or shortly after birth (Cerebral Palsy Alliance, 2018a). For people living with cerebral palsy, conditions can include balance and coordination issues, muscle tone abnormalities, and loss of motor control; this impact causes further complications such as musculoskeletal issues, muscle contractures and bone deformities (Druzbicki, Rusek, Szczepanik, Dudek, & Snela, 2010). In Australia, over 34,000 people are living with cerebral palsy and this number is expected to rise to 47,000 by 2050 (Cerebral Palsy Alliance, 2018b). Orthotic devices are used in people with cerebral palsy to assist with limb function or to treat muscle contractures (Wingstrand, Hägglund, & Rodby-Bousquet, 2014).

The most frequently used is an ankle-foot orthosis. As the number of people living with cerebral palsy grow, further demand will be placed on orthotic services.

Prosthetic Specific Population Demographics

Limb difference can be congenital or the result of infection, disease or related to trauma. In Australia, around 70% of individuals who lose limbs are a result of diabetes and the remaining 30% are a result of congenital defects, injury or accidents, occupational trauma, infection or from cancer and neoplastic diseases (TAS, n.d.). In NSW, more than 2,000 amputations are performed annually (ACI, 2017).

Diabetic Foot Disease

Diabetic foot disease is Australia's leading cause of amputations costing the health system around $1.6 billion annually (Swannell, 2019). Currently, Australia hosts the second highest amputation rate of any OECD country. Over 50,000 Australians require diabetic foot disease services (Swannell, 2019) with a further 300,000 at risk of developing diabetic foot disease (Diabetic Foot Australia, 2018). On average, an additional Australian develops diabetes every 5 minutes which translates to more than100,000 a year (Diabetes Australia, n.d.).

Between 1998 and 2011 there was a 30% rise in diabetic related amputations (Diabetes Australia, 2016) and the rates of amputations are higher for Aboriginal populations. One study found that compared with non-Aboriginal Australians, Aboriginal Australians were 27 times more likely to require a minor amputation and 38 times more likely to require a major amputation (SARRAH, 2016). If incidences continue to grow and individuals do not properly manage symptoms early on, it is likely that the need of prosthetic devices due to amputations will continue to increase.

Congenital Limb Difference

Congenital Limb Deficiencies are potentially disabling conditions whereby individuals are born with or shortly after birth has a partial or complete upper or lower limb deficiency or lose. (Limbs4Kids, n.d.). Limb deficiencies at birth are commonly attributed to genetic variations, environmental impacts or a combination of both (Ephraim, Dillingham, Pezzin, & MacKenzie, 2003). In Australia it is estimated that around 2,500 infants and young people have limb difference (Limbs4Kids, n.d.).

Limb Amputation

Non-diabetic related amputations attribute to and can occur as a result of vascular diseases, injury, cancer or infection. Limited literature was available on the rates of non-diabetic related amputations in Australia; however reports indicate that approximately 25% of amputations are non-diabetes related (Dillon, Kohler, & Peeva, 2013).

4.1.2 Service and referral pathways

There is a variety of service and referral pathways for orthotic and prosthetic services and each differ slightly depending on patient need and circumstance. However, both service types, referral pathways include:

- Referral as an inpatient
- Referral to an outpatient clinic (often from another hospital outpatient clinic, which is a source of significant patient volumes)
- GP referral to services or private provider (such as the NDIS)
- Self-referral to private provider.

In addition to the list above, alternative pathways for prosthetic services could include a referral following hospital discharge to a service such as the EnableNSW Prosthetic Limb Service.

4.1.3 Changing recommendations for standards of care

With advancements in healthcare and increased evidence of the value of preventative care, standards of care are changing for orthotists and prosthetists. For example, developments in the orthotists role in clinical management have resulted in AOPA releasing care recommendations in the areas of diabetes, stroke and arthritis management. These interventions provide preventative treatment in cases such as diabetic foot ulceration and management of gait in instances following stroke.

New technologies are changing the recommendations for standards of care. For example, increased use of osseointegration for people with limb loss or deficiency. Osseointegration, for example, involves directly attaching a prosthetic device to the patient's bone which eliminates potential discomfort and swelling that is found with traditional socket-based approaches (AOPA, n.d.g).

4.1.4 Awareness of the profession

Stakeholders reported that the limited degree of public and professional understanding of what services are provided by orthotic and prosthetic professionals. This invariably impacts the demand on services. Lack of awareness on the part of other health professions can lead to the misdirection of, or even preclude, patient referrals at times. Limited awareness may also exclude orthotists and prosthetists during planning activities such as the establishment of new services or amendments to models of care.

The result being referrals to a podiatrist or a physiotherapist for example, instead of an orthotist or prosthetist. This referral behaviour could result in omission from multidisciplinary team planning in healthcare settings, even where orthotic or prosthetic interventions could benefit a patient's overall health outcomes. An example of this is patients with diabetic foot disease. Stakeholders felt that existing referral pathways could result in patients visiting other allied health professions for treatment and only being referred to an orthotist or prosthetist once their condition had deteriorated and an amputation had occurred.

4.1.5 Service coverage and accessibility

Service availability and accessibility refers to the availability of services as well as accessibility regarding waiting lists and cost. As the workforce across orthotics and prosthetics is small, overall service availability is naturally limited.

In NSW, only 4% of all clinicians registered with AOPA work in rural or remote areas (AOPA, 2012) in both the public and private sector. Rural and remote service availability was noted by stakeholders as an issue for the orthotic and prosthetic workforce due to an overall lack of public services available. A majority of orthotic and prosthetic services are supplied by metropolitan LHDs except for the Albury Prosthetic and Orthotic Service.

The existing distribution of services is weighted predominantly towards metropolitan areas, clearly has implications for service availability in rural and regional areas. This may lead to patients either seeking care from another related health profession, avoiding treatment or having to undertake travel in order to be seen by an appropriate clinician.

Stakeholders recognise the potential to greatly enhance service access via the use of innovative and existing technologies for patients in rural and remote areas (*see opportunities in section 6.1.2*) by utilising these existing and emerging (e.g. 3D printing and telehealth) technologies. They also noted that despite this potential, the challenge of further implementation still awaits. Reported is a lack of clarity around how best to balance the need to manage these technologies, while also retaining the clinical expertise to physically assess patients.

4.2 Supply Drivers

This section provides a detailed analysis of the supply drivers impacting the orthotic and prosthetic workforce as informed by the literature and stakeholder engagement. Supply drivers are defined as factors that contribute to the availability, sustainability and size of the workforce.

Table 2 below provides a high-level overview of the supply drivers, followed by a more detailed explanation and analysis of each supply driver. Table 2: Overview of the key supply drivers for the orthotic and prosthetic workforce

Supply Driver	Description
Profile of the profession	Professional voice, image and representation of the orthotic and prosthetic profession
Workforce retention in rural and remote areas	Workforce retention of orthotic and prosthetic clinicians based on geographic location
Workforce planning	Aligning the needs and priorities of the system with those of its workforce, and appropriate planning (i.e. maternity / backfill)
Graduate numbers and availability of placements	Ensuring that adequate numbers of graduates are available to meet demand and that clinical placements are available to support students learning
Workforce Culture	Culture of orthotic and prosthetic departments and their larger organisations
Skill mix	Advanced practice and other combinations of skills/knowledge that contribute to the future of the workforce
Career pathways and professional development	Availability of career progression and continual professional development and education for clinicians
Funding of roles	Funding of public sector orthotic and prosthetic positions and activities
Fabrication Capacity and Process	Facility manufacturing processes, locations and methods for distribution of orthotic and prosthetic devices (such as central fabrication)

4.2.1 Profile of the profession

Stakeholders acknowledged that enhancing the profile of the orthotic and prosthetic workforce is a key driver in promotion of the benefit of orthotic and prosthetic involvement in care. The profile of the profession represents the professional voice, image and overall representation of the workforce. As mentioned previously, existing referral pathways and referral or treatment behaviours of other professions can act as a barrier for orthotic and prosthetic involvement in the care of patients. Stakeholders identified that growing the profile of the profession, such as through the development of partnerships between departments and LHDs would enable the profession to grow a stronger profile and improve involvement of orthotists and prosthetists in care.

4.2.2 Workforce recruitment and retention in rural and remote areas

Limited local public services exist in rural and remote NSW. As previously mentioned, according to AOPA's membership data, 4% of AOPA clinicians work in rural or remote areas (AOPA, 2012). The combination of limited public services and registered members in rural and remote areas could indicate limited recruitment opportunities within these areas.

Whilst no literature was found regarding recruitment and retention of orthotists and prosthetists, studies do exist for the broader Australian allied health workforce. Across Australia, more than 30% of allied health graduates leave their industry within eight years due to lack of available positions (Philip, 2015). This trend could represent a risk to the profession in rural and remote locations, as limited career pathways or positions within NSW could result in a loss of clinicians to other professions, the private sector or to positions interstate. However, these clinicians could also migrate into key management, research or strategic based roles within the state.

4.2.3 Workforce planning

Stakeholders indicated that workforce planning was important for ensuring the workforce is adequately sized and positioned to manage future demands expected to emerge for orthotic and prosthetic services due to increased population size, factors such as the NDIS and changing population demographics.

The Stakeholder survey found that 76% (n=29) of respondents did not have any plans to retire e within the next five years and 13% (n=5) of respondents indicated that they were considering retiring. Stakeholders generally felt that there were enough graduates to fill positions, so it is unlikely that there will be workforce challenges to fill within existing staffing complements for junior positions in the future.

4.2.4 Graduate numbers and availability of placements

Within Australia two universities offer orthotic and prosthetic programs, of which none are in NSW. Stakeholders from the university and within industry felt that the number of graduates were enough to sufficiently supply the needs of the workforce and the number of placement opportunities enabled the current number of students. Stakeholders perceived recent graduates may be less attracted to positions in NSW. Factor considered by graduates may include location of family remuneration, availability of permanent positions, scope of practice and lifestyle affordability.

Stakeholders proposed that exposure to other disciplines during clinical placements would enhance student's transferable skills and promote a better understanding of the system and its resources.

4.2.5 Workforce Culture

Culture within the profession and the broader organisation were discussed by stakeholders as an issue affecting their workforce. Stakeholders indicated that overall culture within teams could negatively or positively affect the ability for the workforce to retain.

Due to the small size of the orthotic and prosthetic workforce, issues that may affect culture identified include:

- the impact of increasing workload alongside the increasing complexity and population without a comparable increase in workforce
- isolation with small numbers of employees at each site
- local cultural impacts can become significant

- impacted by the wider organisational culture
- locations of and physical environments of orthotic and prosthetic departments and workshops may feel 'tucked away' or be isolated away from the multidisciplinary team
- perception of orthotists and prosthetists from other professionals. This may have consequential impacts on referrals and numbers.

4.2.6 Skill Mix

Maintaining skill mix across the profession can be difficult due to the large content area, scope of practice, and workforce characteristics. Orthotists and prosthetists diagnose and treat physical or functional limitations resulting from illnesses, disability or amputation and manufacture and fit devices. This skill set is diverse for a range of conditions to specialise within. As advancements within the area are quickly progressing, AOPA has established minimum competency frameworks to set the minimum standards of clinicians but have implemented professional self-regulation. This program of self-regulation allows orthotic and prosthetic clinicians to self-direct continued professional development activities (AOPA, 2015) and establish their own scope of practice based on their skill sets (AOPA, 2019a).

Stakeholders felt that due to the small workforce size, there is considerable risk of knowledge loss when staff, especially senior staff, leave the workforce. When staff depart, they can leave a large gap in capability and local knowledge if appropriate and effective skill transfer is not adequately managed. There may be an opportunity for improved workforce and succession planning within some of these small units.

4.2.7 Professional development and career pathways

AOPA sets the professional development requirements for clinicians. As discussed, clinicians can manage their own professional development to meet their own objectives and standards. These requirements stipulate that members undertake 30 hours of approved education for each 12-month membership period (AOPA, 2015). Stakeholders indicated that workforce pressures can at times challenge a clinician's availability to access timely professional development and complete this stipulated amount.

Clear career pathways and professional development were identified by stakeholders as a key workforce issue. Due to the small size of the workforce, stakeholders noted that career progression opportunities are limited within the NSW public system. The limited number of senior positions, combined with a relatively low attrition rate, tends to reduce upward mobility for clinicians wishing to progress.

Destinations for staff who are facing a constrained career pathway could result in migration into management roles, positions with private providers or relocation to other LHDs for alternative clinical posts.

4.2.8 Funding of roles

The funding of additional positions must fit within LHD/SHN service budgets and often competes against other LHD/SHN priorities. Stakeholders felt these decisions may impact on patient wait times.

Stakeholders mentioned that they frequently need to use part-time or temporary staff and/or rely on student placement models to assist with service delivery. When permanent positions arise, often the temporary staff who present best as candidates. They cited difficulties in obtaining timely approvals to make position offers which often results with the preferred applicant leaving the organisation to accept a role elsewhere.

4.2.9 Fabrication capacity and Process

Stakeholders reported that much of the fabrication of custom devices occurs within workshops within each health district. Depending on the fabrication method and equipment available the manufacturing process can be time consuming and require many hours of involvement from either an orthotist, prosthetist or technician. The fabrication capacity is dependent on a range of factors, but stakeholders indicated that workforce, equipment investment and workshop space were primary factors that influence fabrication capacity. Due to these factors, and the emergence of supporting technology, central fabrication is discussed in more detail in *section 6.1.3*.

5 Challenges Encountered by the Workforce

Some of the key current and anticipated challenges encountered by the orthotic and prosthetic workforce was presented in the literature and stakeholder engagement sessions.

5.1.1 Financial access to services

Financial access to services may limit availability for accessing orthotic and prosthetic care. There can be out of pocket expenses for ineligible patients seeking to access orthotic and prosthetic services under schemes such as EnableNSW or the NDIS. A further example is certain preventative treatments such as orthoses that are not subsidised under the MBS or the requirement for a patient to travel to seek services. Financial barriers such as these can prevent patients from seeking services from orthotists and prosthetists and either presenting later in their disease progression or not at all. Improved access to services enables earlier treatment initiation and better control of symptoms. According to the NHS, studied indicate a £4 saving for every £1 of orthotic care investment (NHS, n.d.). This quantum of benefit could possibly be replicated in Australia by removing financial barriers to preventative orthotic treatment.

5.1.2 Social Enterprise and Innovation

Social enterprises are businesses established for solving social, environmental or cultural problems (Social Traders, 2019). These organisations are often known for introducing disruptive innovation into professions/sectors, that dramatically alter the landscape, i.e. the products, services and processes that are currently available or used. In recent years we have seen a number of social enterprises emerging in Australia and internationally which are offering orthotic and prosthetic interventions to disadvantaged communities at often discounted rates or free.

One example is the advent of the downloadable orthosis and prosthesis. “Enabling the future” is one such social enterprise organisation, which has manufactured and distributed over 1,800 prosthetic hands to patients (Enabling the future, n.d.). This community is based on volunteers who are not necessarily trained orthotists or prosthetists but rather a collection of volunteers from a variety of backgrounds, including biomedical engineers. This crowd of volunteers working together can rapidly create and update designs and distribute them on platforms like E-NABLE. The number of devices distributed however, is likely to be conservative as users can freely distribute and manufacture devices on their own. As access to 3D printers continues to improve, production costs are also decreasing – the total cost to download and print a prosthetic hand from E-NABLE costs roughly $35 (USD) (Enabling the future, n.d.). While these services are currently more prominent in developing countries, the principles of fast online development and ease could have impacts on the Australian market in the future.

A local Australian example, Ability Made, are using mobile apps to scan and design orthoses which then can be 3D printed at a central fabrication centre (Abilitymade, n.d.). Use of this technology enables more rapid device manufacturing via changes in the digital scanning, design and printing processes. The potential advantages offered by these kinds of innovative approaches could include increased production efficiency, reduced reliance on local workshops and increased opportunity to provide access for small or remote communities that are otherwise unserved. Such functionality, correctly implemented, also offers the potential to better enable hub and spoke and/or telehealth models of care in these communities.

Whilst these examples are in early stages of development and may not have an immediate impact on the Australian market, it represents new methods of innovation that have the

potential to revolutionise and transform how orthotic and prosthetic care is delivered. Caution does need to be given regarding the quality control risks which could be generated by the widespread 3D printing of devices. As designs are made available online for users to have 3D-printed professionally or at home using off-the-shelf 3D printers; clinical expertise may be compromised.

Whilst innovations like these have the potential to positively improve the services and workforce, there is also a potential risk of harm if new or untested products designed by those other than orthotists and prosthetists are used by patients. Stakeholders voiced concern over the emergence of such devices especially those without appropriate testing or fitting/manufacture by those without the appropriate qualifications. However, as the technology becomes more prevalent and the costs of production decline, the prospect of patients accessing lower quality devices – possibly sacrificing device quality for ease of access – will also rise.

5.1.3 Access to comprehensive data on the workforce and its demand drivers

Throughout the project, access to comprehensive data on the workforce was difficult to obtain. Identified data limitations include:

- ability to understand current and potential demand for orthotic and prosthetic services
- some population data, such as non-diabetic related amputations is not publicly available
- peer reviewed or grey literature supporting the workforce size and characteristics
- data supporting the accessibility and availability of services and workforce in rural and remote areas, including potential skill mix opportunities.

Challenges in the type and quantity of data available can pose barriers to the workforce and organisations readily quantifying challenges and evolving services. Improving literature on the workforce and orthotics and prosthetics in Australia generally would improve service provision overall.

5.1.4 Rural and remote service accessibility and availability

Accessing patients in need of care in rural and remote areas may be limited due to the geographical workforce distribution and availability of public services. Stakeholders reported that the workforce is weighed towards metropolitan areas with very few staff in areas outside of metropolitan centres with many districts not providing orthotic and prosthetic services. This presents a challenge for health districts to provide services locally in the community.

Given the small size of the orthotic and prosthetic workforce it is not realistic to expect service full coverage across rural, regional and remote areas of NSW. Current and emerging technologies (e.g. 3D printing, telehealth) are available which, while not necessarily precluding the need for a face to face assessment, can provide options to effectively augment clinician capacity and offer the potential to provide services to patients differently in the future (e.g. virtual follow-up outpatient clinics). The challenge will be for how the system incorporates these approaches and leverages them to enhance service provision by ensuring the valuable clinical resources are focused as much as possible on high value patient outcomes.

6 Opportunities Available to the Workforce

Throughout the course of the Project, several opportunities for the orthotic and prosthetic workforce were identified to be explored and developed in the future.

6.1.1 Service inclusion under Medicare

Orthotic services are currently not offered under Medicare. In early 2019, the MBS Review Taskforce recommended that orthotic services be included under this scheme. The opportunity to the workforce following inclusion of Medicare rebates for orthotic services would likely improve equitability and demand on services. It is also likely that General Clinicians would also be more inclined to refer patients knowing that out of pocket expenses were limited for their patients.

6.1.2 Satellite and Mobile Services

Mobile orthotic and prosthetic services may provide a solution to accessing sparse population centres in regional and remote NSW by delivering care as needed to smaller communities without permanent service offerings.

An example of mobile services is an orthotic and prosthetic clinic operating within Adelaide. This mobile van can provide clinical assessment, castings and fittings and repairs on devices. This is an example of how satellite services can improve accessibility for patients. Technological improvements mentioned later in the report, such as 3D scanning and central fabrication, may offer improved capacity for services to be delivered locally in community without the requirement of establishment of permanent of physical services.

A further example of mobile delivery is the Rural Simulation Training Program delivered by NSW Health - Health Education and Training Institute. This program allows medical and nursing clinicians to practice clinical skills in a mobile simulation lab which is specifically targeted at those working in rural and remote areas (Health Education and Training, 2019). Whilst this program is not currently providing education for orthotists and prosthetists, the concept and technology used could be expanded to enhance training for orthotists and prosthetists. There could also be consideration for cross-training within the technical assistant framework, to teach appropriate orthotist and prosthetist skills to other relevant professional groups, (e.g. diabetes nurses, orthopaedic surgeons, allied health assistants).

6.1.3 Central Fabrication Facilities

Central fabrication facilities provide custom remote manufacturing services for clinical orthotists and prosthetists. Central fabrication facilities act as a sole primary manufacturing point accepting requests from orthotists and prosthetists in the field. An orthotist and prosthetist use design software to design the device using specifications through 3D scanning or otherwise. This design file is then submitted to a central fabrication workshop where a facility technician carves a positive model using a computer-controlled lathe and returns the completed device to the orthotist and prosthetist (Sanders, Severance, Myers, & Ciol, 2011).

Central fabrication has a number of advantages over the traditional fabrication methods. The chief difference being that devices are produced more quickly and with less specialist technical involvement thereby releasing time for a prosthetist to deliver patient facing services.

One study reported up to a four-fold improvement in efficiency using Computer Aided Design and Manufacturing (CAD/CAM) via central fabrication over traditional manual methods (Sanders, Rogers, Sorenson, Lee, & Abrahamson, 2007). In addition, the prosthetist can utilise the most contemporary technologies without absorbing the costs of purchasing or maintaining the expensive fabrication equipment (Sanders, Rogers, Sorenson, Lee, &

Abrahamson, 2007). These efficiencies can be gained by opportunities pooling workforce into a central location as well as minimising equipment underutilisation loss that can occur across multiple sites.

There are limitations however, with one concern being the potential compromise in the quality of the final device. Inaccuracies in shape can be detrimental to the fit, comfort and overall compliance of a prosthetic device and necessitate refitting (Sanders, Rogers, Sorenson, Lee, & Abrahamson, 2007).

Central fabrication can be considered as a significant opportunity for the NSW Health system to improve efficiency and quality in orthotic and prosthetic services in NSW. Stakeholders implied that they believed that this was the future of fabrication and benefits included more effective sharing of resources across LHDs and improved learning and collaboration between clinicians. Implementing a state-wide model of central fabrication for NSW Health could also provide further benefits including:

- Increased resource efficiency via reduced equipment duplication and under-utilisation at multiple sites
- Pooling of talent and human resource to one location to better improve training and education and utilisation of human capital
- Provide mechanism for any existing or new satellite services to connect to fabrication services

A move to reconfigure the production process on the basis of state-wide central fabrication, offers the system the potential to realise significant economies of scale and reduce the cost of production. Furthermore, the model has potential to address inequity of service distribution across NSW, especially when combined with the latest telehealth/mobile video communication technology.

6.1.4 Telehealth and mobile health applications

Telehealth applications include video conferencing, teleconferencing and email (Victorian State Government Health & Human Services, 2018). Telehealth can deliver clinical reviews to people in rural and remote areas that may otherwise be limited by their location and/or costs of transportation to a metro area. These services are also appropriate for improving access to patients who are frail or people with disabilities (Allied Health Professionals Australia, 2017).

Allied Health Professionals Australia released a position statement encouraging the use of telehealth for patients unable to easily access allied health services (Allied Health Professionals Australia, 2017). The position states that telehealth is an effective alternative to direct treatment interventions and is effective at improving access to services. There are however disadvantages and barriers to effective telehealth roll out such as internet connectivity, the patient's ability to use telehealth facilities and government funding models (Allied Health Professionals Australia, 2017). Clearly the need for orthotists and prosthetists to make physical adjustments to patient's devices is a complicating factor for the use of telehealth by these disciplines. However, this fact does not preclude the modes' utility for other clinician-patient interactions.

The NSW Agency for Clinical Innovation supports and stresses the importance of using telehealth programs for Allied Health. This program supports the use of telehealth for care delivery for those in rural and remote areas in the form of enabling technology and model of care updates (NSW Health, 2019).

Alfred Health in Victoria for example, offer telehealth video conferencing for patients accessing outpatient clinics (AlfredHealth, n.d.). Patients can either attend their local GP or remain at home and access the service from AlfredHealth's website. If during the online consultation the professional recommends further intervention, these can be organised with a local provider.

6.1.5 Computer Aided Design and Manufacture

CAD/CAM software has been used to produce orthotics and prosthetics since the 1980s (Vorum, n.d.). This increasingly sophisticated software is streamlining and improving the efficiency and precision that devices can be made whilst reducing the need for labour intensive casting processes. CAD/CAM systems require heavy involvement of the orthotist and prosthetist. Their expertise guiding a number of potential steps in the process which including the initial stages of measurements prior to input into a program and the completion of final devices through manual lamination or formation over computer carved models (Smith & Burgess, 2001).

At present, orthotists and prosthetists utilising some degree of CAD/CAM systems can be reluctant to upgrade or expand their equipment and software due to lack of return in investment and therefore many adopt a hybrid of traditional and CAD/CAM model (Smith & Burgess, 2001; Sanders, Rogers, Sorenson, Lee, & Abrahamson, 2007). Stakeholders interviewed highlighted that though they considered that central fabrication is the most ideal mechanism for manufacturing of devices, it is not as widely adopted in Australia as it is in other countries such as the United States. As stakeholders repeatedly discussed the benefits of central fabrication, adoption of this type of model in Australia may be beneficial.

An example of CAD improvements is the evolution of 3D scanning. 3D scanning provides a simpler method for obtaining measurements for a CAD system in lieu of traditional foam and plaster moulding (Dombroski, Balsdon, & Froats, 2014). This study found that the use of 3D scanning provided clinically similar results than typical approaches, this could provide financial and workforce benefits if used for ongoing manufacturing.

A further development that was highlighted by stakeholders was the emergence of robotic, or bionic prosthetic limbs. Myoelectric prosthetic limbs, as an example, use microprocessors to understand signals from the nervous system and convert these signals into movement within the prosthetic limb using motors (Australian Academy of Science, n.d.). These limbs have developed significantly over time and are providing a more natural reaction than typical prosthetics. These technical developments will likely continue and impact on the range of skills prosthetists require in the future.

As technologies improve, particularly in the realm of 3D scanning, bionics, and automated manufacturing methods; clinicians will need to upskill in their capabilities adopting new CAD/CAM techniques, to confidently navigate the benefits and limitations of this technology (Sanders, Rogers, Sorenson, Lee, & Abrahamson, 2007). This technological shift may result in a shift in workforce requirements for ongoing delivery of orthotic and prosthetic care.

7 Appendix

7.1 Stakeholders engaged in the project

Name	Organisation
LHD Representatives	
Sayed Ahmed	St Vincent's Hospitals Network
Ruth Baker	Sydney Children's Speciality Health Network
Daniel Firth	Northern Sydney Local Health District
Jacqueline Ford	Sydney Children's Speciality Health Network
James Hui	Northern Sydney Local Health District
Tim Maclean	Central Coast Local Health District
Marnie Malcolm	Healthshare
Alan Miller	Sydney Local Health District
Timothy Mulling	South East Sydney Local Health District
Brett Nicholas	Sydney Children's Speciality Health Network and South Eastern Sydney Local Health District
Thomas Paine	Northern Sydney Local Health District
Harrison Vidler	South East Sydney Local Health District
Universities	
Sarah Anderson	La Trobe University
Professional Bodies and Other	
Leigh Clarke	AOPA

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