WHEELCHAIR PROJECT REPORT

A study into wheelchair options for Aboriginal people with disabilities in rural and remote communities

Independent Living Centre of WA
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1 Executive Summary

Background:
In May 2005 the Disability Services Commission (DSC) proposed a project to identify suitable wheelchair options for Aboriginal people with disabilities in rural and remote locations. The project was in response to longstanding issues recognised by the DSC Country Resource and Consultancy team, prescribing therapists and the disability sector around prescription and providing suitable solutions and outcomes for users.

The Independent Living Centre of WA (ILC) was funded to conduct the project on behalf of the Commission. The project examined the wheelchair options required to meet the functional needs of the clients, their appropriateness to the physical and cultural environment in which they are used and their compliance with the current and anticipated future requirements of the Therapeutic Goods Administration. The project report identifies service and maintenance issues and analyses the use of manual wheelchairs in rural and remote Aboriginal Communities, in order to recommend suitable wheelchair options to meet functional needs, physical environment and cultural requirements of Aboriginal people with disabilities.

The ILC convened and chaired a Steering Committee consisting of representatives from ILC, WA Country Health Services, DSC Country Resource Consultancy team, and DSC Service Purchasing and Development Directorate (Membership Appendix 9.2). All meetings included a videoconference link.

The project processes included consultation, research and problem solving with key clinicians, suppliers / manufacturers and consumers via focus groups, telephone, videoconferencing and site location visits. A range of identified wheelchair options was showcased to the Steering committee and selected suppliers. The project concentrates on the application of manual wheelchairs, as it was evident during initial consultations and data collection that these chairs provide the best overall outcomes for users.

Objectives:
1. To gather information via survey and consultation to determine the type and extent of difficulties experienced in relation to wheelchair provision and current prescription practises for Aboriginal people in rural and remote communities
2. To engage suppliers, manufacturers and steering committee members in problem solving wheelchairs and options that would improve function of wheelchairs used in rural and remote communities
3. To identify solutions to wheelchair prescription and maintenance to support users in rural and remote areas
4. Review of the Therapeutic Goods Act in relation to prescribing wheelchairs for people in rural and remote communities; and
5. To prepare and submit a report to DSC describing the process and outcome of the project.
The survey and consultation process and supplier forum identified the following factors as having a key role in the prescription and maintenance of wheelchairs in rural and remote areas.

- Clinician knowledge of suitable wheelchairs and options for environment
- Wheelchair selection and design suitability to the remote WA terrain and Aboriginal lifestyle
- Cultural considerations
- Access to wheelchairs for trial purpose
- Access to and standard of repair and maintenance services
- Knowledge of entitlements and equipment funding programs
- Coordination between agencies; and
- Transitory nature of allied health therapists, general service providers, clients and the general workforce

The discussion and possible solutions related to these factors are as follows;

1.1 Implications of the Therapeutic Goods Act
Details of all medical devices supplied in Australia must be registered with the Australian Register of Therapeutic Goods (ARTG).

Registration is required for;
- Suppliers of assistive equipment from a manufacturer
- When a medical device is assembled from off-the-shelf components, these components must be registered by the ARTG
- Manufacturers of refurbished assistive technology (see main text for definition page 12)

If the therapist is manufacturing custom made devices then he, she or their employer does not have to be registered with the TGA as a manufacturer. Alternatively if that therapist is manufacturing custom made devices they have to be registered as a custom manufacturer.

1.2 Cultural consideration in wheelchair prescription

There are many contributing issues faced by Aboriginal people in accessing disability support services. When undertaking a clinical assessment of a wheelchair user’s performance in Aboriginal communities, all factors that influence wheelchair mobility must be carefully considered and recognized as having a potentially significant impact on wheelchair provision. These factors include the client’s profile, the environment, daily activities and social roles and language/literacy when it comes to the assessment and training of use of a wheelchair.

The following possible solutions would improve the quality and services to these communities;

Possible Solutions

- Improve the retention of staff through cultural awareness training to allied health, community services and other relevant service providers; and increase Aboriginal staffing levels in communities to ensure service provision is culturally relevant
- Ensure prescribing therapists base assessment around client need not perceived funding options
- Train local people as therapy assistants to support the treatment programs advised by the therapist
- Develop culturally appropriate information on the use and maintenance of equipment; and
- Encourage service providers and government officials responsible for Aboriginal housing to design and modify housing to meet accessibility standards.
1.3 Common wheelchair design, selection and failures
The project did not identify one specific wheelchair to meet user requirements. This is due to the wide range of abilities and needs of clients, the variety of wheelchair options on the market that suit their personal needs and the type of terrains/environments the wheelchair will need to access. The project was able to identify various wheelchairs and options that may suit different client’s requirements. These are presented in a wheelchair matrix designed to assist therapists in the selection and prescription of suitable wheelchairs. (Appendix 9.3)

**Brakes**
The brake assembly becomes loose due to being engaged and disengaged many times during the day, combined with wheelchair frame movement over rough terrain.

**Possible Solutions**
- Provide training for user/carer on maintenance of the brake assembly
- Implement initiatives to increase local supplies of spare parts; and
- Reinforce the need for good tyre maintenance to achieve optimal brake function

**Tyres**
Due to the harsh and varied terrain, tyres were reported as having the second greatest failure rate in the survey. Pneumatic tyres whilst being the most popular choice require the highest degree of maintenance due to an increased probability of incurring flat tyres if a fair proportion of time is spent outdoors. Tyres are available in different tread designs and widths to accommodate most terrains, as well as the users’ mobility needs. For Outdoor all terrain, a wider tyre with a medium knobbly tread will provide better traction on rough surfaces. Refer to the Wheelchair Design Matrix Appendix 9.3 for detailed options.

**Possible Solutions**
- There are special tread designs and widths available for traversing over dirt, sand and grass.
- Consider BMX tyres, Slick Offsider, Real fats; and
- Another option is to use a tyre sealant (a fluid or foam product see appendix 9.3) designed to seal punctures in the inner tread of a pneumatic tyre.

**Castors**
Castors range in size from 5cm to 20cm. Castor assemblies have been known to break and twist with frontal impact from running into curbs or obstacles.

**Possible Solutions**
The larger 15cm (6 inch) and 20cm (8 inch) castor provide greater ease of movement when wheeling over changes in surface height; and
- This area requires further investigation into suitable castor assembly materials and design.

**Spokes**
The most common spokes used on everyday use wheelchair are aluminium, stainless steel and wire spokes. These can demand more maintenance in harsh terrain in contrast to Mags’, which require less maintenance.

**Possible Solution**
Spoke wheels are available at lower cost to MAG wheels but require more maintenance. Where funding allows MAG wheels should be considered; and
- Spoke protectors are recommended as a protection during impact and provide protection to users’ fingers
Footplates
The loss of footplates is a common problem resulting in damage to feet, and poor maintenance of good posture.

Possible Solutions
Foot hangers attached to the main frame, with swing away or flip up footplates for transfers are a preferred option; and
Footplates made of plastic to prevent burning of desensitised feet

Upholstery
In remote areas upholstery needs to withstand daily use in all kinds of conditions.

Possible Solutions
Discussion of the individual's requirements with the supplier is recommended pre prescription; and
Sail cloth upholstery offers a more durable option for consideration than other materials as it remains cool in hot climates and is easy to clean.

Rigid frame or folding wheelchairs
Due to weight, design, and fewer moving parts, the performance of a rigid wheelchair is usually better than a folding wheelchair in harsh environmental conditions. This difference may become even more noticeable as the wheelchair ages. The choice between rigid frame and folding is dependent upon the client’s life style and the importance of ease of transportability.

Possible Solutions
Wheelchair Design Matrix to be used as an information resource for therapists prescribing for clients living in rural and remote locations
Remote and metropolitan based therapists to be offered training in wheelchair prescription for people living in rural and remote locations
Increase the use and prescription of rigid wheelchairs in rural and remote locations
Suppliers to provide greater opportunity for therapist and users to trial rigid frame chairs in remote locations
Use of wheelchair maintenance checklist (Appendix 9.4); and
Access the Independent Living Centre of WA as a resource for assistive equipment information specific to use in rural and remote locations

1.4 Service Maintenance Issues
The lack of resources is a major issue due to lack of or no maintenance services resulting in long delays for equipment and supplies.

Possible Solutions
The identification of local maintenance resource people in each regional area (e.g. personnel in bike shops, car wheel fitters)
Provide employment and training in the local communities on wheelchair maintenance
Increase the prescription of wheelchairs with standard features in rural and remote areas
Develop a maintenance check program for distribution with new wheelchairs
Provide information in the maintenance check program in different formats to support aboriginal people to use the program as a tool to assist in carrying out wheelchair maintenance i.e. stories, images, ideas; and
Consider the merit of introducing a Planned Preventive Maintenance Service
Spare parts
There is insufficient access to spare parts for wheelchairs and not enough local maintenance services to fit these parts.

Possible Solutions
Additional spare parts such as armrest, footplates, bolts, and upholstery to be supplied with each wheelchair purchased for a remote location; and
Identification of facilities for storage of spare parts, possibly the Local Area Coordinator LAC or HACC coordinator
Additional funding of “backup” wheelchairs in local hospitals and clinics to cover periods of time when a wheelchair is sent to Perth for repairs and a temporary replacement is essential.

1.5 Further related Issues, funding and research

Perception of grant funding guidelines
The project identified a variable level of understanding of the CAEP funding programme amongst clinicians, service providers and wheelchair users.

Possible Solutions
Evaluate the knowledge base of CAEP prescribers in regard to prescribing suitable wheelchairs for rural and remote locations.
Develop a communications strategy to inform suppliers and CAEP prescribers that higher cost wheelchair options suited to rural and remote environments may be eligible for CAEP funding
Increase the level of knowledge about equipment funding schemes for University undergraduates and new graduates; and
Increase the knowledge of service providers about CAEP guidelines around applications that exceed the CAEP ceiling which may be put forward to the CAEP Clinical Sub Committee

Wheelchair Trials and hire
There is a provision within the CAEP program to trial or hire a replacement wheelchair but remote locations face multiple difficulties in accessing this service.

Possible Solutions
Manufacturers and suppliers to be encouraged to undertake research in remote areas and set up trials to establish the preferred choice of wheelchair design and options on the chair when used in harsh environments
Increase knowledge and understanding of capacity for CAEP to fund trials of wheelchairs in rural and remote areas
Explore options with manufacturers and suppliers to be able to provide standardised wheelchairs appropriate for trial in remote and rural communities; and
Explore options for increasing the availability of short term replacement chairs in rural and remote locations

1.6 Conclusion
In summary what must be kept in mind and considered first is the need of the end user in order that the most appropriate model of wheelchair that meets their specific needs can be provided.
A positive outcome of this project would be that the possible solutions outlined within the report will be put into place. These have the potential to radically improve the mobility and functional independence for a wheelchair user living with a disability in remote and rural Aboriginal communities.
2 Introduction

"Give me a wheelchair that is light and compact, that fits in a small plane when I need to fly out in the wet season. Make sure it's comfortable, does not give me pressure sores, to make me look like a cripple straight out of hospital. It has to be easy to push because I want to get out, go crabbing in the boat and go fishing on the beach." (Hales S 2001) This quotation describes the needs of a wheelchair user in an Aboriginal community.

There have been advances in the materials used and design of manual wheelchairs. To date there is no specific reference materials to identify preferred features or options when prescribing for individuals who may require their wheelchair to cope with extremes in conditions and use.

A report by Stephen Hales of the Independent Living Centre of Queensland in 2001 assessed the use of the world made 3-wheel rural wheelchair as a possible option for use in rural and remote areas of Australia. (Hales S, 2003) However some limitations of this option were identified; the inability to transport people in the chairs, difficulties with transfers and insufficient orders to achieve a low cost option. It is clear from survey questionnaire responses and discussion with clinicians and manufacturers, that investigating a modular wheelchair option will not provide a viable solution for Western Australia. A preference was expressed by the steering committee and suppliers who attended the supplier’s forum in January 2006, for modification of existing products to fit the needs of the clients in Aboriginal communities. The alternative of producing a new chair for use in remote locations would be a costly option. As with all wheelchair users each client has individual needs and the right to live as normal a life as possible within their home environment.

This project brings together all the factors likely to influence manual wheelchair choice in remote and rural Aboriginal communities. The Disability Services Commission (DSC) has given support to seeking solutions to address the presenting issues by initiating and funding this project. The DSC Steering Committee representatives have clearly stated that solutions are being sought irrespective of cost.

The factors identified through discussion at the steering committee meetings and results of the survey are;

• Clinician knowledge of suitable wheelchairs and options for environment
• Wheelchair selection and design suitability to the remote WA terrain and Aboriginal life style
• Access to wheelchairs for trial purpose
• Access to and standard of repair and maintenance services
• Knowledge of entitlements and equipment funding programs
• Coordination between agencies; and
• Transitory nature of allied health therapist, general service providers, clients and the general workforce

Considering the above factors, the project sets out to identify wheelchair choices, options, adaptations and recommendations to assist in the prescription and maintenance of wheelchairs in these remote locations.
Objectives:
1. To gather information via survey and consultation to determine the type and extent of difficulties experienced in relation to wheelchair provision and current prescription practises for Aboriginal people in rural and remote communities
2. To engage suppliers, manufacturers and steering committee members in problem solving wheelchairs and options that would improve function of wheelchairs used in rural and remote communities
3. To identify solutions to wheelchair prescription and maintenance to support users in rural and remote areas
4. Review of the Therapeutic Goods Act in relation to prescribing wheelchairs for people in rural and remote communities; and
5. To prepare and submit a report to DSC describing the process and outcome of the project.

Methodology
A range of different data collection methods were involved in informing the project. The outcomes of the report are based on data obtained from the following gathering processes;

- Product review
- Questionnaire surveys of clinicians and users in remote and rural location in WA
- Face to face interviews with wheelchair users in a sample target sample area
- Manufacturers and supplier forum
- Location visit

Individual consultation with Suppliers and Clinicians.

A Steering Committee was established at the commencement of the project to provide guidance and direction. Representatives were drawn from the ILC, WA Country Health Services, DSC Country Resource Consultancy team, and DSC Service Purchasing and Development Directorate (Membership Appendix 9.2). The Committee met four times during the project life span utilising videoconferencing to facilitate input from representatives in regional locations. During one session a showcase of wheelchairs that may provide solutions was presented to the Committee members.

A Suppliers Forum was held to engage participants in problem solving wheelchair prescription and maintenance issues and solutions. Six WA suppliers and manufacturers participated.
3 Demographic and Aboriginal Health Figures

To understand the need for services the following sections demonstrates the current demographic status and the prevalence rates of profound or severe core activity limitations in the Aboriginal population. The current demographic status reports that there are an estimated 460,000 Aboriginal people living in Australia, of these an estimated 66,000 live in Western Australia.

FIGURE 1: CENSUS INDIGENOUS POPULATION COUNT BETWEEN 1996 AND 2001
SOURCE: AUSTRALIAN BUREAU OF STATISTICS 2003

A study in 2002 provides, for the first time, information on the prevalence of disability in the Aboriginal population. In 2002, 36% of Aboriginal people aged 15 years or over had a disability or long-term health condition, including 8% with a profound or severe core activity limitation, meaning that they always or sometimes needed assistance with core activities of daily living (self-care, mobility and communication).

THE HEALTH AND WELFARE OF AUSTRALIA’S ABORIGINAL AND TORRES STRAIT ISLANDER PEOPLES 4704.0.2005
Statistics as shown indicate that the prevalence rates of profound or severe core activity limitations in the Aboriginal and non-Aboriginal population is significantly higher for Aboriginal than non-Aboriginal people. In the middle age group of 45-54 years the prevalence of profound and severe core activity limitations was as high as that among non-Aboriginal people aged 65 years and over.

The earlier onset of disability or long-term health condition with a profound or severe core activity limitation indicates the comparatively higher need for service provision for Aboriginal people with a disability at younger ages than for non-aboriginal people. This includes assistive equipment such as wheelchairs, thereby increasing the need for assistive equipment in the future for Aboriginal people.

Service provision in rural and remote Australia

One of the most urbanized populations in the world is in Australia, with approximately 70% of people living in capital cities or major metropolitan areas. Of the remaining 30%, about 45% live in regional cities or large country or coastal towns and surrounding agricultural areas. A further 45% live in small country or coastal towns and their surrounding agricultural areas, and about 10% live in remote areas. (Australian Institute of Health and Welfare, 2002).

The development of the Rural, Remote and Metropolitan (RRMA) classification, in 1994, interprets the distinction between rural and remote areas using ‘distance and personal distance factors’. This is related to the geographic distance from an urban centre of a population of 10,000 and the ‘remoteness’ of the average distance of residents from one another. (Australian Institute of Health and Welfare, 2004).

Health needs of rural communities is limited and inconclusive, however there is sufficient data to indicate that health status and healthcare issues differ due to geographic locations and the diverse nature of the rural environment and the type of rural health service available. (Humphreys J, 1998)

Aboriginal and non-Aboriginal people living with in rural and remote locations faced the same problems of poor access to health services and health care information. Due to the low socioeconomic status of Aboriginal people this adds to the problems of health care access; the major facts being

- Problems of access to care due to geographic isolation and lack of funds to cover the travel costs
- Shortage of health care services and providers
- Language and literacy barriers
- Lack of understanding on Aboriginal health needs; and
- Poor road quality for access (White C., 2003)
4 Current Therapeutic Goods Act requirements in relation to prescribing wheelchairs

Details of all medical devices supplied in Australia must be registered with the Australian Register of Therapeutic Goods (ARTG). Medical devices are classified into one of five classes, generally 99% of assistive technology (AT) falls under Class 1. Changes to the Act were implemented in October 2004 and in the lead up to the change in legislation, the TGA became aware of the extent and diversity of assistive technology devices that fit into Class I medical devices.

There continues to be confusion and misconception regarding the Therapeutic Goods Administration (TGA) medical Devices Act and regulations and how it affects clinical practise. A moratorium on equipment for people with disabilities remains in place until a suitable exclusion definition can be found to exclude those medical devices that, if they fail, are not likely to cause injury. Typical examples of such AT devices are modified eating utensils for arthritis sufferers and ACC devices.

To help in condensing the often confusing and complex TGA legislation the following information covers some points that may affect clinical practice with regards to wheelchair prescription.

Who has to be registered (Therapist, Services Providers & Employers)

- Manufacture who produce assistive technology equipment require registration with the TGA
- Suppliers of assistive equipment to be registered on the ARTG
- Manufacturers of Customised Devices - when a medical device is manufactured from off the shelf components used for the assemble of a medical device, these components must be registered by the ARTG
- Manufacturers of Refurbished assistive technology equipment that can involve the following actions:
  a) Stripping the device into component parts or sub-assemblies
  b) Checking parts of the device for suitability for reuse
  c) Replacing component parts or sub-assemblies of the device that are not suitable for reuse
  d) Assembling reclaimed or replacement component parts or sub-assemblies of the device or another used device
  e) Testing a reassembled device against the specifications of the original device or, if the manufacturer has revised those specifications, the revised specifications; and
  f) Identifying an assembled device as a refurbished device

Do not require registration

- Custom made devices- therapist manufactured assistive technology solutions from materials and/or components which may or may not be intended to be used as a medical device and are not listed in the ARTG.

To explain the difference between customised devices and custom made devices the following example is given using the installation of a seating system as a guide to when registration is required.

- If a therapist installs a system that is intended to be used as a seating system, for example Jay back and Jay seat cushion with adductor wedges and various other bits and pieces, the therapist does not need to register with the TGA for anything; and
- If the therapist installs a seating system manufactured from materials such as foam, plywood, plastics, metal bar etc, the therapist or his or her or their employer must be registered with the TGA as a custom manufacturer. Note that the materials used in construction of the seating system are not intended to be used in a medical device.

Details on TGA registration information is available on line www.tgasime.health.gov.au The TGA and Novitatech websites offer useful resource information. (see section 8 Reference page)
5 Data Collection & Consultation Results

5.1 Survey Questionnaire
The questionnaire gathered information on (See Appendix 9.1 for copy of questionnaire).

- Number of manual wheelchairs provided to users in various regions of WA
- Most common manufacturer of wheelchairs
- Adaptations made to wheelchairs specifically for rural and remote locations
- Main causes of wheelchair break down
- The average service time
- Location of local suppliers and maintenance support
- Information on the environment/locations where the wheelchairs are being used
- Availability of organisations to provide wheelchair maintenance in the location; and
- Availability of wheelchair maintenance training in the location

Eighty (80) questionnaires were sent out via mail and email and a total of 12 surveys were received from providers in 3 regions of WA. Of the respondents, 10 were clinicians (e.g., physical therapists, occupational therapists), and 2 were wheelchair users, representing a variety of geographic locations and types of manual wheelchair used. In addition 6 wheelchair users completed the same questionnaire during face-to-face interviews conducted in the Kimberley region. The results are drawn from the 18 completed questionnaires.

5.2 Wheelchair Distribution in Western Australia
There was insufficient feedback in the questionnaire survey on the number of wheelchairs currently used in Western Australia. Therefore additional statistical information was provided by Royal Perth Hospital (RPH) to identify the number of wheelchair users in remote and rural areas of Western Australia. The data refers to only wheelchair supplied by the Royal Perth Hospital and does not separately identify Aboriginal wheelchair users.

FIGURE 3: DISTRIBUTION OF WHEELCHAIRS IN WESTERN AUSTRALIA
SOURCE: ROYAL PERTH HOSPITAL 2006
THE STATISTICS WERE COMPILED ON 14/2/06 FROM AN EXTRACT FROM ROYAL PERTH DATABASE AND REPRESENTS ALL OF THE WHEELCHAIR SUPPLY AND SERVICE IN WA THAT WERE ON PERMANENT OR TEMPORARY LOAN TO PATIENTS.
This current demographic status summarizes the growing trends of mobility aid users in terms that can be used by policy makers to identifying current and/or future needs of this user group. Growth in the number of users is likely due to changing social and technological trends, such as new design of mobility aids, improved access to these devices, social acceptance and the increase of disability within the Aboriginal population due to a rise in diabetes and other chronic diseases (Le Plante. 2000) (The Health & Welfare of Australia’s Aboriginal & Torres Strait Islander People, 2005) The effects of the growth in the Aboriginal population on the use of wheeled mobility devices is uncertain due, in part, to limitations in the current national survey data available.

Researching statistical information on the numbers of wheelchairs being used in rural and remote locations is difficult. Improved access to this information would benefit further development of services in this area. This may be achieved by the collection of resource allocation data that determines the type of wheeled mobility devices required, locations and the provision of services. This should lead to improve the quality and detail of the information available related to the frequency and severity of impairments and the utilization of assistive technologies and maintenance services within Aboriginal communities. The DSC business management tool E-CAEP may assist in improving collection of data in the future.

5.3 Distribution by Manufacturers and Suppliers of Wheelchairs in WA

It proved difficult to gather accurate data indicating the manufacturers and suppliers of wheelchairs to individuals in rural and remote areas. The information presented in figure 4 is drawn from the eighteen completed questionnaires and information supplied by DSC in respect to the CAEP program, totalling approximately 150 wheelchairs. Figure 4 below shows the main manufacturers and suppliers of wheelchairs used in regional WA. The manufacturer/supplier and type of chair in order of prevalence are listed below based on the eighteen questionnaire results.

GLIDE: Glide Bush Ranger, Glide G2 and G3 range
AUSTRALIAN MOBILITY EQUIPMENT: Otto Bock Start,
SUNRISE MEDICAL: Quickie Wheelchair range
INVACARE: Tracer Wheelchair

FIGURE 4: DISTRIBUTION BY MANUFACTURERS AND SUPPLIERS IN WA

The fact that Glide is a local supplier may contribute to the accessibility of their product and parts and customization of their product occurring in an efficient manner and this may impact on the above.
5.4 Important features on the wheelchair in rural and remote locations in order of preference requested by clinicians and users

- Solid BMX tyres
- Large front castors
- Least amount of movable parts
- Spare parts available for local suppliers/bike shops
- Re-tensioning back and seat upholstery
- Interchangeable parts
- Plastic or composite spokes
- Stronger breathable upholstery (Sail cloth/breezeway); and
- Neutral or no colour

5.5 Reported general failure of wheelchair parts

Figure 5 below, based on the eighteen questionnaire results, shows the major failures users are experiencing with their wheelchairs. The data is drawn from the completed questionnaires with some clinicians reporting on their experience with a number of wheelchairs. The frequency of reported failure of mechanism is distributed across all mechanisms, with brakes reported as having the highest incidence of failure.

FIGURE 5: FAILURE MODE
5.6 **Provision of wheelchair maintenance**

The three regions represented in the 18 survey questionnaires reported accessing maintenance services through the following outlets.

- Local bike shops
- Seat clinic in Darwin and Alice Springs
- Manufacturers and suppliers in Perth; and
- Local Health service maintenance departments

**FIGURE 6: MAINTENANCE FACILITIES MODE**

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5.7 **Maintenance Service Delivery Time**

This was very dependent on a number of factors.

- Availability of spare parts
- Location in which the clients are living (transport distance); and
- Complexity of the repair

The survey results reported that:

- Therapists reported that general simplistic repairs to tyres and brakes took 1-2 weeks
- Therapists reported more complex repairs would take up to 2 months
- Therapist reported a year for repairs on a wheelchair
- Service delivery time was influenced by geographical distance to Perth for the repairs

5.8 **Description of the environment**

The physical environment in some areas can present a greater challenge to people who use manual wheelchairs or have mobility impairment generally. Not all roads are sealed and can be deeply corrugated causing great difficulties for those using wheelchairs. In the wet season the roads are often flooded and boggy, making moving around the community difficult. Few people have cars and public transport is limited. The climate of extreme heat, humidity and cold, dust and wet weather is hard wearing on the material and construction of a chair. Due to this variability in climate and oceanic conditions there is difficulty in having design features on a chair that suit all environments, and considerations during prescription of a chair needs to take into account all environmental factors that are encountered in the user’s home environment (as defined according to CAEP guidelines) which may include a variety of terrains, inaccessible buildings etc. Housing available in remote locations varies greatly in regard to quality and accessibility, both impacting upon the manoeuvrability of the wheelchair within the home setting.
**Viewing of relevant wheelchairs**

The steering committee held one meeting specifically to view a range of wheelchairs that may provide solutions to suitability and use in rural and remote locations.

The following range of wheelchairs were viewed
- Bush ranger - Glide
- Invacare 9000
- Quickie 2 and RGK
- Bush Wheelchair from TADWA
- Third world wheelchair from “Wheelchair for kids”; and
- Tracer (Indomed) Heavy duty chair

The consensus of the committee members were that all the above chairs with the exception of the third world wheelchair were a suitable option for use in rural and remote locations. However all would benefit from different wheel and upholstery options as well as a reduction in moving parts such as fixed footplates. A significant area of concern that was raised during the discussion was the very limited access to maintenances services, the cost of the maintenance service and the delays in accessing new or replacement wheelchairs.

**5.9 Suppliers Forum**

Selected suppliers / manufacturers and a consumer representative were invited to join with the Steering committee membership to participate in a two hour focus group held at the ILC on the 25th January 2006. Six suppliers accepted the invitation. (For list of participants refer to section 9.2) These suppliers provide wheelchairs to the Aboriginal communities and have knowledge of difficulties and maintenances issues of equipment used in these remote areas.

The main focus of the forum was a presentation of the project outline and opportunity to address the major issues identified in the survey and consultation process. A new wheel design was demonstrated by TADWA.

The main points raised by participants were;
- Suppliers reported rarely receiving feedback from users and or prescribers
- There are higher costs are associated with some preferred wheelchair options e.g. Kevlar tyres
- The CAEP principal of basic and essential should not limit choice. The DSC body is seeking solutions that will improve wheelchair provision in rural and remote areas irrespective of cost limitations
- Comments from suppliers and therapists indicated that there is a higher turnover of wheelchairs by users in rural and remote locations in contrast to Metropolitan areas
- Regional areas require better after sales support, service and maintenance (trained staff, tool kits, spare parts, temporary replacement chairs). Transportation can also significantly impact on the provision of service and maintenance
- Electric wheelchairs are returned to suppliers for repair; and
- Warranty conditions can affect where and how service and maintenance is provided

There was a strong commitment expressed by the participating suppliers to resolve the identified issues.
6 Discussion and Possible Solutions

The five main themes identified from the survey, interviews and the suppliers’ forum were;
- Cultural considerations
- Wheelchair design, selection and failure
- Service and maintenance issues
- Therapeutic Goods Act in relation to prescribing equipment; and
- Further related issues, funding and research

6.1 Cultural consideration in wheelchair prescription

When undertaking a clinical assessment of a wheelchair user’s performance in Aboriginal communities, all categories that influence wheelchair mobility must be considered. These factors are;
- Clients profile
- The environment
- Daily activities and social roles; and
- Language/literacy

Client's Profile

The main factors that influence user use of assistive equipment are: - the user’s medical and physical profile, personality, attitude and temperament, socio-cultural relations and spirituality. (Routhier, Vincent, Desrosiers & Nadeau, 2003).

The medical and physical needs include, the individual's age, the nature of their disability, their general physical state, the body measurements of the user and the individuals perception of their disability. Disability is often perceived in a different way by Aboriginal people to non-Aboriginals. For example; during the face-to-face interviews with wheelchair users and health workers in the Kimberley region, it was evident that people were more willing to talk about disabilities in general than to specifically address their personal problems. There seems to be an element of shame attached to the word ‘disabled’. It has been noted that to approach the subject of a disability with a person is difficult for fear of insulting them. (O'Neil 1994)

There are a number of personal attitudes that can affect the use of assistive equipment; the main factors being cognitive function, motivation, pride, adaptation, understanding, behaviour and body image. These psychosocial factors are linked to cultural issues. To gain a greater understanding of the socio-cultural and spiritual characteristics of Aboriginal peoples’ attitudes and values within a community, an assessment needs to include family and community relationships, recognize the heterogeneity of Aboriginal communities and how each community perceives the term ‘disability’, as well as understand the local and social issues of that community. (Routhier, Vincent, Desrosiers & Nadeau, 2003).

Aboriginal families may not as readily recognize that a person has a disability or the way in which support and services could assist in fostering health, skill development and independence. Disabilities are not emphasized and there is natural inclusion of people with a disability in community life (Disability Services Commission, April 2006)
Environment

Due to limited access to therapy and other relevant services there is a lack of appropriate assistive equipment and limited access to home modification in many remote areas; this can impact on the use and performance of equipment, such as a wheelchair. For example, a wheelchair being used as a shower chair shortens the life span of the chair. A client-centred approach is recommended when assessing the ability of the clients inside and outside the home, assessing the architectural barriers, daily activities, social roles as well as the landscape. A number of Aboriginal people in remote locations are living in severe poverty, in overcrowded homes. Many homes are inaccessible for a wheelchair user, door width 600mm or less, no ramp access and tight space in the bathrooms. Outside there are limited pathways and the main access route is over rutted and untreated driveways.

CAEP does specify that equipment be for ‘in home use’; but acknowledges the definitions of ‘home’ within an Aboriginal community can includes indoor and areas.

Daily Activities and Social Roles

Including a functional task-oriented approach to assessment covering personal care, domestic activities, community life, school, work and leisure will emphasis the users’ requirements in terms of mobility in different settings. User mobility requirements may differ in remote Aboriginal communities in contrast to wheelchair users in regional and urban settings.

Language/literacy – assessment and training

English may be the second, third or even fourth language for many Aboriginal people, especially in the older Aboriginal population. Language barriers impact on the assessment, provision of information and training process.

Literacy levels are likely to vary amongst the user group and need consideration when issuing leaflets and information provided by service providers. Information about using and maintaining equipment needs to be available in different formats to meet the needs of the user and their family.

Possible Solutions

- Improve the retention of staff through cultural awareness training to allied health, community services and other relevant service providers; and increase Aboriginal staffing levels in communities
- Ensure prescribing therapists base assessment around user need not perceived funding options
- Train local people as therapy assistants to support the treatment programs advised by the therapist
- Develop culturally appropriate information on the use and maintenance of equipment; and
- Encourage service providers and government officials responsible for Aboriginal housing to design and modify housing to meet accessibility standards.
6.2 Wheelchair design, selection and failures

The project did not identify one specific wheelchair to meet user requirements. This is due to the wide range of abilities and needs of user, the variety of wheelchair options on the market that suit their personal needs and the type of terrains/environments the wheelchair will need to access. The project was able to identify various wheelchairs and options that may suit different user requirements. These are presented in a wheelchair matrix designed to assist therapists in the selection and prescription of suitable wheelchairs. (Appendix 9.3)

The common wheelchair design failures reported in the survey were brakes, tyres, footplates, castors, and upholstery.

6.2.1 Brakes

The survey findings and locations visit, reported that the greatest failure rate on the wheelchair is the brake assembly. The brake assembly becomes loose due to being engaged and disengaged many times during the day, combined with wheelchair frame movement over rough terrain. As the tyres soften, the brakes become less efficient. If brakes are applied to a soft tyre they are not going to make a firm enough contact to brake the chair effectively.

Possible solution

- Provide training for user/carer on maintenance of the brake assembly
- Implement initiatives to increase local supplies of spare parts; and
- Reinforce the need for good tyre maintenance to achieve optimal brake function

FIGURE 6: WHEELCHAIR BRAKE ASSEMBLY

Source: Photograph of a brake assembly that is being held together by a cloth due to missing bolts and inefficient contact on the soft worn tyre. From a user’s chair in a remote location in WA
6.2.2 Tyres

Due to the harsh and varied terrain and lack of maintenance, tyres have the second highest failure rate. An example of impact of environmental wear and tear is shown in Figure 7.

FIGURE 7: WHEELCHAIR TYRE
SOURCE: PHOTOGRAPH OF A TYRE FROM A USERS WHEELCHAIR IN A REMOTE AREA OF WA

6.2.2.a Pneumatic Tyres

While pneumatic tyres are the most popular kind, they require the highest degree of maintenance. This is because the air insert consists of a thin liner that can be easily punctured by thorns, nails or other sharp objects that penetrate through the tyre. Higher performance can be gained by using a Kevlar® (material used to make bullet proof vests) tyre with a high-pressure tube. It is generally acknowledged that with pneumatic tyres there is increased probability of incurring flat-tyres especially if considerable time is spent outdoors. Pneumatic tyres are widely used on most manual wheelchairs because they are generally lighter, relatively easy to replace, shock absorbing and offer good traction on most terrains.

In remote locations there is a lack of tools to repair or pump up tyres. This issue needs addressing to support the use of pneumatic tyres in remote areas.

6.2.2.b Puncture-Proof Tyres

These are made of rubber or plastic (usually polyurethane). The rubber puncture-proof tyres are similar to the pneumatic kind, but the inner tube consists of a solid material such as foam, plastic or rubber. These tyres are essentially flat free and require less maintenance then the pneumatic rubber tyres. However, a single solid insert is generally heavier by an average of 1.5 times that of a single pneumatic insert. While this doesn’t seem like very much, this additional weight can have a significant impact when it comes to transporting and propelling the wheelchair. They are also stiffer (not as shock-absorbing) and tend not to grip the ground as well. These features may adversely affect the performance of the wheelchair in remote outdoors conditions, where it is common to travel up and down inclined surfaces and/or over rough and/or rocky terrain.

Replacing a solid insert can be very difficult to do and the correct tools are required to complete the task.
6.2.2.c Solid plastic puncture-proof tyres (no inserts)
These tyres are generally the least expensive but are also low performance, greatly reducing comfort; and can become damaged easily. Solid plastic tyres are commonly found on depot (hospital) wheelchairs that are designed for indoor usage.

New technologies have enabled puncture-proof tyres to become more lightweight and comfortable for the user while still providing for longer wear times. These tyres typically are constructed of a semi-pneumatic foam and/or rubber combination and come in various tread designs and sizes.

6.2.2.d Tyre Treads
Tyres are available in many different tread designs and widths to accommodate almost any type of terrain, as well as the users’ mobility needs. For outdoors all terrain, a wider tyre with a medium knobby tread is more appropriate so that there is better traction on rough surfaces. For sandy conditions slicks are a tyre option to consider. Prescribing Therapists to refer to Wheelchair Matrix Appendix 9.3 for options.

**FIGURE 8: SOME EXAMPLES OF TYRE CHOICES**

**REAL FATS** – these 4.25” (10cm) wide tyres come in handy for extreme off road / sandy conditions. They have thorn proof motorbike tubes. They can be made available in:

- 20” diameter
- 20mm / 12mm axles
- Quick release or fixed
- Push rim / no push rims
- Disc brake / swing brakes

**SLICK OFFROADERS** – these 3” (7.5cm) wide thick wall tyres, have thorn proof thick wall mountain bike tubes. They are available with:

- 20” / 24” diameter
- 20mm / 12mm axles
- Quick release or fixed
- Push rim / no push rims
- Disc brake / swing brakes

**Possible solutions**
- There are special tread designs and widths available for traversing over dirt, sand and grass. Consider BMX tyres, Slick Offsider, Real fats; and
- Another option is to use a tyre sealant (a fluid or foam product see appendix 9.3) designed to seal punctures in the inner tread of a pneumatic tyre.
6.2.3 Casters

Smaller castors provide for greater foot clearance, agility and are less prone to castor flutter, but are more apt to get stuck in bumps or cause forward falls. The smallest castors available for manual wheelchairs are approximately 5cm (2inch) in diameter. Castors are found to be as large as 20cm (8inch) in wheelchairs designed for daily use. The larger castors can provide the user with more security since they wheel over changes in surface height more easily. Castors can be either pneumatic or solid (usually made of polyurethane). The polyurethane castors are durable but don’t offer as much comfort as the pneumatic castors. (Axelson, Milkel & Chisney 1998)

Various factors such as the wheelchair and occupants weight can affect the loads applied to castors. There have been various studies in this area where castor function has been evaluated in static, impact and fatigue strength tests. Most castor assemblies can withstand these strength tests, but castor assemblies have been known to brake and twist with frontal impact from running into curbs or obstacles during fatigue testing. (Bertocci, Esteireiro, Cooper,Young & Thomas 1999)

Castors are generally connected to the frame by bolts or welds. This area can be a common failure point due to the forces and pressures directed to this area with every day use. (Rentschler & Rory 1999). One of the maintenance issues reported in the survey and through interviews with wheelchair users was the damage to the pintle in the castor assembly, either bending or breaking. This resulted in the alignment of the wheelchair being altered increasing the difficulty in self propulsion. The harsh conditions, how the wheelchair is used and inappropriate prescription can greatly affect the reliability of these castor assemblies. This area may benefit from further investigation into suitable castor assembly materials and design.

**FIGURE 9: CASTOR FORKS CAN BECOME BENT OR FRACTURED**

*Source: Photograph of a castor assembly from a user’s wheelchair in remote location in WA*

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**Possible solutions**

- The larger 15cm (6 inch) and 20cm (8 inch) castor provide greater ease of movement when wheeling over changes in surface height.
- Further investigation into suitable castor assembly materials and design
6.2.4 Spokes and MAGs
Spokes can consist of thin steel, carbon or stainless steel wires. They are common in wheelchairs designed for everyday use and multi-purpose sport manual wheelchairs.

FIGURE 10: DAMAGE TO A SPOKE GUARD OFFERING SOME PROTECTION TO THE SPOKES.
Source: Photograph from a user wheelchair in a remote location in WA

MAG wheels, in reference to wheelchairs, commonly refer to wheels with spokes that are either cast or moulded in alloy or plastic; MAGS in the past have added significant weight to the wheelchair but can now be found in strong, lightweight materials. Unlike the wire spokes, MAGs may be one solid piece including the outer rim, hub and spokes or may have a separate outer rim.

A MAG wheel is stronger than a metal spoke wheel and generally needs little alignment. However, direct sunlight for long periods can distort the MAG wheels, effecting the alignment of the wheels. In the case of a metal spoke wheel, a more progressive failure can occur. If the spokes are not equally tight it can cause misalignment of the rim (wobbling of the wheel when it is spun). Metal spokes, while more economical than MAGs, usually demand more maintenance but are suitable for users of varying activity levels.

Possible solution
- Spoke wheels are available at lower cost to MAG wheels but require more maintenance. Where funding allows MAG wheels should be considered; and
- Spoke protectors are recommended as a protection during impact and provide protection to users’ fingers

6.2.5 Footplates
Footplates are available in many styles. Two-piece footplates support both feet. They can flip up or remain in the same position. The flip up style allows the chair to be folded or to allow for clearance for transfers. They can be tubular bar which stabilises the chair’s frame as well as providing a surface to place the feet on, but minimal surface support throughout the foot. This style of footplate is removable. The footplate is one of the more frequent parts that goes missing, and without the footplate, poor body position and damage to the feet are at greater risk. The feet are prone to drag along the ground when footplates are missing.
Possible solutions

- Foot hangers attached to the main frame, with swing away or flip up function for transfers are a preferred option; and
- Footplates made of plastic to prevent burning of desensitised feet.

6.2.6 Upholstery

Upholstery for wheelchairs must withstand daily use in all kinds of weather. Consequently, manufacturers provide a variety of options for users, ranging from cloth to new synthetic fabrics and leather. Many manufacturers also offer a selection of upholstery colours, ranging from black to neon, to allow for individual selection and differing tastes among clients. Vinyl upholstery, when exposed to UV light, cracks leaving sharp edges. Vinyl upholstery is not recommended where the wheelchair is exposed to sunlight for extended periods.

Sailcloth is a strong, durable material that remains cool in hot climates, does not stretch, and is breathable and easy to clean. The degree of postural support required by the user is an important consideration when choosing upholstery.

Possible solutions

- Discussion of the individual's requirements with the supplier is recommended pre-purchase; and
- Sailcloth upholstery offers a more durable option for consideration, remains cool in hot climates and is easy to clean.
6.2.7 Rigid or folding wheelchairs

Folding chairs have many movable parts that undergo wear. These parts must be regularly adjusted or replaced to keep the chair in alignment, thereby reducing strain on the user. Rigid frame wheelchairs have fewer movable parts and fewer moving parts to wear. Rigid frame wheelchairs are generally more durable and age better than folding wheelchairs.

Studies have indicated there are a number of ergonometric related factors that effect the efficiency of propulsion of a wheelchair and the ease of propulsion needs to be considered when prescribing a wheelchair to be used within harsh terrain. Some of these factors being, “geometry and stiffness of the frame, rolling, air and bearing resistance, wheel stiffness, push ring size, static stability, location of the seat and wheel camber”. (Beekman, Miller-Porter, Schoneberger 1999)

On prescription of a wheelchair for users improper measurements have a great consequence on the users’ performance in the chair, as this is directly related to the user’s position in the chair (Brubaker 1990). Selection of a chair that offers a range of customisation to a user’s dimensions and requirements will ultimately result in better performance and comfort for that user.

Ease of transfer from a rigid or fixed frame wheelchair can vary due to the user’s physical mobility. With some forms of rigid wheelchairs, the user can transfer into the car and from the inside of the car, remove the two wheels, fold down the back rest and bring the wheelchair inside the car and place it either in the passenger seat, back seat or on the floor. Use of a folding chair may at times require a companion to fold the chair and put it in to the trunk, but some users are able to manipulate the chair into the seat next to or behind them. An alternative option is a vehicle hoist for a folding chair.

The advantage of a folding chair is that it can be stored in a trunk of a car and go into small planes without removing the wheels. Rigid wheelchairs are not for everyone, but many people who are currently using folding wheelchairs may have improved mobility in a rigid wheelchair.

Due to weight and fewer moving parts, the performance of a rigid wheelchair is usually better than a folding wheelchair. This difference may become even more noticeable as the wheelchair ages. The choice between rigid and folding will come down to the user life style and the ease of transportability required.

Training in wheelchair prescription and various wheelchair options is a necessity for remote and metropolitan based therapist, as clients for these rural and remote locations are often first introduced to a wheelchair in hospitals and rehabilitation centres in Perth. These therapist need to be aware of the cultural issues, the environment, the services and the follow up therapy available for users in rural and remote Aboriginal communities.

Possible solutions

- Wheelchair Design Matrix to be used as an information resource for therapists prescribing for clients living in rural and remote locations
- Remote and metropolitan based therapists to be offered training in wheelchair prescription for people living in rural and remote locations
- Increase the use and prescription of rigid wheelchairs in rural and remote locations
- Suppliers to provide greater opportunity for therapist and users to trial rigid frame chair in remote locations
- Use of wheelchair maintenance checklist (Appendix 9.4); and
- Access the Independent Living Centre of WA as a resource for assistive equipment information specific to use in rural and remote locations.
6.3 Service and maintenance

In remote locations the community members face many daily challenges. These challenges are amplified for individuals living with a disability and their carers. The lack of resources is a major issue due to lack of or no maintenance services resulting in long delays for equipment and supplies. In addition, lack of equipment and suppliers at a local level and inadequate wheelchair maintenance record programmes, can result in wasted therapist time and lengthy user isolation in the home. Some remote locations report lack of flexibility between different services when the wheelchair user is affected by cross border location issues. The multiple issues are complex and include lengthy waiting time for simple parts and repairs and no availability of a replacement wheelchair either via a hire service or spare stock.

At present there is no access to loan or replacement chairs, no local resources to hire from and reluctance from suppliers in Perth to hire chairs out to rural and especially remote locations; due to transportation costs, time factors and the lack of appropriate chairs available for remote terrains.

The limited survey results indicate that at present wheelchairs are not routinely maintained or serviced; they are repaired when a fault develops often by cannibalizing other wheelchairs. Breakdowns are reported when something major has gone wrong which requires replacement of a chair and not just maintenance. Some repairs are preformed by “mobile technicians” who come out from Perth to the users’ home or community. Generally minor repairs like tyre punctures are carried out by local bike shops, garages, occupational therapy departments or hospital maintenance departments in rural locations.

During the prescription process therapists need to be conscious of the impact on a wheelchair and selected wheelchair options that may result if a regular maintenance service is not available.

The introduction of a planned preventive maintenance service, similar to the scheme run by the National Health Service in Scotland may offer an improved service to rural and remote WA. (NHS review of wheelchair and special seating in Scotland, 2005)

A comparison is drawn between rural and remote areas in Scotland and Western Australia as wheelchair users residing in remote areas of Scotland (such as the Highlands and the Western Isles) reported facing similar difficulties in obtaining services as remote and rural communities in WA. These included the lack of an adequate range of spare parts; difficulties in hiring equipment; inadequate service and maintenance of equipment; long travel distances to the centres; diverse weather conditions; isolated island communities; funding restrictions, and low retention rates of staff. The outcome of the review suggested the introduction of a planned preventive maintenance service. The service would employ an officer to routinely visit the user and carryout a maintenance check on their wheelchair; provide a central wheelchair service co-coordinating roles, and introduce common standards and policies and procedures to assist in eliminating regional variations in funding and services. A recently conducted investment study on the planned maintenance service has shown, if not cost neutral, there is only a modest cost increase occurring, with the added benefit for user of a reduction in breakdowns and repairs. (NHS review of wheelchair and special seating in Scotland, 2005)

**Possible solutions**

- The identification of local maintenance resource people in each regional area (e.g. personnel in bike shops, car wheel fitters)
- Provide employment and training in the local communities on wheelchair maintenance
- Increase the prescription of wheelchairs with standard features in rural and remote areas
- Develop a maintenance check program for distribution with new wheelchairs
- Provide the information in the maintenance check program in different mediums to support Aboriginal people to use the program as a tool to assist in carryout wheelchair maintenance i.e. stories, images, ideas; and
- Consider the merit of introducing a Planned Preventive Maintenance Service
- Greater flexibility in coordination of services across ‘cross border regions’
6.3.1 Spare parts
There is insufficient access to spare parts for wheelchairs and not enough local maintenance services to fit these parts. At present the job may be carried out by therapists, cutting into their already limited therapy time, or the local hospital maintenance person. This is the situation in the Kimberly region where the large geographic area places the hospital maintenance staff in great demand.

Possible solutions
- Additional spare parts such as armrest, footplates, bolts, and upholstery to be supplied with the chair when it is purchased for a remote locations
- Identification of facilities for storage of spare parts, possibly the local area coordinator (LAC or HACC Coordinator); and
- Additional funding of “back up” wheelchairs in local hospitals and clinics to cover periods of time when a wheelchair is sent to Perth for repair and a temporary replacement is essential.

6.4 Further related issues, Funding and research
As indicated in the previous demographic surveys, the Aboriginal disabled population is substantially larger per capita population than the non-Aboriginal population. It is highly probable that there is a significant degree of unknown disabilities within the Aboriginal Communities, accentuated by people with a disability being ‘hidden away’ and simply not able to participate in the wider community. In addition there is evidence that Aboriginal people are unaware of their rights and entitlements and the services that are offered by the DSC. (O’Neil 1994)

There will continue to be a higher turnover of wheelchairs within rural and remote communities in comparison to city and town users, due to environmental factors. This needs to be an ongoing consideration in development of policy and planning for funding of equipment.

6.4.1 Perception of Funding guidelines
The project identified a variable level of understanding of the CAEP funding programme amongst clinicians, service providers and consumers. The DSC is aware of the importance and need to keep the changing workforce population informed, and that this is an ongoing task in both metropolitan and rural areas. There is the ability to exceed the CAEP ceiling by putting applications forward to the CAEP Clinical Sub committee, and this may be the best avenue in order to meet the user needs in their wheelchair choice.

Although the CAEP eligibility criteria, fund a mobility device for use in the home; the definition of home environment differs in Aboriginal communities. There is need to broaden the perception of home to include the facilitation of normal participation in cultural life enabling Aboriginal clients to live within their community independently. It would be beneficial to increase the level of knowledge about funding sources and program guidelines for University undergraduates and new clinicians to equip them to prescribe for clients living in rural and remote locations.

Possible solutions
- Evaluate the knowledge base of CAEP prescribers in regard to prescribing suitable wheelchairs for rural and remote locations.
- Develop a communications strategy to inform suppliers and CAEP prescribers that higher cost wheelchair options suited to rural and remote environments may be eligible for CAEP funding
- Increase the level of knowledge about equipment funding schemes for University undergraduates and new graduates; and
- Increase the knowledge of service providers about CAEP guidelines around applications that exceed the CAEP ceiling which maybe put forward to the CAEP Clinical Sub Committee
6.4.2 Wheelchair Trials and Hire

At present CAEP eligibility criteria does not fund a second mobility aid even when a user has a break down in their electric or manual wheelchair. There is provision within the CAEP program to hire a replacement wheelchair but there are difficulties in accessing a replacement chair. These are highlighted in section 6.3 of the report, the lack of suppliers who are willing to and have appropriate options of chairs available to hire in these locations, difficulties with transporting equipment to some locations, and problems with damage to equipment in transit.

The trialling of wheelchairs in remote communities is limited by the high transportation costs and reluctance on the part of the supplier to facilitate the process. There is evidence of varying degrees of awareness amongst clinicians as to available funding through CAEP for trialing of equipment. The rationale behind the importance of equipment trial is to achieve a good outcome on equipment choice to meet the individual user needs, achieve long term user satisfaction in regard to equipment choice and reduce the risk of misuse and early abandonment.

Possible Solutions

- Manufacturers and suppliers to be encouraged to undertake research in remote areas and set up trials to establish the preferred choice of wheelchair design and options on the chair when used in harsh environments
- Increase knowledge and understanding of capacity for CAEP to fund trials of wheelchairs in rural and remote areas
- Explore options with manufacturers and suppliers to be able to provide standardised wheelchairs appropriate for trial in remote and rural communities; and
- Explore options for increasing the availability of short term replacement chairs in rural and remote locations
7 Conclusion

The project was funded to identify suitable wheelchair options for use in rural and remote Aboriginal communities. However the scope of the project broadened from studying wheelchair options to include cultural consideration when prescribing wheelchairs, funding issues, service and maintenance needs, the delivery of support services within these communities, as well as environmental factors that influence wheelchair mobility and performance.

The findings from the questionnaire were based on a relatively small sample size and this needs to be considered when interpreting the results of the survey and the possible solutions that have been identified. The findings indicated the requirement of a greater understanding of the different beliefs, values and cultural customs within the Aboriginal communities when it comes to understanding the term ‘disability’. This needs to be addressed through cross cultural education and training to provide a more effective disability service and a wider appreciation of the importance of cultural competence within general agencies providing disability services.

Other findings identified were the challenges and obstacles that occur when prescribing, trialling, servicing and maintaining wheelchairs in rural and remote areas. There still remains an enormous diversity in the design, servicing and delivery of wheelchairs to these locations. The wheelchair design matrix was developed to assist with wheelchair choice and options on chairs that are possibly suited for these environments. Service and maintenance issues are constantly highlighted as a significant barrier to users’ satisfaction and clinicians’ prescribing practices in regard to wheelchair prescription and use.

Additional research and evaluation is required on a number of possible solutions identified in this project;
   a. improved training in wheelchair prescription needs for these locations
   b. the trial of various wheelchair options in remote and rural locations
   c. further investigation into the development of a planned preventative maintenance service
   d. improvement of service and support from suppliers and manufactures
   e. investigation into more localised service and maintenance centres; and
   f. improve data collection on the use and maintenance of wheelchairs.

Two final points the project has recognised are,
   a. The need for ongoing development of policy and planning for funding of equipment in remote and rural locations; and
   b. The need to develop initiatives to inform clinicians and suppliers of the guidelines and eligibility of the CAEP program as applied to Aboriginal users in remote and rural areas.

In summary what must be kept in mind and considered first is the need of the end user in order that the most appropriate model of wheelchair that meets their specific needs can be provided. A positive outcome for this project would be that the possible solutions outlined within the report will be put into place. These have the potential to radically improve the mobility and functional independence for a wheelchair user living with a disability in remote and rural Aboriginal communities.
8 References


Disability Services Commission (2006) – Aboriginal People with Disabilities; Getting Services Right (First Edition)

Hales, S. (n.d.). On three wheels everyday- meeting the criteria of remote Australian wheelchair users. Independent Living Centre, Queensland.


O’Neil M (1994) Disability, Aboriginality and service provision in Western Australia. Unpublished Master of Arts, Murdoch University, Perth


Additional resources


Kim, J. & Mulholland, S. (1999). Seating / wheelchair technology in the developing world; need for a closer look. Technology and Disability 11, 21-27


9 Appendices
9.1 Questionnaire – Wheelchairs in Remote Communities Project

WHEELCHAIRS IN REMOTE COMMUNITIES PROJECT

QUESTIONNAIRE:

1. How many of your clientele are wheelchair users?

2. How many of your clientele mentioned in the previous question use manual wheelchairs?

3. What is the most successful experience you have had with a wheelchair specification for a remote community and why?
   a) What features of this chair made a difference?
   b) Was community acceptance of the chair a factor and if so what made it so acceptable?
   c) Was transporting the chair a factor in its success and if so how was it transported? Eg did it enable the client to move with the community by vehicle or when the community moved on foot?

4. What wheelchair manufacturer/supplier are being used in your location? and comment on your experience with trialing, after sales service etc
   □ Glide
   □ Goodlife Medical
   □ Australian Mobility Equipment
   □ Please specify others

5. In your experience how often do your client’s have to have repairs and maintenance work carried out on their wheelchairs? (ie that can’t be managed by the community)
   □ Weekly       □ Monthly       □ Yearly       □ Yearly       □ Please Specify

6. What is the main cause of wheelchair breakdowns? (Please tick one or more options)
   □ FRAME        □ SEATING        □ WHEELS
   □ FOOTPLATES   □ ELECTRICAL    □ BATTERY
   □ AXLE         □ CASTORS       □ BRAKES
   □ Please specify others:
7. If being serviced what is the average time the wheelchair is unavailable to your client?

☐ <1 Week  ☐ 1-2 Weeks  ☐ 2-4 Weeks
☐ 1-2 Months  ☐ > 2 Months

8. What facilities are available within your locations for maintenance and repair of wheelchairs?

9. Briefly describe the environment/location the chairs are used in and comment on

☐ Scrub  ☐ Bush  ☐ Sandy Beach  ☐ Rocky
☐ Pavement  ☐ Pindan  ☐ Spinifex  ☐ Water/Waterhole

10. How do you transport the wheelchair if required.

☐ Able to Fit into Cars  ☐ 4Wheel Drives
☐ Light Planes etc  ☐ Other  ☐ Please Specify

11. In your experience which make of wheelchair is most durable in your location?

12. Are you aware of any organization(s) which provide information and training on wheelchair maintenance in your location?

☐ No  ☐ Yes

Please specify details

If you have any additional comments please detail them below.

Please return all questionnaire to the contact person below by the 12 September 2005

Thank you for your time.
Carol Burns
Occupational Therapist
Independent Living Centre of WA (Inc)
Suite A, 11 Aberdare Road
NEDLANDS WA 6009
Ph: (08) 9381 0643
9.2 Project Steering Committee and Participants in Supplier Forum

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Emily Raso OT Derby Health Service
Heather Jensen Lecture in Allied Health – Alice Springs

**Suppliers Forum Participants**

Steering Committee Members

Service Provider
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Geoffrey Archer Technical Aids for the Disabled WA

Supplier
Paul Durham Shoprider Australia
Russell Howard Australian Mobility Equipment
Gordon Coehol G & P Medical
Brendon Dewar Glide Rehabilitation Products

Consumer representation
Dawn Carter Carer, Fitzroy Crossing

Observer
Robyn Doney OT Student
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<th>Cons</th>
<th>Product options</th>
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<tr>
<td>Steel Frame</td>
<td>Robust for bariatric clients</td>
<td>Strong and does not rust</td>
<td>Heavy to propel and transport</td>
<td>Tracer IV</td>
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<tr>
<td>Aluminium frame</td>
<td>Light weight wheelchair easier self propulsion</td>
<td>Light to propel and transport</td>
<td>Weaker than Steel or Titanium, becomes easily damaged</td>
<td>Acacia, Wedge, Quickie GPS, Quickie 2, Glide SPX</td>
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<tr>
<td>Titanium frame</td>
<td>Lighter than aluminium, increased upper limb stress</td>
<td>Properties of titanium absorb shock, smoother ride</td>
<td>Generally more expensive than aluminium</td>
<td>Wedge, RGK range</td>
</tr>
<tr>
<td>Rigid frame</td>
<td>Stronger than folding frames. Usually lighter than folding.</td>
<td>Fewer moving parts. More movability in self propulsion</td>
<td>Some difficulties with transportation</td>
<td>Jet - Proactive, Quickie rigid series, Glide SPX, RGK range</td>
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<tr>
<td>Folding frame</td>
<td>Folding for transportation</td>
<td>Swing away footrests for transfers and foot propulsion</td>
<td>More moving parts, frame loosens over time</td>
<td>Glide 2 range, Quickie 2 range, Ottobock range</td>
</tr>
<tr>
<td>Front wheeldrive</td>
<td>Larger wheels hit obstacles first</td>
<td>Stable and does not tip. Easier to propel through sand/dirt</td>
<td>Difficult to manoeuvre indoors Less availability</td>
<td>Glide and other suppliers</td>
</tr>
<tr>
<td>Solid tyres</td>
<td>Decreased maintenance costs &amp; prevents flats</td>
<td>No punctures</td>
<td>Uncomfortable ride</td>
<td>Most Glide and Quickie chairs</td>
</tr>
<tr>
<td>BMX tyres</td>
<td>All terrain tyre</td>
<td>Increased traction. Thorn proof tubes</td>
<td>Collect debris in the treads</td>
<td>Glide Bush Chair and Glide Series 1 &amp; 2, Wedge, Quickie range</td>
</tr>
<tr>
<td>Gel filled tyres</td>
<td>All terrain tyre</td>
<td>Flat proof tyre</td>
<td>Adds additional weight to the wheelchair</td>
<td>Check with supplier</td>
</tr>
<tr>
<td>MAG wheels</td>
<td>Less maintenance than spokes</td>
<td>Little or no maintenance</td>
<td>Bearings can come loose</td>
<td>Check with supplier</td>
</tr>
<tr>
<td>Coated hand rims</td>
<td>Increase easy of self propulsion Required for hands or wrist paralysis</td>
<td>Improve independent wheelchair propulsion</td>
<td>Will chip</td>
<td>Check with supplier</td>
</tr>
<tr>
<td>Adjustable axles</td>
<td>Adjustment to the centre of gravity to increase stability</td>
<td>Axles positioned forwards makes wheelchair easier to propel and turn</td>
<td>Moving axle forwards wheelchair more likely to tip backwards</td>
<td>Check with supplier</td>
</tr>
<tr>
<td>Quick release axles</td>
<td>Wheelchair can be broken down into smaller parts</td>
<td>Ease of transportation</td>
<td>Increased maintenance and after a time unable to remove wheels</td>
<td>Check with supplier</td>
</tr>
<tr>
<td>Drum brakes</td>
<td>Sealed brake mechanism &amp; less moving parts</td>
<td>Easier to change wheels</td>
<td>Complex mechanism T brake</td>
<td>Check with supplier</td>
</tr>
<tr>
<td>Disk brakes</td>
<td>Robust in dust, dirt &amp; water</td>
<td>Simple mechanism, less maintenance</td>
<td>Hard to change the wheels</td>
<td>Check with supplier</td>
</tr>
<tr>
<td>High mounted wheel brakes</td>
<td>Holds wheelchair during transfers</td>
<td>Easy to reach</td>
<td>Protrudes from the wheelchair can catch the thumbs</td>
<td>Check with supplier</td>
</tr>
<tr>
<td>Scissor wheelchair locks</td>
<td>Holds wheelchair during transfers</td>
<td>Does not protrude from wheelchair, prevents injury to thumbs</td>
<td>Can be difficult to reach and operate</td>
<td>Check with supplier</td>
</tr>
<tr>
<td>Rigid footplates</td>
<td>Loss of footplates eliminated</td>
<td>Sleepier angle than most swing away leg rests</td>
<td>Difficulties with transfers Can not foot propel</td>
<td>Check with supplier</td>
</tr>
<tr>
<td>Swing away footplates</td>
<td>Allow the feet on the ground for foot propulsion &amp; transfers</td>
<td>Removable for transportation and transfers</td>
<td>Loss of footplate increased maintenance</td>
<td>Check with supplier</td>
</tr>
<tr>
<td>Sail cloth</td>
<td>Durable material in harsh climates. Tension adjustable upholstery</td>
<td>Remains cool in the heat. Easy to clean No stretch</td>
<td>Poor air flow. Some weakness on the seams</td>
<td>TADWA, Glide</td>
</tr>
<tr>
<td>Vinyl</td>
<td>Standard on many wheelchairs</td>
<td>Durable. Easy to clean No stretch</td>
<td>Retains the heat and moisture, cracks</td>
<td>Glide and other suppliers</td>
</tr>
<tr>
<td>Bariatric wheelchairs</td>
<td>Wheelchair with a high load capacity</td>
<td>Designed for the bariatric user - in seat and width, depth</td>
<td>Difficult to self propel around in indoor and outdoor environment due to size and weight</td>
<td>Tracer VI, K Care Delta Glide heavy duty, Quickie M6</td>
</tr>
<tr>
<td>Silicon spray</td>
<td>Mechanisms protections</td>
<td>Seals moving parts and prevents build-up of dirt in folding mechanisms</td>
<td>Temporary results</td>
<td>Available hardware stores</td>
</tr>
<tr>
<td>Double Cross brace</td>
<td>Wheelchair with a higher load capacity</td>
<td>Strengths frame and strengthen folding mechanism</td>
<td>Additions weight to wheelchairs</td>
<td>Tracer IV, 900 Heavy duty XL, Glide Series 3 XL</td>
</tr>
<tr>
<td>Bike shops</td>
<td>Project officer to resource locations for maintenance</td>
<td>Repairs done locally reducing maintenance time and cost</td>
<td>Lack of local services</td>
<td>Check local bike shops</td>
</tr>
<tr>
<td>Chair extensive specific tool kits</td>
<td>Minor repairs to be done on site</td>
<td>Additional parts such as foot and arm rests, brakes handles, upholstery &amp; bolts</td>
<td>Storage of extra equipment &amp; loss</td>
<td>Check with supplier</td>
</tr>
<tr>
<td>Basic maintenance instructions</td>
<td>Write up for each individual chair</td>
<td>Written in a selection of languages and pictorial information</td>
<td>User may try to fix things they should not</td>
<td>Provided by suppliers and DSC</td>
</tr>
<tr>
<td>Spare parts</td>
<td>Central store in locations and data on what spares are allocated to a wheelchair</td>
<td>Quicker repair time reduce cost of transportation to Perth for repairs</td>
<td>Location of a store area</td>
<td>Check returned CAEP equipment</td>
</tr>
</tbody>
</table>

### Suggested Manual Wheelchair Maintenance Guide

#### Day One
- Keep your owner’s manual in a safe place
- Keep an information card with contact detail for yourself, your doctor, wheelchair manufacturer and local repair facility.
- Store tools in a bag on your chair for use in a maintenance emergency.
- Learn how to change your tyres
- Purchase a tyre “patch” kit and carry a hand pump with you

#### Daily
- Wipe chair down with clean damp cloth

#### Weekly
- Check rear wheel spins freely and has no wobble
- Check spokes are not loose or broken
- Check front castors for wobbling and debris
- Check tyre pressure and that the brakes and tyres are making contact
- Check that wheel brakes are tight and functioning correctly

#### Monthly
- Check for loose nuts and bolts
- Check your wheelchair run straight
- Check hand rims for rough or sharp edges
- Check upholstery for tears and cracks and excessive slack
- Check for easy release and replacement of removable leg rests, footrests, armrests and backrests
- Check the chair frame for cracks and dents
- Check that quick-release wheels remove quickly

#### Annually
- Check that folding chairs open and fold easily
- Lubricate folding mechanism, pivot points and ball bearings
- Annual check and service by the dealer when possible

Sourced from [www.spinlife.com](http://www.spinlife.com)
9.5 Resources Supplier Contact List

<table>
<thead>
<tr>
<th>Australian Mobility Equipment</th>
<th>K-Care</th>
</tr>
</thead>
<tbody>
<tr>
<td>PO Box 2077</td>
<td></td>
</tr>
<tr>
<td>MALAGA WA 6944</td>
<td></td>
</tr>
<tr>
<td>Unit 2</td>
<td></td>
</tr>
<tr>
<td>20 Commerce Street</td>
<td></td>
</tr>
<tr>
<td>MALAGA WA 6090</td>
<td></td>
</tr>
<tr>
<td>Phone: (08) 9249 9156</td>
<td>Phone: (08) 9248 4444</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Glide Rehabilitation Products</th>
<th>Rehab WA</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 Legar Street</td>
<td></td>
</tr>
<tr>
<td>BALCATTA WA 6021</td>
<td></td>
</tr>
<tr>
<td>Phone: (08) 9345 3400</td>
<td></td>
</tr>
<tr>
<td>Ross: 0437 208 277</td>
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</table>

<table>
<thead>
<tr>
<th>G &amp; P Medical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit 2, 2 Enterprise Crescent</td>
</tr>
<tr>
<td>MALAGA WA 6090</td>
</tr>
<tr>
<td>Phone: (08) 9249 9333</td>
</tr>
<tr>
<td>Mobile: 0419 958 634</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Good Life Medical</th>
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<tbody>
<tr>
<td>Unit 3, 25 Stockdale Road</td>
</tr>
<tr>
<td>O’CONNOR WA 6163</td>
</tr>
<tr>
<td>Phone: (08) 9331 8377</td>
</tr>
<tr>
<td>Mobile: 0439 777 669</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>River Abilities</th>
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</thead>
<tbody>
<tr>
<td>PO Box 29</td>
</tr>
<tr>
<td>BENTLEY WA 6102</td>
</tr>
<tr>
<td>29 Alexandra Place</td>
</tr>
<tr>
<td>BENTLEY WA 6102</td>
</tr>
<tr>
<td>Phone: (08) 9350 6600</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Technical Aid to the Disabled</th>
</tr>
</thead>
<tbody>
<tr>
<td>PO Box 266</td>
</tr>
<tr>
<td>BASSENDEAN WA 6934</td>
</tr>
<tr>
<td>60 Lord Street</td>
</tr>
<tr>
<td>EDEN HILL WA 6054</td>
</tr>
<tr>
<td>Phone: (08) 9379 3733</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Indomed Pty Ltd</th>
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</thead>
<tbody>
<tr>
<td>41 Forsyth Street</td>
</tr>
<tr>
<td>O’CONNOR WA 6163</td>
</tr>
<tr>
<td>Phone: (08) 9331 6711</td>
</tr>
<tr>
<td>Mobile: 1800 884 634</td>
</tr>
</tbody>
</table>