



## ISPO UK MS 40th Anniversary Meeting

27<sup>th</sup> & 28<sup>th</sup> September 2012

Holiday Inn Royal Victoria Sheffield

in collaboration with



# ISPO UK40

1972 – 2012

# THE COMPENDIUM



Orthotic Education  
& Training Trust





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**Compendium edited by: Rajiv Hanspal, Laura Burgess and Irene Cameron**

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## **Welcome to the 40<sup>th</sup> Anniversary Meeting of ISPO UK MS**

It gives me enormous pleasure to welcome you all on behalf of the executive committee to this the 40<sup>th</sup> annual scientific meeting of the UK Member Society of the International Society for Prosthetics and Orthotics. We have returned to Sheffield where we last held a meeting in 1979 - 33 years ago. This year we also celebrate our 40<sup>th</sup> Ruby Anniversary as a member society of ISPO, formed in 1972. Thank you for attending and I hope that you find the meeting to be interesting and enlightening, that it will drive changes in clinical practice for the benefit of our patients and perhaps provide the opportunity for reflection on the last 40 years of the prosthetic and orthotic field.

For the first time in the history of ISPO UK, I am delighted and very proud that we are holding our annual scientific meeting in collaboration with the British Association of Chartered Physiotherapists (BACPAR) and the British Association of Prosthetists and Orthotists (BAPO). This is a true reflection of the multidisciplinary ethos of ISPO. In these times of increasing clinical commitments with pressure and drive towards efficient and effective use of time, more collaborative meetings in the UK prosthetics and orthotics field may be of great benefit to clinicians.

Professor George Murdoch, one of the key people in the formation of the international society, was the first Chairman of the UK member society. In recognition of his unique contribution to both our field and ISPO, a prestigious prize lecture was launched at the silver jubilee meeting in 1997 – “The George Murdoch Prize Lecture”. More details of the history and recipients of the prize medal are published in this compendium. This year the award was opened up for the first time to an international forum and the winner is Dr. H. Meulenbelt from the University Medical Centre Groningen, The Netherlands.

The international society continues to grow in numbers and now has about 3,200 members in around 60 countries. ISPO UK currently has 160 members and we continue to look at ways of increasing our membership. The membership fee supports the work of the international society and in particular, many of the projects ISPO is involved with in developing countries.

Currently ISPO UK has representation at both the Prosthetics and Orthotics Workforce meetings and the Clinical Reference Group for Specialised Commissioning in Complex Disability Equipment. These forums are both likely to affect the education and development of professionals working in the field as well as ensuring a more equitable and quality service to our patients.

We have worked hard to prepare a full two day programme which encompasses a range of topics and provides the opportunity for a large number of free paper presentations. Our meeting is once again sponsored by a commercial exhibition which will allow delegates to see the most recent components, devices, manufacturing materials and equipment. We are very grateful for the loyal support of the companies attending so please ensure that you take time to visit the exhibition.

Chas A Blatchford & Sons Ltd continues to kindly provide sponsorship for the Blatchford Lecture, which this year will be presented by Dr. Harmen van der Linde from the Netherlands on “A Multidisciplinary Guideline in Lower Limb Amputation, Future International Development”. The Orthotic Education and Training Trust have generously sponsored Mr. Andrew Hansen who will visit from the University of Minnesota, USA to present on “Roll-over Shape as a Tool in Prosthetics and Orthotics”. We are extremely grateful to both for their ongoing support of our meeting. This year I am pleased to report sponsorship opportunities were taken up by Chas A Blatchford & Sons Ltd – (Gold); Irwin Mitchell Solicitors (Silver) and North Sea Plastics (Bronze). I would like to record my thanks to all our sponsors for their support with this meeting.

I take this opportunity to pass on my thanks and that of the executive committee to all the authors and presenters who have contributed to the programme. I would also like to thank those members of the executive committee who have worked hard to organize such a special meeting. Particular thanks must be expressed to Professor Rajiv Hanspal: our anniversary compendium, which provides us with a reference of the last 40 years of ISPO activities, is without doubt a product of his meticulous attention to detail and accuracy, and compiled with endless enthusiasm, encouragement and wise counsel. Enormous thanks must also be given to Irene Cameron who works extremely hard for us in our secretariat role and provides a huge amount of administrative support.

If this is the first ISPO meeting you have attended, I hope you will enjoy the experience very much, find it stimulating and, as a consequence, join our meetings in the future. To those of you who regularly support our annual meeting, I thank you for your continued support. Please do take some time to complete your evaluation form as your feedback is welcome and an essential part in making our future meetings successful. Within the compendium, as well as the programme and abstracts for free paper presentations, we have included some factual information from the past 40 years of the society’s activities that may interest you. There are also some documents of historical relevance to the UK MS, such as the first ISPO UK Newsletter!

Finally, may I express my sincere thanks to you, the delegates, for your interest, support and participation. Please use this forum to promote lively debate and discussion! I hope that you enjoy both the scientific and social aspects of our meeting and take the opportunity to network, making new contacts as well as catching up with old friends.

Laura Burgess, Chair, ISPO UK MS



## **Welcome from the Chair, ISPO UK MS Scientific Sub-Committee**

It gives me immense pleasure to extend a warm welcome to you all to this great joint conference. I am particularly delighted to see you in my home town of Sheffield, the City of Steel. I hope our joint meeting will be as strong as steel, always shining, rust proof and everlasting.

Our programme is packed with a large number of free papers and posters as well as guest presentations from renowned speakers from across the world. The Scientific Sub-Committee, along with the Executive Committee, has worked long and hard to ensure there could be significant participation by many contributors at this prestigious meeting. We hope you will find the event both informative and enjoyable!

Ramesh Munjal, Chair, Scientific Sub-Committee, ISPO UK MS



# **1ST EXECUTIVE BOARD OF ISPO**

**Sitting left to right:** D.S. McKenzie (England), Anthony Staros (USA), Knud Jansen (Denmark), George Murdoch (Scotland), A. Bennett-Wilson (USA)

**Standing:** Jon Kjolbye (Denmark), Colin McLaurin (Canada), A. Mequirk (England)



## **DANISH DOCTOR REALISES 17 YEAR – OLD DREAM**

Rehabilitation experts from 13 nations signed a document to establish “The International Society of Prosthetics and Orthotics” at Rungsted, Denmark, on Sunday, 15<sup>th</sup> November. Nine year old Ulla Anderson who was stricken with polio at 6 months concluded the brief ceremony by affixing the seal to the official document.

For 17 years Dr Knud Jansen of Copenhagen has been organising the efforts of his colleagues through a special committee of I.S.R.D., The International Society for Rehabilitation of the Disabled. The work that has been done by this committee in improving the quality of artificial limbs and braces throughout the world has now been recognised by the formation of this new Society.

It is only in recent years that attempts have been made to apply modern scientific methods to the design of limb, braces and other aids for disabled persons. The need for these appliances far exceeds the meagre resources that exist and it is the aim of the Society to harness the efforts of all these engaged in the training of medical and technical experts and to co-ordinate and exploit research activities on a global basis.

There are few examples in the world today where professional knowledge is so freely shared either on a personal basis or through the many affiliated organisations and it is expected that the leadership provided by Dr Jansen and the officers of the Society will greatly enhance the possibility of services to the millions of disabled individuals where ever they may be.

Further information may be obtained from, The Secretariat, International Society for Prosthetics and Orthotics, 3 Hans Knudsens Plads, Dk – 2100 Copenhagen O Denmark.

These signing the document include:

Andre Bahler, Chief Prosthetist/Orthotist  
Chairman of the INTERIOR  
Zurich, Switzerland

Colin A McLaurin, D.Sc. Project Director  
Prosthetics Research & Training Unit  
Toronto, Canada.

Gotz Gerd Kunh, Professor, M.D.,  
Clinic for Technical Orthopaedics of  
The University of Munster (Westph.)  
Munster, Germany.

Anthony Stores, Director  
Veterans Administration Prosthetics Centre  
New York, U.S.A.

Anthony W McQuirk, F.I.B.S.T.  
Ass. Chief Prosthetist  
J.E. Hanger & Co Ltd., Roehampton, England

A. Bennett Wilson, jr., Executive Director  
Committee on Prosthetics Research and Development  
National Research Council, Washington D.C.,  
U.S.A.

D.S. McKenzie, Director  
Biomechanical Research and Development Unit  
Department of Health and Social Security  
Roehampton, England

Kjolbye, M.D., Ass. Chief Surgeon  
Orthopaedic Hospital  
Copenhagen, Denmark.

George Murdoch, F.R.C.S.  
Orthopaedic Surgeon in Charge,  
Dundee Limb Fitting Centre, Dundee, Scotland

Knud Jansen, M.D. Chief,  
Orthopaedic Department, Copenhagen  
County Hospital, Denmark

The officers appointed to act during the next years are:

President	Dr Knud Jansen
Vice-Presidents	Mr Andre Bahler, Switzerland
	Mr George Murdoch, Scotland
	Mr Anthony Staros, U.S.

INTERNATIONAL SOCIETY FOR PROSTHETICS AND ORTHOTICS  
UNITED KINGDOM NATIONAL SOCIETY



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H. Thompson  
Hon. Chairman:  
Dr. H. J. B. Day  
Secretary/Treasurer:  
J. Williams

Trustees Office:  
Queen Mary's Hospital,  
Rochampton,  
London SW15 5PL

December, 1975

NEWSLETTER

Members of the U.K. National Society.

Dear Member,

I am writing to you on behalf of your Committee to keep you informed of activities which have taken place or will take place and have not been published in the Bulletin. Also I would like to invite you as a member of ISPO to write to Secretary John Williams or myself on any subject in which you feel ISPO would be interested.

The U.K. National Committee

You will have read the listed names in the No.16 Bulletin. It is very much regretted that Mr. Gordon Rose's name was not printed, he is, as you know, a very active member of the Committee. This error will be rectified as early as possible.

There have been two Committee Meetings this year, both extremely well attended. The agenda for the last meeting is published in No.16 Bulletin, being part of the annual report to the President. It was agreed at this meeting that there would be at least two Committee Meetings each year. One prior to the annual Scientific Meeting and an A.G.M.

With very much regret we announce the resignation from the Committee of Dr. Parish who has reluctantly decided to resign for health reasons. We wish him a speedy return to good health and thank him most sincerely for his support.

4th U.K. National Scientific Meeting, Newcastle upon Tyne, 7th April 1976

Preparations are well in hand. Robin Redhead and Nigel King have received an excellent response from members and are now preparing the programme. It will be extremely helpful if you will indicate your intention to attend at Newcastle on the enclosed form. We look forward to a full attendance and an interesting and informative meeting. We have tentatively reserved accommodation for 100 in the Halls of Residence, Newcastle University, for the night of April 6th.

Constitution

It is intended that each member is issued a copy of both the ISPO International Constitution and the U.K. National Member Constitution. As soon as the amended International Constitution is issued from Copenhagen we will arrange for the printing of our amended U.K. National Constitution.

Statement of Accounts

We have, fortunately, engaged at a nominal amount a Chartered Accountant, Mr. K.A. Jackson, who will submit a signed statement of accounts for the U.K. Society for 1975 onwards and who will advise the U.K. Society as required.

Subscriptions

As you will appreciate the subscriptions for next year are due on January 1st. It would be most helpful if members who have not already paid for 1976 would kindly consider paying by bankers order. Please complete the enclosed printed form and return it to John Williams and he will forward it to your bank. Will members who already pay by bankers order please cancel their current arrangement and complete this form. This is necessary due to the change of bank.

News from Members

It was suggested at a Committee Meeting that members would be interested in hearing about current events in U.K. and the following report is from:

Mr. Gordon Rose, F.R.C.S.,  
Consultant Orthopaedic Surgeon,  
Robert Jones and Agnes Hunt Orthopaedic Hospital,  
Oswestry, Salop.

"The first training course sponsored by the Orthotic Training Council of England was held at Garnett College, Rochampton, from September 22nd to September 25th 1975. It had as its three objectives:-

To explain the functions of the Orthotic Training Council and the Education Committee. To discuss the present and future methods of promoting these.

To hold "Model" Training Sessions for evaluation by Industry and the Council.

To promote a social situation for free exchange of ideas between all participants.

The first day and a half were spent on the first objective and included contributions from the Council, the orthotic industry and educationalists who have been concerned in the design both of the academic syllabus and the control mechanism of the in-service training, namely the Task Book. This promoted very free and informal discussion of the manifold problems of the initiation of a training course for certification. Great emphasis was placed on the need for potential evolution to meet the changing demands and structure of the industry (with possible integration with prosthetists) and those of advancing theoretical and practical knowledge, whilst at the same time being relevant to present needs.

A day was given to a session on the Cosmetic Caliper, this included the mechanical and therapeutic objectives of calipers and was illuminated by the different approach of an engineer called upon to design such an orthosis and of orthotists who modify traditional appliances. This was followed in the afternoon by a practical demonstration at Rochampton. Another half day was given to a joint session of prosthetists and orthotists to consider in general theory and practice as applied to quadrilateral sockets and patella tendon bearing devices with an opportunity for orthotists to see some of the research work being done in this respect and in determination of pressure under the foot at B.R.A.D.U.

As regards the third objective this was very successful with an excellent course dinner provided by Garnett College and followed by an impromptu, but surprisingly skilful, choral event held together by the superb piano accompaniment provided by an eminent educationalist.

It is clear that the course was a very considerable success and fulfilled an important need. Lessons learnt, it is our intention to hold a further course next year at the same time which we hope will provide an improved service to a wider audience."

To all members and their families Good Health and Happiness for Christmas and 1976.

Kind regards.

H. Thompson,  
Chairman

## THE NEWSLETTER

The earliest newsletters of the UK Society were brief two or three page letters from the Chairman, generally concerning administrative information and occasional news items – see Winter Issue 1975 printed on the next page. By 1980/1981 it had taken the shape of a newssheet.

In 1981 David Simpson and Ron Donovan proposed that the committee should consider introducing a new style of Newsletter. They felt very strongly that the whole membership, and not just those who were able to attend, should benefit from papers presented at the Annual Scientific Meetings and kept abreast of topics discussed at the Annual General Meeting. The committee duly appointed them as co-editors and agreed funding for a year. They introduced the booklet format containing abstracts of papers presented at the Annual Scientific Meeting and the Annual General Meeting and published three editions of the Newssheet, as it was called, in the first year.

In 1985 the Vice-Chairman, Mr David Condie, was entrusted with the job of Editor and he continued in this role for nine years (17 issues). The newsletter had taken on a book format and included solicited articles and abstracts from the Scientific meetings. David introduced regular international ISPO news in the newsletter. In his last editorial David meticulously thanked 45 individuals to express his sincere thanks for their efforts, help and co-operation. In 1994 Dr Rajiv Hanspal took over editorship and the newsletters began to show further developments in format, resulting in a “news publication”. Abstract were published in a separate “proceedings” and included full results of the presentations at the meetings, including some discussions.

From 1996 the publication of the newsletters became the responsibility of the Public Relations Sub-Committee, under the Chairmanship of Dr Mike Dewar and with “rotating” editors from within the sub-committee membership, most notably, Joe Wilkinson. Together, until their retirement from the Executive Committee in October 2009, Mike and Joe conscientiously and diligently produced regular publications for the ISPO UK membership.

In tandem with the newsletters, the ISPO UK Member Society website was introduced in the late 1990s ([www.ispo.org.uk](http://www.ispo.org.uk)) providing an opportunity to publish increased information and publications to members in “real time” whilst promoting the work and ethos of the Society to the wider public domain.

With a new Public Relations Sub-Committee in situ, under the Chairmanship of Dr Fergus Jepson, ably supported by Colin Dance and Terry Pond, initiatives for ensuring regular communication with ISPO UK members continues to develop, most notably in the form of a quarterly E-bulletin and by wider use of both the website and electronic communication.

To view ISPO UK MS website visit [www.ispo.org.uk](http://www.ispo.org.uk)  
To view ISPO International website visit [www.ispoint.org](http://www.ispoint.org)





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## THE GEORGE MURDOCH PRIZE LECTURE

Emeritus Professor George Murdoch, President of the International Society for Prosthetics from 1977 to 1980, was one of the best known and most respected members of the Society. He was one of the founder members of the Society and was enormously influential both nationally and internationally in the development of prosthetics and orthotics and of treatment by the clinic team. He was a gifted surgeon, teacher and leader with the ability to 'make things happen'.

George Murdoch received his school education at Falkirk High School before proceeding to St Andrews University, where he graduated MB ChB with commendation in 1943. These being the war years, he obtained his initial specialist training at various service hospital establishments including Larbert Base Hospital near his home town at Falkirk. He successfully obtained his Fellowship of the Royal College of Surgeons of Edinburgh in 1947 and was appointed as Squadron Leader (Orthopaedic Specialist) in the Royal Air Force. Returning to civilian life in 1949 he worked as a Senior Registrar at Bridge of Earn Hospital before being appointed Consultant Orthopaedic Surgeon to the East of Scotland Regional Health Board in 1952. He specialised in Orthopaedic Surgery and enjoyed a long and distinguished career culminating in the appointment as Professor and Traumatic Surgery in Traumatic Surgery in the University of Dundee in 1976. With the influence of Professor Ian Smillie, his first "chief" in Dundee, it was hardly surprising that George Murdoch's initial interest lay in disorders of the knee, most specifically cartilage lesions. In 1955, however, he was appointed Limb Fitting Surgeon to the Eastern Region Health Board and so began a love of the subject of amputation and prosthetics which was to dominate the rest of his working life.

George's professional activities during the following 40 years can probably be summed up by references to three organisations: Dundee limb Fitting Centre (DLFC), ISPO and the national centre for Training and Education in Prosthetics and Orthotics. Considering DLFC firstly, in the years following his appointment as Limb Fitting Surgeon he travelled extensively studying amputee rehabilitation practises. The conclusions he reached from these travels resulted in 1965 in a proposal which was happily accepted by the Health Board to create a specialist centre for the rehabilitation of the amputee, the first in the UK, Dundee Limb Fitting Centre. DLFC was George's spiritual home and even, as was inevitable when he moved on to the national and international stage, he retained a keen interest in the development of the Centre. The working practices of the Centre today are firmly based on principles established by George Murdoch more than 30 years ago.

His international travels brought George in contact with a number of key figures who shared his concern for the quality of care of amputees. It is therefore, not surprising that he was a signatory to the founding statement of the International Society of Prosthetics and Orthotics in Copenhagen in 1970. He served as one of the first Vice-Presidents of the Society before being elected President in 1977. During this period and subsequently, he was one of the most active and effective members of the ISPO Board and was responsible for a succession of ISPO initiatives, Workshops and Reports on topics as diverse as Prosthetic Standards, Education and Training, the Needs of the Developing countries, CAD-CAM and Ischial Containment Sockets.

In 1967 George was appointed a member of the Scottish Home and Health Department's Working Party on the Future of the Artificial Limb Service in Scotland. One of the principal recommendations of the 'Denny Report' on the subject of education, which came to fruition in 1973, was the creation of the National Centre for Training and Education in Prosthetics and Orthotics at the University of Strathclyde. Hardly surprising, George was appointed Chairman of the Board at the Centre, in which position he served until 1994. George's influence on the Centre has been enormous and the significance of this role was recognised by the University of Strathclyde by his appointment as Visiting Professor in 1985.

Other organisations that have benefited from George's considerable energy and expertise include the British Standards Institute and the International Standards Organisation – he was instrumental in the establishment of ISO TC 168, the Prosthetics & Orthotics Committee of the ISO, the Chief Scientist's Office of the Scottish Home and Health Department where he chaired their Standing Committee on Prosthetics and Orthotics and its successors from 1973 to 1984, the Bioengineering Unit at the University of Strathclyde to whom he was a visiting Professor from 1974 to 1985, The Science and Engineering Council whose Medical Engineering Committee he served on from 1981 to 1985, the Royal College of Surgeons, the British Orthopaedic Association and many more. His major contribution to orthopaedic science was recognised by the University of Strathclyde in 1989 in his appointment as Honorary Doctor of Science.

With apparently endless list of committees and similar duties, it would be easy to imagine that George would lose contact with the cutting edge of his profession. Nothing could be further from the truth. After his appointment as Professor of Orthopaedic Surgery at the University of Dundee in 1976, while retaining his role of Clinical Director at DLFC, he applied his energy to the task of fostering and promoting orthopaedic training and education. His personal publications, from his early interest in cartilage lesions and meniscectomy to his later classic publications on all aspects of the amputation process, from indications for amputation to level selection, the surgical process and post operative management are as relevant today as they were when first published.

*(written by David Condie, 1997, for the Silver Jubilee Compendium)*

Many of us owe him a debt of gratitude for his help, support and guidance.

In 1997, the ISPO UK NMS established the George Murdoch Prize Lecture.

The following is his letter to the then Chairman of the UK NMS expressing his views on the initiative.

GEORGE MURDOCH,  
MIDDLE CHURCH, FLAT C,  
6 TAY STREET,  
PERTH, PH1 5LQ  
Telephone 01738 445772  
Fax 01738 445772

18th October, 1996

Dr. R.S.Hanspal,  
Chairman,  
International Society for Prosthetics & Orthotics (UK),  
143 Cambridge Road,  
Wimbledon,  
London SW20 0PH.

My dear Hanspal,

**Proposed Prestige (Prize) Lecture**

We have already discussed this matter on the telephone and there is, of course, the 'Condie' correspondence including the discussion papers.

May I say straightaway that I am deeply honoured by the National Society in its intention to name the lecture after me. In this regard I would appreciate if the lecture was described as the George Murdoch Prize lecture (medal). The notion that the lecture should be awarded every two years and be seen as a 'Prize' lecture rather than an Invitational event is in keeping with my own ideas. There are however difficulties which no doubt you have foreseen - notably if 'applications' are of poor standard. If so you cannot award and the lecture loses its appeal and its prestigious nature; in these circumstances the 'lecture' would die a death. You may consider the notion of using the word 'normally' as applied to a lecture based on applications but still gives you a 'let-out' and the possibility to invite a lecture from a member or fellow of standing. It is not an easy decision.

At any rate it should be a prestigious award and lecture in the field of amputation surgery, prosthetics, orthotics and related rehabilitation and bio-engineering.

The main problem is the emergence of a very bright, typically a Ph.D. student, presenting 'Lab' work which at first sight affects the amputee or other disabled but has no direct involvement in his or her work with the disabled and subsequent career. I would like to think that the applicant possesses some evidence of commitment to the disabled. At best I would like the award to go to someone who demonstrates commitment and a real understanding of the patients personal problem, assessment, the programme of rehabilitation and a measurement of the ultimate outcome. For the clinician measurement is the problem and for the 'lab' man the number of factors (especially clinical factors) in the equation he uses. My hope would be that some would tackle the influence of government (in the broadest sense) with respect to attitude, the regulations applied and their influence on the major events in the patient's history. I wish you good fortune in your consideration.

I shall, of course, be very pleased to award the 'prize' emblem whatever that may be. At that event I would like my wife to accompany me.

With best wishes,

Yours sincerely,

  
George Murdoch

Copy to: Roy Nelham  
Amar Jain  
Colin Stewart

## 2012 PRIZE

The George Murdoch Prize for 2012 has been awarded to **Dr. H. E.J. Meulenbelt**, University Medical Center Groningen, The Netherlands - “Skin Problems of the Stump in Lower Limb Amputees.”

## Past Winners List

2008	Mrs Elaine Owen	“The Importance of Being Earnest About Shank & Thigh Kinematics Especially When Using Ankle-Foot Orthoses”
2005	Dr Lorraine Graham	“Do Energy Storing Feet Benefit Trans-femoral Amputees”
2002	No award	
1999	Mr William Spence	“Reciprocating Gait Prostheses for the Bilateral Hip Disarticulation Amputee”
1997	Dr Dipak Datta	“Intelligent Knee – a Multi-Dimensional Evaluation in Search of Evidence”



2008 Winner Elaine Owens  
(with Paul Charlton, ISPO UK Chair)



2005 Winner Lorraine Graham



1999 Winner Bill Spence  
(with Dipak Datta, 1997 Winner)

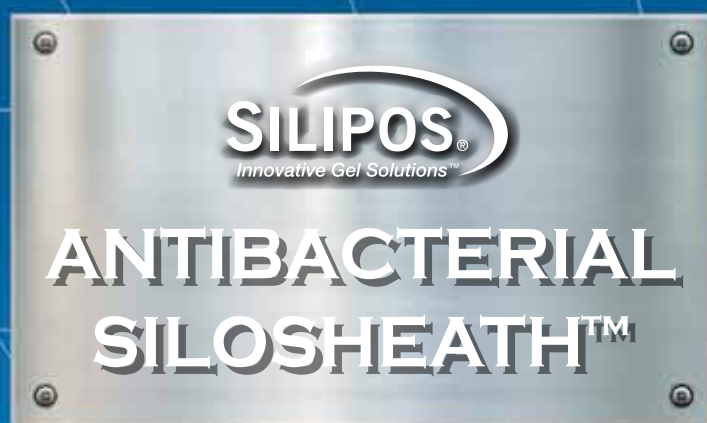


1997 Winner Dipak Datta  
(with George Murdoch)



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## BLESMA PRIZE

THE BLESMA PRIZE - currently £150 each - is awarded by the British Ex Serviceman's Association (BLESMA) to the two best free papers, one of which must be related to prosthetics, presented at the Annual Meeting of the ISPO UK NMS.

Past winners include:-

1976	D. CONDIE	(with C.B Meadows) "Ankle Foot Orthosis"
1977	A STEVENSON	
1980	R NELHAM	"Carbon Fibre Struts for Orthosis"
1986	G. BARDSLEY	(with D.W. Harrison, E.M. Fairgrieve, W. Shepherd) "Modular Nursery Seat for Disabled Children"
	B. J. ANDREWS	(with R.H Baxendale, J. Katakis, A. Cliquet, P.A. Freeman, J.P. Paul) "FES Based Systems for Restoring Locomotion in Spinal Cord Injured Subjects"
1987	P. BOWKER	(with M.A. Hamzeh and I Rowley) "Energy Cost of Ambulation Using Axillary and Elbow Crutches"
	R. HAM	"Wheelchair Provision in a Teaching District"
1988	G.R. JOHNSON	"The Shock Meter"
	MRS P. COTTEY	(with Ms H. Scott, Mrs R. Thompson, Mrs S. Robertson) "The Amputee Group"
1989	P.BOWEN	(with P. Bowker) "Orthotic Treatment Patello-Femoral Pain in Runners"
	MISS R. JEFFERSON	(with I. Weisz, A.J. Carr, A.R. Turner-Smith, G.R. Houghton) "The Affect of Brace Treatment on Back Shape in Scoliosis"
1990	R.S. HANSPAL	(with K. Fisher) "Cognitive and Psychomotor Assessment in Prosthetic Rehabilitation of the Elderly"
	MISS A.B.C.SMITH	(with J.F. Keating, B.J. Andrews, M. Delargy) "This Development of an Ischial Pressure Relief System using FES for the Prevention of Pressure Sores in Quadriplegics"
1991	T.T.J. BLOOM	(with J.C.Cool) "The Development of a Cosmetic Prosthetic Prehensor for Children"
	N. THOMPSON	(with E.B.Butler and R.E. Major) "Improvement in Walking Performance of Cerebral Palsied Children with a Combined Orthotic and Physiotherapy Management Regime"
1992	M. DEWAR	(with R.Redhead) "Clinical Trial of a Prosthetic CAD/CAM System"
	R. NELHAM	(with E. Green and C. Mulcahy, T. Pountney and B.Abett) "24 Hour Postural a Management of Children and Young Adults with Cerebral Palsy to Improve Ability and Prevent Deformity"
1993	C. DRAKE	(with R. Boyd) "Effectiveness of the Hip Abduction and Spinal Orthosis for Postural Management in a Group of Non Ambulant Cerebral Palsy Children"
	S ZAHEDI	"The Intelligent Prosthesis – A Micro Processor Pneumatic Swing Phase Control for the Transfemoral Amputee"
1994	MRS D. QUINLIVAN	"Weight Distribution in Below Knee Amputees"
	MISS S. HARDY	"Perception of Information Given and Post Operative Anxiety Symptoms in Lower Limb Amputees"

1995	PROFESSOR D.I. ROWLEY	(with R.J. Abboud) "The Application of Foot Pressure Measurement in Orthotic Design"
	J.R. RONALD	(with J.E.Kingston) "How Servo Electric Prostheses Can Help Brachial Plexus Lesion Patients"
1996	J.G. BUCKLEY	(with M.S. Zahedi) "Bio-mechanics of Amputee Sprinting"
	MISS E.J. WALKER	"Driving for Upper Limb Amputees"
1997	MR D. GOW	"Experimental Powered Prosthetic Digit System"
	MISS G.McQUAKER	"The Nottingham DSC Experience – The Electrically Powered Indoor/Outdoor Wheelchair (ERIOC) Initiative Created and First Implemented During 1996/1997"
1998		
1999	MR J. ROSS	"A Clinical Evaluation of the Teletorsion Pylon"
	MR S. ZAHEDI	"A New Concept in Prosthetic Knee Stance Controls for Walking on Level, Ramp Descent, Stair Descent and Stumble"
2000		
2001	No Award	World Congress
2002	MRS. M.J. COLE	"Regional Clinical Specialist, Physiotherapy, Amputees: Is there a Role?"
	MRS A.COWLEY	"Can Existing Clinical Balance Tools Measure Postural Control Post Amputation"
2003	DR.J.GIBSON	"Investigation of Delays in Provision of Initial Prosthesis to Acquired Lower Limb Amputees"
	MR. T. GEAKE	"The Locomotion Capability Index in Diagram Form for Goal Setting in the Rehabilitation of Lower Limb Amputees"
2004		
2005	MR. S. ZAHEDI	"Holy Grail of Prosthetic Foot Design"
	DR. A. NAIR	"Analyses of Prosthetic Episodes in Trans-femoral Amputees"
2006	MR. S. ZAHEDI	Amputee Self Alignment using a Patient Adjustable Heel Device
	MR. P CHARLTON	"The effect of Rigid Ankle Foot Orthoses on Knee Alignment and Muscle Recruitment during Stance Phase in Early Recovery from Stroke"
2007	MS. E. MCCURRACH	"A Preliminary Study of an Observational Gait Score for Lower Limb Prosthetics"
	MS. J. VISSER	"Mobile Upper Body Movement Monitoring in Bilateral Amputees"
2008	DR. L.K. NEWCOMBE	"The Design of a Component to Protect the Femur from Loads Applied by a Skeletally-Attached Prosthesis"
	Dr. N. KANG	"Use of an ITAP Implant for Prosthetic Reconstruction of a Transhumeral Amputee"
2009	MS. C. TRETHOWAN	"Comparison between the i-Limb Hand and Otto Bock Myoelectric Prosthesis – a single case study"
	MS. K. SAMSAM	"Dysvascularity and Cognition in Lower Limb Amputees"
2010	DR. S. SOORIAKUMARAN	"The UK Assessment Programme for the Skeletal Attachment of Lower Limb Prostheses using the Branemark Integrum Osseointegration System: an Overview of Results since 1997"
	DR. C. METHA	"A User Satisfaction Survey in a Prosthetics and Orthotics Outpatient Setting"
2011	MR. G. HARRIS	"Use of Axial and Bending Strain Energy in a Dynamic Prosthesis"
	DR. N CAIRNS	"What do Lower Limb Amputees Think of Their Cosmesis?"



## LIMBLESS ASSOCIATION PRIZE

Since 1994 The Limbless Association have been donating a prize (£150) for the best free paper devoted to *prosthetic optimisation of interface between stump and socket* presented at the ISPO UK Annual Scientific Meeting.

Previous winners include:

1994	B. PANAGAMUWA	(with O. Altay, J.A. Lindsay, T. Coddington) "An Audit of Icelandic Roll-on Silicone Socket (ICEROSS) Usage"
1995	J.H. CAMPBELL	"The Diabetic Foot with Partial Amputation: Clinical Implications of a Bio-mechanical Study"
1996	I.M. McCURDIE	(with R.S. Hanspal and R.Nieveen) "ICEROSS A Consensus view"
1997	DR.S.MULLICK	"Efficacy of Silicone-gel Impregnated Sock in Optimisation of Interface Problems of Ambulatory Transtibial Amputees Wearing Patellar Tendon Bearing Prostheses"
1998	L.BURGESS	"Juzo Compression Shrinkers – A Review of Current Practice in the UK"
1999	DR.D.MORRISON	"Gel Liner Usage in the Oxford Prosthetic Service"
2000	M.McALINDEN	"Study on Use of Tracer CAD in Prosthetic Clinical Practice"
2001	No Award	World Congress
2002	S.TAYLOR	"Clinical Use of Silicone as a Socket Material for Through Hip and Hemipelvectomy Patients"
2003	A.JONES	"The Production and Implementation of a Regional Post Amputation Exercise Booklet – a Pilot Study"
2004		
2005	R. KERR	"Shoes Influence Lower Limb Muscle Activity and may Predispose the Wearer to Lateral Ankle Ligament Injury"
2006	K.M. MCIVER	"The use of FMRI to investigate the Role of Mental Imagery in the Relief of Phantom Pain"
2007	D. MOSER	"Development of Self-Aligning Ankle-Foot Prostheses"
2008	L. O'HARE	"Finite element analysis of the Shape & Roll Prosthetic Foot"
2009	DR. L. GRAHAM	"An audit of pre, post amputation & primary prosthetic rehabilitation phase for patients attending the Regional Prosthetic Unit, Musgrave Park Hospital, Belfast"
2010	M. UDEN	Case Presentation: "An overview of 6 years prosthetic use of the first female transfemoral osseointegration volunteer in the UK"
2011	A.MCDOUGALL	"Investigation into the Effects of Prosthetic Prescription on Patients' Activity and Quality of Life: a comparison between Echelon and Esprit Feet"

# Avalon Foot



The Avalon Foot is a more leisurely paced version of the Echelon. Its hydraulic ankle motion ensures good plantar and dorsi-flexion on slopes to assist knee stability. The single adjustment allows simple optimisation for safe and comfortable walking.

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## THE BLATCHFORD LECTURE



Since 1996 Chas A. Blatchford & Sons Limited have sponsored an overseas guest speaker to present a lecture at the Annual Scientific Meeting. The speaker is selected by the ISPO UK Executive Committee.

Previous speakers are as follows:

1996	Ossur Kristinsson	Ossur Prosthetics and Orthotics, Reykjavik, Iceland	"Socket Design with Particular Reference to Hydrostatic Sockets Using Silicone Encapsulation and Pressurized Casting"
1997	Professor Dudley Childress	Director, Prosthetics Research Lab and Rehab Engineering Research Programme, Northwest University Medical School, Chicago	"Prosthetic Rehabilitation for Upper limb Deficiency"
1998	Cason Harte	Principal of the Cambodian School of Prosthetics and Orthotics	"Prosthetics and Orthotics in the Developing World – Lessons for Clinical Practice in the United Kingdom"
1999	John Sabolich	President of Sabolich Research and Development Corporation in Oklahoma City, Oklahoma	"Socket Design for Transfemoral Amputees – the Next 25 Years"
2000	Professor Mark Cornwall	Department of Physical Therapy Northern Arizona University	"The Utilisation of Plantar Pressure Measurement in the Prescription and Evaluation of Foot Orthoses: Strengths and Weaknesses"
2001	No Lecture	World Congress	
2002	John Michael	CPO Services Ltd. USA	"Gel Liners: What we Know and What we Don't"
2003	Don Katz	Director, Orthotics Department, Texas Scottish Rite Hospital for Children, Dallas, Texas	"Controlling Curve Progression with an Orthosis in Adolescent Idiopathic Scoliosis: Primary Factors that Influence Outcome"
2004	Stephen Blatchford	Chas Blatchford & Sons	"Life as a Prosthetic Contractor"
2005	Mary Novotny	Knoxville, USA	"Back to the Future: Outcomes in Prosthetic Care"

2006	Professor Malcolm MacLachlan	Centre for Global Health and School of Psychology, Trinity College, Dublin	“Psychoprosthetics: Psychological Adjustment to Limb Amputation”
2007	Steven Gard	Director, Northwestern University Prosthetics Research Laboratory & Rehabilitation Engineering Research Program, Chicago, USA	“Functional Biomechanics of Gait with Implications for Prosthetics Research”
2008	Gert-Peter Brueggeman	Professor of Biomechanics, The German Sport University, Cologne, Germany	“Biomechanics of Running, Sprinting and Jumping with Artificial Limbs”
2009	Professor Jean Paysant	Institut Regional de Medecine Physique et de Readaptation, Nancy, France	“Objective Measurement in Transfemoral Amputee with Microprocessor Controlled Knee”
2010	Robert S Gailey	Associate Professor, University of Miami Miller School of Medicine, USA	“A New Age in the Care and Treatment of People with Traumatic Limb Loss”
2011	Professor Jason Highsmith	University of South Florida, Tampa, Florida, USA	“Safety, Bioenergetic and Healthcare Cost Efficacy of the C-Leg Microprocessor Prosthetic Knee: A Review of the Literature”
2012	Dr. Harmen van der Linde	Radboud University Medical Centre, Nijmegen, The Netherlands	“A Multidisciplinary Guideline in Lower Limb Amputation, Future International Development”



Since 2005 the Orthotic Education & Training Trust has sponsored a guest speaker to present at the ISPO UK NMS Annual Scientific Meeting on an orthotic related topic.

Past speakers are as follows:-

2005	James Campbell	Becker Orthopaedic, Troy, Michigan, USA	“The Contemporary Orthotic Management of Quadriceps Weakness: Component Design, Clinical Application & Measured Outcome”
2006	Julia Cassim	Research Fellow, The Helen Hamlyn Research Centre, London	“The Client as Consumer – Removing Stigma and Enhancing Desirability in Orthotics and Prosthetics Through Inclusive Design”
2007	Robert Wagenaar	Professor of Rehabilitation Sciences and Director of the Center for Neurorehabilitation Boston, USA	“Does Rehabilitation Work”
2008	R Banim	Orthopaedic Consultant, The Countess of Chester Hospital, Chester	“Surgical Options in the Treatment of Knee Arthritis”
2009	G Ramdharry; B Meadows; A Shortland; D Moser	St. Georges University of London; Southern General Hospital, Glasgow; Guy’s and St. Thomas’ Foundation Trust; Chas A Blatchford & Sons	“Terminal Stance – “Roll-off” or “Push-off” and its Impact on Orthotic and Prosthetic Design”
2010	Lord John Walton of Detchant	Chair House of Lords Select Committee on Medical Ethics; President World Foundation of Neurology 1989-97; President General Medical Council 1982-89	“The Walton Report”
2011	Professor Andrew Boulton	Professor of Medicine, University of Manchester, Manchester, UK	“The Diabetic Foot in 2011”
2012	Andrew Hansen	Associate Professor, Department of Physical Medicine & Rehabilitation, University of Minnesota, USA	“Roll-over Shape as a Tool in Prosthetics and Orthotics”



## PAST ISPO UK MS OFFICE BEARERS

	<u>Chairman</u>	<u>Vice Chairman</u>	<u>Secretary</u>	<u>Treasurer</u>
1972	G. Murdoch	H. Thompson	J. Hughes	J. Hughes
1975	H. Thompson	H.J.B. Day	J. Williams	J. Williams
1978	G. Rose	H.J.B. Day	K. Mensel	C. W. Dunham
1980	I.M. Troup	J. Florence	D. Simpson	C. W. Dunham
1983	M. Ellis	D.N. Condie	D. Simpson	C. W. Dunham
1986	D.N. Condie	C. Peacock	D. Simpson	C. W. Dunham
1989	C. Peacock	R. Cooper	R. Platts	C. W. Dunham
1992	R. Cooper	B. McHugh	R. Platts	C.P.U. Stewart
1995	R. S. Hanspal	R. Nelham	A. S. Jain	C.P.U. Stewart
1998	D. Simpson	D. Datta	R. Ham	P. Barsby
2001	D. Datta	R. Luff	P. Lewis	R. Aboud
2004	R. Luff	P. Charlton	L. Burgess	J. Howitt
2007	P. Charlton	L. Burgess	L. Burgess	J. Howitt
2010	L. Burgess	L. Landham	F. Jepson	L. Landham





## **ISPO UK MS EXECUTIVE COMMITTEE MEMBERSHIP**



### **Ms. Laura Burgess**

Clinical Specialist Physiotherapist and Team Lead in Amputee Rehabilitation at the Holderness Rehabilitation Centre, Imperial College Healthcare NHS Trust, London. Currently Chair of the MS since January 2011, previously Vice-Chair and Honorary Secretary, appointed to the committee 2001.

### **Dr. Lal Landham**

Consultant in Rehabilitation Medicine and Clinical Director, Medway Maritime Hospital, Kent. Current Vice Chair and Treasurer since January 2011, appointed to the committee 2002.



### **Dr. Fergus Jepson**

UKTI Rehabilitation Lead - Consultant in Amputee and Trauma Rehabilitation, Specialist Mobility Rehabilitation Centre Preston, Current Honorary Secretary since 2010, Chair of the Public Relations Sub-Committee since April 2012 and appointed to the committee November 2008.

### **Mr. Colin Dance**

Rehabilitation Engineer, Gillingham DSC, Kent and Holderness Centre, London. Appointed to the committee 2002.



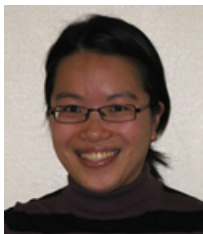
### **Mr. Terry Pond**

Rehabilitation Engineer, Bowley Close DSC, Kent. Current Vice Chair of the Public Relations Sub-Committee and appointed October 2010.

### **Miss Rebecca Beltran**

Senior Occupational Therapist, Scotland. Appointed to the committee November 2008.





**Miss Melissa Leong**

Senior Occupational Therapist based at Bowley Close Rehabilitation Centre, Guy's and St Thomas' NHS Foundation Trust, London. Appointed November 2009.

**Mr. Tom Wickerson**

Prosthetic Manager at Roehampton DSC, London. Appointed November 2008.



**Professor Jai Kulkarni**

Clinical Lead - Manchester DSC. Appointed October 2010.

**Dr. Ramesh Munjal**

Consultant and Clinical Lead – Mobility and Specialised Rehabilitation Centre, NGH Sheffield. Current Chair of the Scientific Meeting Sub-Committee since May 2012, appointed October 2010.



**Dr Steve Hutchins**

Senior Orthotic Lecturer, University of Salford, Manchester. Appointed October 2011.

**Professor Rajiv Hanspal (ex officio)**

Honorary Secretary ISPO Executive Board and Consultant in Rehabilitation Medicine, Royal National Orthopaedic Hospital, Stanmore



**Mr Paul Charlton**

Peacocks Medical Group  
Immediate Past Chairman ISPO UK MS



## ISPO UK MS ANNUAL SCIENTIFIC MEETINGS: PREVIOUS VENUES

Year	Venue	Year	Venue
1973	Bristol	1993	Swansea
1974	Keel	1994	Blackpool
1975	Cambridge	1995	Kingston upon Hull
1976	Newcastle upon Tyne	1996	Harrogate
1977	Liverpool	1997	Scotch Corner ~ Silver Jubilee
1978	Guildford	1998	Dunblane
1979	Sheffield	1999	South Normington
1980	London	2000	Grantham
1981	Dundee	2001	Glasgow ~ World Congress
1982	Leeds	2002	Liverpool
1983	London ~ World Congress	2003	Newcastle upon Tyne
1984	Manchester	2004	York
1985	Warwick	2005	Swindon
1986	Glasgow	2006	Stoke-on-Trent
1987	York	2007	Stoke-on-Trent
1988	Bath	2008	Chester
1989	Nottingham	2009	Chester
1990	Edinburgh	2010	Newcastle-upon-Tyne
1991	Norwich	2011	London
1992	Manchester	2012	Sheffield



## **British Association of Prosthetists and Orthotists (BAPO)**

The British Association of Prosthetists and Orthotists (BAPO) congratulates ISPO on 40 years of championing prosthetics and orthotics both worldwide and in the UK and we are delighted to be associated with this Anniversary year conference.

BAPO is the professional body for Prosthetists and Orthotists and is intimately involved in the development of individual professionals and the way that the healthcare system responds to meet the needs of patients.

As a member organisation, with a view to ensuring excellence of care combined with expert knowledge and provision for our patients, BAPO's purpose is to champion the role of the profession to all key stakeholders including:

- The four UK home governments,
- Education,
- Department of Health,
- NHS,
- Health and Care Professional Council (HCPC) our regulatory body,
- NIHC,
- Employers
- Patient and user groups.

The Association enables its members to work professionally and protects them within their work by providing insurance, employment advice and protection through our associated trades union, education and training events, standards and codes of best practice and dissemination of information and literature.

Being the smallest of the Allied Healthcare professions, promoting the place of the Prosthetist and Orthotist can be challenging in the wider health economy and all work is done by volunteer members, keen to promote the profession with the assistance of our secretariat administrators. We know that the difference that our profession makes to people's lives is high in relation to our numbers. A striking example of the skills that Prosthetists and Orthotists provide has been demonstrated in the recent Paralympics where many of the athletes will have been enabled to achieve excellence in their chosen sport.

In the emerging health economies in the UK, our profession must stay strong ensuring that the patients who need our skills and services will be able to access them to retain mobility and independence to improve their lives.

Prosthetics and Orthotics have come a long way in the last 40 years and developments are increasingly rapid with an increase in specialisation.

BAPO hopes that you have a good conference and are inspired to continue to bring new developments into practice for the benefit of the patients that we serve.



BRITISH  
ASSOCIATION OF  
CHARTERED  
PHYSIOTHERAPISTS IN  
AMPUTEE  
REHABILITATION

This year we are delighted to be working in collaboration with ISPO UK and BAPO towards this conference in Sheffield.

#### **Louise White Memorial Award**

For the past few years we have presented the Louise White Memorial Award to the best platform presentation at our annual conference/ study event. Louise White was a physio who died a few years ago leaving a young family. She was an active member of BACPAR, working at the Artificial Limb Service at Northampton General Hospital and had been an executive committee member. Her family fully supports this award. This year BACPAR will be awarding this to the two poster presentations judged to be the best by a panel of BACPAR executive committee members. An award of £50 will be given to each.

#### **What is BACPAR?**

BACPAR is a Professional Network of the Chartered Society of Physiotherapy (CSP). It was founded in 1993 to provide a nationwide network for physiotherapists involved in the specialist field of amputee and prosthetic rehabilitation.

BACPAR supports the promotion of evidence base practice and research, is committed to education, and provides a network for the dissemination of best practice in pursuit of excellence and equity, whilst maintaining cost effectiveness.

Two journals are produced each year in spring and autumn and a 2 day conference is usually held in November. BACPAR is made up of 14 regional groups each with a regional representative(s) who support local members and run local study days.

We have a very busy interactive online presence via the CSP's interactive site which all BACPAR members can access consisting of discussions, journal articles and shared documents

**For further information concerning BACPAR, including how to become a member, please visit our website [www.bacpar.csp.org.uk](http://www.bacpar.csp.org.uk)**

# CONFERENCE PROGRAMME

Thursday 27th September 2012

0845 – 0930 hrs	<b>Registration &amp; Refreshments</b>	
0930 – 0945 hrs	<b>Welcome</b>	<i>Ramesh Munjal Chair of Scientific Sub-Committee, ISPO UK MS Sir Andrew Cash CEO Sheffield Teaching Hospitals NHS Foundation Laura Burgess Chair ISPO UK MS</i>
0945 – 1030 hrs	<b>Presidential Ruby Anniversary Lecture</b>	<i>Chair: Laura Burgess</i> <b>“Sexuality and Disability with a Focus on Amputation”</b> Prof Jan Geertzen, President ISPO, University Medical Center Groningen, The Netherlands
1030 – 1130 hrs	<b>Free Paper Session</b>	<i>Chair: Lal Landham</i> <b>“Through-knee Amputation – is it a Viable Option in Peripheral Arterial Disease?”</b> S Sooriakumaran, Roehampton Rehabilitation Centre, Queen Mary’s Hospital, London, UK <b>“Patient Satisfaction in Acute Amputee Rehabilitation”</b> K Primett, Royal Free Hospital, London, UK <b>“Predictors of Limb Fitting and Limb Use in a Consecutive Sample of Patients After Transfemoral Amputation”</b> H Scott, West of Scotland Mobility and Rehabilitation Centre, Glasgow, UK <b>“Patients with Peripheral Arterial Disease: What Common Characteristics were Found Between In-patient Hospital Stay and Final Outcome Post Amputation?”</b> F Smith, Western Infirmary, Glasgow, UK <b>“Guidance for the Multidisciplinary Team on the Management of Post Operative Residuum Oedema in Lower Limb Amputees”</b> L Bouch & L Geer, Manchester Royal Infirmary and Heart of England NHS Foundation Trust, UK
		<b>York Room</b>  <b>Manufacturers’ Workshop:</b>  11.00 – 1130 hrs <b>Ossur UK</b>  “Managing unicompartmental OA with the Unloader One® range”
1130-1140	<b>“Specialised Commissioning – an Update”</b>	Prof Rajiv Hanspal, Chair Clinical Reference Group Complex Disability Equipment
1140 – 1205 hrs	<b>Exhibition and Refreshments</b>	
1205 – 1305 hrs	<b>Blatchford Lecture (introduced by Mr Stephen Blatchford)</b>	<i>Chair: Rajiv Hanspal</i> <b>“A Multidisciplinary Guideline in Lower Limb Amputation, Future International Development”</b> Dr Harmen van der Linde, Radboud University Medical Centre, Nijmegen, The Netherlands
1305 – 1405 hrs	<b>Exhibition &amp; Lunch</b>	
1405 – 1515 hrs	<b>Pain Management in Amputees – Alternative Approaches</b>	<i>Chair: Jai Kulkarni</i> <b>“An Overview”</b> Prof Jai Kulkarni, DSC, South Manchester University Hospital, Manchester, UK <b>“Graded Motor Imagery/ Neuroplasticity”</b> T Beames, Neurological Orthopaedic Institute, UK <b>“Use of Botulinum Toxin”</b> Dr R Munjal, Sheffield Teaching Hospitals NHS Trust, UK <b>“The Use of Acupuncture as an Integrated Approach”</b> J Longbottom, University of Hertfordshire, UK
		<b>York Room</b>  <b>Manufacturers’ Workshop:</b>  1400 – 1430 hrs <b>RSL Steeper Ltd</b>
1515 – 1550 hrs	<b>Free Paper Session</b>	<i>Chair: Jai Kulkarni</i> <b>“SIGAM Mobility Outcomes and K Level Predictions of Lower Limb Amputation Patients in the North of the Netherlands”</b> Dr G M Rommers, University of Groningen, The Netherlands <b>“Exploring the Views of Children and Parents to Contribute Towards the Design of Upper Limb Prostheses for Children and Young People”</b> T Sims, University of Southampton, UK <b>“Assessing the Quality of Primary Clinic Appointments at Portsmouth DSC”</b> C Ostler, Portsmouth Disablement Services Centre, UK
1550 – 1620 hrs	<b>Exhibition, Refreshments &amp; ISPO UK Annual General Meeting</b>	
1620 – 1700 hrs	<b>“Goal Setting Questioned”</b>	<i>Chair: Rajiv Hanspal</i> Dr D Playford, London, UK
1700 – 1730 hrs	<b>“Prosthetics and Orthotics – 40 Years with ISPO – What Next?”</b>	Prof S Zahedi, Chas A Blatchford & Sons Ltd, C Peacock, Peacocks Medical Group & Prof R S Hanspal, RNOH, Brockley Hill, Stanmore, UK
1730 hrs	<b>Exhibition and Meeting Closes</b>	
1930 hrs	<b>ISPO UK MS 40<sup>th</sup> Anniversary Gala Dinner &amp; Dance</b>	



# CONFERENCE PROGRAMME

Friday 28<sup>th</sup> September 2012

0845 – 0905 hrs	<b>Registration &amp; Refreshments</b>	
0905 – 0910 hrs	<b>Welcome</b> <i>Laura Burgess Chair ISPO UK MS &amp; Louise Tisdale Chair BACPAR</i>	
0910 – 1010 hrs	<b>Free Paper Session</b> <i>Chair: Ramesh Munjal</i> <b>“Van Nes Rotationplasty for Management of Ewing’s Sarcoma of the Femur: A Case Study”</b> I Sedki, C Cointet, J A Fulton, Stanmore Disablement Services Centre, London, UK <b>“Sweat Management in Prosthetic Sockets, Results of Research and Patient Trials”</b> J McCarthy, C.A. Blatchford & Sons Ltd., Hampshire, UK <b>“Analysis of Adaptive Roll-over Collision During Amputee Gait”</b> D Moser, C.A. Blatchford & Sons Ltd., Hampshire, UK <b>“Development of a Biomimetic Prosthetic Ankle-Foot for the Low Activity Amputee”</b> R Painter, C.A. Blatchford & Sons Ltd., Hampshire, UK <b>“A Pilot Study to Determine Compliance in Orthoses Used to Treat Talipes Equinovarus”</b> S Osborne, Sheffield Children’s Hospital, Sheffield, UK	
1010 – 1105 hrs	<b>Microprocessor Controlled Knees: A Review</b> <i>Chair: Fergus Jepson</i> <b>“Microprocessor Knees – What’s the Choice?”</b> T Carlsson, PACE Rehabilitation, Manchester, UK <b>“Microprocessor Knees – How do you Choose?”</b> C Hirons, PACE Rehabilitation, Manchester, UK <b>“Microprocessor Knees - Literature Review – Appropriate Prescription”</b> I Sedki, Stanmore Disablement Services Centre, London, UK	<b>York Room</b> <b>Manufacturers’ Workshops:</b> 10.10 – 10.40 <b>Orthomobility</b> “Very Good Knee” 10.40 – 11.10 <b>Touch Bionics</b>
1105 – 1135 hrs	<b>Exhibition &amp; Refreshments &amp; BACPAR Annual General Meeting</b>	
1135 – 1205hrs	<b>Para-Olympians Across the World...</b> <i>Chair: Lal Landham</i> <b>“Experiences of Working with Para-athletes”</b> R Hirons, Ossur UK, Manchester, UK <b>“Paralympic Athletes – Experiences of London 2012”</b> Jonnie Peacock and Richard Whitehead <b>“More Precious Than Gold”</b> C Harte, The Cambodia Trust, Northern Ireland	
1205 – 1235 hrs	<b>Exhibition &amp; Lunch</b>	
1235 – 1305 hrs	<b>George Murdoch Prize Medal:</b> <i>Chair: Dipak Datta</i> <b>“Skin Problems of the Stump in Lower Limb Amputees”</b> Dr H Meulenbelt, University Medical Center Groningen, The Netherlands	
1305 – 1400 hrs	<b>George Murdoch Prize Runner Up:</b> <b>“Mortality Predictors After Lower Limb Amputation: A Prospective Study”</b> R Singh, Sheffield Disablement Services Centre, UK	
1400 – 1430 hrs		
1430 – 1445 hrs		
1445 – 1545 hrs	<b>Free Paper Session</b> <i>Chair: Fergus Jepson</i> <b>“Study of Prosthetic Foot Mechanism on Transfemoral Amputee Gait: a Case Study”</b> N Stech, Chas A Blatchford & Sons Ltd, Hampshire, UK <b>“A Comparison Between Otto Bock Myoelectric Prosthesis and i-Limb Hand Touch Bionics”</b> C Wilson, Musgrave Park Hospital, Belfast, NI <b>“Congenital Upper Limb Deficiency (CULD): Pre-Natal Consultation in Sub-regional Limb Loss Rehabilitation Clinic”</b> J Kulkarni, University Hospital of South Manchester NHS Trust, Manchester <b>“Optimising Energy Management – The Combination of Energy Efficient Structures, Hydraulic Damping and Dynamic Alignment in a New Prosthetic Foot”</b> A Ward, C.A. Blatchford & Sons Ltd., Hampshire, UK <b>“Personalised Foot Orthotics with Embedded Temperature Sensing: Proof of Concept and Correlation with Activity”</b> S Telfer, Glasgow Caledonian University, Glasgow, UK	<b>Breakout Sessions</b> <b>York Room</b> <i>Chair: Louise Tisdale</i> <b>“Cognitive Issues in Older Vascular Surgical Patients”</b> J Partridge, Guy’s & St Thomas’ NHS Foundation Trust, London, UK <b>“Exercise Physiology and the Response to Exercise”</b> Amanda Thomas, Barts Health NHS Trust, London, UK <b>Great Central Room</b> <i>Chair: Steve Hutchins</i> <b>“A Review of Orthotic Management of Peripheral Neuropathy”</b> Paul Charlton Peacocks Medical Group
1545 – 1600 hrs	<b>Exhibition and Refreshments</b> <i>(Exhibition Closes 1600 hrs)</i>	
1600 - 1645 hrs	<b>OETT Lecture:</b> <i>Chair: Steve Hutchins</i> <b>“Roll-over Shape as a Tool in Prosthetics and Orthotics”</b> A Hansen, Associate Professor, Dept of Physical Medicine & Rehabilitation, University of Minnesota, USA	
1645 hrs	<b>Free Paper and Poster Prize Presentations and Close of Meeting</b>	

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## Guest Speaker Biographies



**Professor Jan Geertzen**

Jan Geertzen is physiatrist and a professor in Rehabilitation Medicine and chairman of the Department of Rehabilitation Medicine at the Center for Rehabilitation, University Medical Center Groningen, the Netherlands. Jan received his PhD degree in March 1998 and became a professor in Rehabilitation Medicine in February 2002. Jan specialises in amputation and prosthetics, and specific pain syndromes such as phantom pain and Complex Regional Pain Syndromes. He is the Immediate Past-President of the Dutch Society of Physical and Rehabilitation Medicine (2006-2009) and has been the chair of Board of Career and Education Board. He has more than 170 international (PubMed) publications and is (co-)author in many (international) books. He was the chair of ISPO the Netherlands from 1993-1998. He was an Executive Board member from 1998-2001 and vice-president from 2001-2004 and became president elect of ISPO in 2007. He is now the President of ISPO, 2010-2013.

**Dr Harmen van der Linde**

Harmen van der Linde is a Consultant in Physical & Rehabilitation Medicine at the Department of Rehabilitation, Radboud University Medical Centre, Nijmegen, the Netherlands. His professional and research interests include guideline developments in P & O, functioning with a prosthesis, activity monitoring, indications, movement analysis and prosthetic prescription. He lectures in amputation and prosthetics, diabetes mellitus and hand injuries across the world. Dr van der Linde is a member of the Committee for medical aids of the Dutch Society for Rehabilitation Doctors and a member of the ISPO International Board where he serves as Chairman of the Scientific Committee.



**Professor Jai Kulkarni**

Jai Kulkarni is Honorary Professor & Consultant in Rehabilitation Medicine at the Disablement Services Centre in Manchester. He was appointed as Consultant in UHSM in 1991 following his specialist training in Leeds. He became Honorary Professor in the University of Salford in 2009 and is also Rehabilitation Medicine Training Programme Director at the North West Deanery for Specialist Registrars / Trainees. Jai specialises in the provision of Amputee / Prosthetic Rehabilitation for both upper and lower limb loss cases, subsequent to vascular problems, trauma, cancer, or congenital limb loss. He assists in assessment for specialised seating systems to be used in wheelchairs to enable patients to regain maximum independent mobility. He also has over 20 years experience in neurological rehabilitation and now focuses on spasticity management. He has special interest in post amputation pain, paediatric cases and is Chair of National Special Interest Group in Amputee Medicine.

### **Tim Beames MSc BSc MCSP**

Tim lives in London where he works in private practice and is the principal instructor for NOI UK. Having completed his Masters in Pain: Science & Society at King's College London he has a special interest in complex and persistent pain states and in pain education for both the patient and health professionals. He teaches the Mobilisation of the Nervous System, Neurodynamics and the Neuromatrix, Explain Pain and Graded Motor Imagery courses throughout the UK, Europe and Australia. He is also co-author of the Graded Motor Imagery Handbook alongside Lorimer Moseley, David Butler and Tom Giles.



### **Ramesh Munjal MS FRCS**

Ramesh Munjal qualified from Gujarat University in Ahmedabad, India where he was President of the Junior Doctors Association for two consecutive years. He was awarded the gold medal in surgery for the academic year 1979. He moved to the UK in 1985 and obtained his FRCS in 1988. He has held appointments in cardiothoracic surgery in Harefield, Middlesex and then in general and vascular surgery in Cambridgeshire. He then specialized in rehabilitation medicine and became a consultant at Sheffield Teaching Hospitals NHS Foundation Trust in 2004. He is currently clinical lead for the neuro rehabilitation and prosthetics and orthotic service. Dr Munjal has presented widely at national and international conferences and enjoys clinical teaching. His research interests include pain management in amputees including low back pain, congenital limb deficiency and spasticity management.

### **Jennie Longbottom MSc MMed BSc FCSP BAac BMAS**

Jennie is a Chartered Physiotherapist and Licensed Acupuncturist specialising in Womens Health and Chronic Pain Management. She is Practice Director of Parks Therapy Centre, St Neots. MSc Acupuncture Module leader at the University of Hertfordshire, Governor of the British Acupuncture Council and currently engaged in the supervision of Masters students and execution of acupuncture research.



### **Dr Diane Playford**

Diane Playford is Reader in Neurological Rehabilitation at UCL Institute of Neurology and Honorary Consultant in Neurology at the National Hospital for Neurology and Neurosurgery UCLH Trust where she is clinical lead for the neurological rehabilitation service. Her research interests include rehabilitation processes, such as goal setting, interventions, such as vocational rehabilitation upper limb robotics, and service evaluation. She has been fortunate to receive research funding from the MS Society and the National Institute for Health Research Policy Research programme amongst others for work in this area.

### **Toby Carlsson**

Toby Carlsson is a HCPC Registered Prosthetist/Orthotist who graduated in 1987 from the School of Health Sciences at Jönköping University in Sweden. After graduating, he worked in Iceland for Össur hf. Toby arrived in the UK in 1990 working for LIC (later to become part of Otto Bock) at Manchester DSC. He later took on responsibility for the clinical aspect of the company's prosthetic service provision in the UK until he left in 1995. Toby went on to establish the UK subsidiary of Össur which both distributed their products and ran a clinic and training facility for clinicians and technicians. As the organisation developed he went onto manage their clinical and technical service teams in Europe. In 2003 he left Össur and co-founded PACE Rehabilitation Ltd. The founders' vision was to embrace and adopt the best principles of multidisciplinary NHS treatment but eliminate the restrictions and disadvantages that they had experienced first-hand within their working environment in such a large publically funded organisation. The company has expanded over the years and now operates two clinics with multidisciplinary teams and full manufacturing facilities. Throughout his career, clinical service provision has remained in Toby's focus alongside managerial duties within the different organisations in which he has been involved. His current clinical workload is dominated by trauma cases. He is also a regularly appointed expert witness in litigation cases involving amputations. Outside work he seems to spend most of his time trying to keep the family's goats out of the garden, and evicting the fox from the hen pen. It is a never ending battle....



### **Carolyn Hiron**

Carolyn has worked in the specialist field of rehabilitation following amputation since 1990. She worked for 15 years in the NHS with individuals following amputation in the acute setting, on rehabilitation wards, as outpatients and within the community and their work environment. She has also worked within a regional specialist unit. During her career, she spent three years teaching physiotherapy undergraduates at the University of Salford, and continues to have educational responsibilities. Since 2005 Carolyn has been employed in the private independent sector within the multi disciplinary team at Pace Rehabilitation Ltd based in Cheadle. She is a founder member of the clinical interest group BACPAR and has a particular interest in the use of exercise to maintain independence and a healthy mind and body after amputation. She has had four publications related to her specialist field, and her a masters degree thesis examined rehabilitation outcomes.

### **Dr Imad Sedki**

Dr Imad Sedki was appointed a Consultant in Rehabilitation Medicine at Stanmore/ Luton Centres in the summer of 2010 after nine years' practicing in Orthopaedic Surgery. He considers himself to be extremely lucky to be one of a handful of consultants in the UK who exclusively work with amputees on a daily basis, particularly at this time of rapid scientific advances both in rehabilitation techniques and prosthetic component technology. His work at both Stanmore and Luton provides a wide variety of case mix and levels of complexity.

Dr Sedki's particular interest lies in the management of congenital limb deficiencies, phantom limb pain as well as the rehabilitation of active amputees.





### **Richard Hiron**

Richard Hiron is a Prosthetist with Össur. Prior to joining the Icelandic Orthopaedic company in 1995, he worked as a Prosthetist in Manchester's Withington Hospital. He has been an active member of the professional and regulatory bodies for Prosthetics and Orthotics, as well as lecturing and presentations to National and International audiences. His special interests lie with engaging amputees in fitness and recreational activities as part of long term rehabilitation outlook and high performance prosthetics for everyday use.

### **Carson Harte**

Carson is a Prosthetist/Orthotist - a product of the 1976 intake of the National Centre for Prosthetics and Orthotics, University of Strathclyde, Scotland. He worked as a Prosthetist Orthotist in the Rehabilitation Engineering Centre of Musgrave Park Hospital, Belfast through the 1980s. In 1989, he helped form a P&O service delivery company in Belfast and a year later in Dublin, Ireland. In 1993, he was recruited by The Cambodia Trust, as the founder Director of the Cambodia School of Prosthetics and Orthotics. Initially recruited for a three year contract, he eventually spent seven years in Cambodia. In 2000, in partnership with The Nippon Foundation, he moved to Singapore, as Cambodia Trust International Director, and developed a strategic plan for P&O training in SE Asia. This plan led to the establishment of training schools in Sri Lanka (2004), Indonesia (2008) Philippines (2011) and Myanmar (2013). Working in partnership with the school in Thailand, Vietnam and Pakistan, and encouraging regional developments through the Alliance of P&O schools in Asia (APOS), the Cambodia Trust is coordinating the largest group of P&O training providers in the world. Carson lives in Northern Ireland, and commutes electronically and physically to SE Asia, supporting a network of highly motivated and professional staff, both National and Expatriate across the region. He is facilitated, encouraged and supported by co-worker and spouse Audrey, and family. He has been and remains, an active ISPO education committee member. Carson is now developing, with partner organizations a sustainable model of service delivery, suitable for the fast growing economic powerhouse that is Asia.



### **Andrew H Hansen PhD**

Andrew Hansen is Director of the Rehabilitation Engineering Research Program at the Minneapolis VA Health Care System and an Associate Professor in the Program in Rehabilitation Sciences within the Department of Physical Medicine and Rehabilitation at the University of Minnesota. Andrew has biomedical engineering degrees from the University of Iowa (BSE) and Northwestern University (MS and PhD), with training in prosthetics and orthotics from Donald Shurr, PT, CPO in Iowa City and Dudley Childress, PhD in Chicago. Dr. Hansen was awarded Best Paper Prize in 2004 at the ISPO meeting in Hong Kong, the Thranhardt Lecture Award in 2006 at the AAOP meeting in Chicago, and the Research Award in 2012 at the AAOP meeting in Atlanta. He has published 37 peer-reviewed journal articles over the last 12 years and has numerous patents pending on prosthetics, orthotics, and other rehabilitation equipment. His primary research interests are human biomechanics and design of improved rehabilitation technologies.



## ABSTRACTS (in order of presentation)

Title: *Sexuality and disability with a Focus on Amputation*

Presenter: Professor Jan Geertzen, University Medical Center, Groningen, The Netherlands  
President, ISPO

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In the Netherlands annually 3300 major amputations of a limb are performed. The major part (76%) of the amputees is older than 65 years because most amputations are performed due to vascular reasons. After the amputation patients try to continue their lives as before. However an amputation induces several limitations in performing professional, leisure, social and marital activities including sexual activities. In literature concerning amputation, limitations in sexual activities of amputees are rarely discussed. In these papers it is assumed that problems in performing sexual activities are hindered in different ways, related to the type and level of amputation and the cause of the amputation. The level of sexuality, sexual functioning and sexual satisfaction seems to be an under lighted area. The finding that amputation had a higher impact on sexual functioning in elderly compared to younger amputees might also be an age effect unrelated to the amputation. Also adaptation in sexual behavior or for example obtaining other positions during coitus may be more difficult for elderly. In an attempt to inspire researchers in this field, a 'generic' conceptual framework about the impact of disease on sexuality will be presented. The main goal of this conceptual framework is to provide an in-depth analysis of and insight in how disease-related, psychological and relational factors may have an (inter-related) impact on sexual functioning and sexual well-being of patients, their partners and their relations. Sexuality is rarely discussed by professionals in the amputation department. It is the responsibility of the professional to break the 'conspiracy of silence' about sexuality. By addressing sexuality in a systematic way and discussing this as a common topic professionals 'give permission' to patients and other team members to bring up and discuss eventual sexual problems or concerns of patients with an amputation.

### References:

Sexuality and amputation: a systematic literature review. Geertzen JH, Van Es CG, Dijkstra PU. Disabil Rehabil. 2009;31(7):522-527.

Chronic disease and sexuality: a generic conceptual framework. Verschuren JE, Enzlin P, Dijkstra PU, Geertzen JH, Dekker R. J Sex Res. 2010 Mar;47(2):153-170.

Sexuality in people with a lower limb amputation: a topic too hot to handle? Jesse E. Verschuren, Paul Enzlin, Jan H. Geertzen, Pieter U. Dijkstra, Rienk Dekker. Submitted

Title: ***Through-knee Amputation – is it a Viable Option in Peripheral Arterial Disease?***

Presenter: **S.Sooriakumaran**, Consultant in Rehabilitation Medicine  
Queen Mary's Hospital, Roehampton Lane, London, SW15 5PN

E-mail: [Sellaiah.Sooriakumaran@stgeorges.nhs.uk](mailto:Sellaiah.Sooriakumaran@stgeorges.nhs.uk)

Other Authors: M.Burrows, Rehabilitation Assistant

#### **Aims & objectives:**

Through-knee amputation accounts for just 2.8% of annual amputations in England. Historically, it has not been favoured by vascular surgeons because of perceived poor wound healing rates and challenges to prosthetic fitting. Epidemiological studies indicate transfemoral amputation being chosen where the optimal level of transtibial amputation was not possible. The purpose of this survey is to analyse the recent literature, as well as our own data on through-knee amputation in peripheral arterial disease. Does the longer lever of through-knee end-bearing residual limb provide a better prosthetic rehabilitation outcome compared to transfemoral amputation for a geriatric vascular amputee?

#### **Method:**

A literature (Medline & Embase) search for the last ten years was carried out to identify relevant publications. Eight publications were chosen as relevant to this study. In addition, our own data of primary amputees for the period May 2007- May 2012 was analysed.

#### **Summary of results:**

Seven of the eight publications concluded in support of through-knee amputation as a favourable option of management. Our own data identified 12 through-knee amputations in contrast to 105 transfemoral amputations during a period of 5 years. Average age, length of therapy, physiotherapy contacts and rehabilitation outcomes - timed-up and go (TUG), 2 minute walking test (2MWT), and SIGAM mobility grade, were compared. There were both a significantly higher number of physiotherapy contacts and a longer length of therapy for our through-knee amputees compared to transfemoral. However, the rehabilitation outcomes were significantly better at both discharges from therapy, and at the 6 week review. There was not enough data to compare 6 month outcomes. No difference in average age was seen.

#### **Conclusion:**

Through-knee amputation in contrast to transfemoral amputation is known to have a lesser perioperative mortality and reduced incidence of residual and phantom limb pain. A variety of surgical techniques have been presented for through-knee amputation. Most are either variants of knee disarticulation or supracondylar amputation (Gritti-Stokes, 'modified' Mazet). In a dysvascular, elderly amputee with atrophic musculature the through-knee residual limb offers a longer, robust and more comfortable lever for bed mobility, wheelchair seating and prosthetic use. Based on the findings of this literature search and on the analysis of our own data, we can conclude that the through-knee amputation offers an acceptable primary healing rate and satisfactory functional outcome in patients with peripheral arterial disease. The advantages of through knee amputation over transfemoral amputation in a geriatric amputee make it the preferred alternative for patients with vascular disease who are not suitable for transtibial level amputation.

#### **References:**

Jackson AJ, Coburn G, Morrison D, Mrozinski S, Reidy J. Through-knee amputation in peripheral vascular disease. *The Br J Diabetes & Vascular Disease* 2012;12:26-32

Morse BC, Cull DL, Cass AL, Taylor SM. Through-knee amputation in patients with peripheral arterial disease: a review of 50 cases. *J Vascular Surgery* 2008;48:638-643

Title: *Patient Satisfaction in Acute Amputee Rehabilitation*

Presenter: K Primett, Clinical Specialist Physiotherapist  
Royal Free Hospital, London

E-mail: [kate.primett@nhs.net](mailto:kate.primett@nhs.net)

### **Introduction:**

Evidence suggests that more satisfied patients continue using health services; have improved compliance; maintain better relationship with care providers (Westaway, 2003) and recommend services to others (Drain, 2001).

**Aims:** This study aims to evaluate and analyse current methods of obtaining patient satisfaction and explore strategies to implement future quality improvement initiatives in line with current government objectives.

**Methods:** Feedback from 39 primary amputee inpatients was obtained using a bespoke patient satisfaction questionnaire (PSQ). The PSQ was designed by a specialist steering group consisting of physiotherapists, occupational therapist, psychologist, and clinical nurse specialists. The PSQ combined 21, positively phrased, open and closed questions relating to rehabilitation, discharge, ward experience, and information received. Following a pilot study, the finalised PSQ's were distributed and collected before discharge. Responses from 2010 and 2011 were collated and analysed.

**Results:** 39/84 (46%) primary amputees returned completed questionnaires. Non returns were attributed to patient death (n= 3/51, 2010; n=4/33, 2011), refusal (n = 6/51, 2010; n= 3/33, 2011) and discharge pre PSQ dissemination (n = 20/51, 2010; n= 9/33, 2011).

In 2010 and 2011, 38% of the total responses were recorded as 'Strongly Agree'. In 2010 only 7.14% responded 'Strongly Disagree' compared with 5% in 2011. Positive feedback was obtained from questions relating to nursing care, physiotherapy input and goal setting. Negative feedback was related to pre operative information and counselling accessibility.

**Discussion:** Consistently positive feedback was received from the majority of responses obtained. However, strategies to improved questionnaire validity, reliability, reduce bias and increase response rates can be identified. In accordance with government initiatives future development strategies will focus on converting the PSQ to Patient Experience Questionnaire (PEQ).

**Conclusions:** With an increased proportion of provider income being related to patient experience collation of accurate patient experience data is essential to maintaining a high quality efficient service and attracting future commissioning.

### **References:**

- Drain, M. (2001) Quality improvement in primary care and the importance of patient perceptions. *J Ambul Care Med*, 24 (2), pp. 30-46.
- Westaway, M. S. (2003) Interpersonal and organizational dimensions of patient satisfaction: the moderating effects of health status. *Intern J Qual Health Care*, 14 (4), pp 337-344.

Title: *Predictors of limb fitting and limb use in a consecutive sample of patients after trans-femoral amputation*

Presenter: Mrs Helen Scott<sup>1</sup>, Chartered Physiotherapist  
West of Scotland Mobility & Rehabilitation Centre (WESTMARC)  
Southern General Hospital, Glasgow

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Other Authors: Imogen L. M. Bloomfield<sup>2</sup>, Brian F. O'Neill<sup>3</sup>, David R. Morrison<sup>4</sup>,  
Alastair Weir<sup>5</sup>, Martin T. Smith<sup>6</sup>, Marjory Robertson<sup>7</sup>, Sandra Bowers<sup>7</sup> &  
Laura McKernan<sup>9</sup>

<sup>1</sup>*Chartered Physiotherapist, WESTMARC*

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<sup>3</sup>*Research Fellow, University Stirling*

<sup>4</sup>*Prosthetist, WESTMARC*

<sup>5</sup>*Consultant in Rehabilitation Medicine, WESTMARC*

<sup>6</sup>*Associate Specialist Orthopaedics, WESTMARC*

<sup>7</sup>*Occupational Therapists, WESTMARC*

<sup>9</sup>*Research Assistant, WESTMARC*

### **Aims and Objectives:**

Patients referred for limb fitting post transfemoral (TF) amputation are a heterogeneous cohort who are not all suitable for limb fitting or the physical and cognitive demands of rehabilitation. Successful limb fitting in this group may be as low as 24% with subsequent high rates of abandonment (SPARG, 2011). Previous research has shown that variables such as age, balance and cognitive function predict outcome after lower-limb amputation (O'Neill, 2008). We aimed to assess the predictive value of the Addenbrooke's Cognitive Examination-Revised (ACE-R), the Amputee Mobility Predictor Assessment Tool (AMPnoPro) and K value in determining outcomes.

### **Methodology:**

57 consecutive patients who had had a TF amputation were administered the AMPnoPro and ACE-R at their first prosthetic clinic over a 15 month period (20th May 2008 and 25th August 2009). K levels were retrospectively calculated. Demographics, aetiology, pain and comorbidities were assessed. Those patients who were limb fitted were routinely followed up at one year, case activity was reviewed; the Functional Measure for Amputees was completed. Data was analysed using SPSS (v.19).

### **Sample:**

73.3% of the sample was male. The average age at assessment was 66.67 (SD 14.77). The cause of amputation in the majority of cases was related to vascular disease (n=44; 77.2%), as compared to 13 cases (22.8%) where the aetiology was traumatic, due to cancer or other non-vascular cause.



**Results:**

The mean AmpNoPro total score (49 patients) was 22.06 (SD 8.77). The ACE-R was completed with 39 patients. The mean total score was 77.44 (SD10.01). 14 (24.6%) participants had a k value of zero, 27 had a k value of 1 (47.3%), 12 (21.1%) had a k-value of 2 and 4 (7%) had a k value of 3.

Of the 57 patients, 44 (77.25%) were prescribed a prosthesis and 13 (22.8%) were not. Of the 44 patients limb fitted, 6 were lost to follow up. Of the 35 followed up, 24 (68.6%) reported limb use and 15 (42.8%) reported that they were no longer using their limb.

AmpNoPro balance score and total score, and K-levels were significantly higher ( $p<0.001$ ) in all patients who were successfully limb fitted. Age and ACE-R scores were not independent predictors. In patients who were successfully limb fitted, 1 year continued limb use was significantly higher in patients who had higher average AmpNoPro total and prediction scores, MMSE scores and K scores at assessment ( $p<0.05$ ). Age and total ACE-R scores were not significantly associated with 1 year outcome.

**Conclusions:**

There was a 32% rate of abandonment of prosthesis at 1 year. Objectively better physical status (higher K levels and AmpNoPro scores) was predictive of fitting and continued use, and better cognitive performance (higher MMSE score) was predictive of continued use. Numerous reasons for non-use were given. Data supports the use of these measures to support clinician's decision.

**References:**

O'Neill BF. 2008. Cognition and Mobility Rehabilitation Following Lower Limb Amputation. In Gallagher P, Desmond D, MacLachlan M, eds. Psychoprosthetics. Springer-Verlag, London.

Scott H, Patal R, Hebenton J. 2011. A Survey of the Lower Limb Amputee in Scotland 2009.

Title: *Patients with peripheral arterial disease: what common characteristics were found between in-patient hospital stay and final outcome post amputation?*

Presenter: Mrs Fiona Smith, Senior Physiotherapist, Western Infirmary Glasgow

Email: [fionadavie@hotmail.com](mailto:fionadavie@hotmail.com)

Other Authors Dr Lorna Paul, Reader in Rehabilitation, Glasgow University

### **Aims:**

The aim of the study was to identify a relationship between length of in-patient stay post amputation with population characteristics such as gender, level of amputation, aetiology and limb fitting status from the SPARG database of amputees in Scotland from 2007-2009.

### **Methods:**

Surgical and Rehabilitation data was collected on every person undergoing a major lower limb amputation in Scotland. The database was web based and called SPARG (Scottish Physiotherapy Amputee Rehabilitation Group). The data from 2007-2009 (inclusive) was examined and patients undergoing amputation for reasons other than PAD excluded (i.e. trauma or tumour). Key characteristics e.g. age, sex, level of amputation, presence of diabetes, were compared to in patient stay and outcome post amputation. Statistical analysis was performed using Minitab v15. The Tukey Method was used as an analysis of variance and a 95.0% Confidence Interval or p value <0.05 was deemed significant.

### **Results:**

There was no statistical significance in time spent in hospital when analysed according to level of amputation ( $p=0.547$ ). There was also no statistical difference when analysed according to aetiology ( $p=0.462$ ). However when gender and length of stay were analysed there was a statistical difference ( $p<0.01$ ), females spent longer in hospital (136.7 days) than males (116 days). There was also a statistical difference between those limb fitted who spent 184.6 days in hospital compared to those not limb fitted who stayed 84 days ( $p<0.01$ ). Abandoning the limb fitting process and those who died were not analysed according to days in hospital. In summary, females spent on average almost three weeks longer in hospital than males and if limb fitted then the length of stay is more than twice than those non-limb fitted independent of gender.

### **Conclusion:**

This study concurs with other literature where an increased length of stay is shown when patients are limb fitted however the gender split is an incidental and interesting finding in this study and has not been previously discussed in other literature. The reason for this increased length of stay for women is unknown and warrants further research.

Title: ***Guidance for the multi disciplinary team on the management of post operative residuum oedema in lower limb amputees.***

Presenters: Liz Bouch, Senior Specialist Physiotherapist, Manchester Royal Infirmary  
Lizzie Geer, Senior Vascular Physiotherapist, Heart of England NHS Foundation Trust, Birmingham

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Other Authors: Katie Burns (OT), Matt Fuller (PT) and Anna Rose (PT)

### **Objectives and Aims**

To establish the evidence behind the various modalities available for the management of post operative residuum oedema.

To establish the most effective modality to manage post operative residuum oedema.

The literature states there are large variations in practice with the regards to the management of post operative residuum oedema with selection of modality based on clinical experience rather than current best evidence.

### **Methods**

A guideline development group was established of four Physiotherapists and one Occupational Therapist from the Post Graduate Certificate in Amputee Rehabilitation at Bradford University (2009 cohort) to carry out the guideline process. A thorough systematic literature search was completed in November 2010. One hundred and seventeen articles were identified, 73 were excluded by perusal of the abstract. A database was created to tabulate and collate the evidence found. The remaining 44 articles were appraised using the Scottish Intercollegiate Guidelines Network (SIGN) methodology checklists (2008), by two Guideline Development Group (GDG) members seeking clarification by a third member if consensus was not met. Each paper was given a grade based on methodological rigour. Evidence was collated for five modalities of oedema control which were; rigid dressings, Pneumatic Post Amputation Mobility (PPAM) aid, compression socks, stump boards and elastic bandage wrapping. The strength of evidence for each modality was determined by the GDG as a whole and assigned an overall grade. The evidence bodies for each modality were reviewed by the GDG as a whole and assigned an overall grade.

### **Results**

Based on best current available evidence rigid dressings should be used when expertise, time and resources allow to reduce post operative residuum oedema. Additional benefits of rigid dressings are documented in the evidence and include; reduced healing time, reduced time to prosthetic casting and protection from trauma. General consensus from the literature was for early application although no evidence compared timings of application. More commonly used methods of oedema control such as Pneumatic Post Amputation Mobility Aid (PPAM aid), compression socks and wheelchair stump boards were supported by the literature, however methodological quality was poor with key details about timing of application not addressed by the current evidence base. The evidence suggested the use of elastic bandage wrapping should not be used due to the possible inaccuracies in application.

### **Conclusion**

Rigid dressings should be used in clinical practice when expertise, time and clinical resources allow. All other forms of oedema control recommended in this guideline have been shown to have some evidence base and may be used in the absence or conjunction of rigid dressings. Further randomised controlled trials are required to establish the optimum timing of application for each of the available modalities and to clarify the optimum design of the rigid dressing.

## **The Blatchford Lecture 2012**

Title: ***A multidisciplinary guideline for lower limb amputation surgery, rehabilitation and prosthetic prescription in the Netherlands***

Presenter: Harmen van der Linde, MD, PhD  
Radboud University Medical Centre, Nijmegen, the Netherlands

E-mail: [H.vanderLinde@reval.umcn.nl](mailto:H.vanderLinde@reval.umcn.nl)

Amputation surgery and prosthetic prescription for lower limb amputees is primarily based on empirical knowledge. This knowledge is transmitted to professionals by residents clinical training and is constantly developed and renewed in clinical practice and through courses and symposiums. These developments and renewals have not been established in a standardized way, i.e. there is no existing clinical guideline. Experience plays an important role in for example surgery and also for adequate prescription of a prosthesis. This means that a clear evidence-based motivation for the choices like, indication, time of amputation, start of prosthetic training, prosthetic components cannot always be given. In this perspective, a clinical multidisciplinary guideline will lead to a more consistency and better quality of care.

A multidisciplinary guideline for lower limb amputation was developed in the Netherlands in the period from january 2010 till january 2012. Several medical societies and other organizations were involved in this proces. Th eproces started with systematic review of the literature of the the topics surgery, postoperative management, rehabilitation and prosthetic prescription. Outcome of literature and clinical expertise were discussed in multidisciplinary meetings resulting in conclusions and recommendations for clinical practice and future research.

In this project the guideline development was restricted to the adult population (over 18 years of age) with a trans-tibial (TT), knee disarticulation (KD) or trans-femoral (TF) amputation level. The methodology used was based on the gathering of scientific evidence (from the literature) and clinical expertise within the different disciplines involved.

The presentation will focus mainly on literature evidence and the recommendations for clinical practice. Also recommendations for future research will be mentioned.

Title: ***Graded Motor Imagery – a taster***

Presenter: Tim Beames, Principal Instructor, NOI, UK

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GMI is an individually tailored treatment process that has successfully been used for persistent and complex pain states. It aims to give flexibility and creativity back to the brain via graded exposure.

The term ‘graded motor imagery’ broadly means that in rehabilitation the focus is placed on synaptic exercise. The exercising of synapses assumes that the brain is changeable and easily adaptable and gives hope to people with difficult pain states. It involves the use of computers, flashcards, imagined movements and mirror visual feedback.

Evidence for the use of GMI comes from basic sciences (neuroscience) and clinical trials. It can offer substantial improvements in pain and disability in phantom limb pain.

#### **Implicit Motor Imagery** (left/right judgements)

- You don’t know you are mentally moving
- Premotor cells modify primary motor cells without activating them
- Less likely to activate a pain response

**Explicit Motor Imagery** (imagined movements) is essentially thinking about moving without actually moving. There are many different ways to go through the process and the most common method used in GMI is a first person perspective of feeling your own movement and postures.

**Mirror Therapy** means looking into a mirror to see the reflection of the limb or body part in front of it. The mirror will effectively give the illusion that you are looking at the limb that is hidden. Brain activation during mirror therapy is less than actual movement but slightly more compared with imagining the same movement.

#### **GMI: a graded approach for treating pain**

It appears necessary that GMI is offered in a sequential manner. A strong grounding in the science underpinning GMI is essential for all users to be able to decide best when to move forwards, sideways or backwards through the treatment process.

#### **References**

- 1/ Moseley, G.L., Pain 2004
- 2/ Moseley, G.L., Pain 2005
- 3/ Moseley, G.L., Neurology 2006

Title: ***Botulinum toxin in stump pain***

Presenter: Dr Ramesh Munjal, Consultant in Rehabilitation Medicine,  
MSRC, Sheffield Teaching Hospitals NHS Foundation Trust, Sheffield

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Management of pain in the residual limb after amputation remains a major challenge both for the physicians and for the patients. Pain has huge variations from being very severe phantom pain to hypersensitivity to touch, pain on pressure of wearing the limb and in some cases spasms and jumping of the stump.

Analgesic effects of Botulinum toxin are explainable both on an anatomical and physiological basis.

- 1 Botulinum toxin can block the conduction at the motor end plate which leads to reduction in the muscle tone and abolition of local contractions. This leads to reduced mechanical stimulation of nociceptive afferent signals in muscles, tendons and ligaments.
- 2 There are also indirect analgesic mechanisms which are thought to result from reduced compression of blood vessels and nerves in contracted segments of the muscle.
- 3 There is also experimental evidence of direct peripheral analgesic and local anti inflammatory activity of Botulinum toxin.

All these mechanisms interrupt the vicious cycle of reducing the release of pain inducing neuropeptides and also improving muscular ischemia. There's also evidence that the sensory input in chronic pain conditions is permanently modified.

The presenter has used Botulinum toxin in 9 patients with various types of stump pain and of varying severity. This is not one of the licensed indications and all the injections were carried out with informed consent and named patient basis. The results have been very impressive in reducing the pain in the stump and increasing the mobility of the patient in over 70 % of patients. There has been considerable reduction in the use of analgesics including opiates and neuropathic medications like Pregabalin and Gabapentin.

With the reduction in pain and ability to walk better, particularly in some hypersensitive stumps, patients have been able to wear the prosthetic limb for longer periods thus increasing their quality of life and also enabling some of them to get back to work. In some patients it has meant the ability to look after children and do the household chores in a better way thus affecting the overall quality of life.

More planned research in the form of RCT is required to establish the benefits seen in clinical practice.



Title: *The use of acupuncture as an integrated approach*

Presenter: Jennie Longbottom, Chartered Physiotherapist & Licensed Acupuncturist  
Parks Therapy Centre, St Neots, UK

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The presentation will offer an overview of current research to support the use of acupuncture in the multi-disciplinary team approach to the management of Phantom Limb pain. The presentation will evaluate the current physiological research and clinical understanding of PLP together with a critical analysis of current practice.

Title: ***SIGAM mobility outcomes and K level predictions of Lower Limb Amputation patients in the North of the Netherlands***

Presenter: G M Rommers, Consultant in Rehabilitation Medicine, MD, PhD  
Department of Rehabilitation Medicine, University Medical Center  
University of Groningen, the Netherlands

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Other Authors: AH Vrieling, Consultant in Rehabilitation Medicine, MD, PhD  
Department of Rehabilitation Medicine, University Medical Center  
University of Groningen, the Netherlands.

**Background:** In the North of the Netherlands with a population of 1.7 million people, in and outpatient rehabilitation is provided by the University Medical Center as secondary and tertiary referral Centre for Lower limb amputees (LLA). All patients are referred from the University Medical Center and 7 regional hospitals. Multidisciplinary rehabilitation treatment starts during hospital stay and is continued within 14 days after amputation in the rehabilitation center with in and/or outpatient treatment. Mobility outcome is one of the parameters issued by Netherlands Association for Medical Rehabilitation as treatment outcome parameter.

**Aim:** To investigate the outcome of the SIGAM mobility score after in and outpatient rehabilitation treatment.

Methods: Patients were prospectively scored with the SIGAM mobility score by medical staff and physiotherapists after completing in and/or outpatient treatment. Amputation level and length of stay were recorded. K-level rating scores were assigned after initial training.

**Results/Findings:** 348 patients were admitted between December 2006 and March 2011.

In / Outpatients completing the training included: Hemipelvecomy + Hipdisarticulation: 2%; Transfemoral: 25%; Kneedisarticulation: 19%; Transtibial: 55%; Syme: 3%; Chopart: 1%.

24 patients (13%) were bilateral amputees.

Average admission time inpatients: 80 days (sd 58 days).

Average admission time outpatients: 67 days (sd 68 days).

SIGAM mobility score at discharge: SIGAM scores: A: no prosthesis: 12%; B: frame with help 3% ; C: inside house with walking aids: 18%; D: in-outside house > 50m with or without walking aids: 40%; E: walking outside > 50m occasional walking aid: 17% ; F: walks > 50m outside without any aids: 10%. K-level assignment showed a good relation towards SIGAM scores.

**Conclusion:** SIGAM scores showed 88% prosthetic mobility. 85% could walk independently. K-level assignments showed good relation towards the SIGAM scores.

Implications: SIGAM scores and K-level assignments give comparable results between hospitals. It gives valuable information for the patients, rehabilitation team and regional hospital services. It speeds up the prescription process and enhances team communication.

## References:

The mobility scale for lower limb amputees: the SIGAM/WAP mobility scale.

Rommers GM, Ryall NH, Kap A, De Laat F, Van der Linde H.

Disability and rehabilitation 2008; 30 (15): 1106-15

The SIGAM mobility grades: a new population-specific measure for lower limb amputees.

Ryall NH, Eyres SB, Neumann VC, Bhakta BB, Tennant A.

Disability and rehabilitation 2003; 25 (15): 833-44

Title: *Exploring the views of children and parents to contribute towards the design of upper limb prostheses for children and young people*

Presenter: Tara Sims, PhD Student  
Faculty of Health & Sciences, University of Southampton, Southampton

E-mail: [tss1e10@soton.ac.uk](mailto:tss1e10@soton.ac.uk)

Other Authors: Maggie Donovan-Hall and Cheryl Metcalf, Research Fellows  
University of Southampton, Southampton

### **Introduction:**

Upper limb (UL) dysfunction can have an impact on development at all stages of childhood. There is, however, a rejection rate of UL prostheses of up to 50% amongst children. Research has suggested that children may choose to use a different prosthesis depending on the task (e.g. Egermann et al, 2009), but there is a distinct absence of the views users. Inclusion of end, lay and professional users is crucial to successful development of medical devices as unless devices are examined in the cultural and social context in which they are used the effectiveness of the devices will be limited (Ram et al, 2005).

This research explores the views of children and parents on UL prostheses to contribute towards the design of prosthetic ULs for children.

### **Methods:**

Eight children (aged 8 – 15), with experience of using an UL prosthesis, and nine parents of children with limb difference participated in either a focus group or a one-one interview.

### **Results:**

Findings demonstrated that children may choose to use a prosthesis as an aid in activities, to prevent unwanted attention and to have fun. They may choose not to wear a prosthesis because it is more of a hindrance than a help or because they are comfortable with their limb difference. Areas for development identified included appearance, comfort, weight, movement, ease of use and for assistance with specific activities.

Parents identified that the reasons children may or may not choose to wear a prosthesis can be both extrinsic (peer support, support of the limb centre) and intrinsic (including for parents to adjust to their child's limb difference and because the child finds the prosthesis useful). Parents' priorities for developing upper limb prosthetics were similar to children's but also included making prosthetics more affordable. Parents, however, also identified that improvement should be made in service provision (better support for parents at birth and better patient/family choice in prosthetics).

These findings were used to inform the development of new prototype prostheses, which have been presented back to the participants for their feedback – the results of this are currently being analysed.

### **Plans for future work:**

Stage 3 of this study is currently being conducted and involves exploring the views of clinicians on UL prostheses and gaining their feedback on prototypes developed.

### **References:**

- Egermann, M., Kasten, P., Thomsen, M. 2009. Myoelectric hand prostheses in very young children. *International Orthopaedics*, 33(4): 1101-1105.
- Ram, B. M., Browne, N., Grocott, P., Weir, H. 2005. *Methodologies to Capture User Perspectives in Medical Device Development: A Survey of the Healthcare Literature*. In "Multidisciplinary Assessment of Technologies Centre for Healthcare (MATCH) Report". Middlesex: Brunel University.

Title: *Assessing the quality of Primary Clinic appointments at Portsmouth DSC*

Presenter: Chantel Ostler, Amputee Specialist Physiotherapist  
Physiotherapy Department, Portsmouth DSC, Portsmouth, Hants

E-mail: [chantel.ostler@solent.nhs.uk](mailto:chantel.ostler@solent.nhs.uk)

Other Authors: Dr Alison Hatfield, Rehab Consultant  
Alison Cole, Amputee Specialist Nurse  
Alasdair Gilbertson, Senior Prosthetist  
Portsmouth DSC, Portsmouth, Hants

**Aims and Objectives:**

In 2009 Portsmouth's Disablement Services centre (DSC) had a 4 month waiting list for primary assessment appointments and an attendance rate of only 80%.

An Audit was undertaken to assess whether the DSC offered its amputee's timely primary assessments in line with national and locally agreed standards. An action plan was implemented following this audit and the service was re-audited in 2011.

Alongside the 2011 audit patient's were asked to complete a patient experience survey to gain their perspective on the assessment process.

**Method:**

Between January and March 2009, 44 patients attending a primary clinic appointment were included in the audit. An audit tool was used to collect data which included national standards (BSRM 2003) and locally agreed standards.

An action plan was implemented following the 2009 audit.

Between January and March 2011 the same audit tool was used to re-audit the primary appointments. A patient experience survey was also completed by all patients after each appointment.

**Results:**

The results of the 2009 audit showed that a number of the agreed standards were not met. Patients were not always receiving a full MDT assessment, no written information was available for patients, and many patients were not ready to begin prosthetic rehab at their primary appointment. Due to a prolonged vacancy in the nurse's role patients were also not receiving specialist wound care. An action plan was implemented which introduced new ways of working in an attempt to address these issues and meet the audit standards. The re-audit in 2011 found that 85-100% of primary appointments met the audit standards. It also showed that waiting times had significantly reduced and attendance had improved. Key finding showed significant improvements in the number of patients having an MDT assessment. There were also improvements in the number of patients who were ready to begin prosthetic rehab. Alongside this the patient experience survey found that:

- 94% of patients reported their expectations were met during their consultation
- 100% of the patients felt listened too and felt that their important questions had been answered.
- 94% of patients were very satisfied with the information they received during the consultation.

**Conclusions/implications:**

The audit process has led to the primary clinic appointments undergoing significant restructuring. This has reduced waiting times, improved patient attendance and satisfaction.

These developments have helped to identify the right appointment time for primary amputees. This has increased the number of patients being cast at their primary appointment. The changes in this audit have raised the quality and cost effectiveness of the service.

Title: ***Goal Setting Questioned***

Presenter: Dr Diane Playford, Reader in Neurological Rehabilitation UCL Institute of Neurology and Honorary Consultant Neurologist, National Hospital for Neurology and Neurosurgery, UCLH Trust.

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Goal setting has been described as the core skill of the rehabilitation professional. However it is time consuming and little work has been performed that demonstrates its effectiveness or cost effectiveness. This presentation will consider the evidence for goal setting, the myths and legends surrounding goal setting and highlight some of the advantages and disadvantages of different forms of goals setting.



Title: *Van Nes Rotationplasty for Management of Ewing's Sarcoma of the Femur: A Case Study*

Presenters: I Sedki, Consultant in Rehabilitation Medicine  
Dr C Cointet, Lead Prosthetist  
J A Fulton, Clinical Specialist Physiotherapist  
Prosthetic Rehabilitation Unit, Royal National Orthopaedic Hospital  
Brockley Hill, Stanmore, UK

E-mail: [imad.sedki@rnoh.nhs.uk](mailto:imad.sedki@rnoh.nhs.uk)

### **Introduction:**

Van Nes Rotationplasty (VNR) was first described in Germany 1930 and introduced to English literature by Van Ness 1950. It is currently performed more commonly in North America and some European countries for selected cases of congenital limb deficiency or treatment of malignancies.

### **Objective:**

This paper will describe the case history of a 20 month old child; one of the youngest reported patients in the healthcare literature; who has undergone modified VNR for the management of Ewing's sarcoma of the femur. The management of this child highlights the need for interdisciplinary collaboration between the surgical/medical/therapy/prosthetic teams from the early pre-operative stage through to ongoing rehabilitation and management.

We will discuss the following:

- Dealing with parent's expectations, anxiety and concerns.
- Clinical examination
- Operation details, indications and technique.
- Physical Rehabilitation
- Prosthetic considerations, timing of fitting and socket design
- Serial pictures and videos of progress.
- Current progress and expected outcome

### **Conclusion:**

The use of segmental amputation in the form of modified VNR has allowed this child to achieve developmental milestones and a level of function that would not have been possible with a hip disarticulation amputation. However challenges remain ahead for the patient including remaining cancer free and the development of a functional hip joint which will ultimately dictate the level of function achieved. For the professionals involved the challenge remains the minimisation of musculoskeletal compensation strategies due to altered anatomy and biomechanics while at the same time promoting function and independence.

Title: *Sweat Management in Prosthetic Sockets – Results of research and patient trials*

Presenter: J McCarthy, Prosthetist  
Chas A Blatchford & Sons Ltd, Lister Road, Basingstoke, Hants

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Other Authors: J Ross, A McDougall, A Ward, L Ritchie, S Zahedi

**Aims/Objectives/Outline :** Sweat at the stump socket interface is widely reported as being an issue with modern impervious liners. This moisture results in reduced control, potential increased risk of tissue breakdown as well as being an ideal breeding ground for pathogens.

This presentation will reveal some experiments carried out over recent years to improve sweat management at the stump socket interface and discuss the results.

**Techniques/Methods:** Standard off the shelf liners were perforated to investigate if their use resulted in drier residuum's. The trial protocol was developed and tested on amputees (K3-K4) who were specifically prone to sweat problems. The study was a double blind trial and followed the methodology laid out below:

### **Methodology**

Initially participants wore a trial liner for a week. After this period they were asked to complete a questionnaire. In the second week they were asked to wear a different trial liner. After which they were asked to complete a questionnaire again.

**Summary/results:** 10 of the trial participants reported drier residuum's, one was wetter and the other was inconclusive as he discontinued use due to poor socket retention (did not have an air-tight system). There was also one bilateral trans-tibial patient who after one week's use suffered a blood blister distally. This patient is a diabetic and has been prone to breakdown in the past so discontinued use.

**Conclusions:** Perforation of liners can in most instances result in drier residuums. Some experienced improved prosthesis retention. We suspect that some of the variation in results which occurred was due to change in stump volume and the use of socks to compensate for this. It is possible to perforate different types of gel liner with appropriate laser technology. During the course of the trial, liners were perforated using manual methods which were expensive and time consuming. There was also some variation in the processing (hole density, especially distally). Discussions with the laser manufacturer suggest that with moderate outlay, perforation could be more consistent using an indexed mandrel which would reduce cycle times. It is possible to program a laser for liners with tapering wall thickness. The position of expulsion valves should be as distal as possible; further investigation is required but preliminary results from this trial seem to suggest that simple "fish tank" valves are probably most suited to this application. It is hypothesised that due to the apparent vacuum generation that seems to occur with perforated liners that the more sophisticated expulsion valves seal more efficiently and do not permit moisture to escape so readily. Further trials continue to validate these preliminary results in order to lead towards optimisation of new sweat management technologies.

Title: *Analysis of adaptive roll-over collision during amputee gait*

Presenter: Dr David Moser, Senior Research Engineer  
Blatchford Products Ltd, Lister Road, Basingstoke, Hants

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Other Authors: G Harris, S Zahedi, N Stech, A Sykes, J McCarthy

### **Aims and Objectives**

This study reports on several experimental investigations carried out to analyse the impact of adaptive control on the kinetic and kinematic behaviour of the elan adaptable ankle foot prosthesis. Recently advances in prosthetics have sought to design prosthetic feet that have some form of adaptive capability with a trend towards more muscular like control of (viscoelastic ,hydraulic damping + elastic) foot behaviour. It is already now established that this functional concept provides greater stability within the socket, improved proprioception and lower stump interface pressures (Portnoy 2011). Crucially it has also been shown that more balanced distribution of loading takes place between pathological and intact limb thus reducing the risk of further pathologies developing and reducing healthcare costs. It is clear from biomechanics research that the “rolling-collision” between foot and ground during locomotion is of paramount importance. The aim of the experimental work reported here was to quantify how the kinetic and kinematics of the “rolling collision” are altered during gait.

### **Methods**

Ankle joint goniometry and high speed digital photography was used to quantify ankle kinematic measures, A pylon load cell and ground Reaction force data was used for kinematic analysis. The ankle PF/DF damping was adjusted to alter the rolling collision characteristic of the foot in a way that would “assist” and “brake” the roll-over in comparison to a neutral balanced PF/DF damping setup

### **Results/Discussion**

By adapting the PF/DF damping many different “virtual spring” ratings and biases can be created enhancing the scope of biomechanical characteristics of the foot system that may be achieved (see fig 1). With the brake mode enabled (down ramp) the stability is increased. The foot reaches the flat foot condition much earlier in the gait cycle. The response from the foot is less elastic, and thus less reactive. With the assist mode enabled (fast walking and up ramp) the efficiency of the locomotion task is improved. More energy is directed through the springs the response becomes more elastic and greater aft shear and vertical GRF indicates more propulsion in the direction of progression and push-off.

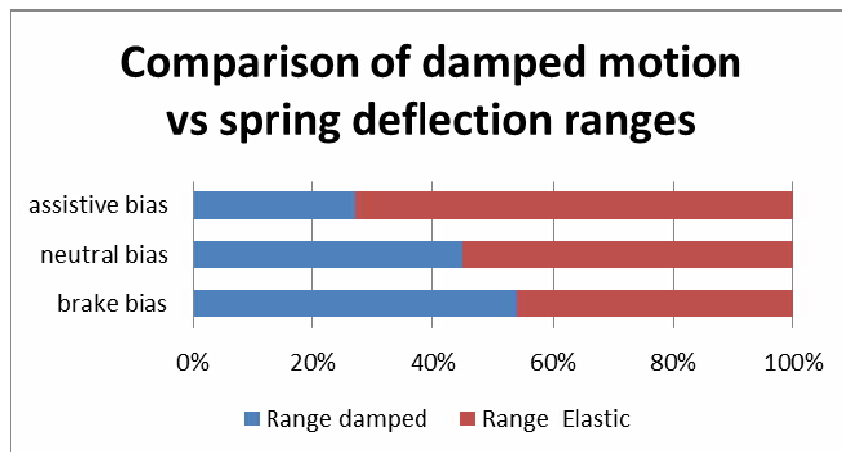


Figure 1. Comparison between PF/DF resistance bias settings, of the comparative distribution between damped movement and spring deflection expressed as a percentage of total available visco-elastic system movements

### Conclusion

The consequences of pathological kinetics at the ankle we believe contribute greatly to the energetics of locomotion and the degree to which amputees have to adapt and compensate their gait. From our results to date we have demonstrated that it is possible to actively adapt the rolling collision of the foot with the ground interface in a way that has a positive effect biomechanically for different walking tasks. Future studies are underway to provide more insight into the muscular control effects more widely into integrated multi-joint prosthetic control systems.

### References

Portnoy S, et al. (2011) Outdoor dynamic subject-specific evaluation of internal stresses in the residual limb: Hydraulic energy-stored prosthetic foot compared to conventional energy-stored prosthetic feet. *Gait & Posture*, Volume 35, Issue 1, Pages 121-125

Title: *The Development of a Biomimetic Prosthetic Ankle-Foot for the Low Activity Amputee*

Presenter: Rob Painter, MSc, B Eng, Mechanical Design Engineer  
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E-mail: [rob.painter@blatchford.co.uk](mailto:rob.painter@blatchford.co.uk)

Other Authors: Graham Harris, Principal Mechanical Design Engineer  
Alan McDougall, Prosthetist  
Saeed Zahedi, Technical Director

### **Background:**

Reduction in the number of falls and lower back pain in lower limb amputees has been the main goal of biomimetic ankle-feet design. The success of such devices is well documented in active K3 users especially through increased confidence and reduced compensation in dealing with steep slopes and stairs. A conventional ankle-foot device available for a low activity K2 level amputee has elastic elements within the ankle which forces the foot to return to a fixed equilibrium position during ambulation. Transferring to and from a chair and standing on slopes or uneven surfaces the limitation of such devices causes imbalance which requires compensation by the amputee. There have been benefits seen with biomimetic adaptive ankle-foot devices using hydraulics to provide the damped resistance but with no fixed position. For the first time this type of device is made available to suit the specific requirements of a K2 amputee.

### **Aim:**

The aim of the study was to investigate whether the benefits seen with current K3 biomimetic ankle-feet could be experienced by K2 amputees and be made available with a foot tailored to their needs.

### **Method:**

Through the review of the scientific literature and discussion with clinicians the issues of importance to a K2 amputee were established. The benefits of adaptive ankle-foot devices for K3 amputees were identified and compared against the issues of importance for K2 amputees to form a specification for a new foot design.

A new design for a biomimetic ankle-foot combining a hydraulic ankle with a resilient keel was established and trial units manufactured. Ten (7 Trans-tibials, 3 Trans-femoral, 42kg to 101kg) were fitted to K2 activity level patients who were previously using conventional fixed type ankle-feet. The new ankle-foot was worn for three months and a questionnaire was completed to compare the new biomimetic ankle-foot to their previous foot.

### **Outcome:**

The trial participants reported being more confident and secure on the new biomimetic ankle-foot compared to their previous foot. Specifically the biomimetic ankle-foot made uneven surfaces and slopes easier and safer compared to their previous fixed type ankle-foot. It was also shown to give improved shock absorption and better overall function.

### **Conclusions:**

Biomimetic adaptive ankle-feet can have noticeable benefits to the low activity K2 amputee when designed specifically to meet their needs and requirements.



Title: *A pilot study to determine compliance in orthoses used to treat Talipes Equinovarus*

Presenter: S Osborne, Clinical Specialist, Sheffield Children's Hospital, Sheffield  
Honorary Research Fellow, Stafford University

E-mail: [stephen.osborne.obs@googlemail.com](mailto:stephen.osborne.obs@googlemail.com)

Other Authors: Mr M Flowers FRCS, Mr G Davis FRCS, Mr S Jones FRCS,  
Mr S Giles FRCS, Orthopaedic Surgeons, Sheffield Children's Hospital

The treatment of talipes equinovarus has turned 180 degree switching from surgery to manipulation in the last 40 years. Now the provision of boots and bars for the first years in life is standard practice. Unfortunately some children still relapse after the initial success of treatment and go on to have further surgery. It is considered that non-compliance with the boots and bars regime is a factor in this.

To better understand if the treatment regime is being complied with, a temperature sensor was placed inside the outer sole of the boots used in the treatment process. The families chosen were blinded to the use of the sensor as it was thought that this may affect compliance if they knew they were being monitored. Six patients were chosen for the study. They had just embarked on the first 12 weeks of the treatment regime which requires the parent to ensure that the boots and bars are worn for 23 hours out of 24 hours a day. The sensors were changed at 6 weeks and then removed at the 12 week period. At the end of the 12 week period the parents were asked if they had been able to comply with the treatment protocol and to describe any difficulties they had.

From the six subjects chosen five full sets of data were collected. Looking at the temperature data collected from the remainder of the subjects there was significant variation in interval when the temperature dropped significantly. It would be expected that with full compliance there should be a significant temperature drop measured on 84 occasions per trial. The subjects measurement varied from 56 changes in temperature signifying removal to 121 over the same period with only one subject being correctly removed 84 times. All of the families in the trial felt that they had complied with the instructions and did not state they had any significant problems in complying with the treatment.

The results of the study show that compliance was achieved in that the children had worn the orthoses for the whole period but there was variation in how many times the boots and bars were removed with one orthosis being removed 121 times over the 12 week period. Unexpectedly 2 subjects had their footwear removed less than the allowed interval. The method of data collection does appear to be reasonably robust and the only error noted was a failure to replace a sensor. After the 12 week initial period, patients go on to wear their boots and bars whilst sleeping, usually for a number of years. A further study will now be undertaken to examine patients who have progressed to night time regime to check if compliance is achieved in this group. The study found that temperature sensors could be used to monitor changes in temperature in footwear and that this data can be used to estimate compliance with footwear wear over a period of weeks.

Title: *Micro-processor controlled knees – What’s the choice?*

Presenter: Toby Carlsson, HCPC Registered Prosthetist/Orthotist  
PACE Rehabilitation Ltd, Cheadle, Cheshire

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The field of prosthetics has seen technological advances like never before in recent years, to a large degree driven by political will to rehabilitate service personnel injured in the conflict zones throughout the world.

This new generation of products has evolved over the last few years. It offers the opportunity to achieve higher levels of control and safety, inviting prosthetic users to extend their scope of activities. This increased level of function for the most part comes at substantial cost. The products often include sophisticated control systems that incorporate sensors that detect the state of the component and influence the behavior of the component in real time to optimize the performance for the user. The process of translating information from the sensors to influence the actuators that control the behavior of the component is typically performed by micro-processors. The biggest single group of prosthetic components that incorporate such technology are prosthetic knee joints.

Different manufacturers use different concepts of varying sophistication provide the “sensing-processing-actuating” cycle. This presentation offers a brief overview of the technical and functional characteristics of some micro-processor controlled knees used in the UK together with the presenter’s personal experiences of using some of them. It aims to set the scene for the subsequent presentations in this session.

Title: ***Micro-processor Knees – How do you choose?***

Presenter: Carolyn Hirons, HCPC Registered & Chartered Physiotherapist  
PACE Rehabilitation Ltd, Cheadle, Cheshire

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Electronic knees, controlled by microprocessors, can be a mystery. How do they work, when do they do what, how do we optimise the settings and what does this all mean for the individual user?

Providing electronic knees is a team event, with prosthetist, physiotherapist and user working closely together. A comfortable and stable socket is essential in order for the user to feel the knee and give it the right instruction. Alignment is important to the sensors, to detect the movement required to control the knee. The prosthetist needs to be IT savvy these days. The physiotherapist needs skills in assessment to help match the user to the knee functions and skills in training knee behaviour. The user needs time to learn.

The Otto Bock C leg has been recognised as a reliable steed but there are other knees that offer different features, which for some users will open up new avenues for living with a prosthesis.

So, how do you choose?

This presentation will shed light on the ‘e-knee, me-knee, my-knee, mo’ approach.

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Title: ***Microprocessor Knees: Literature Review – Appropriate Prescription***

Presenter: Dr Imad Sedki, Consultant in Rehabilitation Medicine  
Stanmore/Luton DSCs, UK

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A recent revolution in prosthetic component design has resulted in the availability of a wide range of high-end components. As the trend of innovation continues to gather momentum, the use of Microprocessor knees is becoming increasingly popular among both users and clinician groups. Like most new components in prosthetics, Microprocessor knees come with a range of recommended indications by the manufacturers and a promise of significant mobility and quality of life improvements. As clinicians, it is our duty to agree appropriate evidence-based prescription criteria and highlight the possible health, social and health economic impact of using such components by different amputees during their normal day-to-day activities.

Title: *Prosthetics and preparing athletes for the London 2012 Paralympic Games*

Presenter: Richard Hirons, Clinical Specialist – Prosthetics  
Ossur UK Limited, Manchester

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Competitive sport is governed by rules and regulations and those who engage at an elite level are often athletes enrolled in formal training schedules and regimes.

There has been much debate regarding the contribution prosthetics make to the performance of elite athletes in competitive sport. Advantage or disadvantage, athletes with amputation need a prosthesis that is appropriate for their sport in much the same way that any prosthesis needs to match the needs of its user.

In the lead up to the London 2012 Paralympic Games there has been much preparation for a number of elite athletes on their road to selection and eventual competition. Despite initial impression, much of the equipment used is standard and available to a wider audience. What has been unique is the attention to detail, funding and coaching arrangements put in place to enable these athletes to perform at their best.

Contributions during this session will come from:

Richard Hirons Clinical Specialist – Prosthetics  
Hayley Ginn – UKA Apprentice Coach  
Alison McPherson – UKSport Research and Innovation Co-ordinator  
Richard Whitehead – T42 200m Gold Medal Winner London 2012 Paralympic Games  
Jonnie Peacock – T44 100m Gold Medal Winner London 2012 Paralympic Games

Title: ***More Precious than Gold: When the ordinary is more valuable than the ultimate – the impact of prosthetics and orthotics on the lives of the poorest of the poor***

Presenter: Carson Harte, International Director, The Cambodia Trust

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In many low income countries, the loss of mobility, caused by amputation or by disease, brings loss of status, reduced employment prospects, exclusion from education and with that, increased poverty. The World Bank indicates that disabled people are among the poorest people and most excluded people in the world. In this time of Paralympic awareness, we will reflect on those for whom a prosthetic or orthotic device means survival, and for whom achieving the ordinary – which is taken for granted in the west - represents a triumph of technology and human spirit.

This paper looks at the impact of prosthetic and orthotic rehabilitation on the lives of people with disability, and focuses on the causes of poverty and practical ways in which rehabilitation works. ISPO has played a pivotal role, along with the World Health Organisation, in establishing standards in P&O education, a process of accreditation and establishing guidelines on appropriate prosthetic technology, wheelchairs and orthotics.

The work of ISPO over the last thirty years and its impact on the lives of people all over the world is not well understood. This paper will primarily explore ISPO influence in the SE Asian region, country by country and then globally.



Title: ***Skin Problems of the Stump in Lower Limb Amputees***

Presenter: H.E.J. Meulenbelt, MD PhD  
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**Winner – George Murdoch Prize Medal 2012**

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The topic of the research is covered by its title; skin problems of the stump in lower limb amputees.

This research was performed since skin problems of the stump in lower limb amputees are a common problem in daily clinical practice. Aims of the research were to obtain knowledge about incidence and prevalence of skin problems of the stump in lower limb amputees, of possible determinants which have influence on developing such a problem, and about the influence of a skin problem of the amputation stump on functioning in daily life.

By the results of the research it is now known there is limited evidence of incidence and prevalence of skin problems of the stump in lower limb amputees, several determinants were identified which influence the development of a skin problem, and the negative influence of a skin problem of the stump on functioning in daily life was found.

Title: *Mortality predictors after lower limb amputation: a prospective study*

Presenter: Dr R K Singh, Consultant in Rehabilitation Medicine  
MSRC, Northern General Hospital, Sheffield

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Other Authors: Dr G Venkateshwara, Clinical Fellow  
Dr M F Khan, SpR in Rehabilitation Medicine  
Dr K P S Nair, Consultant Neurologist  
Northern General Hospital, Sheffield

### **Objective:**

To evaluate mortality after first-time lower limb amputation and any independent predictors for long-term mortality.

### **Design:**

Prospective Cohort Study at a Regional Rehabilitation Centre with three years follow-up.

### **Participants:**

Successive lower limb amputations over one year (N=105)

### **Outcome measure:**

Mortality

### **Results:**

After 3.1 years, 35 individuals in the cohort had died, representing a mortality of 33%. On initial univariate analysis, those who died were more likely to have Type 2 diabetes mellitus ( $\chi^2=7.16$ ,  $df=1$ ,  $p=0.007$ ) and less likely to have been limb-fitted ( $\chi^2=5.84$ ,  $df=1$ ,  $p=0.016$ ). There was no association with age, gender, level of amputation, social isolation, significant medical co-morbidity other than diabetes or presence of mood disorders. A multi-variable logistic regression (backward step) confirmed that diabetes (odds ratio=3.10, confidence intervals=1.25-7.40,  $p=0.009$ ) and limb-fitting (OR=2.60, CI=1.16-6.25,  $p=0.028$ ) were independent predictors of mortality.

### **Conclusions:**

Mortality after amputation is extremely high and is increased in individuals with diabetes or in those who are not limb-fitted after amputation. This is the first study to find an effect from limb-fitting. This requires further investigation to ascertain why the wearing of a prosthetic limb, confers an independent survival benefit.

Title: *Study of prosthetic foot mechanism on transfemoral amputee gait: a case study*

Presenter: Nadine Stech, Dipl.-Ing, Research Engineer  
Chas A Blatchford & Sons Limited, Lister Road, Basingstoke, Hants

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### **Background:**

Much research has been carried out to investigate effects of different feet on transtibial amputees but not so much for transfemoral amputees where compensatory effects in gait occur to a higher degree and prosthetic feet play a crucial role during stance.

### **Objectives:**

This study investigates the kinetic effects of three different feet on a knee disarticulated amputee walking on different surfaces and with different speeds.

### **Study Design:**

Case study.

### **Methods:**

One unilateral knee disarticulated amputee was monitored wearing three different feet. The kinetic impacts of three different speeds and three different surfaces were investigated using measurements of ground reaction forces and bending movement.

### **Results:**

Ground reaction forces and bending moment indicate different characteristics of the feet concerning a smoother transition during stance and the timing of transition from plantarflexion to dorsiflexion which influences stability during stance.

### **Conclusions:**

This case study indicates that kinetic and kinematic characteristics of feet can play an important role for transition and stability during stance for transfemoral amputees. Further research should focus on the kinetic impact of feet on the hip joint.

Title: ***A Comparison between Otto Bock Myoelectric Prosthesis and i-Limb Hand Touch Bionics***

Presenter: Claire Wilson, Clinical Lead Occupational Therapist  
Regional Disablement Services, Musgrave Park Hospital, Belfast

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Other Authors: Dr Suzanne Carson, Clinical Psychologist  
Dr Lorraine Graham, Consultant in Rehabilitation Medicine  
Musgrave Park Hospital, Belfast

### **Aims/Objectives of study:**

To complete a standardised functional assessment with the Otto Bock Sensor hand and the i-Limb hand.

To compare the functionality of the 2 prostheses.

To explore values and preferences that prosthetic users have of their prostheses.

### **Techniques/Methods used:**

Five patients with right transradial amputations were identified for participation in the trial. The Southampton Hand Assessment Procedure (SHAP) was used to assess functionality using initially the Otto Bock Sensor hand and then after a period of on average four weeks training the i-Limb hand was assessed. Four completed the study. Each client was assessed by a clinical psychologist using the Repertory Grid, Beck Depression Inventory, SF 36 and ABIS-R (body image scale) after completion of final SHAP assessment.

### **Summary of results:**

Overall the SHAP functionality profiles demonstrate that the i-Limb is scoring marginally higher than the Otto Bock Sensor speed hand. The Otto Bock hand overall functional scores were 18, 50, 53 & 16 and i-Limb overall functional scores were 22, 57, 54 & 24. Therefore the i-Limb scored slightly higher on function. The power grip and tripod grip scores were consistently higher for i-Limb hand. The lateral grip score was higher for 3 out of 4 participants with Otto Bock hand. None of the participants scored significantly for depression, anxiety, body image or quality of life issues. Repertory grid identified three participants who felt grip of Otto Bock hand was stronger but they preferred the cosmetic appearance and natural movement of the i-Limb. One participant favoured the Otto Bock over the i-Limb but felt that if issues with glove, stability of thumb and reliability could be resolved then the i-Limb would rank more favourably. One participant rated the i-Limb and Otto Bock sensor speed hand highly on all constructs but felt that due to the higher cost of the i-Limb, provision of this hand couldn't be justified and technical issues also needed to be resolved. Constructs important to all participants were functionality, independence, satisfaction with comfort and fit and happiness. In these constructs 2 participants reported that their body powered prosthesis out ranked the i-Limb and Otto Bock hands.

### **Conclusions:**

This study has shown that the i-Limb scored slightly more favourably for overall functionality in relation to the various grips possible and speed of completion of activity of daily living tasks. However the Otto Bock hand scored well on SHAP assessment and the majority of participants preferred the grip strength of this hand. All participants identified functionality, independence, satisfaction with comfort and fit and happiness as the most important constructs.

Title: ***Congenital Upper Limb Deficiency (CULD): Pre-natal consultation in sub-regional limb loss rehabilitation clinic***

Author: Bhaskar Basu, Speciality Registrar in Rehabilitation Medicine  
DSC, University Hospital of South Manchester NHS Trust

Presenter: Professor Jai Kulkarni, University Hospital of South Manchester

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Other Authors: Professor Jai Kulkarni, Consultant, Manchester DSC  
Jane McLaughlin, Specialist OT, Manchester DSC

**Aim and Objectives:** A long term review of 67 patients with CULD from 1995-2011. This includes 23 pre-natal consultations following positive ante-natal scan for CULD. Routine ante-natal US Scans sometimes miss abnormalities. If limb deficiency is detected during pregnancy, parents should be referred pre-natally to the appropriate specialist Limb-Deficiency Clinic. The major benefit of pre-natal diagnosis lies in the opportunity to counsel families with regards to the limb deficiency aetiology, management and merits of life-long follow up. The aims of the study were to collect demographic data of CULD including those whose parents were consulted pre-natally, to identify whether we were following the BSRM Standards and Guidelines to refer all parents from the point of diagnosis-for pre-natal consultation with specialist Limb-Deficiency Centre, whether the full MDT rehabilitation team was involved in management and to predict the effectiveness of pre-natal consultation influencing the successful or unsuccessful outcome involving future limb loss management, decision making or abandonment of prosthesis.

**Methods:** Data was collected from notes of the patients from 1995-2011. Retrospective cross-sectional study of reported 67 CULD was conducted including 23 cases of pre-natal consultations following ante-natal diagnosis of CULD.

**Results:** Out of 67 CULD (42 1995-2005 and 25 2005-2011) were recorded, there were differences in laterality and gender. 44 were first seen post-natally. The defect was predominantly affected male children (58.2%), left side if unilateral affection (65.67%) and equal incidence of transverse mid-forearm deficiency (44.78%) and partial hand deficiency. Most referrals came from Regional foeto-maternal unit, closely followed by plastic surgeons. 15 cases were recorded undiagnosed with ante-natal scan, 6 were never referred to specialist Limb-Deficiency Clinic despite diagnosed with scan and 3 parents refused pre-natal consultation. Most patients were seen by consultants and specialist OT but seldom by other professionals like counsellor (10.45%) or prosthetists (32.8%). Good outcomes were recorded for 71.64% included 19 children who are using myo-electric prosthesis and 15 without any. 10 had abandoned prosthesis at an average age of 9 years.

Total 23 pre-natal consultations for CULD (4 1995-2005 and 19 2005-2011) were recorded with 56.5% female. Most referrals came from foeto-maternal unit. 6 cases of Positive scan at 20 weeks were never referred or parents refused consultation. Unilateral Left-side involvements in 60.87% with 65.22% incidence of transverse mid-forearm deficiency and 26.09% of partial-hand deficiency were identified. Most parents were seen by consultants and specialist OT. 13 were diagnosed as of sporadic occurrence by Clinical Genetics and 3 as syndromic. One parent refused genetic test. Good outcomes were recorded in 65.2%, 6 children are using myo-electric prosthesis presently and 12 using nothing. 3 children had abandoned prosthesis at an average age of 3.67 years.

**Recommendation:** Continued efforts to improve the links between referrer and specialist Limb-Deficiency Clinic are needed with aim of 100% parents referred for pre-natal consultation with counselling. Amputee Rehabilitation MD team should be fully involved during initial consultation time. Multicentre studies with larger population will emerge with more reliable information for both who use Amputee Rehabilitation service or plan a service.

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**Reference:** Standards and guidelines in Amputee and Prosthetic Rehabilitation, BSRM 2003.



Title: ***Optimising Energy Management – The Combination of Energy Efficient Structures, Hydraulic Damping, and Dynamic Alignment in a New Prosthetic Foot***

Presenter: Alastair Ward, Training & Education Prosthetist  
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Other Authors: G Harris, Principal Mechanical Design Engineer

### **Aims and Objectives**

A New Prosthetic foot was to be designed that would combine multiple force and energy management concepts into one compact device. Integral to this would be the energy storing elements of a dynamic foot system, a tele-torsion pylon, and the damping and improved alignment capabilities of a hydraulic biomimetic ankle.

The combination of these individual elements into one single system would allow the size and weight of such a device to be minimised. It would also offer the challenge and the opportunity of fine-tuning each individual element to achieve both optimised energy management and a more functional system for the end user, across a range of walking speeds.

The purpose of this study, undertaken during the foot's development, was to collect and analyse the necessary data to achieve this goal.

### **Methods**

A series of gait experiments using a force platform and load cells were carried out. The purpose was to study the functional elements individually before looking at how they interact when combined. This data was analysed for different phases and styles of gait across varying cadences. Test simulations were used to show how the various elements could be optimised in order to achieve a better overall function. Changes were implemented and then further evaluated. Repetition of this design, testing and evaluation was used until the best outcome had been reached. User responses were also recorded.

### **Results/Discussion**

Kinematic and kinetic data has been compared for simple dynamic feet, biomimetic feet and the new foot design. The experimental results showed that there is a need develop a detailed understanding of how the functional elements of the foot can be coordinated during the roll-over process to provide better biomechanical outcomes. An optimised range of movement for each element in the system has been identified based on energy distribution during stance as well as direct user feedback.

### **Conclusion**

Improved prosthetic foot function requires not only efficient energy management but also an optimised alignment for a given walking or standing situation. It is important that the elements in the system are balanced so that the amputee can enjoy a smooth, controlled gait over a range of walking speeds and terrains.

Title: ***Personalised foot orthotics with embedded temperature sensing: proof of concept and correlation with activity***

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Other Authors: J Munguia, Research Fellow, Newcastle University  
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The ability to monitor physiological and mechanical parameters relating to the foot over extended time periods is of potential interest for a number of clinical conditions. For example, the ability to detect the early signs of plantar ulcer development in patients with peripheral neuropathies could be highly beneficial for this highly prevalent and difficult to treat problem. The in-shoe environment is however a challenging environment for long term repeated measurements, primarily because of a combination of cyclic high loading patterns and varying temperature and humidity levels [1, 2]. The aim of this study was to test a novel foot orthotic (FO) design featuring embedded temperature sensors and to determine if the measurements taken by the device could be correlated with activity levels.

Ten healthy participants (5♀) gave informed consent to take part in this study. A pair of customised FOs were designed from weight bearing 3D surface scans of the participant's feet using OrthoModel software (Delcam, Birmingham, UK). The designs were then modified to include attachment sockets for temperature sensors with built in data loggers, (Thermochron iButton®, Maxim Integrated Products, San Jose, CA, USA) positioned to measure plantar surface temperature under the medial arch, and below the FO to measure ambient shoe temperature. All devices were then manufactured in Nylon 12 via selective laser sintering (Peacocks Medical Group, Newcastle, UK).

Participants wore the temperature sensor FOs and an activity monitor (ActivPAL; PAL Technologies Ltd, Glasgow, UK) over the course of four consecutive days. After collection, the data was randomly partitioned into equal sized training and validation sets and a threshold algorithm developed to identify time periods of high activity from temperature data. T-tests were performed for both datasets to compare energy expenditure levels at time periods identified as low and high activity.

All FOs performed in a reliable manner over the course of the test period. The average energy expenditure during periods identified as high activity from the temperature data was 2.23 and 2.43 MET/hr for the training and validation datasets respectively, compared to 1.49 and 1.59 MET/hr for low activity time periods, with differences shown to be statistically significant (training set  $p < 0.001$ , validation  $p < 0.001$ , and overall  $p < 0.001$ ).

These results provide preliminary evidence that FOs featuring embedded temperature sensing can be used to identify time periods of high activity in healthy individuals and may be useful as a tool for measuring compliance. Embedding sensors in an FO is an appealing option as these devices can be used in multiple sets of footwear without the requirement for any non-reversible modifications to the footwear itself.

Further work is required to determine if the devices could be applied in a population with peripheral neuropathy, and ultimately as a measure to detect localised inflammation.

### **Acknowledgments**

This work was funded through the European Commission Framework Seven Program (Grant number NMP2-SE-2009-228893) as part of the A-FOOTPRINT project ([www.afootprint.eu](http://www.afootprint.eu)).

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## **The OETT Lecture 2011**

Title: ***Roll-over Shape as a Tool in Prosthetics and Orthotics***

Presenter: Andrew H Hansen, PhD, Associate Professor  
Department of Physical Medicine & Rehabilitation  
University of Minnesota, USA

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For many years, clinicians and researchers have discussed “roll-over” of persons walking with different prosthetic feet, ankle-foot orthoses, shoes, and the like. The roll-over shape is an effective rocker shape that can be measured directly during the “roll-over” period of walking (i.e., prior to push-off) and can provide useful information for design, evaluation, and alignment of prosthetic and orthotic components. We have studied the roll-over shape in young able-bodied persons and have found a high level of consistency for a variety of level walking conditions. For example, when able-bodied persons walk at different speeds, carry additional weight, or walk with different footwear, their roll-over shapes are appreciably invariant. The invariance of the roll-over shape for level terrain has driven the development of low-cost biomimetic prosthetic foot designs, a theory for alignment of ankle-foot prostheses and orthoses, and design of rocker shoes for prescribed ankle movements. Studies of roll-over shapes of able-bodied persons walking on ramped surfaces have led to designs of ankle-foot components that can automatically adapt to different slopes. Effective shapes measured during standing and swaying have suggested simple approaches for the future to improve prostheses and orthoses for persons with balance problems. This presentation will provide an overview of studies related to the roll-over shape and the relevance of this measurement to the field of prosthetics and orthotics.

Title: ***Cognitive Issues in Older Vascular Surgical Patients***  
Presenter: Judith Partridge, Guy's & St Thomas' NHS Foundation Trust, London  
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The rate of surgical procedures in older patients is rising. Despite deriving clear benefits from surgery older patients remain at increased risk of adverse postoperative outcomes compared with their younger counterparts. Postoperative cognitive issues such as delirium are a particular problem for older patients. Risk factors for vascular disease common in the older vascular surgical population put patients at increased risk of both cognitive impairment and of postoperative delirium. This session describes postoperative cognitive issues and pre-existing cognitive impairment in the older vascular surgical population.

#### **Learning objectives for this talk**

- 1 To gain an overview of the spectrum of postoperative cognitive issues which exist (postoperative cognitive dysfunction and postoperative delirium)
- 2 To appreciate the burden of undiagnosed cognitive impairment within the older vascular surgical population
- 3 Establish the incidence of postoperative cognitive issues
- 4 To appreciate the impact of cognitive issues on longer term outcomes
- 5 To understand how postoperative cognitive issues (such as delirium) can be prevented in the surgical patient

Title: ***Exercise Physiology and the Response to Exercise***  
Presenter: Amanda Thomas, Barts Health NHS Trust, London  
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All human activity is characterized by unique metabolic, cardiovascular and respiratory responses irrespective of intensity. These highly consistent reproducible responses demonstrate remarkable physiological coupling and have been described in detail as the "Oxygen Transport Oathway", a pathway operative in both health and disease. The oxygen transport pathway illustrates the complex inter-relationships of the tissue metabolic pathways to the systems driving delivery of oxygen and elimination of metabolic waste products. The nature of these responses is classically defined by the "Fick Equation" and for the most part can be identified by reproducible linear characteristics. Appreciation of the underlying physiological response to acute exercise provides the basis for understanding the responses anticipated for patients in clinical environments where exercise is utilized as a therapeutic strategy.

Title: *A Review of Orthotic Management of Peripheral Neuropathy*

Presenter: Paul Charlton, Peacocks Medical Group, Newcastle upon Tyne

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This short presentation will review current evidence for interventions; consider current clinical options and present recent work on evaluating one particular option. This case study considers the effect of flexible and rigid AFOs on a subject with anti - myelin associated glycoproteins (anti MAG ) neuropathy, a progressive disorder that can lead to gait and balance disorders . A 65 year old man presented having worn flexible AFO for over a year. Rigid AFO manufactured using both traditional and SLS means were provided and evaluated after four weeks' use to consider balance gait and quality of life.

The use of more rigid AFO produced improvements in walking speed and balance. The performance of SLS orthoses was equivalent to those manufactured using standard methods.



## POSTER ABSTRACTS

Title: *The interdisciplinary rehabilitation of a quadrilateral amputee following an explosives accident*

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### **Introduction:**

The management of a patient with extensive traumatic injuries including quadrilateral amputation poses several challenges to both the patient and rehabilitation team (Davidson et al. 2001). This case study highlights the importance of a coordinated multidisciplinary approach in order to address complex rehabilitation goals.

### **Case Presentation:**

In 2011, a 24 year old male (Mr L) was admitted for inpatient rehabilitation after sustaining extensive injuries following an explosion whilst mixing chemicals with a friend. His injuries included:

- Bilateral transfemoral amputations
- Bilateral partial hand amputations
- Extensive burns and scarring to his legs, hands, face, neck and airway
- Vagus nerve palsy

Mr L presented with numerous physical impairments and functional limitations due to his injuries and lengthy acute hospital admission. Primary issues comprised of bilateral transfemoral amputations, gross deconditioning, bilateral hip extensor contractures, bilateral wrist and finger contractures, facial and neck scarring, inability to swallow as well as the major psychological adjustment to his condition. As a result of these primary issues, Mr L faced significant associated problems which posed major challenges for this gentleman to return home. These included:

- Global muscle atrophy, malnutrition, fatigue and fluctuating motivation initially lead to limited participation in therapy
- Full assistance required for mobility and personal care
- Specialised seating required due to inability to sit upright
- Minimal hand function
- Extensive scarring, contracture formation, poor healing and hypersensitivity of his limbs as well as initial weight bearing restrictions
- Social isolation whilst in hospital as well as changes in identity and appearance
- Financial burden (non-compensable and limited funding assistance) and major home modifications required

**Management and outcomes:**

The large inter-disciplinary team worked extensively together with Mr L to assist him in returning home with his family after four months at which time he was able to independently transfer, use a manual wheelchair, swallow safely and complete most personal tasks either independently or with minimal assistance.

This case study highlights how using a problem solving approach, team members were able to work together to address issues in a coordinated fashion rather than each discipline working in isolation. For example, the immediate challenge of gross deconditioning was addressed by Medical/Dietetics ensuring adequate nutrition, Physiotherapy implementing a strengthening program, Occupational Therapy providing assistive equipment, motivation by Mr L and communication between the team to allow participation in therapy around an extensive feeding regime.

**Discussion:**

This case study highlights the many challenges initially faced by a patient with extensive traumatic injuries. It further emphasises the importance of working as an inter-disciplinary team as many issues needed input from more than one health professional and could not be managed effectively by a single discipline in isolation.

Mr L is now pursuing further goals including prosthetic use and return to work/study as an outpatient in a similarly coordinated fashion.

**Conclusion:**

This case study highlights that working together as a team focussing on patient goals rather than discipline-specific goals leads to superior outcomes.

**Acknowledgments:**

- Inpatient amputee rehabilitation team at Royal Melbourne Hospital
- Mr L

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Shin, JC, Park CI, Kim, YC, Jang SH, Bang IK, Shin JS (1998) Rehabilitation of a triple amputee including a hip disarticulation. *Prosthetics and Orthotics International*. 22(3), 251-253

Title: ***Comparison of functional outcomes for primary amputee patients at 1, 3 and 6 months post fit-delivery of a lower limb prosthesis at different rehabilitation locations.***

Author: Jodie Georgiou, Specialist Prosthetic Physiotherapist  
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Guys and St Thomas's NHS Foundation Trust

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## **Introduction**

The Bowley Close Rehabilitation Centre provides (BCRC) a regional prosthetic rehabilitation service (PRS) to the registered population of south east London and Kent. Due to high demand for the physiotherapy service, only amputees in the neighbouring boroughs of Southwark and Lambeth are seen for their physiotherapy at the centre. Patients in other boroughs are seen by local physiotherapy outpatient services. Additionally, some patients are referred from the acute setting to non specialist bed based rehabilitation (BBR) if required. Due to the lower volume of amputees accessing these services, these services typically are not resourced with static physiotherapy posts with specialist amputee skills.

Locally it was anecdotally observed that those patients entering BBR had poorer outcomes at their reviews post delivery of their prosthesis. Lower outcomes at some outpatient physiotherapy services (OPCs) were also noted.

In November 2011, a pilot study was designed to objectively assess the affect of the rehabilitation setting on lower limb amputee outcomes at 1, 3 and 6 months post fit delivery of prosthesis. The study also aimed to gain a greater understanding of the co-morbidities of these patients and whether this could contribute to lower outcomes rather than the rehabilitation setting.

## **Aim**

To compare at 1, 3 and 6 months the functional outcomes of amputees provided with a lower limb prosthesis at different rehabilitation locations in south east London.

## **Inclusion criteria**

- All lower limb amputees referred over an 8 month period who were provided with a prosthesis.
- Outcome measures for all patients completed at reviews at PRS (specifically: TUG, 2MWT, LCI-5).
- Patients needed to have completed 1,3 and 6 month review.

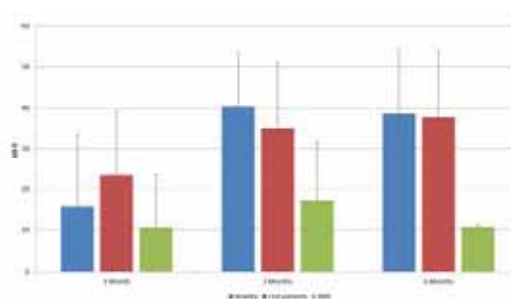
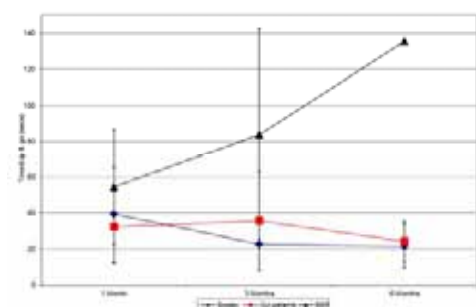
## **Method**

- Patients put into 3 groups depending on rehabilitation setting: Prosthetic Rehabilitation Service, Outpatient Physiotherapy Service and Bed Based Rehabilitation.

- Retrospective data collection of results of outcome measures formulised on an Excel Spreadsheet.
- Unpaired T Test (median), with unequal variance used to calculate significance between groups for each outcome measures at 1, 3, and 6 months. Median calculated as needed for appropriate statistical text.
- Comparison of results made for trans tibial amputees (TTA) vs trans femoral amputees (TFA).
- Use of Charleston Co-Morbidities Index to score co morbidities for each patient, and average score calculated for each group.

### **Results (p values to be included on final presentation)**

- Significant difference between PRS and BBR, with BBR showing poorer outcomes.
- Improved outcomes at PRS compared to OPS however the difference was not significant.
- Significant difference between OPS and BBR, with BBR showing poorer outcomes.
- Significant difference between outcomes of TTA and TFA.
- No significant difference between patient demographics (age, gender, level) at varying rehabilitation locations.
- Moderate difference of co-morbidities at PRS and OPS compared to BBR



### **Limitations**

Pilot study only therefore small sample size. There was a risk that one anomaly can make large changes to results.

Significant outliers were excluded due to the above.

Outcome measures for all patients completed at reviews at the Prosthetic Centre (PC) = TUG, 2MWT, LCI-5. These could be by completed by a different physiotherapist in the team dependent on who were booked to complete the initial fit-delivery. However intra-reliability has been critically appraised for these outcome measures in the literature and deemed not to be a significant factor effecting results.

### **Discussion/Conclusion**

There are differences in functional outcome of patients at varying rehabilitation settings. As expected TTA showed improved outcome measures sooner and to a larger extent than TFA. BBR showed outcomes significantly lower than the PRS, and moderate difference from OPSs.

It is difficult to make conclusions from this small pilot study if these differences were due to 1: Skill mix of staff at different locations and lack of Specialist Amputee Therapists at BBR, or 2: The moderate difference in co-morbidities being a major factor.

Although lower level patients with increased co-morbidities are likely to be referred to IP Rehab than sent home to attend Outpatient Rehabilitation, baseline data collected demonstrated no significant difference in function at baseline.

### **Recommendations**

Further research is needed to understand why these significant differences in patient outcomes were observed depending on rehabilitation location, however the indication that a combination of higher co-morbidities and lack of specialist staff and knowledge base can be assumed at this stage.

### **Next Stage**

Questionnaire to be sent out to BBR facilities in south east London to establish competency in treating amputees provided with a lower limb prosthesis to improve understanding if lack of specialist staff is a factor effecting functional outcomes in this population.

### **Acknowledgements**

Robert Bateman, Rotational Physiotherapist  
Esther Platts, Rotational Physiotherapist  
Guys and St Thomas's NHS Foundation Trust

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Title: ***Has Centralisation of the Vascular Service In Glasgow Been Successful?***

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**Introduction:** As a physiotherapists involved in the centralisation of a vascular service we were interested in the impact of this on effective service provision for patients and staff. Centralisation should result in an improved service (Darke 1998). However has it improved the vascular speciality from surgery to discharge? Improvement is defined as “...*any change strategy that results in a better health service for patients*” (The Quality Strategy 2010). This project aimed to look at the two drivers for centralisation, according to the model for change, length of stay and mortality rates.

**Methods:** Local analysis of the SPARG data for Glasgow in 2011 regarding 30 day mortality rates and length of in patient stay. This was compared to the National rate of mortality and length of stay from 2007-2009.

**Results:** The mortality rate using SPARG data in 2011 for Glasgow shows a 15.3% rate compared to the National rate in Scotland as 15.9% therefore no change since centralisation.

The length of stay has been substantially reduced from a National average of 86 days for non-limb fitted patients and is now reduced to 36 days within the new Vascular Unit.

#### **Discussion:**

Costs will have reduced significantly with a reduced length of stay from surgery to discharge, this is in accordance with the quality improvement model. Mortality has remained the same which should have reduced with a specialist service however due to the nature of the dysvascular patient this may not be possible.

When clinicians are sceptical of new services it is usually due to conflicting priorities (Gollop et al 2004). Clinicians regard services and treatments as their main concern in centralisation whereas management deem political drivers and targets as theirs. This conflict of interests causes a prolonged period of mistrust which is a much more negative aspect of centralisation.

**Summary & Conclusion:** It is too early to thoroughly analyse the success of vascular centralisation almost eighteen months on from its inception in Glasgow from a qualitative perspective. However quantitative analysis shows no change in mortality rates and a significant reduction in length of stay. With more medical staff to challenge one another's practice and learn from their expertise it is inevitable that patient outcomes will improve.

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Title: *Roehampton Amputee Swimming Group Feedback Questionnaire May 2012*

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At Queen Mary's Hospital, Roehampton, the therapy team are passionate about enabling amputees to get back into different forms of regular exercise in order to promote health and wellbeing.

In 2008, the therapy team at Roehampton developed a monthly swimming group for amputees in the community.

The therapy team have been aware of the reported benefits that the amputees were experiencing by exercising in water. However, there had been no formal feedback to confirm this. A patient questionnaire was developed to help collate feedback in order to evaluate the group and identify any patterns in the amputee's experience of the sessions. The questionnaire was sent to 39 patients, of varied amputation level, that attended the group from June 2008 to June 2011, 6 weeks were allowed for the response and then the results were collated.

The following areas were targeted:

- goals of the session
- feelings before and after the session
- was the social time afterwards useful
- have they been swimming since?

The results gave valuable feedback, confirming patient satisfaction with the sessions, the value of social time with other amputees, feedback that patients would like the sessions to run more often and be available to a higher number of amputees.

The results have also provided useful evidence of patient's anxieties being overcome during the sessions and how many amputees have continued to use swimming as a form of exercise.

The poster will be on view in the rehabilitation gym at Roehampton in order to inform both patients and professionals of the perceived outcomes of the group by those who have attended the sessions.

Title: *Pre-admission physiotherapy and occupational therapy for elective amputation*

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**Introduction:** Our therapy team were developing our service by offering pre-admission therapy for elective amputees. The perceived advantages were to improve the patient experience through giving information about the rehabilitation process, improving discharge planning and improving length of stay. Various sources were used to find the evidence to support such a service including discussion with peers within the hospital and nationally, and literature reviews from many sources. This poster describes the service and evaluates the evidence for such a service.

**Description of the service:** A patient is referred to the service once the decision to amputate has been made. The therapists arrange to see the patients and their carers in the Mobility and Specialised Rehabilitation Centre initially, with a follow up home visit by the Occupational Therapist. As well as full physical, functional and social assessments and discussions of realistic expectations we are also able to start the discharge planning process. The individual may be assessed for an appropriate wheelchair and other equipment that will be required for discharge, which can be ordered and in place, in many cases prior to admission.

**Benefits of this service:** The benefits are many and can be divided into three subheadings: for patients and their carers, for staff and for the service.

Benefits for patients and their carers: This includes identifying a persons individual needs, receiving timely information regarding their rehabilitation and realistic expectations, reducing anxiety, improving their experience and satisfaction by giving them a locus of control. It also enables them to start to plan for their return home.

Benefits for staff: knowing that you have directly contributed to the patient experience; effective team working; key information is made in a timely manner; improved discharge processes improves professional working practises.

Benefits for the Service; positive relationships are promoted within the multidisciplinary team and with other local providers, there is improved patient flow with efficient discharge planning, post-operative length of stay will be reduced and there will be fewer complaints around discharge planning.

### **Discussion and Conclusion**

This service development is based on sound evidence, particularly referring to two department of Health guidelines around discharge planning. Our future plan is to evaluate the benefits within our service, particularly the patient experience and the impact on length of stay.

### **References**

Department of Health (2004). Achieving Timely “Simple” Discharge from Hospital. A Toolkit for the MDT.

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Title: *Patient evaluation of the Echelon foot using the Seattle Prosthesis Evaluation Questionnaire*

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Other Authors: R Moor, Senior Prosthetist

We aim to assess patient satisfaction using a self reported and validated outcome measure (Seattle Prosthesis Evaluation Questionnaire PEQ). Patients who were prescribed Echelon feet were asked to evaluate their existing prosthetic foot(either the Esprit or Multiflex). Patients would then re-evaluate their prostheses four weeks after using Echelon (no other changes to the prescription were made). We analysed the results in relation to six chosen domains of the PEQ: Ambulation, Transferring, Utility, Wellbeing, Prosthesis Satisfaction, Walking Satisfaction. Patient satisfaction was higher with the Echelon in all domains compared to the previous foot with more significant improvements in bilateral amputees. We propose that the improved levels of satisfaction are due to the effect of the self aligning hydraulic ankle in the Echelon and we would highly recommend the use of Echelon feet in bilateral amputees.

#### References

- Legro MW, Reiber GD, Smith DG, et al. Prosthesis evaluation questionnaire for persons with lower limb amputations: assess- ing prosthesis-related quality of life. *Arch Phys Med Rehabil* 1998;79:931–938

Title: ***Care Pathway – Orthotic Management in Stroke***

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Other Authors: Tom Ramsey, Orthotist; Steve Seccombe, National Clinical Lead

The national care guideline published in 2008 recommends that stroke patients have access to orthotic intervention within 5 days of admission; however, in 2010 the national stroke audit showed that only 76% of hospitals were complying with this recommendation.

This care pathway aims to provide evidence based resources for clinicians to deliver an orthotic service for stroke patients confidently and consistently, aiming to comply with the national guidelines. These recommendations are delivered in the form of a flow diagram which can be used in the clinical setting.

The care pathway has been developed using the available literature at the time of writing. It also takes into account opinions and experience from orthotists and other clinicians. An initial search for literature on orthotic management in stroke was conducted. From the results of this search further searches were conducted.

It is anticipated that when relevant additional literature is published, this can be added into the care pathway, ensuring a continually up-dated reference guide. The challenges faced by patients following a stroke are varied and can affect both lower and upper limbs. For clarity, the two topics have been separated in the care pathway.

During the literature review process, a Best Practice Statement (BPS): The Use of Ankle Foot Orthosis (AFO) Following Stroke<sup>1</sup> was found which was written in co-ordination with lecturers from the University of Strathclyde and orthotists. This included a comprehensive literature review and produced guidance on best practice using this evidence base. They highlighted the importance of orthotists having prescription choice in co-ordination with multidisciplinary team input and the need for tuning AFOs to provide the best possible alignment available for the patient.

A second literature review was also found on ‘The effect of upper limb orthotics after stroke’<sup>2</sup> which has been conducted in Salford. This was less comprehensive but did provide some evidence on the use of wrist hand orthoses from the papers reviewed. However, the overall conclusion of this literature review was that upper limb orthotics has very little influence on stroke patient rehabilitation implying a further need for robust research.

The overall conclusions of the care pathway drawn were the importance of multidisciplinary team working and ensuring dedicated stroke clinicians, the need for complying with the national guidelines to guarantee stroke patients are seen at the most appropriate time and the benefits of orthotists expertise in prescription choice and fine-tuning of appropriate orthoses.

The care pathway recommendations were that there is a need for increased evidence in the field of orthotics in stroke. There is also a requirement for closer review into why patients do not have access to orthotic intervention within 5 days and how this can be changed.

1 Bowers RB; 2009 ‘Best Practice Statement: Use of ankle-foot orthoses following stroke’ Quality Improvement Scotland

2 Tyson SF, Kent RM; 2011 ‘The effect of upper limb orthotics after stroke: A systematic review’, NeuroRehabilitation. Vol 28 pp 29–36

Title: *Review or the evidence so far for visco-elastic hydraulic/carbon fibre feet*

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### **Aim**

Over 3 years ago Endolite released the world's first biomimetic based foot/ankle that connected a hydraulic damper and mechanical spring in series, beginning to simulate the natural action of muscle, thus allowing the amputee to control the ankle and walk with a more natural gait. Such ankles adapt to the outside environment, for year prosthetic feet have been designed and set up for walking on level ground, but as every amputee knows, the world outside the clinic room is far from flat. Hills have always been a source of difficulty for amputees and standing naturally on a slope has been virtually impossible. However with the advent of such feet/ankles that adapt to the varying surfaces and slopes that an amputee encounters, amputees have been able to stand on varying angles of slopes naturally and walking up and down slopes with more stability and less forces acting on the stump. This ground compliance, stability of the prosthesis and lowered socket pressure on slopes are some of the benefits amputees have been experiencing while using such a device. Many studies have been carried out to try and quantify the reported benefits, some published and some yet to be published.

This presentation aims to review the current evidence to see which of these claims can be quantified and to see if such a device lives up to the claims that have been made.

### **Method**

I have reviewed the current literature to see if the claims made about the visco-elastic feet can be validated, and each paper that has been included has been critically appraised using the CASP tool.

### **Results**

The evidence is there to support the claims made about the feet/ankles. Stability is improved, socket pressures are reduced and quality of life is increased.

### **Conclusion**

The use of these types of feet has very sound clinical evidence behind it, this is necessary for good and evidence based prescription criteria in the field of prosthetics.

Title: *Effective Clinical Reasoning: how do we do it?*

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‘Action Research’ often seems unfamiliar to colleagues when first mentioned, however when it is explained, colleagues often remark that they have in fact carried out action research before. The term ‘Action Research’ seems to be first mentioned in the 1940’s, but was criticised in the 1950’s by quantitative researchers and fell out of favour during the 1960’s because of its association with radical political activism (Smith 2001, citing Stringer 1999).

The discussion of Action Research does tend to fall into two categories; ‘an orientation towards enhancement of direct practice’ and ‘the systematic collection of information that is designed to bring about social change’. Essentially a process which provides change and understanding. A simple example to demonstrate the simplicity of action research is: Look > Think > Act

Meyer (2000) suggests Action Research is research with people and not on people, bridging the gap between research and practice.

Action Research also seems to overlap with the less formal process of Reflective Practice, which all healthcare clinicians are encouraged to do by the Health Professions Council. However, Reflective Practice can be a closed loop system.

Action Research tends to be open and spiralled because it cannot generalise; unless several studies in diverse settings give similar results. Instead, claims are made which promote further investigation, thus creating an open loop.

There are different interpretations of Action Research, but essentially it is an enquiry in the context of efforts aimed to subjectively improve the quality of a system or process and its performance. It is typically designed and performed by the persons who will analyse the data to improve their own work. It could be performed individually or with colleagues but this team approach could be regarded as a collaborative enquiry. In healthcare, Action Research is concerned with systems and processes, not necessarily the treatment of pathology. This is because systems and processes are variable and what may suit one Primary Care Trust (PCT) will not suit another, whereas the treatment of a pathology should theoretically be consistent in all PCTs.

Overall, whilst Action Research is considered time consuming because there is no time limit, it is a simple cost effective learning process that can improve service provision.

It can be concluded that Action Research does have its use in improving systems and processes and ultimately service delivery. It also has the benefit for providing an impetus to implement change within an environment.

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- Smith, M. K; 2001. 'Action research', the encyclopaedia of informal education, [on-line]. Available from [www.infed.org/research/b-actres.htm](http://www.infed.org/research/b-actres.htm), [accessed 29<sup>th</sup> June 2012].
- Meyer J; 2000. ‘Qualitative research in health care’, British Medical Journal, Vol. 320, pp 178-181



Title: *Results from a Survey of Health Professionals on which Outcome Measures are currently being used in Prosthetic Rehabilitation*

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### **Aim**

Establish a database of Outcome Measures (OMs) regularly being used by Health Professionals (HPs) i.e. Physiotherapists, Prosthetists and Occupational Therapists during lower limb prosthetic rehabilitation across the UK.

### **Methods**

A postal survey was distributed listing the most common OMs published over the last 10 years. Health Professionals were asked to indicate which OMs they used with a) low level activity amputees and b) high level activity amputees, as defined by their K Levels, and at what stage in the care pathway they used them. Survey packs, including the questionnaire and information sheets, were circulated via the various Professional Interest Groups.

### **Results**

Twenty three Physiotherapists, 12 Prosthetists and 3 Occupational Therapists have returned completed questionnaires so far. The majority of respondents, 33/38 (87%) were over 10 years qualified and 32 (84%) had been working in the field for at least 5 years, with 25 of them working with amputees over 10 years. (Only 5/38 (13%) work with amputees less than one third of their working week, but the remainder work with them for the majority of the time.) Of the 30 Outcome Measures listed 18 were ticked as being used regularly, but 4 were clearly used more often: 40% of responders (15) ticked SIGAM (Special Interest Group in Amputee Medicine) Mobility Grades and Timed up and Go (TUAG), while 34% and 29% ticked the Timed Walk Test and the LCI-5 (modified Locomotor Capability Index), respectively. The Socket Comfort Score and TAPES (Trinity Amputation and Prosthesis Experience Scales) were also ticked by some of the responders (9 and 8 respectively). The remaining 18 OMs chosen were ticked by 5 or less responders. A slight fall in the number of OMs used with K3 and then a further decrease at the K4 level was noted compared to the lower levels. This may be an indication that fewer HPs are working with these levels of amputees as some returned questionnaires did not give results for the K3 and K4 groups. There were some comments about discontinuing the use of the OMs. Three of the top 6 had been used and then discontinued by some responders. Various reasons were given, such as: time to complete, lack of sensitivity or ceiling effect, and lack of relevance to functional progress. A further 14 OMs were noted in addition to those on the list. Some were the respondents own questionnaires while others were non-amputee specific measures.

### **Discussion**

The variety of OM's listed in the survey shows that there is a lack of consensus regarding the OMs used in clinical practice and while there is some consensus in the groups about which OMs are used there are still a large number of different OMs in use. The comments about the lack of sensitivity and relevance to functional progress, may question the use of some of the measures. The most popular ones used by the Physiotherapists are those that have been recommended by the British Association of Chartered Physiotherapists in Amputee Rehabilitation (BACPAR) in their Toolbox.

Title: ***Physiotherapy experience of producing evidence for Individual Patient Commissioning Committee following patient trial of Helix hip and C-leg***

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The Multi-disciplinary Team in the Prosthetic and Wheelchair Centre was asked to facilitate a trial of a Helix hip/C-leg prosthesis for a 42 year old man with a hip disarticulation amputation. The patient had undergone amputation at age 18 due to an aggressive tumour. Up until 2005 he had achieved good mobility enabling him to work full-time. He then began complaining of reduced mobility and joint pain in the contra lateral limb, with the need to use walking aids to improve his balance and confidence.

The physiotherapy aspects of the trial included assessing a range of physical measures with the patient using his prescribed prosthesis, providing training with the trial prescription and repeating the measures using the trial prescription at 1 week and 5 weeks post provision.

The physical measures used were: Tinetti Balance Assessment (used in the Centre at the time), Timed Up and Go Test, Timed Walk Test (4 minutes and 6 minutes on treadmill), timed ascent and descent of 1 flight of stairs and the Physiological Cost Index. Other evidence gathered included video footage of the patient using his prescribed prosthesis while walking on level/uneven ground, ascending/descending slopes and stairs and picking objects up from the floor. These activities were also recorded with the patient using the trial prosthesis following a period of training. In addition the patient also completed the Prosthesis Evaluation Questionnaire for his prescribed prosthesis and the Helix hip/C-leg trial prosthesis following the trial.

The results of the physiotherapy measures assessed are shown in the table below

Test	Previous prescribed prosthesis	Trial prosthesis after 1 week	Trial prosthesis after 5 weeks
Tinetti Balance Assessment	24/28	26/28	28/28
Timed Up & Go ( 3m)	27secs	11secs	10secs
4 Minute Walk Test	63m	204m	247m
6 Minute Walk Test	Unable to complete	315m	382m
Timed up & down 1 flight stairs	50secs	21secs	18secs
Physiological Cost Index	8beats/m	Not tested	7beats/m

The results of The Prosthesis Evaluation Questionnaire (PEQ), completed by the patient, are shown in the table below. The higher the score for any given domain, the more satisfied the patient is with the performance of the prosthesis.

<b>Previous Prescribed Prosthesis</b>	<b>Domain</b>	<b>Trial Prosthesis</b>
8.75	AMBULATION	86
25.2	APPEARANCE	78.4
19.8	PERCEIVED RESPONSE	100
56.8	RESIDUAL LIMB HEALTH	82
10.3	SOCIAL BURDEN	63
0	SOUNDS	100
21.5	UTILITY	97.5
5	WELL-BEING	92
0	FRUSTRATION	100

Following the trial a report was produced which included the results of the physical measures and PEQ, along with the video evidence and report from the patient's GP. This was considered by the Individual Patient Commissioning Committee who approved funding for the Helix hip/C-leg "as the results of the trial showed significant improvement in the patient's mobility and quality of life."

Title: *A multi disciplinary and collaborative team approach to improving the mobility and quality of life of a transtibial amputee: an innovative approach*

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Despite considerable advances in prosthetic manufacturing and technology, the residual limb still remains the most important piece of the jigsaw in the successful rehabilitation of an amputee. There is a clear understanding amongst limb reconstruction surgeons that transtibial amputation is preferred over transfemoral amputation in order to provide an energy efficient and more cosmetic gait pattern to the amputee. Therefore limb salvage, particularly salvage of the knee joint, is always a priority. However, a very short scarred insensate transtibial stump can be fraught with problems for both the patient and the rehabilitation team.

Considering these two issues, we present this complex case and how, with our collaborative approach, we have managed to achieve more acceptable outcomes.

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A full-length photograph of Jonnie Peacock, a male athlete with short blonde hair, standing with his left hand on his hip and his right leg propped forward. He is wearing a black t-shirt with a small logo on the chest, black shorts, and a white sock on his prosthetic right leg. He is wearing a bright green athletic shoe on his natural left leg. The background is dark and textured.

# ÖSSUR AND JONNIE. REDEFINING ABILITY.

What happens when the technology of Össur is paired with the talent of Jonnie Peacock? You get an amputee determined to compete with the best in the world and win the biggest competitions.

Whatever your goals are, Össur wants to help make them a reality. So, if you supply the tenacity, we'll supply the technology, and together we'll redefine ability.

To learn more about Össur prosthetics, call 08450 065 065 or visit [www.ossur.co.uk](http://www.ossur.co.uk)



*Life Without Limitations<sup>®</sup>*



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