POSTURE & MOBILITY GROUP

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Best Practice ~ Risk, Consensus and Evidence

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Editorial Team

Editor:
Phil Swann,
Delichon Ltd.
Kings Yard, Martin,
Fordingbridge
Hampshire, SP6 3LB
tel: 01923 673052
fax: 01923 673052
email: philswannptmy@aol.com

Literature Review Editor:
Elizabeth White,
Research & Development officer,
college of Occupational Therapists

Articles Editor:
Julia Cunningham,
Physiotherapist, Whizz Kidz

Feedback Editor
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RED Kings Healthcare

Cover Page: Sherwood Major Oak
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Guess the Product

Mitchells Marvel's

Only in America...

A Charlotte, NC man having purchased a box of very rare, very expensive cigars, insured them against fire amongst other things. Within a month, having smoked his entire stockpile of cigars and without having made even his first premium payment on the policy, the man filed a claim against the insurance company.

In his claim, the man stated the cigars were lost "in a series of small fires".

The insurance company refused to pay, citing the obvious reason; that the man had consumed the cigars in the normal fashion.

The man sued.....and won! In delivering the ruling, the judge agreed that the claim was frivolous.

He stated, nevertheless, that the man held a policy from the company in which it had warranted that the cigars were insurable and also guaranteed that it would insure against fire, without defining what is considered to be, "unacceptable fire," and was obligated to pay the claim. Rather than endure a lengthy and costly appeal process, the insurance company accepted the ruling and paid the man $15,000.00 for the rare cigars he had lost in the "fires".

HERE COMES THE BEST PART!!
turn to page 11

Guess the Product:
The product featured on page 2 of volume 14 was **a Quickie F55 armrest.** Once again the response was disappointing - still its a roll-over for volume 15!

The next issue of Posture & Mobility will be in **Sept. 2002** The deadline for this issue is the **01st of Aug**. The aim of the Posture & Mobility is to keep members in touch with current events in the world of posture and mobility and to provide the opportunity to share ideas and learn of new initiatives. Articles should be between 500 and 2000 words, photos and/or cartoons are welcome as are jokes and mindbenders etc. Please send contributions printed (Times New Roman bold 12pt) or (preferably) email them to Phil Swann or post a floppy.

The Posture & Mobility is published by the Posture and Mobility Group. The views expressed are those of individuals and do not necessarily reflect those of the Group as a whole.

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Articles

Feedback Forum

Regulars

Editorial

Greetings, I hope you find this issue a good read. Big thanks to all the contributors for their articles.

As I travel about the country I get quite a good overview of differing service provision. One thing that stands out is the breakdown in support for children/young adults attending schools and colleges out of district. It would appear that many wheelchair services are unable to organise the transfer of maintenance and assessment to the local service. The end result is that therapists at the schools/colleges spend a disproportionate amount of time chasing wheelchair services either for reviews or to fix/adjust broken wheelchairs/seating systems. Why is this such a difficult issue to resolve? Please could someone explain why is not as simple as transferring files and clinical responsibility to the local service. Money spent maintaining that client's posture and mobility is invoiced to the home wheelchair service since they retain the financial responsibility. I hope someone will take the time to write in so that the next issue has an explanation in the post bag.

On a final note we say goodbye to Patsy Aldersea as literature review editor. Patsy has helped develop 'Posture & Mobility' over the past five years. Patsy has always been great at seeking out contributors and has written countless articles to give the membership a good read. Thank you Patsy for all your hard work, and how about an article for the next issue? See page 2 for the closing deadline.

Phil Swann
Editor

Mindbender:
There are several pigs and sows in a farm-yard. Each sow can see as many sows as male pigs, but each male pig can see twice as many sows as male pigs. How many pigs (ie male pigs and sows) are there altogether?

Answer on page 26

Letter from the Chairman

This year's conference at the East Midlands Conference Centre is the 10th Anniversary Conference of the PMG and both our membership and conference attendance numbers continue to increase. This is no mean achievement in these ever changing times and I feel proud to be the Chairman at this time. The PMG is clearly meeting the needs of its members and will continue to do so for as long as PMG members communicate these needs to inform the Executive Committee. A special tribute is due to the Committee members who work so hard to promote and progress the aims and objectives of the PMG as well as arranging the programme for each Conference.

The Committee is currently looking forward to the conferences for the next three years hopefully culminating in an International Conference on Posture and Mobility in 2005. In the meantime we are planning a programme for 2003 in York and are short-listing venues for 2004. The 2005 International Conference may be in Harrogate, Edinburgh or Glasgow. Work is just beginning on this Conference with partners such as the Scottish Seating & Wheelchair Group and others who are being invited to collaborate on the organisation and agree a venue.

We have had an excellent response to our requests for nominations to the Committee. We have had sufficient nominations to replace those members retiring and resigning and to confirm those co-opted at the last conference and wishing to continue. Thank you to all members who offered their services and I trust that your place on the committee will be confirmed at the AGM. For those of you still considering nomination in future years a reminder that there are CPD benefits each year you are a Committee member and the PMG pays your travel expenses to attend the Committee meetings. The venue of these meetings is currently London but is chosen by the committee to be the most suitable venue for all members so is likely to rotate around the country in future to avoid a few members always having to travel the furthest.

I am pleased to report ever increasing liaison with the Scottish Seating and Wheelchair Group. The two groups now have a member attending each other's committee meetings and a slot in each conference programme for an update on the activities of the other group. I hope that this liaison continues to grow as both groups face the challenges of the provision of services and can learn from each other's experiences albeit in slightly different political circumstances. Sharing in the organisation of conferences in the future is one way in which I hope we can benefit members of both groups as there are a finite number speakers out there to choose from!

At the Nottingham Conference I hope we will be able to agree a Declaration of Principles for the delivery of our services that has been developed with users. If we can sign up to this then I believe we will have a strong voice in support of a statement of the quality of service delivery required by both the professionals and the service users. More at the conference - be there!

I hope to see as many of you as is possible at Nottingham and I look forward to a good conference and the valuable exhibition. Don't forget - the subsidised book purchase of £30 is only available to PMG members who attend the conference. See you there!

Roy Nelham

Chairman

Virus Warning: Forward to everyone you know

Friday March 29th 2000

There is a new virus going around called 'work'. If you receive any sort of 'work' at all whether via email internet or simply handed to you by a colleague...**DO NOT OPEN IT**.

'Work' has been circulating around our building for months and those who have been tempted to open 'work' or even look at 'work' have found that their social life is deleted and their brain ceases to function properly.

If you do encounter 'work' via email or are faced with any 'work' at all then to purge the virus, send an email to your boss with the words 'Sorry ..I'm off to the pub..' The 'work' should automatically be deleted from your brain.

If you receive 'work' in paper-document form, simply lift the document and drag the 'work' to your bin. Put on your coat and skip to the nearest bar with two friends and order three pints of beer. After repeating this action 14 times, you will find that 'work' will no longer be of any relevance to you.

Send this message to everyone in your address book. If you do not have anyone in your address book, then I'm afraid the 'work' virus has already corrupted your life.

A Review of Seating Principles in the Context of a Prototype Design Project

Mr John Tiernan MEngSc BE, Clinical Engineer, Enable Ireland, Sandymount, Dublin 4

Abstract

Conventional wheelchair design has traditionally been concerned with the provision of an alternative means of transit to people with severe mobility impairments. As design efforts in the past have tended to concentrate primarily on the area of mobility, issues relating to transfer, good posture and comfort have frequently been ignored. As a result wheelchair systems often offer poor postural support, which leads to discomfort over prolonged sitting periods and may ultimately contribute to the development of pressure sores.

In response to this, an armchair with the added functionality of a wheelchair has been designed at University College Dublin. By addressing the principles of good seating and incorporating features that allow easy lateral-transfer and subsequent positioning of patients, it is expected that this prototype design will act as an aid in reducing the incidence of pressure sore development, while providing a more comfortable and dignified patient-transfer method than those currently employed.

A vertical height-adjustment mechanism facilitates patient transfers and the design incorporates a tilt-in-space. A novel back-recline mechanism allows for a certain amount of translation of the back support during recline. This avoids the generation, at the body-seat interface, of shear forces, which have been shown to be a causative factor in pressure sore development. The Frame is mounted on two large wheels, centrally-located, with four castors located at the extremities. This configuration offers manoeuvrability far superior to conventional wheelchairs.

Introduction

There are 1,411,000 wheelchair riders in the United States, of whom over half live in institutions [1]. The demand for wheelchairs is increasing at a faster rate than can be explained by demographics alone [2].

While mobility is generally the central focus in the design of wheelchairs, they are frequently used intensively as a seat. Of the indoor users who were interviewed by Platts [3], 80% stated that they remained in their wheelchair for over six hours per day, and this included 43% who were in their wheelchair for 12 or more hours daily. Despite these prolonged periods spent in wheelchairs, market research indicates that the majority of those currently in use are unsuited to their users' specific needs [4]. The challenge in wheelchair design, therefore, is to develop a chair that:

- facilitates patient transfers,
- supports posture,
- enables motion, and
- advances health [5, 6].

Sitting involves the support surface - the chair - supporting the body in an upright position when it bends at the knees and pelvis. When a person is correctly supported, they can perform daily tasks without having to consider how they sit. Correct posture is dependent on the correct positioning and support of the pelvis. The pelvis is an intrinsically unstable feature of the body and acts as the foundation for the most flexible part of the body - the spine. It can twist and rotate, which will cause the spine to flex and bend. A well-supported pelvis will help to distribute the weight of the body above it evenly into the seat surface below. This, in turn, will hold the trunk straight, allowing the internal organs and blood supply to function effectively, while at the same time providing a comfortable position.

As comfort is an entirely subjective concept, it is not simple to define [7]. The human body is not designed to remain seated for long periods [8]. Tiny movements in position allow a person to correct discomfort. The design of a chair can affect how frequently this is necessary. Gravitational forces acting upon the human body can cause slouching, sliding forward on a seat or leaning to one side. Poor sitting posture causes abdominal muscles to slacken, curves the spine and impairs the function of some internal organs [7]. Thus poor design can result in damage to the sitter's health.

Pressure ulcers are an example of the detrimental effect of long-term sitting in wheelchairs [3]. Up to 85% of spinal cord injury patients develop pressure sores [9], which are usually preventable [10,11]. Experimental studies have shown that the critical period of pressure application for the development of pressure sores is the 1 to 2 hour range [9, 12, 13]. The redistribution of the load-bearing surfaces, through a back-recline or tilt-in-space mechanism, is one method of reducing the likelihood of pressure sore development [14, 15].

While chair design is important, the carer's role in positioning a patient is crucial [16]. Therefore, carers must be regarded as wheelchair users and their needs catered for. Their main activities relate to transfer, pushing, and operating adjustment mechanisms. They are particularly concerned with the problems of transferring a heavy person, positioning the patient, and manoeuvring the wheelchair in a confined space. Carers need a chair that minimises the need for manual-handling equipment, and maximises ease of use of such equipment when used.

The translation of functional standards into a mechanical design is the challenge of the design phase [17] when developing a product. The final design must take into account of not only users' needs, but also practical and economic considerations [3]. Factors to be considered include dimensions, function, materials, weight, style and cost. This paper discusses these factors in the context of wheelchair design and explores their effect on the overall design of a concept prototype designed to simultaneously address both postural and mobility requirements of elderly and heavily dependant people.

Wheelchair Design Requirements

For design purposes, the prototype chair may be considered in terms of its component characteristics, i.e.

1. It is a chair.
2. It is mobile.
3. It facilitates patient transfers.
4. It may be positioned in a number of different ways to suit varying patient requirements.
5. It must be adjustable to suit the requirements of users who vary in size.
6. It must provide good value for money.

1. Chair

Primarily, a wheelchair design must act as a chair and satisfy the fundamental qualities of good seating design. Given the nature and intended use of the prototype, comfort and good postural support are key issues in its design. Comfort may be described as the 'absence of discomfort' [7]. In relation to seating, the ideal situation is one where the sitter loses all awareness of the seat and sitting posture. A well-designed seat should support the spine and minimise strain to the muscles that hold the spine in its normal shape [8]. Since prolonged sitting in one position leads to discomfort, a range of postures needs to be possible.

For the purpose of the prototype design, as advised in EN 12183: 1999, those placed between the 5th percentile adult female, and 95th percentile adult male population defined the ergonomic boundaries of the design. The anthropometric data were consulted in the literature [7,8,18,19,20,21,22].

The type and dimensions of a seat are related to the reasons for sitting. The width of the seat base should be such that it allows the sitter to change position with ease [20]. The inter-trochanteral distance is used in determining the inside chair width [18]. It was decided that the prototype seat width ought be adjustable over a range of 400mm - 460mm.

The length of the seat has a strong effect on the posture of the sitter. The ideal posture is one where the back is fully supported by the back-support system, the feet are placed firmly on the ground or foot support, and as much weight as possible is transferred through the underside of the thighs [14]. Space ought to exist between the front edge of the seat and the popliteal area behind the knee [18], [23]. If the seat length is too great, the sitter will experience pressure in the popliteal area, and will not have correct support from the backrest, resulting in reduced body stability [20]. If the seat length is insufficient, it will result in excessive pressure on the ischial tuberosities, as the sitter has been deprived of sufficient support under the thighs. Consequently, it was decided that the prototype seat length be adjustable from 410mm - 510mm.

The back support should provide support for the sitter's lower (lumbar) and upper back regions. The height of the back support is generally a matter of personal preference. Higher backs are generally provided to those with less trunk control [6]. In the prototype design, the backrest is width-adjustable between 460mm and 510mm and ranges in height from 510mm to 750 mm by means of an adjustable headrest.

Armrests provide vertical support that can reduce the load on the buttocks and thighs [18], provided they are set at the correct height to lend the support required. To provide a comfortable right-angle position of the elbow, flexibility in armrest height is necessary [23]. The decision was taken to allow the prototype armrest to be adjustable between the heights of 150mm and 250mm above the seat surface.

2. Mobility

In order to be mobile, a wheelchair must be mounted on wheels. It must be easily manoeuvred and light enough to be pushed by an elderly person. It must be small enough to fit easily through doors, and designed in such a manner that it can be easily turned in the tight spaces generally encountered in a bedroom or hospital ward

environment. A dynamic braking system, i.e., one that enables engagement while the chair is in motion, improves external functionality of the chair as it improves control on slopes - particularly wheelchair-access ramps.

A handle height of approximately 1m has been shown to be the optimal height for pushing vehicles such as a wheelchair [24]. This choice is based on maximum force development, minimum torque generated around the hip, and highest pushing efficiency and is within the height range recommended by EN 12183: 1999. The favoured handle separation is 440mm.

3. Patient Transfers

A defining feature of the prototype chair design is that it facilitates the transfer of patients from a supine position in bed to an upright position when seated.

This operation is facilitated by the chair altering in height to align itself with the bed. Its back-support then folds flat (like a stretcher), and its armrest is adjustable in such a manner that it allows lateral transfer of the patient without blocking their path.

To enable transfers to and from a bed, the seat should be at the same height as the bed [12]. An adjustable seat-height is therefore necessary. The minimum chair height is 450mm. The upper height is set at 700mm, far in excess of those recommendations set out in the literature [7, 8, 18, 19, 20, 21]. This enables eye-to-eye contact when the sitter is interacting with individuals who are standing up.

The vertical height-adjustment mechanism has been largely retained from a previous prototype model developed by Tiernan [22], but the manner in which this operates has been revised.

A sitting posture in which the trunk-thigh angle is about 115 degrees and the lumbar position of the spine is supported, produces the nearest approximation to the 'normal' lumbar shape [7]. While a number of chairs currently on the market have incorporated back recline, few, other than stationary armchairs, have automated back recline. Fewer again offer a recline angle of more than 10º or 20º. In the prototype design the back-recline feature offers a range of positions from 90º (upright) to 180º (flat). The 'flat' position is what will enable a patient to be transferred laterally to and from a bed.

4. Patient Positioning

For those who have limited ability to change their position or posture, it is important to provide seating that offers a range of adjustments, thus preventing the user becoming 'fixed' into the same shape as the chair they are using. Multi-positioning features included in the prototype design include back recline, tilt-in-space, armrests and footrests that are height-adjustable, and that can move away to facilitate patient transfers.

Back recline refers to the ability of the back-support section of a chair to be pivoted about an axis thus allowing the angle between the back-support and the seat base to be varied. "This function is important because it allows people to independently redistribute and/or decrease pressure on weight-bearing surfaces, and to rest residual trunk and respiratory musculature, decreasing the likelihood of tissue damage and fatigue" [25]. A back recline feature has the added advantage that it allows for a certain amount of body language during conversation.

Unfortunately, users of reclining equipment complain that repeated reclining alters their position in the chair, making it less comfortable. It frequently causes wrinkling or bunching of clothing, which can itself cause areas of pressure concentration [26]. This occurs as the locations of the pivot points of the chair differ from the axis of rotation of a person's body during recline. When reclining, a person tends to slide down the back support (Fig. 1). Shear forces then exist between the person and the back support during elevation of the back support. The existence of such forces is highly undesirable, as they have been shown to be a major contributing factor to the development of pressure-sores [27] and they prevent the user from sliding back up to the original seating position. Consequently, the user frequently requires assistance for repositioning, limiting their functional independence [26].

Back supports that provide a non-shear feature must

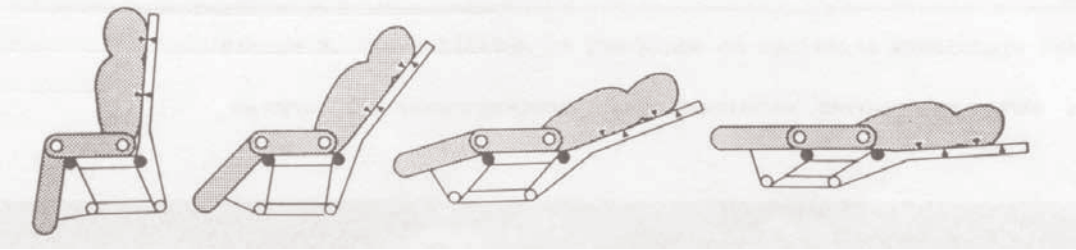

Figure 1

Illustration of the translation of the body during recline of the back-support [Ref. 25].

accommodate a displacement of approximately 10 centimetres during the recline cycle. In a comparison study [26], the use of a four-bar linkage was found to be highly effective in reducing back displacement, since it moved the effective axis of rotation of the back mechanism so that it more closely approximated to the axis of rotation of the user's back during the recline. It was found to reduce displacement of the back from 11cm to 0.9cm. In the prototype design a novel system was developed to address this issue. The back support translates forward 100mm as it rotates through 90 degrees.

'Tilt-in-space' is a common feature in more recent wheelchair designs. Using this feature, the angle between the seat base and the seat back-support is held constant while the whole seat is tilted rearwards. This takes some of the pressure off the ischial tuberosities and redistributes it over the patient's back. It is generally desirable to have a 5 to 10 degrees tilt of the entire seated positioning system [28]. EN 12183: 1999 recommends a seat angle of between 4° and 14°. The more advanced chairs on the market allow this angle to be altered while the user is in the seat. On the prototype design, the tilt-in-space feature may operate between the angles of 0º - 25º to the horizontal plane.

5. Adjustability

Adjustment of the chair may be necessary, not only to cater for people who vary in size, but also where a person's physical condition changes over time [20]. Consideration must be given to the decreasing abilities of patients due to these changes. "A user's physical dimensions may change due to alterations in weight, redistribution of fat due to muscular paralysis and/or the assumption of a sedentary lifestyle, use of orthoses, or the progression or reversal, through surgery, of severe skeletal deformities such as scoliosis. In such cases, it ought to be possible to alter the dimensions of the seating system easily and economically" [6]. Adjustability in seat length, backrest and footrest height, addresses this issue, while also enabling people of varying physical sizes to use the chair.

Market research indicates that different users have different requirements and expectations from their chairs [4]. In the course of this market research, some chairs were deemed to have 'too many features'. The high turnover rate of nursing staff means that they do not have sufficient time to familiarise themselves with the complexities of a multi-functional seating system. An incorrectly used seating system will be detrimental to the health of a patient. A challenge in wheelchair design is how best to design a product that caters for the needs of patients without confusing staff. The solution offered by the prototype design is to provide easy adjustment of features such as back recline and tilt-in-space with adjustable widths and heights requiring more specialised knowledge of the system so that settings prescribed by a specialist may not be inadvertently altered by others.

6. Value for Money

A healthcare professional, interviewed in the course of the market research, is quoted as saying: "If there is no choice (of wheelchair system) then price doesn't matter. If there is an alternative chair, then price does become an issue". A solution to the problem of high-cost systems is to design a range of basic chassis' with alternative super-structure components that can be assembled to suit individual patient-requirements. These can then be interchanged as needs alter or parts wear out.

Modularisation offers the added advantage of broadening the potential market for a chair. The financial advantage of a modular design is evident. A basic model may retail for approximately 1000$, with more advanced models breaking into the 2.5 - 4k price bracket.

Discussion

Simplicity was key feature in the prototype design process, both in terms of the functioning of the chair and in terms of its manufacture and assembly. In order to minimise costs of the prototype development, it was decided to use tubular mild steel, conforming to BS

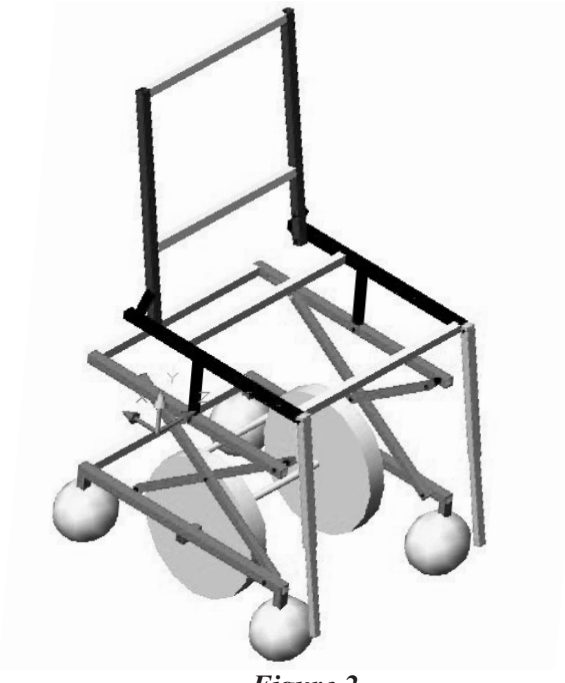

Figure 2

Three-Dimensional CAD image of Frame Design

6323-1: 1982, for virtually all components of the prototype design.

The frame design shown in Figure 2 uses a method of height-adjustability that is based upon a scissors mechanism that operates along two side-rails that form the top and bottom sides of the frame. The posterior ends of the scissors bars are thus free to rotate on the pins and simultaneously free to translate a fixed distance along the rails.

The seat base is mounted on two upright supports that are slotted into the upper portion of the frame, and may rotate rearwards in a controlled manner, tilting the seat structure to an angle of 25°.

To compensate for the misalignment between the axis of rotation of the back support and the axis of rotation of the user's hips, the base of the back support can translate 100mm towards the front of the chair. The resulting feature is a back support system that allows the support to be reclined from 90º to 180º in a smooth manner closely resembling the motion of the user's back. It is also possible to lock the support for maximum comfort at any angle between 90º and 180º.

The leg-supports are mounted on inserts that are slotted into the front of the seat-base side-rails. They can thus be elevated to a point where they are level with the seat base. With the leg-supports in this position, and the backrest fully reclined, the chair effectively acts as a stretcher. The leg-supports also control the length of the seat base and allow the seat base to extend 100mm, from 410mm to 510mm, by sliding in an anterior/posterior direction, along the inside of the seat base side-rails. Mounting footplates on inserts that slide within the leg-supports allows extension from 350mm to 520mm in length, allowing for variations in patient height. When the seat is set at its lowest vertical height, the footrests will sit directly on the floor for added stability. Once the seat is raised, there will be sufficient space between the base of the footrests and the floor to allow for unobstructed movement of the chair.

In wheelchair-design, there is often a trade-off between the manoeuvrability and stability. The prototype design took the innovative step of giving the chair both front and rear castors, with the main wheels - the 315mm diameter fixed wheels - placed at the midpoint of the frame. This has considerably increased the manoeuvrability of the chair, enabling it to turn on the spot, while also ensuring a stable configuration where any tendency to tip is greatly reduced as the castors are located at the extremities of the chair.

A three-dimensional CAD impression of the upholstered prototype is shown in Figure 3, with the finished prototype shown in Figure 4.

Testing

Having completed the manufacture of the prototype design it was important to conduct a number of tests

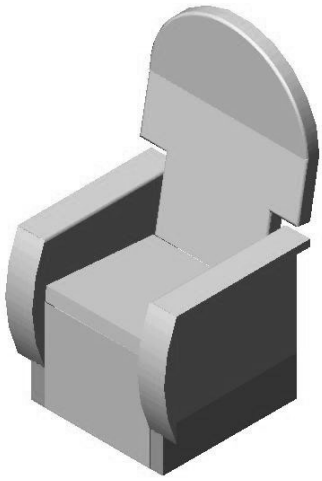

Figure 3
Three-Dimensional CAD image of Potential Upholstered Design

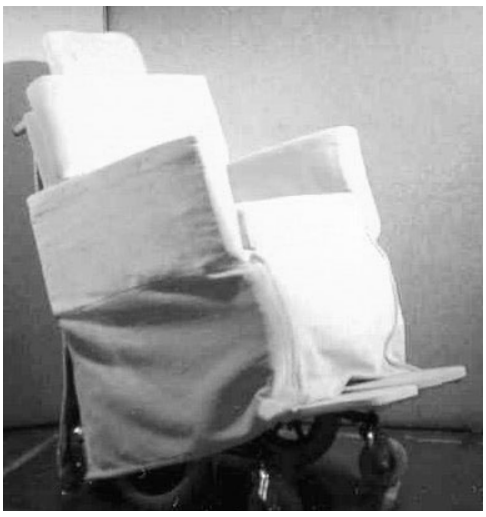

Figure 4
Photograph of Prototype Design set at Maximum Height

prior to clinical testing. To this end, a number of BS and ISO standard tests were conducted on the prototype. BS 4875-1: 1985 outlines the principle of strength testing as being "to determine the strength of the structure of an article of furniture, by applying to various parts, loads or forces simulating normal functional use, as well as acceptable misuse". Critical components of the design were tested for strength and shown not to fail at four

times the design loading condition.

Stability testing was carried out in accordance with ISO 7176-1:1999, a standard which provides guidelines for testing but which provides no indication of the angle of tipping to be expected in a chair. Following the procedure outlined in the test, the minimum tipping angle of the chair when loaded with an occupant of weight 111kg was found to be 14.8° in the forward direction. The maximum tipping angle was found to be 26.3° in the rearward direction, under similar conditions.

Given the intended use of the chair, overall dimensions and turning space are critical elements of the design, and were tested in accordance with BS6935-5: 1988, ISO7176-5: 1986 and ISO7176-8:1998, which has been updated to EN 12183: 1999. No guidelines are offered for the overall width of a chair, but with an overall length of 758mm and overall width of 670mm the chair offered a tuning radius of 383mm and turnaround space of 418mm, 38% and 32% of the maximum values permitted by EN12183: 1999.

Conclusions

There is a market requirement for a wheelchair that can act as a mobile chair, facilitate patient transfers and provide correct postural support for patients once seated. A prototype design of such a chair has been developed at University College Dublin. As part of the prototype design process, a comprehensive review of current literature relating to wheelchair design was conducted. The findings of this review have been presented in this paper

The prototype chair is adjustable in the vertical plane. A compensating back-recline feature has been incorporated into the design, along with a tilt-in-space feature allowing for full-body recline of patients. The seat base is adjustable in length and the back-support adjustable in height, with adjustable armrests that fold away to facilitate lateral transfers of patients. The footrests are adjustable in length to suit patients of various heights.

Upon completion of the working prototype design, it was tested in order to demonstrate conformity to a range of international standards. Having performed satisfactorily in laboratory tests, the next stage in the design process requires that the design be tested in a clinical setting.

It is recommended that work examines the current design and, having performed relevant testing, examines the possibility of automation of the various kinematic features of the design.

Authors

This work was undertaken by Mr John Tiernan MEngSc BE, Clinical Engineer at Enable Ireland, Sandymount, Dublin 4 in the course of a Masters Degree in Engineering Science, undertaken at the National University of Ireland, Dublin. Supervisors for this project were Dr Michael Gilchrist PhD (*Corresponding Author), Senior Lecturer in the Department of Mechanical Engineering, National University of Ireland, Dublin, and Professor Annraoi de Paor Phd DSc, Professor of Electronic Engineering, National University of Ireland, Dublin. Mr Conor Leonard MSc DipCOT, Project Manager in the Royal Hospital Donnybrook instigated the project and provided clinical expertise throughout the project.

The project was funded by Materials Ireland and the National University of Ireland, Dublin.

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Appendix - Standards

BS 4875-1: 1985, Strength and stability of furniture - Part 1: Methods for determination of strength of chairs and stools.

BS 6323-1: 1982, Seamless and welded steel tubes for automobile, mechanical and general engineering purposes - Part1: General requirements.

BS 6935-5: 1988 Wheelchair tests - Part 5: Methods for determination of overall dimensions, mass and turning space.

ISO 7176-1: 1999, Wheelchairs - Part 1: Determination of static stability.

ISO 7176-5: 1986, Wheelchairs - Part 5: Determination of overall dimensions, mass and turning space.

ISO 7176-8: 1998, Wheelchairs - Part 8: Requirements and test methods for static, impact and fatigue strengths.

EN12183: 1999, Manually propelled wheelchairs - Requirements and test methods.

Only in America continued.....

After the man cashed the check, the insurance company had him arrested on 24counts of ARSON!!

With his own insurance claim and testimony from the previous case being used against him, the man was convicted of intentionally burning his insured property and sentenced to 24 months in jail and a $24,000.00 fine.

Mexican Experience.

Sarah Davies, Occupational Therapist

In January 2000, as the new millennium dawned, I found myself in Monterrey in northern Mexico, without a job, no knowledge of the Spanish language and wondering how on earth I was going to fill my days. My husband's job had taken us overseas, leaving our teenage children behind, one at Sixth Form College and the other starting university.

In a very short time I was wishing the days had more hours to do all that I wanted to do. I had volunteered to work in an institute for children with cerebral palsy, 'Instituto Nuevo Amanecer' which means 'New Dawn'. This institute provides medical facilities, rehabilitation and schooling for a large number of children. It receives no government funding and relies totally on charity to function. Monterrey is a huge city with a population of 3.5 million and Nuevo Amanecer also sees children from the surrounding towns and rural areas. Almost all the families who take their children there to be treated are very poor.

When I told the director/founder of the institute that my background was in wheelchairs and special seating she was overjoyed, this was one of the areas crying out for development. There was no knowledge or expertise in the field of postural management. Worse still there are no wheelchair manufacturers, no special seating equipment available and huge problems importing equipment from the US. (Even if there had been money to do this) All this coupled with the fact that almost all the children needed a wheelchair.

There were about 80 children who attended the school in the Institute and although they all had a chair or wheelchair of some description to use at school, none were seated well and most in such a way as to exacerbate their problems. Some did have a wheelchair at home, but mainly the children would be propped up on the sofa, or cushions on the floor and be carried around by parents or siblings. The children who came into clinics or came for therapy programmes fell roughly into two groups. The first was young children and babies who usually had a conventional child's pushchair. Mexican children can be transported in these for much longer than children here, simply because they are much smaller. The second group was the children with very severe postural deformities who sometimes had a wheelchair of sorts; their postural problems were often extremely complex and alarming. None of the children wore spinal jackets and many, even teenagers, were carried around by their parents.

Before my arrival the Institute had started a programme of making multi-adjustable wooden seats with castors. Parents had to save enough money for these or try to raise it from wherever they could, for instance through other family members all donating small amounts. These seats were far from ideal. However they were all we had to start with and there were quite a few lined up and paid for, so I had no choice but to make the best of them for the time being. The tilt in space and the recline in the backrest together with small adjustable thoracic supports were being used to try to position the children in these chairs and they were cumbersome and difficult to move around.

It was easy for me to tell everyone what was achieved here in the UK and show my impressive 'before and after pictures' from here. However they needed to see results of their own with some of their own children rather then pictures from here. Luckily I had to make a quick trip home to England and was able to take back to Mexico our first small casting bag, kindly donated by Otto Bock. I cast Lejaim, who had a severe spinal

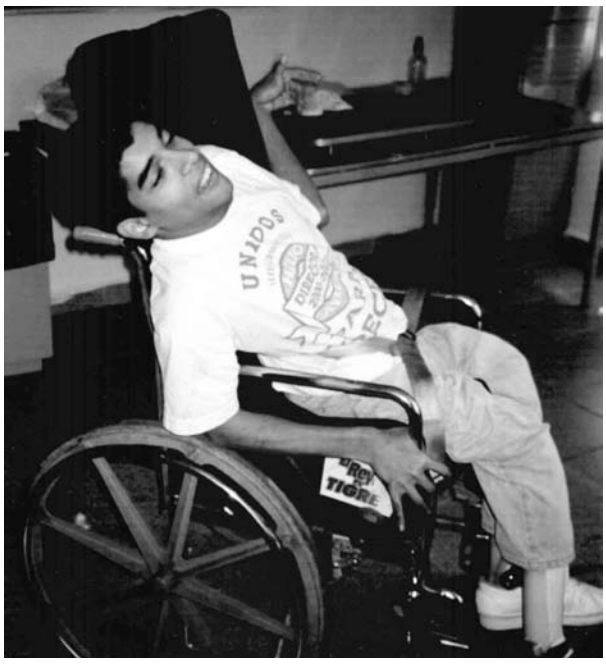

Figure 1, Lejaim in his original wheelchair

deformity and made the first seat for him by hand, from foam remembering methods I used working in Holland way back in the 70's, making seats for children with

muscular dystrophy. (It took all day and I think I was dizzy from the amount of glue I had inhaled!!) I fitted

Figure 2, Lejaim showing spinal deformity

this into the wooden seat already made, had it upholstered and made him a lap strap. This gave me the result I was hoping for, as Lejaim's posture improved so dramatically that everyone realised what could be achieved.

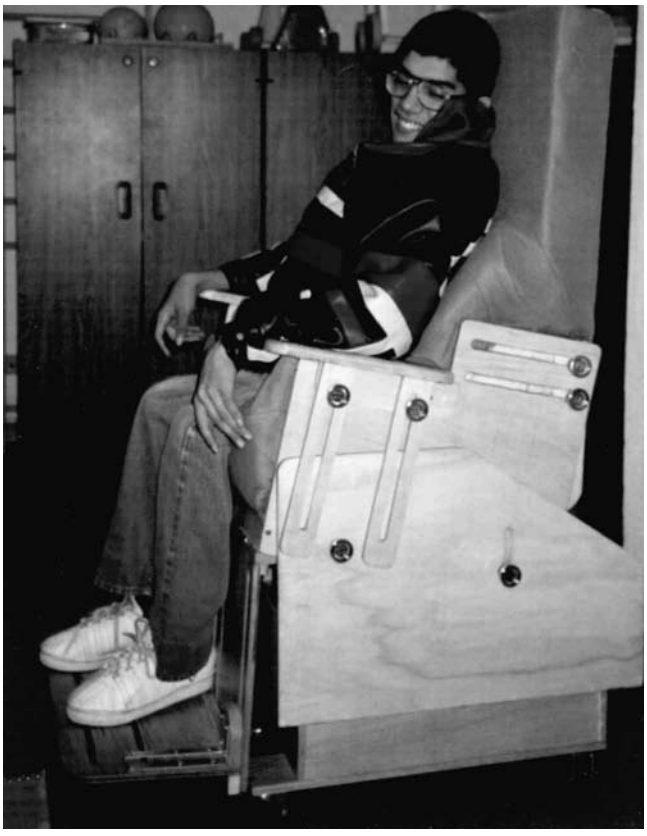

Figure 3, Lejaim in with foam seat, accommodating and stabilizing his posture

Not only was it obvious that we had accommodated Lejaim's postural deformities but we had stabilized his posture, decreased reflexive movements, normalized muscle tone and improved his function dramatically.

The next step was to find a cost-effective method of making seats using locally available materials. As Monterrey is the biggest manufacturing city in Mexico, I felt sure we could find a company to manufacture seats for us from a thermoplastic material using the casts we had made. This proved impossible because of the cost. However with the help of my husband, I experimented in our garage and started to make seats from fibreglass.

Figure 4, Christopher, age six, no seat and complex postural problems

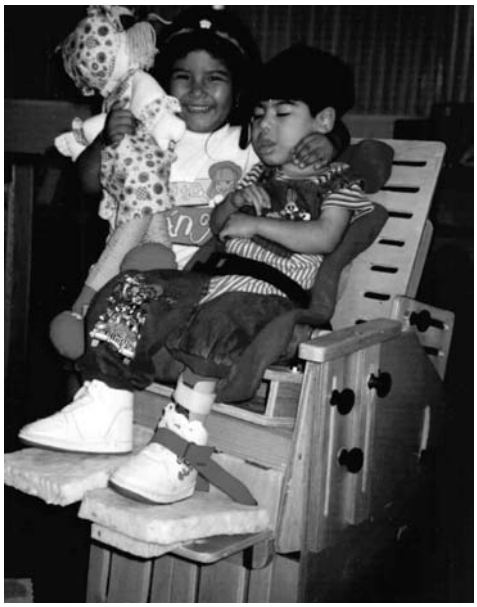

Figure 5, The first fibreglass seat, fitted into a wooden seat the Institute had made for Christopher

These were very successful and eventually we found a small manufacturing company to make them. Obviously there were many other small problems to

overcome. Upholstery took some time to master and we had to find ways of manufacturing our own lapstraps and harnesses, headrest etc. None of these were available to buy even if there had been money to pay for them. R.M.S. here in England generously gave us advice on designing and manufacturing many of these items.

Figure 6, Chacho in his original wheelchair. His only independent ability was to manoeuvre his wheelchair paddling backwards with his feet

Figure 7, Chacho in his new fibreglass seat, lowered to enable him to continue to propel

Figure 8, Chacho's seat. The headrest came from England. We subsequently started to made our own

I made quite a few trips back to England during the time I worked in Mexico, and consulted various people on these visits home. Many companies and individuals were generous with expertise, advice and samples of equipment, in some cases giving permission to copy their designs. Chailey Heritage was most generous in allowing us to translate their excellent book for use in the institute 'The Chailey Approach to Postural Management'.

We developed a 'postural management team' consisting of a paediatrician, a consultant in rehabilitation, an OT and two physios. Together we ran a course on postural management for the whole institute, using the Chailey approach. This was a great success and really reinforced the 24-hour approach to postural management. Many of the teaching staff attended as well as all the therapists and the medical staff and we incorporated into our course information for all of these disciplines.

The seating clinics that I had started as soon as I had arrived became much more structured and effective, with all members of the team giving input and involving the family in a more constructive way. Everyone was now much more aware of the 24 hour approach and started finding ways of dealing with the problems we faced rather than waiting for me to tell them what we had to do next. We started making corner seats and

showed people how they could make them from cardboard boxes until they could afford the wood to make a more permanent one. Carpenters were found to make simple adjustable standing frames and foam was used to make positioning cushions for sleeping.

We were able to raise enough money to build a small workshop and had machinery donated to equip it. We also found a technician and raised money to pay his salary. He worked on the wheelchairs we had available, fixing and adapting them and started making a simple modular adjustable seat.

Figure 9, Eli in his original wheelchair

The small manufacturing company began making these modular seats together with a symmetrical seat for babies and the very young children. The symmetrical seat was based on the design of the 'Saxon' seat from Basingstoke. It proved ideal for the situation there, it was inexpensive and easy to make and could be fitted to the conventional child's pushchair. The Mexican children being 'small' was a great advantage, the seat, in theory could be used much longer than we could use such a seat here with our 'bigger' children.

Postural management and wheelchair provision are not the only problems that the Institute has to overcome. It does a tremendous job with few resources, huge financial constraints and very little quality training for their staff. I was able to arrange for a physiotherapist friend and former colleague, Marieanne Theuinnssen from Holland, to come to Monterrey and spend almost a month in the institute training staff. She has thirty years of experience treating children and teaching in paediatrics and the training she did was a tremendous success.

We made a lot of progress. However, much remains to be done, particularly training for staff and the provision

Figure 10, Eli with one of the first simple modular seats made in our workshop

of affordable, appropriate wheelchairs. The medical director, Dr. Fabiola Barron, plans to visit England this year with a view to visiting institutions with expertise in all fields. I am looking for experts willing to go out and work with them for short periods or find funding for their staff to come here to train. I would be delighted to hear from anyone who might be interested in contacting me, my email address is: esarahd@hotmail.com

Audit of the use of botulinum toxin in management of spasticity at the RRU

Dr Ajoy Nair, Mr Stephen Ashford, Dr Kyaw Nyein & Professor Lynne Turner-Stokes, Regional Rehabilitation Unit, Northwick Park Hospital

Introduction

Botulinum toxin (BTX) has been used in the management of spasticity for patients at the Regional Rehabilitation Unit (RRU), Northwick Park Hospital for the past seven years. BTX is a toxin produced by the bacterium Clostridium botulinum (Hambleton, et al 1995). It acts by inhibiting acetylcholine release at the neuromuscular junction. The use of BTX has been shown to be an effective adjunct to the management of spasticity in patients following stroke (Das and Park, 1989).

In April 2001 new guidelines were produced by a multidiciplinary working party on the use of BTX in spasticity management (Guide to Clinical Practice, 2001) . Spasticity is defined here as an increase in resistance to passive movement in individuals with upper motor neurone syndrome (Brown, 1994) and can also be referred to as hypertonia. The production of the guidelines has lead the team at the RRU to audit their practice related to the use of BTX in patients with spasticity.

Aim:

An audit cycle to assess aspects of the use of BTX in spasticity in accordance with published guidelines and the standards of practice set by the RRU team.

Standards of practice set by RRU team:

1. Principles of BTX use in spasticity.

Clear identification of:

- The clinical problem.
- A dynamic hypertonic (spastic) component.
- Functional goals should be identified (Including ease of care).

2. Clinical application.

Intervention and goals set, which are discussed with patient and family. Informed consent should be obtained (written consent where possible). BTX injection and additional procedures should include:

- Full documentation of intervention.
- Documentation of injection technique & dosage.
- Implementation of therapy and splinting interventions required.

3. Measurements of intervention.

Appropriate measures of intervention at impairment and activity (disability) levels of measurement should be used. Follow up at:

1-14 days
4-6 weeks
3-4 months

Audit methods

- First round audit: Random selection of ten patients from in-patient service (May, 2000 - August, 2001)
- Intervention between audit stages Modification of the proforma used to record intervention data to allow a more user-friendly format and prompt practice in accordance with the guidelines. Increased awareness among the staff of the standards needed in therapy and medical intervention related to BTX usage (particularly related to the documentation and follow up of interventions).
- Second round audit: All seventeen patients who were referred to the service requiring intervention, as an in-patient or through outreach service (August, 2001 - December, 2001).

Results

Discussion

	First Round Audit	Second Round Audit
Functional goals identified	80%	100%
Injection details documented	100%	100%
Planned therapy interventions documented	100%	100%
Informed consent obtained and recorded	-	55%
1-14 Day review undertaken	50%	90%
4-6 Week review undertaken	10%	90%
3-4 Month review undertaken	-	65%

A number of areas were identified by the audit process which demonstrated improvements in operational performance by the team based at the Regional Rehabilitation Unit following the intervention between the two audit cycles. Improvements were detected by the second data collection phase in the areas of the identification of functional goals, recording of informed consent when obtained and in each of the three review phases that take place following injection and therapy intervention. This demonstrates that in this clinical service the intervention implemented to improve performance of the service was effective.

However some areas still require considerable improvement to reach acceptable levels of service provision.

In particular the areas identified for further development prior to the third round of audit were: the documentation of informed consent, improving the rate of patient follow-up (specifically in the 3-4 month review), the undertaking and accurate recording of outcome measurements following intervention. A third round audit is now planned for December 2002 to include an analysis of functional outcomes.

Conclusion

In conclusion, the audit process has been an effective way of developing clinical practice. It has already demonstrated some benefits for improvements in service provision which have taken place. Specifically, improvements have taken place in clinical awareness of the issues related to BTX injection combined with follow-up therapy, the consistent use of outcome measurement, accurate documentation, the value of follow-up and the importance of obtaining and recording informed consent.

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AN ASSESSMENT TOOL FOR ENVIRONMENTAL CONTROL PROVISION

Samantha Haines, Rehabilitation Engineer, Rehabilitation Engineering Division, Department of Medical Engineering and Physics, Kings College Hospital, NHS Trust, England, UK

BACKGROUND

The first ECS (Environmental Control System) was produced in the late 1950s for survivors of the polio epidemic (Dicey R et al 1987 cited in Wellings and Unsworth 1997). Over the next 30 years improvements were made in the design and range of appliances that could be operated via the ECS but they remained cumbersome. Advances in technology have since led to more sophisticated systems, which now have the potential to operate communication aids, computers and wheelchairs as well as household equipment. Many ECSs incorporate a remote unit which is unobtrusive and easy to mount on wheelchairs. These units may now have up to 1000 functions and switch input can now be individually designed for and by the user. Larger display units are available for those people with visual impairment and those with learning or cognitive problems who benefit from icons rather than words and an auditory feedback to operate the system.

An environmental control system consists of 3 main elements:

1) The user interface (Input switch to access the system). This may be operated by hand, foot, and chin, to the extreme of eye blink or suck/puff or may be voice activated.

2) The system (A controller). This learns and stores the codes needed to control the household appliances and usually present as a simple scanning menu format. They may transmit in Infra Red and/or Radio.

3) The environment (Accessories). These are the appliances operated by the controller. The most commonly used devices are hands-free telephones, intercoms, door openers, televisions, satellite and Hi-Fi systems.

In the UK, ECS are prescribed free of charge by the National Health Service (NHS) following a clinical and independence needs assessment (BSRM 2000).

There are currently three suppliers of Environmental Control Equipment on the NHS contract, the companies involved agree to have their equipment evaluated by a third party, PASA, and if agreed, they are then placed on contract with the NHS. Not being placed on contract does not exclude other companies from offering their services under the European directive, but purchasers tend to only obtain equipment that has been placed on contract.

TECHNO TROLLEYS

Although EC systems are offered to those of any disability and of any age, the assessors or therapists involved in the service are under pressure when providing expensive equipment to those with severe cognitive

disabilities or those with rapidly deteriorating conditions. In the past, this may result in either the patient not being provided with equipment or the service funding equipment that may not be used effectively. The aim of this project was to incorporate the use of temporary installation kits, 'Techno trolleys' into the Environmental Control prescription process and to establish the true need of the client without the draw on the installation budget.

METHOD AND APPROACH

The Techno trolleys allow for existing equipment to be used for extended assessment trials and as an interim measure for rapidly deteriorating cases while awaiting the full installation of equipment from the suppliers. This also permits a developmental approach whereby the complexity of the system can be increased as the user develops their confidence and capabilities. The idea of the Techno Trolley originated from the hospital based Regional Rehabilitation Unit 1 whereby a 'trolley' consisting of one EC unit, a switch input matched to the users needs and various appliances including a television, lamp and fan, would be wheeled to the patient's hospital bedside.

For the home environment, it was determined that a better response was found if the user's own appliances were programmed into the EC unit. It has therefore now developed that the unit is customised for the individual with the Rehabilitation Engineer programming the unit on site.

Those clients who are provided with a Techno Trolley to establish motivation and cognitive ability, find a voice-prompted system, known as a Possum Freeway 2, easier to understand. This also allows for the complexity of a system to be dramatically reduced to as little as one function and therefore, in general, if the user is unable to use this unit, they are unlikely to be suitable for an EC system.

PRESCRIPTION (see figure 1 below)

At point 1, the availability of the EC Equipment, the mounting kits and available switches would be determined.

At point 2, the EC Co-ordinator will be asked to attend if there is a problem with determining a switch or an issue with posture. We will also invite a representative from Social Services to the installation. At this stage this would be for their information only but if the client goes on to have a full company installation, input and funding from Social Services will be required.

Following installation, a review will take place after approximately 8 weeks.

RESULTS

The results shown are following a caseload of 30 past and present users of Techno Trolleys.

Following the initial assessment, the main reasons why an assessor would refer for a Techno Trolley can be established and grouped together to form a percentage: One client may come under more than one category.

32% Unsure as to the extent of understanding of Environmental Control Principles

30% To determine the motivation of using an ECS

15% Due to a deteriorating condition

15% To identify suitable switch access

5% To identify a scanning method

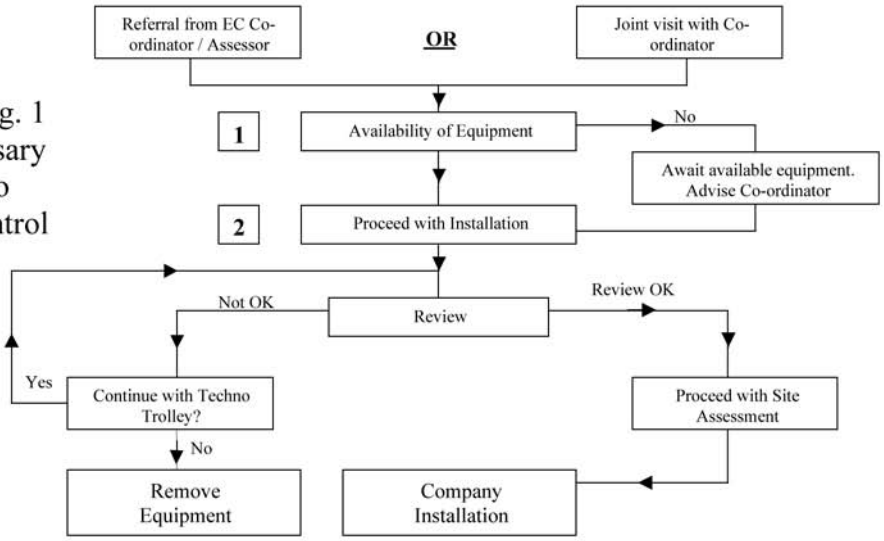
3% Other

Out of these 30 users:

17 System have been withdrawn due to lack of moti-

The flow chart shown in Fig. 1 shows the procedure necessary for prescription of a Techno Trolley Environmental Control System:

Fig 1



vation or cognitive difficulties

3 Are ongoing with the trial with the outcome still to be determined

6 New referrals, waiting to be seen

Only 4 users (16%) have gone on to have a referral for a full company installation. This obviously highlights the saving of unnecessary installations, as shown below, and reinforces the importance of the Techno Trolleys:

Taking the 17 clients who have had their systems removed:

Cost of Installing 17 Techno Trolleys	**VS.**	**Cost of Company Installation**
= £300 x 17		= £5000 x 17
= £5100		= £85,000

Therefore cost saving to date = £79,900

DISCUSSION

The current results have shown a low proportion of Techno Trolley provision going on to be referred for a full company installation, emphasising the overall cost saving for the service in unnecessary installations. This also results in more appropriate prescription and thus higher use.

Future development includes the integration of other Assistive Technology including wheelchair control and communication aid integration.

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3. ***BSRM 2000. British Society of Rehabilitation Medicine*** *(2000) Electronic Assistive Technology. A Working Party Report of the BSRM. BSRM , London UK*
4. *1 Professor Lynne Turner Stokes, Regional Rehabilitation Unit, Northwick Park Hospital, Watford Road, Harrow, Middlesex. HA1 3UJ*
5. *2 Possum Controls Ltd, 8 Farmbrough Close, Aylesbury Vale Industrial Park, Stocklake, Aylesbury, Buckinghamshire. HP20 1DQ*

PMG NEWS

10 Year History of PMG: Annual Conference Venues & Themes

Prior to PMG forming, the first 2 Conferences for the newly formed District wheelchair services were as follows;-

1991 21st & 22nd March, Sheffield Octagon Centre, 'Special Seating Seminar'

1992 7th & 8th April, Salford University, 'Wheelchair and Special Seating Meeting' Posture & Mobility Group for England & Wales established at this conference to act as a forum for and bring together all professionals and manufacturers / suppliers concerned with the posture and mobility needs of disabled people. Scotland already had the Scottish Seating & Wheelchair Group (SSWG).

1993 30th & 31st March, First PMG Conference, Swansea University, 'Managing Change & Changing Management'

1994 11th & 12th April, Warwick University, 'Quality of Service - where we are & where we should be'

1995 24th & 25th April, EMCC, Nottingham University, 'Independence by Design'

1996 16th & 17th April, Warwick University, No theme - 'Annual Scientific Meeting of the PMG'

1997 8th - 12th September, Dundee 97 - 'International Conference on Wheelchairs and Seating' PMG co-organisers

1998 27th & 28th April, Hull, Quality Hotel, No theme - 'National Conference of the PMG'

1999 12th & 13th April, Glamorgan University, 'Safety v Freedom'

2000 10th & 12th April, Llandudno, North Wales Theatre & Conference Centre, 'Working Together - the whole is greater that the sum of the parts'

2001 20th & 21st March , York University, 'Children of Today - Adults of Tomorrow'

2002 15th & 16th April , East Midlands Conference Centre, Nottingham University, 'Best Practice - Risk, Consensus & Evidence'

Gillian M Wigham
Proposed: Yvonne Borum
Seconder: Karen Hannell

As a qualified OT I have worked with disabled people for fifteen years specialising in wheelchairs and seating the last three. I feel that my experiences would enable me to bring a practical and holistic viewpoint regarding posture and mobility to the group. I also have great enthusiasm for research in this field as I am presently doing a part time MSC at Salford University.

Penny Martin
Proposed: Gillian Wigham
Seconder: Alan Kendrick

I am a chartered physiotherapist with a wealth of experience in the field of rehabilitation. I recently moved to the wheelchair service in Salford and feel very strongly that therapy input is essential in ensuring that individuals are provided with the most appropriate equipment with regard to their postural and mobility needs. It is therefore with this in mind that I am applying for a place on the committee.

Please also consider this application as a one of a joint venture between myself and Gillian Wigham. We feel that due to other commitments and distances to travel that to undertake membership as individuals would be too much; however to share the duties we feel would be more manageable.

David Calder
Proposed: Roy Nelham
Seconder: Rene Parison

I work as a Senior Rehabilitation Engineering Manager with RED, King's Healthcare. I am a professional engineer and have worked in the field of rehabilitation since 1991. My interests include special seating, mobility systems and management systems. I have provided input to the PMG over many years having led the group who wrote the guidelines. I produced and maintain the website and am part of the editorial team for 'Posture and Mobility'. It is the combination of experiences across the whole field of Posture and Mobility that I could bring to the workings of the committee.

Russell Jewell
Proposed: Patsy Aldersea
Seconder David Porter

I am a Bio-Engineer with a background in Human Biology, working at the Mary Marlborough Centre. I am involved with a wide range Assistive Technology, with special interest in paediatrics and client with complex postural issues. I have worked enthusiastically on the PMG committee for 12 months and among other things organised the evidence session at the 2002 conference.

David Long
Proposed: Andrew Frank
Seconder: Phil Swann

I have been a co-opted member of the committee for the past year and have enjoyed serving the group in conference organisation amongst other activities. I am a rehabilitation engineering Manager for the special seating service at Stanmore. Being at the sharp end of provision I feel I can make a significant contribution to the activities of the group.

Natalie Dean
Proposed: Henry Lumley
Seconder: Martin Moore

I am an Occupational therapist working for Bristol wheelchair service and am involved in all aspects of wheelchair seating and provision including postural and pressure care management and provision of special seating services. I am extremely hard working and believe I would be an enthusiastic and active member of the committee.

Martin Moore
Proposed Richard Pearse
Seconder Keith Parfrey

I have been a rehabilitation engineer at Bristol Wheelchair Centre for over six years. I have a keen interest in all areas of wheelchair and seating provision. Having enjoyed being a co-opted member of the committee for the past year I feel my contribution to the committees activities can be increased.

See page 25 for current committee and stand down dates.

PMG Guidelines

Please Please read them and feed back comments to Dave Calder.

2002 AGM Agenda.

1. Apologies fo absence
2. Minutes of previous meeting
3. Matters arising
4. Chairman's report
5. Treasurer and membership report
6. Elections to committee
7. PMG working groups
8. ISO Representation - Standards Report
9. Future meetings
10. Any other business.

2001 minutes published in Vol 14, next meeting 18/19 April 2003 in York.

CONSTITUTION

Adopted on the 21st day of March 2001

A Name

The name of the Association is Posture & Mobility Group ["the Charity"].

B Administration

Subject to the matters set out below the Charity and its property shall be administered and managed in accordance with this constitution by the members of the Executive Committee, constituted by clause G of this constitution ["the Executive Committee"].

C Objects

The Charities objects ["the objects"] are to promote improvement in and dissemination of knowledge about the posture and mobility needs of people with disabilities and about the equipment and services those needs require within a framework which recognises the rights and dignity of such people. To this end the Charity has the aims

i To develop an interdisciplinary forum for continuing education, research and debate in the interests of the general public and of people with disabilities in particular.

ii To provide an umbrella organisation linking members of voluntary and statutory agencies, representatives of users' bodies and representatives of manufacturers.

iii To maintain a register of members to enable efficient communication.

iv To encourage the establishment and maintenance of high standards of service delivery.

D Powers

In furtherance of the objects, but not otherwise, the Executive Committee may exercise the following powers:

i power to employ such staff [who shall not be members of the Executive Committee] as are necessary for the proper pursuit of the objects and to make all reasonable and necessary provision for the payment of pensions and superannuation for staff and their dependants;

ii power to co-operate with other charities, voluntary bodies and statutory authorities operating in furtherance of the objects or of similar charitable purposes and to exchange information and advice with them;

iii power to establish or support any charitable trusts, associations or institutions formed for all or any of the objects;

iv power to appoint and constitute such advisory committees as the Executive Committee may think fit;

v power to do all such other lawful things as are necessary for the achievement of the objects.

E Membership

1 Membership of the Charity shall be open to any person over the age of 18 years interested in furthering the objects and who:

- **i** has paid the annual subscription laid down from time to time by the Executive Committee and approved by the membership
- **ii** has a professional, educational, research or commercial interest in the delivery of products or services meeting posture and mobility needs
- **iii** is an appointed representative of a users' organisation; or of a society judged appropriate by the Committee on behalf of the membership.

2 Every member shall have one vote.

3 The Executive Committee may, by unanimous vote and for good reason, terminate the memberships of any individual; provided that the individual concerned shall have the right to be heard by the Executive Committee, accompanied by a friend, before a final decision is made.

F Honorary Officers

At the annual general meeting of the Charity the members shall elect from amongst themselves persons to make up the Executive Committee. The Charity seeks to encourage a mix of skills and disciplines on the Executive Committee.

G Executive Committee

1 The Executive Committee shall consist of not less than 8 members nor more than 15 members:

2 Executive Committee members may serve for a maximum continuous tenure of three years, ending with the third annual general meeting following their election to the committee.

3 Executive Committee members must stand down after this time but are eligible for re-election.

4 The Executive Committee will elect the Chairman, Vice-Chairman, Honorary Treasurer and

Membership Secretary and Secretary from the Committee membership.

5 The three-year tenure of Executive Committee members shall be extended in the case of holders of the offices within the Committee - Chairman, Vice Chairman, Secretary, Treasurer, Membership Secretary - by the length of tenure of that office which shall be a maximum of three years before re-election to that or another office.

6 The Executive Committee may in addition appoint not more than 5 co-opted members but so that no-one may be appointed as a co-opted member if, as a result, more than one third of the members of the Executive Committee would be co-opted members. Each appointment of a co-opted member shall be made at a special meeting of the Executive Committee called under clause J and shall take effect from the end of that meeting unless the appointment is to fill a place which has not then been vacated in which case the appointment shall run from that date when the post becomes vacant.

7 The proceedings of the Executive Committee shall not be invalidated by any vacancy among their number or by any failure to appoint or any defect in the appointment or qualification of a member.

8 Nobody shall be appointed as a member of the Executive Committee who is aged under 18 or who would if appointed by disqualified under the provisions of the following clause.

9 No person shall be entitled to act as a member of the Executive Committee whether on a first or on any subsequent entry into office until after signing minutes of the Executive Committee a declaration of acceptance and of willingness to act in the trusts of the Charity.

H Determination of Membership of Executive Committee

A member of the Executive Committee shall cease to hold office if he or she:

1 is disqualified from acting as a member of the Executive Committee by virtue of section 72 of the Charities Act 1993 [or any statutory re-enactment or modification of that provision];

2 becomes incapable by reason of mental disorder, illness or injury of managing and administering his or her own affairs;

3 is absent without the permission of the Executive Committee from all their meetings held within a period of six months and the Executive Committee resolve that his or her office be vacated; or

4 notifies to the Executive Committee a wish to resign [but only if at least three members of the Executive Committee will remain in office when the notice of resignation is to take effect].

I Executive Committee Members not to be personally interested

1 Subject to the provisions of sub-clause [2] of this clause no member of the Executive Committee shall acquire any interest in property belonging to the Charity [otherwise than as a trustee for the Charity] or receive remuneration or be interested [otherwise than as a member of the Executive Committee] in any contract entered into by Executive Committee.

2 Any member of the Executive Committee for the time being who is a solicitor, accountant or other person engaged in a profession may charge and be paid all the usual professional charges for business done by him or her or his or her firm when instructed by the other members of the Executive Committee to act in a professional capacity on behalf of the Charity: Provided that at no time shall a majority of the members of the Executive Committee benefit under this provision and that a member of the Executive Committee shall withdraw from any meeting at which his or her own instruction or remuneration, or that of his or her firm, is under discussion.

J Meetings and proceedings of the Executive Committee

1 The Executive Committee shall hold at lest two ordinary meetings each year. A special meeting [which may be electronic] may be called at any time by the chairman or by any two members of the Executive Committee upon not less than 4 days' notice being given to the other members of the Executive Committee of the matters to be discussed but if the matters include an appointment of a co-opted member then not less than 21 days' notice must be given.

2 The chairman shall act as chairman at meetings of the Executive Committee. If the chairman is absent from any meeting, the members of the Executive Committee present shall choose one of their number to be chairman of the meeting before any other business is transacted.

3 There shall be a quorum when at least one third of the number of members of the Executive Committee

for the time being or three members of the Executive Committee, whichever is the greater, are present at a meeting.

4 Every matter shall be determined by a majority of votes of the members of the Executive Committee present and voting on the question but in the case of equality of votes the chairman of the meeting shall have a second or casting vote.

5 The Executive Committee shall keep minutes of the proceedings at meetings of the Executive Committee and any sub-committee.

6 The Executive Committee may from time to time make and alter rules for the conduct of their business, the summoning and conduct of their meetings and the custody of documents. No rule may be made which is inconsistent with this constitution.

7 The Executive Committee may appoint one or more sub-committees consisting of two or more members of the Executive Committee together with appropriate numbers of additional members of the Charity for the purpose of making any inquiry or supervising or performing any function or duty which in the opinion of the Executive Committee would be more conveniently undertaken or carried out by a sub-committee; provided that all acts and proceedings of any such sub-committees shall be fully and promptly reported to the Executive Committee.

K Receipts and expenditure

1 The funds of the Charity, including all donations constrictions and bequests, shall be paid into one or more accounts operated by the Executive Committee in the name of the Charity at such banks the Executive Committee shall from time to time decide. All cheques drawn on any account must be signed by at least two members of the Executive Committee.

2 The funds belonging to the Charity shall be applied only in furthering the objects.

L Accounts

The Executive Committee shall comply with their obligations under the Charities Act 1993 [or any statutory re-enactment or modification of that Act] with regard to:

1 the keeping of accounting records for the Charity

2 the preparation of annual statements of account for the charity

3 the auditing or independent examination of the statements of account of the Charity; and

4 the transmission of the statements of account of the Charity to the Commission.

5 The accounting year which shall be to 31st December. Membership subscriptions will run to 31st December and will be renewable on 1st January

M Annual Report

The Executive Committee shall comply with their obligations under the Charities Act 1993 [or any statutory re-enactment or modification of that Act] with regard to the preparation of an annual report and its transmission to the Commission.

N Annual Return

The Executive Committee shall comply with their obligations under the Charities Act 1993 [or any statutory re-enactment or modification of that Act] with regard to the preparation of an annual return and its transmission to the Commission.

O Annual General Meeting

1 There shall be an annual general meeting of the Charity which shall be held in the month of March in each year or as soon as practicable thereafter.

2 Every annual general meeting shall be called by the Executive Committee. The secretary shall give at least 28 days' notice of the annual general meeting to all the members of the Charity. All the members of the Charity shall be entitled to attend and vote at the meeting.

3 The Executive Committee shall present to each annual general meeting the report and accounts of the Charity for the proceeding year.

4 Nominations for election to the Executive Committee must be made by members of the Charity in writing and must be in the hands of the secretary of the Executive Committee at least 28 days before the annual general meting. Should nominations exceed vacancies, election shall be by ballot. Votes must be returned in person no later than two hours before the annual general meeting or by post to arrive five working days before the annual general meeting.

P Special General Meetings

The Executive Committee may call a special general meeting of the Charity at any time. If at least ten members request such a meeting in writing stating the business to be considered the secretary shall call such a meting. At least 28 days' notice must be given. The

notice must state the business to be discussed.

Q Procedure at General Meetings

1 The secretary or other person specially appointed by the Executive Committee shall keep a full record of proceedings at every general meeting of the Charity.

2 There shall be a quorum when at least one tenth of the number of members of the Charity for the time being or ten members of the Charity, whichever is the greater, are present at any general meeting.

R Notices

Any notice required to be served on any member of the Charity shall be in writing and shall be served by the secretary or the Executive Committee on any member either personally, electronically or by sending it through the post in a prepaid letter addressed to such member at his or her last known address in the United Kingdom, and any letter so sent shall be deemed to have been received within 10 days of posting.

S Alterations to the Constitution

1 Subject to the following provisions of this clause the Constitution may be altered by a resolution passed by not less than two thirds of the members present and voting at a general meeting. The notice of the general meeting must include notice of the resolution, setting out the terms of the alteration proposed.

2 No amendment may be made to clause A, clause C, Clause I, clause T or this clause without prior consent in writing of the Commissioners.

3 No amendment may be made which would have the effect of making the Charity cease to be a charity at law.

4 The Executive Committee should promptly send to the Commission a copy of any amendment made under this clause.

T Dissolution

If the Executive Committee decides that it is necessary or advisable to dissolve the Charity it shall call a meeting of all members of the Charity, of which not less than 28 days' notice [stating the terms of the resolution to be proposed] shall be given. If the proposal is confirmed by a two-thirds majority of those present and voting the Executive Committee shall have power to realise any assets held by or on behalf of the Charity. Any assets remaining after the satisfaction of any proper debts and liabilities shall be given or transferred to such other charitable institution or institutions having objects similar to the objects of the Charity as the members of the Charity may determine or failing that shall be applied for some other charitable purpose. A copy of the statement of accounts, or account and statement, for the final accounting period of the Charity must be sent to the Commission.

This constitution was adopted on the date mentioned above by the persons whose signatures appear at the bottom of this document on behalf of the members present.

Signed:

R Nelham (Chairman)

B ter Haar (Treasurer)

Current PMG committee by profession, position and stand down dates:

Name	Profession	Position	Date off
Elizabeth Green	Consultant		2004
Roy Nelham	Engineer NHS	Chairman	2005
Simon Fielden	Engineer NHS		2003
Phil Swann	Engineer Commercial	Editor	2004
Rene Parison	Engineer NHS	Vice Chair	2005
Barend ter Haar	Biological Commercial	Treasurer	2007
Julia Cunningham	PT charity	Secretary	2007
Henry Lumley	WCS Manager		2004
Gordon Mcquilton	Engineer Commercial		2004
Dave Calder	Engineer NHS	Guidelines Co-opt	
Russ Jewell	Engineer NHS	Co-opt	
David Long	Engineer NHS	Co-opt	
Michael Edwards	Engineer NHS	Co-opt	
Antony Stockton	Engineer NHS	Co-opt	
Martin Moore	Engineer NHS	Co-opt	

Post Bag

Empty - no mail, nothing. Obviously everybody's so happy that there's nothing to write about.

Notice Board

Date	Location	Title	Contact
April 2002			
15 - 16	**Nottingham**	**National Conference of the PMG**	**tel. 01223 882105**
May 2002			
01	Stirling	Wheelchair and Seating Technical Standards And Their Clinical Application.	See below for details
June 2002			
17 - 18	York	Manual wheelchair training day and trike study day	Whizz Kidz tel. 020 7233 6600 email: jmcunningham@freeuk.com
20	London	3rd International Matrix Conference and Custom Seating Symposium	tel. 020 8780 4500 ext 5236 email. jsemlyen@rhn.org.uk
April 2003			
18 - 19	**York**	**National Conference of the PMG**	**tel. 01223 882105**

SEMINAR ANNOUNCEMENT

The Scottish Seating and Wheelchair Group will be holding a seminar entitled "Wheelchair and Seating Standards and their Clinical Application" on **Wednesday 1st May 2002** at **The Golden Lion Hotel, Stirling.**

This will have a very similar format to the successful Seating Standards Workshop run jointly by BTHA and the Posture and Mobility Group last August in Solihull.

If you missed the PMG event, here is your chance to hear what is happening on the International Standards scene, and to make your views known before the standards are finally published.

For further details please contact;
Liz Henderson on (0141) 548-4792 or e.henderson@strath.ac.uk for **delegate enquiries**
and
Gavin Drummond on (01382) 496312 or gavin@tortc.tuht.scot.nhs.uk for **exhibitor enquiries**

The members delegate fee of £30 will be available to members of either SSWG or PMG.

PROGRAMME

9.30 REGISTRATION AND COFFEE
Morning Session. Chairperson: **Dr Shona Michael**
10.00 Introduction
10.05 Background to the standards process, the wheelchair series of standards and the seating series of standards. **Dr Geoff Bardsley**
10.40 Definitions of Body and Seat Dimensions (ISO 16840 part 1). **Dr Barend ter Haar**
11.00 Tissue Integrity Management devices (ISO 16840 part 2). **Prof. Martin Ferguson-Pell**
11.20 COFFEE AND EXHIBITION
11.50 Postural Support devices - Test Methods for Static, Impact and Repeated Load Strength (ISO 16840 part 3). **Mr Nigel Shapcott**
12.10 Seating Devices for use in Motor Vehicles(I S O 16840 part 4). **Mr Bob Appleyard**
12.30 LUNCH AND EXHIBITION
13.30 Introduction to workshops
13.40 Four workshops. ISO 16840 parts 1,2,3, and 4.
14.35 Repeated workshops
15.30 Feedback from discussion groups
15.45 CLOSE

Wheelchair Users in Vehicles ~ Good Practice

Initiated by Alison Thom, this IPEM working group now chaired by Martin Seabrook is working to produce a Good Practice document to help with the practical issues relating to wheelchair users in vehicles. The aim is to produce a nationally balanced perspective that can form the basis of regional transport policy. There are three sub groups working on: knowledge base, risk assessment and communication and training. If you have worked on any of these issues and feel you could contribute to save re-inventing the wheel then we would like to hear from you. Please contact:

Martin Seabrook, Active Design Ltd, 68K Wyrley Road, Witton, Birmingham, B6 7BN.
email: martins@activedesign.co.uk Tel: 0121-326-7506 Fax: 0121-326-7506

Education & Training

Funding for training in the new NHS remains a major issue for many hard-pressed wheelchair services. Locally held budgets are always under pressure and it is frequently costs that are perceived as non-clinical that are cut. However, with increasing responsibilities for supporting continuing professional development, can we, as service providers, afford to reduce our support for training of our staff?

Services should look towards their local Education Purchasing Consortium for support for what is euphemistically called Extra Contractual Educational Activity. Last year we submitted a number of bids covering orthotist training courses and OT training on a postural management course. They were all approved to the tune of around £3,500. We ultimately used the money to support two rehabilitation engineers on an MSc course as well as the OT course.

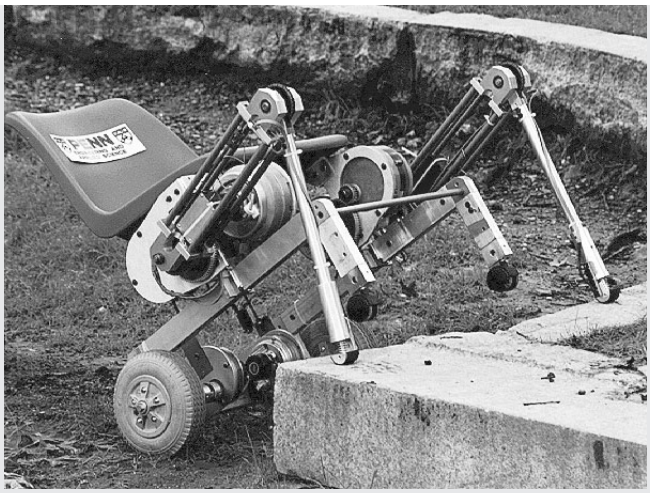
This year we have again submitted bids for a variety of training requirements totalling £9,000 but have yet to hear the outcome. Bids had to be in by end of January but you might try an enquiry to your training department to see whether local closing dates have passed.

Henry Lumley
Wheelchair Service Manager Bristol

Mindbender Answer
7 pigs - 3 male pigs and 4 sows

The World of the Web

Here are some more sites to visit. The All Terrain Wheelchair site provides an interesting concept for seated mobility over harsh terrain. Here is one of the photos from the site showing the spider like legs protruding from the front of the chair!



http:// www.naric.com
National Institute on Disability and Rehabilitation Research. Search on project funding by key words to provide research contacts.

http://www.cis.upenn.edu/~venkat/wheel_noframe.html Current research on All Terrain Wheelchairs (cross between a wheelchair and a spider!)

http://www.radar.org.uk

RADAR's new website opens up communication within a network of 500 local and national member organisations.

http://www.empowernet.org/index.htm

Check out the wheelchairPOWER group.

http://www.whizz-kidz.org.uk/
Whizz-Kidz is a national children's charity with a very simple goal - to give disabled children independent mobility.

http://www.nmap.ac.uk

NMAP (Nursing, Midwifery and Allied health Professions) is a gateway to evaluated, quality Internet resources, aimed at students, researchers, academics and practitioners in the health and medical sciences.

http://www.pasa.doh.gov.uk/rehabilitation/

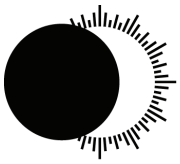
Purchasing and Supplies Agency.

http://www.mobility-unit.dtlr.gov.uk/wheelchair

'Get Wheelchair Wise' BHTA release

http://www.posture-mobility.fsnet.co.uk

2002 annual conference programme



Visit the website at:
http://www.smart-therapy.org.uk/courses.shtml

THE 3rd INTERNATIONAL MATRIX CONFERENCE AND CUSTOM SEATING SYMPOSIUM – 20TH JUNE 2002, 9am – 5.00pm

ROYAL HOSPITAL FOR NEURO-DISABILITY, PUTNEY, LONDON, SW15 3SW

This event will expand upon previous successful Matrix custom seating conferences. The aim is to link Matrix use within the context of all forms of custom seating. We hope to engage commercial users, prescribing Therapists, Rehabilitation Engineers and others in a dialogue around problems, new ideas, working practices, and training needs. To help create a forum for custom seating provision, proposals for presentations, workshops and panels are invited. The program is therefore subject to minor change and the final result will incorporate all communication/dissemination from participant's suggestions.

Preliminary Programme:

9.00-9.30	Registration, Coffee and Exhibition.
9.30-9.35	**Welcome**
9.35-10.00	**Fit for Purpose: The Custom Seating Prescription Process** *Dr Linda Marks, Consultant in Rehabilitation Medicine*
10.00-10.15	**Demand and Supply: Clinical and Technical Training Implications for Custom Seating** *Speaker to be confirmed*
10.15-11.00	**The US Experience: Matrix Fabrication in 6 Hours** *Clyde Peach, Orthotist, and Therapist, TBC*
11.00-11.30	Coffee and Exhibition
11.30-11.50	**Hybrid Matrix Seating** *Paul Dryer, David Long and Paul Richardson, Rehabilitation Engineers*
11.55-12.05	**Crash Testing and Custom Seating** *Simon Hook, Seating Specialist*
12.05-12.15	**Structural Testing of Seating Components** *Dr. Dennis May, Clinical Engineer*
12.15-1.45	Lunch & Exhibition
1.45-2.30	**The UK Experience: Custom Seating and Assistive Technology** *Dr. Steve Cousins, Clinical Engineer, Gary Derwent, Occupational Therapist and others TBC*
2.30-3.30	**Workshop 1:** *'Tricks of the Trade': New Techniques in Matrix Use, Stuart Morling, Seating Specialist, Clyde Peach and others TBC* **Workshop 2:** *Fit for Purpose: Improving the Custom Seating Decision Making Process Dr. Linda Marks and others TBC* **Workshop 3:** *Identifying Training Needs for Custom Seating Lead TBC, Catherine Scott, Seating Specialist and others TBC* **Workshop 4:** *Crash Testing and Custom Seating Simon Hook and others TBC*
3.30-4.00	**Tea and start of Workshop Feedback / Panel Discussion**
5.00	Close

Cost per delegate £75 (includes refreshments and lunch). For further details please contact**: Conference Co-Ordinator on 020 8780 4500 ext. 5236 or email: jsemlyen@rhn.org.uk.**

CARDIFF AND VALE NHS TRUST

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Rookwood Hospital
Rehabilitation Engineering Unit

Clinical Engineer/Rehabilitation Engineer

Salary: £20,059 - £27,450 (Clinical Scientist B8-16)
£17,831 - £25,379 (MTO 3-4)
pay review pending

Full-time (37 hours per week)

This is an exciting opportunity for an enthusiastic person keen to develop their career within an innovative and forward thinking department.

The Rehabilitation Engineering Unit delivers a range of specialised clinical services, in particular, the provision of special seating and assessment for electronic assistive technology. The Unit supports an active research and development programme in partnership with local universities and private companies.

The Unit's Special Seating Team provides special seating to clients throughout South East Wales. Working as part of a team whilst exercising considerable individual initiative, you will assess clinical need and prescribe, fit and issue integrated special seating and wheelchair systems for people with complex disabilities.

To be appointed at the higher end of the Clinical Scientist/MTO scale, you should have a good honours degree/HNC or equivalent in engineering, science or a clinically related discipline with extensive clinical experience and a sound knowledge of all aspects of special seating. Candidates with less qualifications and/or experience may be considered for appointment initially at the lower grade with opportunities to progress within the Unit's very supportive approach to both the personal and the continuing professional development of staff.

For informal enquiries please contact Dr Colin Gibson, Head of Rehabilitation Engineering, Rookwood Hospital, Cardiff on 029 2031 3931.

For an application form and job description please contact the Recruitment Department, University Hospital of Wales, Lakeside Complex, Heath Park, Cardiff CF14 4XW, telephone 029 2074 6547 or after hours (voicemail) on 029 2050 2550 or email: recruitment.office@uhw-tr.wales.nhs.uk

Please quote ref: CSG075.
Closing date for applications: 3rd May 2002.
www.cardiffandvale.nhs.uk

Committed to Equal Opportunities