## ACKNOWLEDGEMENTS

### EXHIBITORS

<table>
<thead>
<tr>
<th>Exhibitor</th>
<th>Address</th>
<th>Contact Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>AbilityMade</td>
<td>Unit 1, 124 Regent Street, Redfern NSW 2016</td>
<td>Melissa Fuller <a href="mailto:mel@abilitymade.com">mel@abilitymade.com</a> 0405 942 267</td>
</tr>
<tr>
<td>Herrean Footwear</td>
<td>113 Mitcham Road, Donvale VIC 3111</td>
<td>Jonathan Herrean <a href="mailto:jonathan@herreen.com">jonathan@herreen.com</a> 0415 163 005</td>
</tr>
<tr>
<td>DJO</td>
<td>P.O. Box 605, Frenchs Forest D.C. NSW 2086</td>
<td>Stephen Wrigley <a href="mailto:Stephen.wrigley@djoglobal.com">Stephen.wrigley@djoglobal.com</a> 1300 677 730</td>
</tr>
<tr>
<td>Hy5</td>
<td>27 Laceflower Pde, Casuarina NSW 2487</td>
<td>John Stewart <a href="mailto:jp@freshmedical.com.au">jp@freshmedical.com.au</a> 0477 888 633</td>
</tr>
<tr>
<td>Evok3D</td>
<td>43-45 Canterbury Rd, Braeside, VIC 3195</td>
<td>Joe Carmody <a href="mailto:joe.carmody@evok3d.com.au">joe.carmody@evok3d.com.au</a> 1800 386 533 x2000</td>
</tr>
<tr>
<td>Massons Healthcare</td>
<td>Unit 15/111 Lewis Road, Knoxfield, VIC 3180</td>
<td>Anton Karak <a href="mailto:info@orthoticaust.com.au">info@orthoticaust.com.au</a> 03 9898 0011</td>
</tr>
<tr>
<td>Head to Foot</td>
<td>39 Centre Way, Croydon VIC 3136</td>
<td>Tim Jarrott <a href="mailto:tim@htfo.com.au">tim@htfo.com.au</a> 03 9870 2284</td>
</tr>
<tr>
<td>medi Australia</td>
<td>83 Fennell Street, North Parramatta NSW 2151</td>
<td>Alex Carver <a href="mailto:acarver@mediaustralia.com.au">acarver@mediaustralia.com.au</a> 02 9890 8696</td>
</tr>
<tr>
<td>Momentum</td>
<td>Traeger Court Business Park, 6/28 Thynne Street, Bruce ACT 2617</td>
<td>Richard Goward <a href="mailto:rgoward@momentumsr.com.au">rgoward@momentumsr.com.au</a> 02 6210 0060</td>
</tr>
<tr>
<td>Herreen Footwear</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OAPL</td>
<td>29 South Corporate Avenue, Rowville, VIC, 3178</td>
<td>Jordan Ellis, Tomie Pfeiffer <a href="mailto:marketing@oapl.com.au">marketing@oapl.com.au</a> 1300 866 275</td>
</tr>
<tr>
<td>OI/TMR Surgical &amp;</td>
<td>Unit 36, 148 Chesterville Road Moorabbin VIC 3189</td>
<td>David Lee Gow <a href="mailto:davidlg@pmprosthetics.com.au">davidlg@pmprosthetics.com.au</a> 03 9532 5098</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

E: admin@aopa.org.au  P: (03) 9816 4620  F: (03) 9816 4305  AOPA CONGRESS 2018  Page 2
ACKNOWLEDGEMENTS

EXHIBITORS

OPC Health
151-159 Turner Street Port Melbourne, VIC 3207
Paul Coleman
pcoleman@opchealth.com.au
03 9681 9666

Orthomedico
2/320 Curtin Ave West, Eagle Farm, QLD 4009
Debby Smith
info@orthomedico.com.au
1300 309 233

Osseointegration International
23A King George Street McMahons Point, NSW 2060
Nick Birbas
customerservice@osseointernational.com
0410 571 660

Össur
26 Ross Street, North Paramatta NSW 2151
Ireny Mossaad
E. IMossaad@ossur.com
P. 02 8838 2800

Ottobock
Suite 1.01, Century Corporate Centre, 62 Norwest Boulevard Baulkham Hills NSW 2153
Nat Kenyon
E. Nathaniel.Kenyon@ottobock.com.au
P. 0448 054 770

Sentient Bionics
1/85 Salmon St Port Melbourne VIC 3207
Dr Paul Boxer
E. paulb@sentientbionics.com
P. 03 8616 0799

Vorum
8765 Ash Street, Unit 6, Vancouver BC, V6p 6T3 Canada
Shireen Khimani
E. skhimani@vorum.com
P. +1 604-321-7277 x 2302

SPONSORS

CAFÉ
Össur
26 Ross Street, North Paramatta NSW 2151
Ireny Mossaad
E. IMossaad@ossur.com
P. 02 8838 2800

STUDENT EVENT
Ottobock
Suite 1.01, Century Corporate Centre, 62 Norwest Boulevard Baulkham Hills NSW 2153
Nat Kenyon
E. Nathaniel.Kenyon@ottobock.com.au
P. 0448 054 770

PENS
Geelong Orthotics
70 Bellerine St, Geelong VIC 3220
Ben McMurtrie
E. info-sales@geelongorthotics.com.au
P. 03 5224 2200

CONGRESS AWARDS
Guild Insurance
5 Burwood Rd, Hawthorn VIC 3122
E. mandiebrown@guildinsurance.com.au
P. 1800 810 213
WORKSHOPS

Head to Foot
39 Centre Way
Croydon VIC 3136
Tim Jarrott
tim@htfo.com.au
03 9870 2284

medi Australia
83 Fennell Street
North Parramatta NSW 2151
Alex Carver
acarver@mediaustralia.com.au
02 9890 8696

NMO
1846 Dandenong Rd
Clayton, VIC 3168
Paul Sprague
paul@neuromuscular-orthotics.com.au
1300 411 666

OAPL
29 South Corporate Avenue,
Rowville, VIC, 3178
Jordan Ellis
marketing@oapl.com.au
1300 866 275

OPC Health
151-159 Turner Street Port
Melbourne, VIC 3207
Paul Coleman
pcoleman@opchealth.com.au
03 9681 9666

Össur
26 Ross Street,
North Paramatta NSW 2151
Ireny Mossaad
E. IMossaad@ossur.com
P. 02 8838 2800

Ottobock
Suite 1.01, Century Corporate Centre,
62 Norwest Boulevarde
Baulkham Hills NSW 2153
Nat Kenyon
E. Nathaniel.Kenyon@ottobock.com.au
P. 0448 054 770

Vorum
8765 Ash Street, Unit 6,
Vancouver BC, V6p 6T3 Canada
Shireen Khimani
E. skhimani@vorum.com
P. +1 604-321-7277 x 2302

CONGRESS COMMITTEE

Jessica Grant (Convenor)
Prosthetist/Orthotist
Melbourne Health

Dr Sarah Anderson
Lecturer, Acting Discipline Lead
Prosthetics and Orthotics
La Trobe University

Shanelle Fogarty
Senior Orthotist, Practice Manager
Interface Orthotics

Hannah Graham
Orthotist/Prosthetist
OSQ & PSQ

Simon Yap
Business Development Manager
Massons Healthcare
On behalf of the Australian Orthotic Prosthetic Association (AOPA), it is my pleasure to welcome you to the 8th AOPA Congress.

In 2018 we have continued with the highly successful half day workshops to allow delegates to engage in hands-on learning from the first day of the congress. This year we are featuring a broad range of workshops, allowing attendees to explore the latest in upper limb myoelectric technology, pattern recognition, CADCAM, custom orthotic solutions and integrating evidence into prosthetics – to name but a few.

The main aim of the AOPA Congress is to provide an opportunity for all attendees to embrace learning from a variety of general and specialty interest topics. The theme of the 2018 Congress is ‘Embrace the Past. Design the Future.’ This will feature in our two keynote addresses. Dr Stefania Fatone will discuss what we know, what we don’t know and what we want to know, while Mr Frank Brusciano-Raiola will examine Osseointegration and muscle reinnervation and its role in changing lives. These keynote presentations will be complemented by 52 conference presentations and workshops – our biggest yet. There are further networking opportunities for all delegates provided by the trade displays, corridors, hallways and coffee venues as well as the conference dinner. The 2018 Congress program is extensive and will allow attendees to explore areas of interest and seek ideas from outside of their own specialties.

The ever improving technology coupled with the changes in funding strategies indicates progress and carries exciting opportunities for all. Embracing these opportunities and understanding their potential impact, developing new skills and adapting our working environments is the responsibility of each of us. Changes such as these demand a need for ongoing learning and development so that we, as a profession, can continue to provide consumers with the best options available while enabling us to work safely and effectively in our workplace.

The AOPA congress would not be possible without the support of our exhibitors and sponsors. Please spend some time over morning tea, lunch and afternoon tea visiting the stands and learning about the exciting developments in technology that are on offer.

Finally, a sincere thank you to members of the AOPA office and the Congress Convening Committee. The team have spent many hours, days and weeks working to ensure that the 2018 Congress is a successful, enjoyable and exciting event for all. We hope you leave with new ideas and thoughts for your future, inspired by insights into products, materials and techniques that you can implement into your workplace in order to improve clinical outcomes for the consumers of the O&P profession.

I look forward to seeing you on the Gold Coast,

Jess Grant
2018 Conference Convener
Dr. Stefania Fatone

Dr. Stefania Fatone is a Professor in the Department of Physical Medicine and Rehabilitation at the Northwestern University Feinberg School of Medicine where she conducts research and contributes to the Masters of Prosthetics-Orthotics program. She received her undergraduate degree in prosthetics-orthotics with honours from La Trobe University in 1996 and then her PhD in 2001. Since completing a post-doctoral fellowship at Northwestern University in 2003, she has maintained an active and diverse research portfolio with funding from federal agencies, industry, and professional organisations. She is an internationally recognised researcher with 80 publications and is frequently invited to speak internationally.

Mr. Frank Bruscino-Raiola

Mr. Frank Bruscino-Raiola is the Head of the Plastics, Hand and Facio-maxillary unit, as well as the Head of the Plastics Research Group at The Alfred Hospital in Melbourne, where his work on targeted muscle reinnervation (TMR) is at the forefront of global knowledge and practice. Since graduating from Monash University in 1991, Mr. Bruscino-Raiola has established the Osseointegration and TMR programme in 2016 and has since held the role of primary surgeon within the team.
PROGRAM – THURSDAY 4th OCTOBER

WORKSHOP PROGRAM

**Workshop 1**  
Southport 1  
**Optimising Outcomes with Touch Bionics Solutions by Össur**  
Hosted by Össur  
Capacity: 40 delegates  
This comprehensive workshop will include information about the latest technology from Össur available to individuals with upper limb loss. Topics covered will include candidacy considerations, casting techniques, myoelecting, fitting approaches, covering options, and therapy training protocols for transradial and transhumeral amputees. Additionally, attendees will better understand the i-digit fitting process for partial hand amputees, including impression taking, myoelecting, digit alignment, and functional training.

**Workshop 2**  
Southport 2  
**Integrating Gait Analysis into Lower Limb Orthotic Prescription**  
Hosted by OAPL  
Capacity: 40 delegates  
This interactive workshop will cover new technologies and assessment capabilities in the prescription of AFOs for patients with neuromuscular conditions. Emphasis will be placed on patient assessments, outcome measures and clinical case studies. The workshop will discuss componentry options in lower limb orthotics, such as the Becker Triple Action ankle joint, and explore the benefits of gait analysis technology, such as RehaGait, for orthotic prescription. Attendees will get ‘hands on’ with the various products throughout the session.

**Workshop 3**  
Southport 3  
**Orthotic Management of Upper Motor Neuron Lesions (UMN)**  
Hosted by Ottobock  
Capacity: 40 delegates  
This workshop will educate attendees about the extensive range of neuro-rehabilitation orthotic interventions available for management of upper motor neuron lesions. Attendees will learn how these orthoses are integrated into therapy to a specialised Rehabilitation Physiotherapist. There will also be an opportunity to trial the orthoses, including the latest in Functional Electrical Stimulation (FES) technology, and perform an in-depth gait analysis with other members of the multi-disciplinary team.

**Workshop 4**  
Coolangatta 1/2  
**Can a CAD/CAM solution help you stay relevant?**  
Hosted by Yorurn  
Capacity: 40 delegates  
The Australian O&P market is quickly evolving. CAD/CAM can help businesses in a changing market, such as hospitals like Sydney Children’s Hospital, c-labs like Momentum Health Technologies and Geelong Orthotics or clinics like Melbourne Orthotics. Practices like these are growing and thriving despite changing NDIS regulations and rising patient expectations. They are ready to explore the latest technology as it matures. Learn how practices like you are using the latest digital technology and how to smoothly migrate from plaster to a digital 3D world in this hands-on workshop.

**Workshop 5**  
Coolangatta 3/4  
**Custom Leg Bracing Solutions and Advanced Composite Dynamic AFO**  
Hosted by OCP Health  
Capacity: 40 delegates  
This workshop presents custom lower limb bracing solutions using the latest technologies from Townsend Design presented by Kurt Townsend and the latest advances in dynamic composite AFO’s presented by Tim Cossey the developer of the SnapStep. Delegates will get up to date information on the mechanics of composite struts and composite design principles used in different composite AFO’s and KAFO’s.

**Workshop 6**  
Broadbeach 1/2  
**Prosthetics Best Practice - Integrating Evidence into Practice**  
Hosted by AOPA  
Capacity: 25 delegates  
This workshop will launch a collaboration between UniSA and AOPA. Pre-registered delegates will assist to establish key clinical questions related to transfemoral prosthetic management. The current literature informing best practice for these questions will be explored in a facilitated, systematic manner. Focus will be placed on the implication for clinical practice (the “so what”) and the clinical applicability, feasibility and relevance of the research papers discussed.

**Workshop 7**  
Southport 1  
**Ligament Knee Solutions**  
Hosted by Össur  
Capacity: 40 delegates  
This combined theory and practical workshop will focus on enhancing delegates knowledge of complex knee ligament injury management. Topics covered will include clinical evidence, prescription considerations and practical fitting tips for managing PCL, MCL and multi-ligament injuries. Delegates will have the opportunity to conduct fittings of Össur ligament knee range and be trained in Össur’s Smart measure 3D scanning and measurement system.

**Workshop 8**  
Southport 2  
**Pattern Recognition: The Standard in Intuitive Upper Limb Myoelectric Control**  
Hosted by OAPL  
Capacity: 40 delegates  
Since 2013, Coapt has established its Complete Control pattern recognition product line as the most modern and intuitive myoelectric control option for upper-limb amputees. This workshop will cover the many benefits of the technology as well as clinical approaches to evaluating potential users. Attendees will have the opportunity to interact and experience the product during this workshop.

**Workshop 9**  
Southport 3  
**How to best manage contractures - the science behind the most effective treatment pathways**  
Hosted by Head to Foot  
Capacity: 40 delegates  
Delegates will be provided with a comprehensive overview of contracture management, including effective tips and tools for immediate implementation. Presented by an international Physiotherapist/CPO with 20 years experience, topics will include biomechanics, pathology, history and clinical treatment protocols using the principles of low load prolonged stretch and high load brief stretch. Demonstration of orthotic designs using these principles will also be presented.

**Workshop 10**  
Coolangatta 1/2  
**Debridement made easy, oedema control made simple**  
Hosted by Medi Australia  
Capacity: 40 delegates  
This workshop will address how to manage and solve complex skin management issues. Delegates will learn about the latest evidence based practice techniques to tackle non-healing wounds, and how Medi is using technology to achieve optimal patient outcomes. The workshop will also present tips for application of compression therapy that can be implemented into your practice immediately. From treating skin dryness to chronic ulcers, venous oedema management and fibrosis to magnific and the use of compression therapy to designing the future limb. Learn how to tackle complex wound problems and how this relates to orthoses and prosthetics.

**Workshop 11**  
Coolangatta 3/4  
**Modular components in lower limb orthotics – tips and tricks**  
Hosted by NeuroMuscular Orthotics  
Capacity: 40 delegates  
The release of the Posterior Dynamic Element (PDE) from Fabeltech Systems, and the Pivot, X-Tension and SMARTstop trio of components from LaunchPad has transformed the way orthotists alter the characteristics of lower limb orthoses to suit the patient’s goals, rehab progression, shoe selection and activity level. This workshop will detail the clinical applications and provide exclusive technical instruction to assist the implementation of these modular components into practice.

**Workshop 12**  
Broadbeach 1/2  
**Prosthetics Best Practice - Integrating Evidence into Practice (REPEAT)**  
Hosted by AOPA  
Capacity: 25 delegates  
This workshop will launch a collaboration between UniSA and AOPA. Pre-registered delegates will assist to establish key clinical questions related to transfemoral prosthetic management. The current literature informing best practice for these questions will be explored in a facilitated, systematic manner. Focus will be placed on the implication for clinical practice (the “so what”) and the clinical applicability, feasibility and relevance of the research papers discussed.

**Student and Early Career Professional Full Day Workshop**  
**Offsite: Southern Cross University**  
Expansion of O&P Fabrication Techniques  
Hosted by AOPA and Ottobock  
Capacity: 20 delegates  
This workshop is open only to 3rd and 4th year students and Early Career Practitioners (0-3 years post graduation). Build upon established knowledge and gain hands-on experience with the industry’s most contemporary manufacturing techniques. Applied to both Orthotics and Prosthetics, participants will be exposed to the latest materials technology for diagnostic and definitive interventions. Interact with new materials, and access the most up-to-date machinery.

Use this opportunity to expand your knowledge of recent advancements in orthotic/prosthetic fabrication.

This is an off-site event. Delegates will be assisted with transport to and from the workshop.

E: admin@aopa.org.au  P: (03) 9816 4620  F: (03) 9816 4305

AOPA CONGRESS 2018  Page 7
<table>
<thead>
<tr>
<th>TIME</th>
<th>OPENING PLENARY: KEYNOTE SPEAKER</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:50 am</td>
<td>Opening and Welcome Address</td>
</tr>
<tr>
<td>9:15 am</td>
<td><strong>Dr Stefania Fatone</strong> – What we know, what we don’t know, and what we want to know</td>
</tr>
<tr>
<td>10:00 am</td>
<td>Keynote Q&amp;A</td>
</tr>
<tr>
<td>10:20 am</td>
<td>MORNING TEA</td>
</tr>
</tbody>
</table>

**Friday 5th October**

<table>
<thead>
<tr>
<th>TIME</th>
<th>Insights from Experts: Orthotic Management</th>
<th>Insights from Experts: Prosthetic Management</th>
<th>11:10 am</th>
</tr>
</thead>
<tbody>
<tr>
<td>11:10 am</td>
<td><strong>Paul Retschko</strong> – Current concepts review and implications for Posterior Tibial Tendon Dysfunction management using foot orthoses</td>
<td><strong>Marta Geada</strong> – This Osseo Life – A case study of a bilateral transfemoral amputee</td>
<td>11:10 am</td>
</tr>
<tr>
<td></td>
<td><strong>Christopher Wallis</strong> – Implication of a hip unloader brace in hip OA management – Who, when and how?</td>
<td><strong>Stefan Laux</strong> – Scandinavian insights into a standardised holistic team approach to lower limb amputation</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Kate Perlstein</strong> – Fracture management – Have you missed anything?</td>
<td><strong>Erin Herd</strong> – The impact of functional and cosmetic prostheses – A case study of a partial digit traumatic amputee</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Ken Shaw</strong> – An overview of the management of cranial deformities – Taking the hell out of helmet</td>
<td><strong>Charles Wheeler</strong> – Paediatric case studies in the prosthetic management of Congenital Femoral Deficiency</td>
<td></td>
</tr>
<tr>
<td>12:30 pm</td>
<td>LUNCH</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**1:30 pm**

<table>
<thead>
<tr>
<th>TIME</th>
<th>O&amp;P Education and Communication</th>
<th>AOPA FORUM: Disruptive Technology in O&amp;P</th>
<th>1:30 pm</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:30 pm</td>
<td><strong>Dr Renee Mackenzie</strong> – Scaffolding communication skills across the Master of Clinical Prosthetics and Orthotics at La Trobe University</td>
<td><strong>Leigh Clarke</strong> – Harnessing disruptive technology to create opportunity</td>
<td>1:30 pm</td>
</tr>
<tr>
<td></td>
<td><strong>Kerry Fisher</strong> – Do Orthotist/Prosthetists need to acknowledge a client’s spiritual framework as a part of holistic clinical care?</td>
<td><strong>A/Professor Lisa O’Brien</strong> – 3-D printing in upper limb prosthetics – Challenges in design and delivery models</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Dr Michael Dillon</strong> – La Trobe University Clinical Prosthetics and Orthotics course redesign</td>
<td><strong>Professor Peter Lee</strong> – The development of new materials and methods to manufacture lower cost prostheses to meet the global need</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Michael Holland</strong> – Disruptive technology and what it means to the prosthetic industry</td>
<td></td>
</tr>
</tbody>
</table>

**2:50 pm**

<table>
<thead>
<tr>
<th>TIME</th>
<th>Technology of Today and Tomorrow: Orthotics</th>
<th>Research informing Practice and Policy: Prosthetics</th>
<th>3:40 pm</th>
</tr>
</thead>
<tbody>
<tr>
<td>3:40 pm</td>
<td><strong>Nigel Freeman</strong> – Implementation of CADCAM for the provision of orthotic services, an efficiency analysis</td>
<td><strong>Dr Michael Dillon</strong> – Uncertainty with long-term predications of lower-limb amputation prevalence and what this means for prosthetic and orthotic research</td>
<td>3:40 pm</td>
</tr>
<tr>
<td></td>
<td><strong>Shannon Patton</strong> – Efficacy of the 3-Dimensional scanning method on fit, duration and cost for fabrication of ankle foot orthoses</td>
<td><strong>A/Professor Lisa O’Brien</strong> – X-Limb – A soft prosthetic hand</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Thomas Thomson</strong> – Fabricating over foam - Challenges and insights into new orthotic manufacturing techniques</td>
<td><strong>Dr Stefania Fatone</strong> – Evaluation of the NU-FlexSIV Socket for persons with Transfemoral Amputation</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Jessie McGrath</strong> – Implementing central fabrication – Increasing efficiency whilst ensuring quality</td>
<td><strong>Dr Michael Dillon</strong> – While mortality rates differ following dysvascular partial foot and transtibial amputation, should they inform decisions about the choice of amputation level?</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Dominic Hannett</strong> – UK usage of CADCAM in orthotic clinical practice</td>
<td><strong>Sean Gray</strong> – Drawing on the experiences and perspectives of amputees using a microprocessor knee to inform policy and practice</td>
<td></td>
</tr>
<tr>
<td>5:00 pm</td>
<td>CLOSE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5:15 pm</td>
<td><strong>AOPA AGM</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7:00 pm</td>
<td><strong>Congress Dinner</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TIME</td>
<td>OPENING PLENARY: KEYNOTE SPEAKER</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9:00 am</td>
<td>Welcome</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9:10 am</td>
<td><strong>Mr Frank Bruscino-Raiola</strong> - Osseointegration and targeted muscle reinnervation changing lives</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10:00 am</td>
<td>Keynote Q&amp;A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10:20 am</td>
<td><strong>MORNING TEA</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11:10 am</td>
<td><strong>Exploring Orthotic Specialties</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Brianna King</em> - Client education can improve your service – A paediatric facility example</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Tim Jarrott</em> - Managing diabetic feet – Using objective measures to guide treatment and optimise outcomes</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Daniel Baldwin</em> - Gait analysis – Sagittal plane segment kinematics made easy for a busy clinic</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Paul Sprague</em> - Yielding AFOs – An overview of design and function for stance and swing control</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Flora Versyck</em> - Effect of dynamic contracture management following Low Load Prolonged Stretch</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Technology of Today and Tomorrow: Prosthetics</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Sean Gray</em> - A responsible approach to incorporating digital prosthetic manufacturing into service delivery</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Dr William Lu</em> - <em>Is Osseointegration the definitive answer to amputee reconstruction? Examining the complication and re-operation rates after osseointegrated reconstruction</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Dr Laurent Frossard</em> - Governmental perspectives on the quality improvement for provision of bone-anchored prostheses</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Dr Levi Hargrove</em> - Towards Neural Control of Powered Legs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12:30 pm</td>
<td><strong>LUNCH</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1:30 pm</td>
<td><strong>AOPA FORUM:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Improving Orthotic/Prosthetic Policy in Australia</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Discover future changes to O&amp;P Policy in Australia, with presentations from experts and key policy makers regarding DVA, NDIS and PHI developments</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2:50 pm</td>
<td><strong>AFTERNOON TEA</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3:40 pm</td>
<td><strong>CLOSING PLENARY: DESIGNING THE FUTURE OF O&amp;P</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Michael Holland</em> - Innovation at 1 Gig - The future is accelerating!</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Dr Levi Hargrove</em> - The future of intuitively controlled bionic limbs</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Paul Prusakowski</em> - The future of data, business intelligence and analytics in O&amp;P</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Paul Sprague</em> - The future of O&amp;P clinical practice in Australia</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Q &amp; A</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5:00 pm</td>
<td><strong>CLOSING CEREMONY</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7:00 pm</td>
<td><strong>Congress After Party</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
KEYNOTE ADDRESS

What we know, What we don’t know, And what we want to know

Dr Stefania Fatone
Northwestern University, Chicago, IL

Introduction
When invited to deliver this plenary presentation, I was challenged to create a presentation that would explore the meeting theme: “Embrace the Past, Design the Future.” Given that I’ve focused most of my career on prosthetics and orthotics (P&O) research, I interpreted meeting the theme through a research lens. As a researcher, embracing the past is about exploring what we know so that we can define what we don’t know and inform what we still need or want to know. In essence, this describes the first step to any successful research project: the literature review.

Literature Reviews
Literature reviews refer to both a process and an output. The process for any type of literature review is relatively consistent; it is the extent of formality that differs between types of reviews, with the rigor of the process reflected in the format and content of the output. Literature reviews can be used in many different contexts to understand what is known on a topic and to identify gaps in knowledge that may justify research or development activities.

In recent years the publication of literature reviews, especially systematic reviews, has increased both generally and in P&O. Additionally, the internet and open access publishing movement has made peer-reviewed literature, including literature reviews, more accessible. This makes embracing the past increasingly feasible.

Inspiration from the Past
My own research career began with inspiration from the past. As a graduate student in the late 1990s, an editorial by Dr. Hans Richard Lenheis from 1985 helped define and confirm my ideas for prosthetic socket management of children with Proximal Femoral Focal Deficiency (PFFD). My path crossed with Dr. Lehneis again years later when his chapter in the New York University Lower-Limb Orthotics Manual inspired our project modelling ankle axis misalignment in ankle-foot orthoses. More recently, we’ve developed a technique for a sub-ischial socket that leverages principles of soft tissue compression and quasi-hydrostatic systems described respectively in 1955 by Dr. Charles Radcliffe and 1979 by Dr. RG Redhead.

Conclusion
While embracing the past can influence the future, the challenge in P&O is that much of what we know isn’t documented. For past ideas to lead to new outcomes, we need to document our ideas. Literature is legacy: we can all contribute to creating a strong legacy in P&O.

References

INSIGHTS FROM EXPERTS: ORTHOTIC MANAGEMENT

Current concepts review and implications for Posterior Tibial Tendon Dysfunction management using foot orthoses

Paul Retschko
OTS

Implications of a hip unloader brace in hip OA management: Who, When and How?

Christopher Wallis
Ossur APAC

Introduction
Hip osteoarthritis (OA) imposes a significant burden on affected individuals and the community through reductions in quality of life and substantial health care costs (Zhang et al 2010). Guidelines on Hip OA Management are rare and are mainly based on clinical data from Knee OA (Fernandes et al 2013; Hochberg et al 2012). As therapeutic options to manage Hip OA are limited, a novel hip brace has been developed. Early research of the Unloader Hip brace suggests that biomechanical interventions can improve clinical outcome (Nerot & Nicholls 2016). An Expert Consensus aimed to provide clear guidance on hip OA management, including who should receive a brace.

Method
An onsite meeting was conducted with 31 interdisciplinary OA experts from the US and Canada following completion of a questionnaire on current
References

Fracture Management – Have You Missed Anything?
Kate Perlstein
Orthotics Plus

Introduction
The role of orthotist/prosthetist has evolved into one with high levels of clinical autonomy and decision-making skills, able to establish the optimum interventions for clients.

This requires high level clinical reasoning and the ability to participate confidently as part of a multidisciplinary team, and to voice concerns in cases of potential misdiagnosis.

There are three common foot and ankle injuries that are often missed/mis-diagnosed/mis-managed by medical professionals. These present situations where orthotist/prosthetists may contribute to ensuring the correct diagnosis and subsequent management.

Examples of these cases are explored in this presentation.

Case Study One – Lisfranc Injury
Clients with mid-foot fractures are often referred for CAM walkers.

When taking into consideration the mechanism of injury and presentation of pain, a lisfranc injury needs to be considered. These can be further managed by a referral to an orthopaedic surgeon who is likely to suggest a weight-bearing CT and/or MRI to check the stability around the lisfranc ligament. Without appropriate identification and referral, patients can develop chronic pain without resolution.

Case Study Two – Syndesmosis Injury
Mid-diagnoses syndesmosis injuries can be treated as basic ankle sprains. We find that a syndesmosis injury is only considered when it has become a more chronic injury (ie: ongoing pain for an extended period of time). When taking into consideration mechanism of injury, presentation of pain and special tests, a syndesmosis injury needs to be considered. These can be further managed by a referral to an orthopaedic surgeon for a weight bearing CT and/or MRI to check if there is instability in the ankle joint. Without our input these patient can be incorrectly managed as a severe ankle sprain, without resolution.

Case Study Three – Jones’ fracture
There are multiple types of 5th metatarsal fractures. The treatment required may vary greatly between fractures. A Jones’ fracture will need repeat x-rays to check if healing is occurring. This needs to be discussed with the GP at the time of referral. If there are any signs of non-union an orthopaedic opinion will be required to ensure appropriate and timely management occurs.
Conclusion
The potential for mis-diagnosis in foot and ankle injury has the potential to effect client outcomes. Orthotist/prosthetists can contribute to reducing this risk by being knowledgeable and re-referring in cases when there is doubt regarding the diagnosis.

Taking the ‘hell’ out of ‘helmet’.

Ken Shaw
Orthokids

INSIGHTS FROM EXPERTS:
PROSTHETIC MANAGEMENT

This Osseo Life – a case study of a bilateral transfemoral amputee

Stefan Laux
Clinical Services Manager and Senior Prosthetist, APC

Marta Geada
Clinical Prosthetist, APC

Introduction
We present a case study of a young Australian who suffered a motor vehicle accident and as a result, underwent bilateral above knee amputations and sustained left arm paralysis. The aim of this case study is to share the journey of this patient and show the pathway followed to improve his mobility, independence and quality of life.

Method
A 26-year-old patient who was wheelchair bound for the last 2 years had osseointegration. Initially unilaterally, he managed with one socket and one osseointegration. We fitted the patient with a knee disarticulation socket on the left and osseointegration connection on the right side. After 5 months the patient chose to have osseointegration on the contralateral side. We used the patient’s existing knee units and feet. He was able to rehabilitate his general fitness condition, walk with a standing frame and progress to a higher level of independence.

Results
The result of this procedure and the rehabilitation programme was a significant increase in mobility, independence and quality of life.

Discussion
Would be interesting to continue to look at this group of patients and collect some data to identify the benefits on a bigger scale.

Conclusion
This particular case is only one where osseointegration can make a difference when a ‘socket prosthesis’ is a challenging option. Osseointegration might not be appropriate for every amputee but it can be a limitless option for a specific group of patients.

References

Scandinavian insights into a standardised holistic team approach to lower limb amputation

Anton Johannesson A (CPO, PhD)
Össur Nordic

The surgical methods for lower limb amputations (LLA), the postoperative treatment and rehabilitation have not changed considerably over the years and there is no consensus on the best alternative. The majority of patients in western countries are dysvascular and wound healing is a problem. Irrespective of the reason for the amputation, oedema is one of the major factors and diminishing it without risking an adequate perfusion is an act of balance. The high cost of hospitalisation and often poor outcome requires new ideas and more efficient methods.

The rehabilitation after LLA is a challenge and a multi-disciplinary team approach is optimal. The experience from vascular patients can also be used after LLA because of trauma or tumour.

Our standard treatment is sagittal flaps for trans-tibial amputations and application of rigid dressing in the OR. The dressing is removed within a week followed by the use of silicone liners to diminish oedema and to shape and protect the stump. An advantage to traditional wrapping is that there is no inter-individual difference with different nursing staff. This results in a very good quality of the stumps regarding adhesions, scar-formation and shape. A similar treatment is used for knee disarticulations and transfemoral amputations. This is followed by an early rehabilitation with a direct manufactured prosthetic solution (DS) and a follow-up phase focused on
The impact of functional and cosmetic prostheses: A case study of a partial digit traumatic amputee

Erin Herd
Northern Prosthetics

Sophie Fleming
Prosthetic Art Technology

Melissa Leong
Occupational Therapist

Introduction
This case study aims to examine the functional and psychosocial impact of fitting a partial digit amputee with functional prostheses from Naked Prosthetics and high definition custom silicone cosmetic restoration digits from Prosthetic Art Technology.

Case
Subject: 32 year old male.
Amputation: Multiple Partial Digits on Dominant Hand – proximal to PIP joint on thumb, index and third fingers and distal to PIP joint on forth finger.
Cause: Traumatic amputation following machine accident at worksite.

Client Goals: To be independent with ADLs, return to work as a sawyer, and a selection of fine motor skill tasks such as writing, turning ignition on in a car and opening a beer.

Prosthetic Device(s): Functional - Naked Prosthetic partial finger solution utilising 2 x MCP Drivers, Thump Driver, and PIP Driver; Cosmetic – Prosthetic Art Technology's high definition custom silicone glove.

Evaluation: Outcome measures used to assess client-centred goals as well as psychosocial impact were Quick-DASH, TAPES-R and SF-36.

Results
At the time of submission only trial devices had been fitted - final results to come.

Discussion
The results are yet to be determined, however, during the trial stages it is clear that even though all goals set initially, were functional goals, the impact of the cosmetic prosthesis is significant. We will have a better understanding once both definitive devices have been fitted.

Conclusion
No conclusion can be made yet without having both definitive prostheses fitted.

Pediatric case studies in the prosthetic management of congenital femoral deficiency

Charles Wheeler
APC Prosthetics, Northmead

Introduction
Congenital femoral deficiency (CFD) is a trans-longitudinal deficiency that affects the development of the hip and anatomical structures distal to this joint. CFD includes the more commonly known Proximal Femoral Focal Deficiency (PFFD). Each child with PFFD can present differently, with many instances requiring surgical intervention. Depending on the severity, there is range of surgical procedures that can be performed. Every individual case can require different prosthetic solutions at various stages of child growth. These presentations can be complicated and are generally accommodated through various designs of an extension prosthesis.

From working with the rehabilitation team at the limb deficiency clinic at the Westmead Children’s hospital, Sydney, I have had the opportunity to be involved with several various PFFD clients which have been prescribed various designs in extension prostheses. Many of these designs have been successful but could also take the form of different designs. Here is a couple of cases with different PFFD presentations and extension prosthesis, with the intention to gather feedback and ideas from fellow colleagues.

About the Condition
Brief overview of the Congenital Femoral Deficiency; Including:
- Proximal Femoral Focal Deficiency

References:
• Classifications and severities, 
• Prevalence 
• Medical/orthopaedic treatment, 
• Surgery: Pelvic Osteotomy 
• Lengthening 
• Presentations and complications 
• Literature on prosthetic prescriptions for PFFD 

Case studies
3-4 case studies of this condition.

Each case study identifies a different PFFD presentation and classification, along with the prescription of the extension prosthesis.

A brief explanation will be included about the prescription with pros and cons of each.

These prescriptions include: articulated, non-articulated, carbon feet, sockets, knee joints, etc. as a solution for the presenting condition.

References

Containment? Stabilising hip and knee joint in an adult person with Proximal Femoral Focal Deficiency

Myriam Steffen
St Vincent’s Hospital Melbourne

Introduction
“C” presented to our Amputee Clinic investigating possibilities for a new prosthesis. She used a stiff legged prosthesis until adulthood, when she was fitted with a prosthesis with external free knee joints, allowing her to use her ankle as the knee. After multiple falls and a tibia fracture “C” reported ankle pain and an ill-fitting prosthesis.

Method
Subject: 46 years old female with a Type 3a (Paley Classification) PFFD of her left leg.

Apparatus: “C’s” gait was assessed with G-Walk and Hudle techniques. Both, wearing her old prosthesis and wearing her new prosthesis. Locomotor Capabilities Index 5 (LCKI-5) was also completed.

Procedure: Limitations of her current prosthesis were discussed with “C” and a physical assessment was performed. “C’s” large lateral trunk bend, mobile anatomical knee and hip joint as well as concerns about her ankle joint and tibia were taken into consideration for the new prescription. This recommended prescription contained a multi-axial foot for medio-lateral stability, a polycentric pneumatic knee and an “ischial containment” socket with a flexible brim and a BOA closure. Limitations of this design were discussed with “C”. She was curious to trial a prosthetic knee joint. A transparent check socket has been used for assessment.

Results
At initial fitting an immediate reduction of the lateral trunk bend was observed. “C” reported increased stability and comfort. For her daily activities the ability to flex the prosthetic knee is a big improvement.

Discussion
The ankle has been fixed in a comfortable position for “C”. The length of her leg and the position of her ankle/foot has led to a compromise in the knee positioning/alignment and the cosmetic appearance of the prostheses.

It is anticipated that the new prosthesis in conjunction with gait re-education will further improve “C’s” gait.

Conclusion
Even though this new prescription has its limitations (cosmesis, knee positioning/alignment) we were able to achieve an improvement for our client.

The higher lateral trimline and the firmness of the socket helps to stabilise “C’s” hip which results in an improvement in gait.

References
Scaffolding Communication Skills across the Master of Clinical Prosthetics and Orthotics at La Trobe University, Australia

Dr Renee Mackenzie
Discipline of Prosthetics and Orthotics
La Trobe University, Australia

Background
Communication skills are widely regarded as a core competency necessary for health professionals who work with clients who use prosthetic and orthotic devices. Such is the value of good communication, that its importance is readily discussed in both professional and educational role-statement literature (La Trobe University, 2014, AOPA, 2014, ISPO, 2002). However, literature describing communication can be difficult to translate to a quantifiable or observable skill-set, due to the subjective nature of the interpretation of broader ‘value’ statements. Recent doctoral studies concerning the current expectations of the role in Australia (Mackenzie, 2015), indicated the professional community (including clients) were in strong agreement the prosthetist should be a competent communicator, but also reported a lack of clarity concerning the quantifiable nature of the competency. Behaviour considered ‘appropriate’ by some, was not by others. Furthermore, a constructive alignment review of prosthetics/orthotics curriculum concerning communication specifically related to client interaction showed a lack of clarity and student feedback until their final years on clinical placement (Mackenzie, 2017). The aim of this project was to better scaffold communication and increase the constructive alignment of the competency across the entire Prosthetics and Orthotics educational program at La Trobe University, Australia.

Method
The method for scaffolding involved a review of existing curriculum, so as to identify areas that may benefit from increased clarity. This review also provided a model of the educational structure that allowed the developers to consider where the addition of newly developed curriculum might be best integrated without substantial disruption of standing curriculum. The planned model for the scaffold (in line with pedagogical frameworks where students progress through ‘scoping’, ‘enabling ‘integrating’ and ‘relating’) was then documented and the new curriculum developed.

Results
Subjects flagged in the 2017 doctoral review were refined to improve the constructive alignment, extent of student feedback concerning communication competencies. A model for scaffolding communication and reflective practice was built and integrated at strategic times (where students engage with clients) across the 2nd, 3rd and 4th years of the program at La Trobe University.

Discussion and Conclusions
The new scaffold was first implemented in 2017 and student feedback and evaluations are still in progress. Traditional models of subject evaluations do not provide targeted feedback on the scaffold, since it is delivered at strategic moments across many subjects, rather than under the banner of one subject alone. However, student engagement in the assessment tasks involving reflective practice have yielded insightful reflections as they speculate on how personality traits may translate into their clinical work. Similarly, final year students now complete an assessed client interaction and for the first time, receive detailed, criteria based feedback concerning their communication competency.

Conclusions
A new communication scaffold was designed and implemented as part of the Master of Clinical Prosthetics and Orthotics at La Trobe University.

References
Do Orthotist/Prosthetists need to acknowledge a client’s spiritual framework as a part of holistic clinical care?

Kerry Fisher
La Trobe University

Anthony Francis
La Trobe University

Nathan Collins
La Trobe University

Introduction
This presentation is based on a chapter written and published in the text ‘Spiritual Care for Allied Health Practice. Carey L. B., and Mathisen B. A., (2018). The chapter considers the role of the prosthetics and orthotics profession with regard to spiritual care in the context of a client-centred model. It is not proposed that every Prosthetist / Orthotist should necessarily be competent in or attempt spiritual assessment or counselling. However, it is proposed that Prosthetist / Orthotists should increase their awareness of spiritual factors influencing the health and wellbeing of their clients and improve their competence and confidence to engage with their clients about the role that spirituality may have in a client’s life.

Method
A two-stage literature review was undertaken scoping any research or other literature noting P&O and spirituality. An initial search was conducted by the authors utilising all of the available academic online databases (e.g., CINAHL, MEDLINE, PsychInfo, Google Scholar). This search used variations on the search terms ‘Prosthetics’, ‘Orthotics’, ‘artificial limb’, ‘bracing’, ‘amputation’ and ‘spirituality’. This initial search found very few articles that named or defined spirituality within the context of prosthetic and orthotic practice.

In order to broaden the findings the search was widened to include terms such as ‘Disability’, ‘Brain Injury’, ‘Spinal cord injury’, as well as ‘Holistic’, ‘Quality of life’, ‘self-image’, and ‘religion’.

Discussion
Spirituality is a topic that most Prosthetist / Orthotists are not trained to discuss, nor directly discuss with their clients, yet the literature indirectly indicates what a profound impact spirituality and beliefs may have on an individual and their health outcomes. Spirituality is an extension of each person, how they cope with stressors, how they adjust to life-altering events, how they view themselves in the world and find meaning and reason for their existence. All these factors can be linked to how individuals manage change following a significant injury.

Conclusion
Prosthetist / Orthotists work with clients across all age groups, therefore across the spectrum of cultural religious affiliations and belief systems. In addition to being culturally-competent professionals, P&O clinicians should aim to acknowledge and integrate the spiritual beliefs of individuals, their communities and culture as part of the context in which people choose to live. In addition to planning interventions across multiple disciplines that directly support client-created goals and outcomes, consideration should be given to the client’s spiritual framework and belief systems.

References
Spiritual Care for Allied Health Practice. 2018. Carey, LB, and Mathisen BA.

La Trobe University Prosthetics and Orthotics course redesign

Dr Michael P Dillon
La Trobe University

Background
For many years, La Trobe University has offered a suite of allied health courses in the form of a combined Bachelor/Master degree, such as the Bachelor of Applied Science/Master of Clinical Orthotics and Prosthetics.

For most students, their participation in higher education is supported by the Commonwealth. With a Commonwealth Supported Place (CSP), the cost of the degree is shared between the Federal Government and the student.

Earlier this year the Federal Government advised that they would no longer provide CSP funding for the Masters component of these combined degree courses. Assuming the current Bachelor of Applied Science/Master of Clinical Orthotics and Prosthetics remained in situ, students would be required to pay the full cost for the final two-years of their degree.

Given this advice from the Federal Government, the School of Allied Health Executive asked disciplines to look at alternative course designs that would mitigate the risks associated with this change in the CSP funding arrangements.

Over the last quarter, academic staff have explored a number of alternative course designs including:
- a four-year, CSP funded, Bachelor of Prosthetics and Orthotics with embedded honours (BPO Hons),
- a two-year, full-fee, graduate entry Master's degree for students with an existing bachelor degree.
Based on these explorations and discussion with key stakeholders including members of the Prosthetic Orthotic Course Advisory Committee, the Australian Orthotic Prosthetic Association, and the University’s Senior Executive Group, a suite of new courses has been proposed:

- a four-year, BPO Hons
- a two-year, graduate-entry, course whereby students with relevant prerequisites could enter into the third year of the BPO Hons
- a stand-alone one-year Master of Advanced Practice.

A number of benefits have been envisaged that make this proposed suite of new courses preferable to alternatives such as a two-year, full-fee, graduate entry Masters; specifically:

- a large pool of school-leavers with strong academic records necessary to sustain enrolment
- students could readily articulate from the BPO Hons into a Master of Advanced Practice or higher degree by research
- a two-year, graduate-entry, course would provide a pathway for diploma trained clinicians (that meet the prerequisites for entry) to obtain a BPO Hons in two years.
- a sub-bachelor qualification (e.g., diploma) could be created to enhance the technical or allied health workforce, and designed to articulate into the BPO Hons

At this stage, work is underway to develop the detail of these proposed courses. The detail is necessary to ensure compliance with the Australian Qualifications Framework, determine entry/exit pathways, and undertake the financial modelling necessary to demonstrate the sustainability of these proposed courses.

With these details, the University’s Senior Executive Group will be able to decide whether these course offerings will be implemented for students commencing in 2020.

**AOPA FORUM: DISRUPTIVE TECHNOLOGY IN O&P**

This AOPA forum features a panel of experts with diverse expertise in the application of disruptive technology. They will share their experiences in the required considerations, the po-tential, the application of emerging technologies in the field of prosthetics both in Australia and internationally.

**Leigh Clarke**  
Australian Orthotic Prosthetic Association

Disruptive innovation is expected to play a major part in the shaping of businesses over the next decade and into the future. Disruptive technologies are continually reshaping the way professionals in many fields operate. With the potential for great benefits to orthotic/prosthetic workforce in terms of efficiencies, quality control and an expansion in the materials used, as an industry ortho-tist/prosthetist are in the midst of ex-ploring, developing, trailing and using this new technology.

As an expert in workforce regulation, Leigh will highlight the ways in which disruptive technology can be harnessed in the orthotic/prosthetic industry. She will set the scene for an interesting discussion regarding what can be considered as truly disruptive in this field, and what the profession can do to harness this opportunity.

**A/Professor Lisa O’Brien**  
Monash University

Lisa was awarded a Churchill Fellowship to travel to the USA and Europe in 2018 to learn cutting-edge design, fabrication and rehabilitation methods for 3D printed hand devices from experts in this rapidly developing field.

Lisa will share some of her reflections following this undertaking and will provide an international perspective addressing the maker-space in the 3D printing of upper limb prosthetics. She will discuss this technology, the application of it and the challenges encountered when hobbyists provide limbs in the absence of a clinically trained prosthetist.

**Professor Peter Lee**  
University of Melbourne

Peter Lee has investigated the use of technology in the assessment of socket interface pressures. Lower limb amputee’s residual limb/socket interface pressures have been considered as one of the most viable parameters to quantitatively evaluate prosthetic socket fit. This is supported by the number pressure measurement and finite element modelling investigations over the years, attempting to measure and predict residual limb/socket interface pressures respectively. However, a good prosthetic socket fit today is still highly dependent on the skill and experience of the prosthetist. The question we are raising is – what else besides residual limb/socket interface pressures? In this talk, fundamental knowledge of socket biomechanics and residual limb/socket interface pressure measurement will be presented. With this background, we will discuss the advances in socket design (e.g. pressure casting).
motivated by socket biomechanics. Finally, we will discuss future perspectives in socket design, highlighting state-of-the-art research such as advanced motion analysis (e.g. using the Computer Aided Rehabilitation Environment (CAREN)), patient-specific residual limb / socket interface and neuromusculoskeletal modelling. The overarching aim of this presentation is to provide fundamental knowledge in socket biomechanics, highlight current and future technologies that could improve socket fitting, and finally encourage research and development in this area to improve the well-being of patients.

Disruptive technology and what it means to the prosthetic industry

Michael Holland
Hy5

If you feel technology seems to be moving faster, it is because it is! Michael Holland will address some of the common questions associated with disruptive innovations entering industries; such as: What are the underlying principles of this change and how does it affect the prosthetics industry at large?

Technology has been the most disruptive influence of modern times and shows no signs of slowing. From open source, home 3D printed solutions through to advanced Bionics … technical development at both ends of the Prosthetics Industry continue to accelerate. What is challenging the norm is that a large percentage of this disruption, or innovation, is coming from non-traditional sources.

For this presentation Michael will draw on some of the world’s leading institutions to identify future technology trends as they relate to the prosthetics industry, and how organizations are structuring themselves to take advantage.

Conclusion
AOPA looks forward to joining delegates attending this forum for a dynamic discussion regarding disruptive technology and the Australian prosthetics industry.

TECHNOLOGY OF TODAY AND TOMORROW: ORTHOTICS

Implementation of CADCAM for the provision of orthotic services, an efficiency analysis

Nigel Freeman
Momentum Sports and Rehabilitation Services

Introduction
Computer aided design and computer aided manufacture (CADCAM) has been present in orthotics and prosthetics (O&P) for 30 years, yet uptake into Australian markets has been limited. Momentum Sports and Rehabilitation Services set out to implement CADCAM within its clinical service and to analyse the pros and cons of transitioning into digital practices through CADCAM.

Method
Subjects: Two O&P clinicians
Apparatus: Vorum O&P CADCAM software was used for digital rectification. Standard plaster rectification was undertaken using industry standard plaster equipment

Procedure: Prior to implementing CADCAM, the time from casting to fitting of thermoplastic ankle foot orthoses was measured. Time was measured for casting, including setup and cleanup, plaster modification including filling and stripping of the cast was measured, and fabrication time was measured. The same was performed 3 months and 6 months following implementation of CADCAM. Casting was replaced by scanning and time was measured including setup and pack up. Digital model modification was timed and manufacturing time was also measured. Anecdotal subjective experiences were also collected in order to analyse positive and negative experiences.

Data Analysis: Simple time comparison was undertaken, without statistical analysis. A cost comparison was also performed by calculating material and equipment related costs, as well as cost of labor.

Results
Time savings were found through the use of CADCAM particularly in model rectification after only 3 months. Time savings in scanning over casting took longer to become evident. After 6 months it was found that shape acquisition through scanning was up to two times faster when compared with taking a plaster cast. Model rectification was found to be 3-5 times faster using CADCAM. Cost comparisons are still being calculated.

Discussion
The introduction of CADCAM was initially challenging as the change was being applied across the spectrum of Orthotic and Prosthetic services simultaneously. Consolidation of new techniques across each shape would have been more efficient
if applied in a progressive manner. Despite this experience, significant time savings were achieved across the process of AFO service provision. Shapes are now more easily saved and stored as well as modified if necessary. While assessment of efficiency was not performed for prosthetic shapes, the efficiency improvement in this was subjectively assessed and found to have the largest time saving of all shapes.

Conclusion
Implementation of CADCAM has saved time in service provision. This has enabled improved service efficiency and improved the capacity of clinicians to see more clients or undertake other duties.

References

Efficacy of the 3-Dimensional scanning method on fit, duration and cost for fabrication of ankle foot orthoses

Luthando Bonase¹
Sally Cavenett¹,²
Dr. Christopher Barr¹

1. Flinders University, Faculty of Medicine, Nursing and Health Sciences
2. Orthotics Prosthetics South Australia, SALHN, SA Health

Introduction
The purpose of this study is to complete a retrospective case note audit in which patients who were fitted with AFOs made from traditional casting method and those who were scanned using the 3D laser scanner to manufacture their AFOs were compared.

This study aims to show the introduction of 3D scanning methods have improved efficiency in manufacturing orthoses in the clinical setting and demonstrate if related issues identified on follow-up have been reduced with the use of scanning methods to the benefit of clients.

Method
Design of study: A retrospective case note audit compared consecutive patients (age 0-18 years old) fitted with AFOs made from hand-casting method 10 months before the introduction of 3D scanning method and those fitted with orthoses manufactured off-site from 3D scanned files.

Inclusion and exclusion criteria: Patients who were considered by Orthotists to have significant high complexities and unable to be scanned, were excluded. Younger adults who are above the age of 18 years old but below 21 years old were considered if they were still receiving service for children. Patients fitted with off-shelf AFOs were excluded from the study.

Outcome measures captured in results data included cost of orthoses fabrication, patient wait time from date of assessment to date of orthosis delivery, and the number of modifications needed at review.

Subject characteristics were analysed using chi square test of association for categorical variables and independent t-test to compare the two groups’ continuous variables. Significance level of p<0.05 was used for interpretation of results using the SPSS program.

Results and Conclusion
RESULTS: No significant difference found (p=0.62) in number of rejected AFOs between scan (7.14%) and cast method (3.03%). There was insignificant mean cost increase of AU$140.73 (p=0.52) and insignificant (p=0.25) increase in the mean number of waiting days (9.8 days) by the scan method. The number of participants who needed adjustments on their AFOs was not improved by scan method compared to cast method (p=0.59) as well as the number of adjustment made (p=0.52).

References

Fabricating over foam, challenges and insights into new orthotic fabrication techniques

Thomas Thomson
Momentum Health Technologies

Introduction
Implementation of CADCAM into O&P fabrication brings new technical challenges. Momentum Health Technologies has implemented CADCAM and fabrication over polyurethane foam models. This case study provides an outline of the challenges, benefits and solutions of fabrication over polyurethane foam.
Method
Subjects: One O&P technician
Apparatus: Vorum O&P CADCAM carver, polyurethane foam blocks, Infrared heat bank oven, vacuum
Procedure: Experiences of other services was first explored and compiled. Systematic trials were then undertaken to test fabrication processes over polyurethane foam models. The parameters of oven temperature, stockinette material, vacuum pressure and moisture content was manipulated until an optimal finish was achieved.
Data Analysis: No empirical data analysis was undertaken during this process and technique case study

Results
The results showed that a number of changes were required when compared to thermoplastic moulding over plaster casts. Oven temperature and resultant plastic temperature was required to be lower. Vacuum pressure was found to be a minor factor and that flow rate has a larger impact. A change in stockinette materials was required. Moisture content of stockinette was found to be an important factor.
Foam models offered a number of clinical service benefits over plaster. Improved design times, improved manufacturing times, easier manual handling and reduced risk of injuries.
Discussion Shifting from moulding thermoplastic devices over plaster casts to foam models requires significant changes in fabrication techniques.

Conclusion
Implementation of CADCAM into P&O service provision improves overall service efficiency. Time needs to be taken to understand the changes in fabrication process to ensure that a high quality thermoplastic finish is achieved.

References

Challenges faced by small private practices
The central fabrication model was implemented to minimise initial setup costs and to omit the need for expensive workshop machinery and 3 phase power typically required to manufacture AFOs.
It has proven difficult to attract and keep capable staff in many regions outside of Victoria. Whilst Nova Orthotics would benefit from additional orthotists this is unlikely to be viable. As an alternative, we have looked to further increase the efficiency of the sole orthotist with investment in digital scanning, CAD modification and 3D printing.

Implementation of central fabrication
Various business models were discussed with industry leaders and AOPA staff and the advantages of a central fabrication model were immediately apparent.
Several companies were approached and details and logistics were nutted out. Pricing, turn around times and responsibility for mistakes were established via email. A central fab team with known good repore was chosen.
Positive casts take 2 working days to reach the central fab in Melbourne, turn around time is generally 5 working days and completed orthoses are returned via overnight courier.

The benefits of central fabrication
Central fabrication has allowed Nova Orthotics to provide services to a greater number of clients. With the implementation of central fabrication, we have been able to focus on providing a quality service to paediatric clients in a timely manner with clients seen within 3 weeks of funding approval and orthoses provided 3 weeks later. The orthotists unique skill
set is in clinical services. Whilst most orthotist/prosthetists enjoy time at the bench, utilising a quality central fabrication system enables many more clients to be seen. To ensure quality, the client casts and scans are modified by the orthotist before being sent for central fabrication.

Central fabrication proves cost effective with clinical time being billed at a higher rate than technical time. Additionally, the business does not need to absorb the cost of errors that may occur during fabrication.

**The challenges and the future**

Packaging of positive casts was an initial headache that was overcome with a reusable system utilising rigid containers and foam padding.

Time management still continues to challenge the orthotist as jobs cannot be rushed through ‘at the last minute’. The orthotist loses some control over the end product but good communication and jobcards has helped to address this.

Emerging technologies are being implemented in an effort to further reduce workshop time to enable more clients to be seen.

**Conclusion**

A quality central fabrication service facilitates a small business to see more clients freeing up the orthotist to focus on their clinical load.

---

**UK usage of CADCAM in Orthotic clinical practice**

**Alex Tyler**

OpCare Ltd

**Dominic Hannett**

OpCare Ltd

**Introduction**

The presentation provides insight into the way in which CADCAM has been used to replace traditional methods in custom spinal bracing in OpCare clinics at Addenbrookes Hospital, Cambridge, UK.

**Method**

**Subjects:** The overview involves 13 CAD data capture scans.

**Apparatus:** The presentation focuses on the use of OMEGA scanner and associated software vs traditional plaster casting with an Oxford frame.

**Procedure:** We carried out a retrospective study of the data capture and rectification method for custom spinal braces in the Addenbrookes clinic in Cambridge. We reviewed the successful delivery volumes of each method and reviewed the Cobb angle outcome for each patient irrespective of data capture method.

**Data Analysis:** The study was simple overview of usage of traditional methods vs CAD. Therefore, data analysis was equally simple.

**Results**

We found that the transition from traditional methods to CAD took approximately 18 months with ongoing training on the scanning technique and rectification process. We identified similar outcomes in relation to Cobb angle impact with increased patient compliance to the CAD method. The negation of general anesthetic gave considerable risk management benefit for the patient group and the repeatability, alongside development of design of brace, using CAD, were seen as distinct advantages.

The time process for CAD was shown to have been 5 times as efficient as the traditional methods.

**Discussion**

The introduction of new technology required the clinical and manufacturing team (which is separated out in the UK) to work closely together and clear instructions were required.

**Conclusion**

The use of CAD in this clinical environment has improved patient compliance, improved the timeline of delivery of braces whilst maintaining the required outcome for the patient as set by the MDT.
RESEARCH INFORMING PRACTICE AND POLICY: PROSTHETICS

Uncertainty with long-term predictions of lower-limb amputation prevalence and what this means for prosthetic and orthotic research.

Michael P Dillon
La Trobe University

Matthew Quigley
La Trobe University

Stefania Fatone
Northwestern University

Introduction
Being able to accurately estimate the number of people living with limb loss, and predict how this might change over time, provides valuable information to help institutions plan for the future needs of people living with limb loss.

It is difficult to be certain how the number of people living with limb loss may change into the future given that just one study has reported the prevalence of lower limb amputation (Ziegler-Graham et al. 2008). In 2005, it was estimated that there were 1.6 million Americans living with lower limb amputation and that this number would more than double by 2050 (Ziegler-Graham et al. 2008). In the decade since Ziegler-Graham et al. (2008) published this influential work, a number of studies with more recent time series suggest that the incidence rate of lower limb amputation has remained stable or declined (Dillon, Quigley & Fatone 2017).

We are concerned that the long-term predictions of limb loss prevalence reported by Ziegler-Graham et al. (2008) are often used to justify research without regard for the uncertainty associated with such long-term predictions.

While the long-term projected increase in amputation prevalence reported by Ziegler-Graham et al. (2008) makes a compelling argument to justify research, we need to be cautious and thoughtful in our characterisation of amputation prevalence to be confident that the research investment and policy decisions we make today are targeted to the needs of tomorrow.

Despite uncertainty in the long-term prevalence estimates, there is a compelling need for research into the prevention of limb loss and how we can improve the outcomes for those living with amputation. Amputation is a life-changing event. Outcomes are often poor. Experiences of depression and anxiety are common. Quality of life is often diminished as is the ability to participate fully in activities that bring meaning to life. These are all compelling reasons to continue to pursue high-quality research, regardless of any uncertainty in the long-term prevalence of limb loss.

References

Dillon, MP, Quigley, M & Fatone, S. 2017 ‘A systematic review describing incidence rate and prevalence of dysvascular partial foot amputation; how both have changes over time and compare to transtibial amputation’ Systematic Reviews vol. 6 no. 230 doi: 10.1186/s13643-017-0626-0

X-Limb: A Soft Prosthetic Hand

Alireza Mohammadi
The University of Melbourne

Jim Lavranos
Caulfield Hospital

Peter Choong
St Vincent’s Hospital

Denny Oetomo
The University of Melbourne

Introduction
The advances in myoelectric hand prostheses showed the potential to return independent living for people with upper limb loss. Despite the recent advances, the heavy weight of the prosthetic hand and lack of natural control of the hand are still major shortcomings [1]. We have developed a soft prosthetic hand with features addressing the need of people with upper-limb loss using Soft Robotic techniques.

Method
The design of the X-Limb was conducted with a focus on a low complexity and user-friendly interface, to allow intuitive, robust, and reliable control in addition to light weight. This is done by firstly focusing on providing only the most common grasps for the activities in daily living and secondly using 3D printing techniques to manufacture the overall hand with low infill in the structure to reduce the...
weight. As shown in Fig. 1, we have realised the two most commonly used grasps: pinch grasp and power grasp. Combined, these grasps will cover more than 70% of the daily activities as reported in [2]. For fabrication of the whole hand, we used a commercially available 3D printer (FlashForge Dreamer) to print TPU90 (Thermoplastic Polyurethane with Shore 90A).

Results and Discussion

The overall weight of the X-Limb hand including the embedded actuators and universal quick disconnect wrist is 292gr which is half of the weight of existing commercial hand prostheses such as Bebionic. The required functionality for the hand is determined through evaluation criteria for prosthetic hands proposed in [3]. This includes a set of tasks for food preparation, dressing, holding cup, opening cap of bottles and picking small items. The capability of the X-Limb in grasping different objects and its application in performing ADLs is provided as a video in this YouTube link (https://youtu.be/vIF9QH0ojzg). This demonstrates effectiveness of the optimally designed hand prosthesis with a user-friendly interface.

Conclusion

The designed hand is ultra-light, durable, cheap and easy to manufacture. It is readily customisable for different hand size due to parameterised CAD design and using 3D printing techniques. The user-friendly control of the hand is achieved by using combination of designed-in behaviour of the finger and optimised movement of the fingers. This enables users to grasp a wide range of object in one specific hand preshape eliminating the need for multiple switching between different grasps.

Evaluation of the NU-FlexSIV Socket for Persons with Transfemoral Amputation

Fatone S
Caldwell R
Stine R
Subramanian V
Angelico J

1. Northwestern University, Chicago IL
2. Scheck & Siress Inc. Oakbrook Terrace IL
3. Jesse Brown VA Medical Center, Chicago IL

Funded by DOD Award #W81XWH-15-1-0708.

Introduction

Sub-ischial sockets, such as the newly described Northwestern University Flexible Sub-Ischial Vacuum (NU-FlexSIV) Socket,1 do not interact with the ischium, potentially increasing comfort and hip motion compared to Ischial Containment (IC) sockets.2,6 The purpose of this pro-spective, assessor-blinded randomized cross-over trial was to compare comfort and functional performance in these two sockets in persons with unilateral transfemoral amputation (TFA).

Method

Subjects: Goal is to recruit 30 subjects; interim analysis was on the first 13 subjects who completed the study (11 males; 48.9±13.8 years; 178±12.3 cm; 89.2±22.7 kg). Amputation etiology included 7 trauma, 4 cancer and 2 vascular with high mobility levels (7 K4; 6 K3). All subjects wore IC sockets prior to study participation.

Apparatus: A mix of patient-reported and performance-based measures were collected for each socket, including Socket Comfort Score (SCS, 0-10 scale); Orthotic and Prosthetic User’s Survey (OPUS); 3D gait analysis; 5-time Rapid Sit-to-Stand Test (RSTS); Four-Square-Step Test (FSST); and T-test of Agility.

Procedures: Participants were randomized to using one socket for 6 weeks before crossing over to using the other socket for 6 weeks. Prosthetic components were standardized within subjects.

Interim Data Analysis: Differences in each outcome measure at 6 weeks were assessed using a Wilcoxon Signed Rank Test for the primary outcome measure of SCS and reference to minimal detectable change (MDC) values where possible for all measures.7,10
**Results**

Two subjects withdrew. For the remaining 11 subjects, initial analysis showed there is a significant difference between sockets in terms of comfort; however the difference did not consistently exceed the MDC. Differences between sockets for all other measures did not consistently exceed MDC values. Nine subjects chose to continue using the NU-FlexSIV Socket upon study completion.

**Discussion**

Interim results suggest that while comfort and preference tended to favor the NU-FlexSIV Socket, functional performance results were mixed across subjects.

**Conclusion**

The availability of a more comfortable socket, even with equivalent functional performance, may improve experience with prosthesis use for persons with TFA.

**References**


**While mortality rates differ following dysvascular partial foot and transtibial amputation, should they inform decisions about the choice of amputation level?**

**Michael P Dillon**  
La Trobe University

**Matthew Quigley**  
La Trobe University

**Stefania Fatone**  
Northwestern University

**Introduction**

Although there is strong evidence to show that the risk of dying after transtibial amputation is higher than partial foot amputation (Figure 1), we are concerned by the implication that amputation level influences mortality, and that such interpretations of the evidence may be used to inform decisions about the choice of amputation level.

We argue that the choice of partial foot or transtibial amputation does not influence the risk of mortality. The highest mortality rates are observed in studies with older people with more advanced systemic disease and multiple comorbidities (Dillon et al. 2017). When the confounding influence of these factors is controlled for, amputation level does not influence mortality rates.

These insights have important implications in terms of how we help inform difficult decisions about amputation at either the partial foot or transtibial level, and highlight the need for a more thoughtful and well-evidenced interpretation of the published mortality rates.

**References**


**Figure 1.** All-cause proportionate mortality 30 days, 1- and 5-years after dysvascular partial foot and transtibial amputation: point estimates and 95% confidence intervals are shown.
Drawing on the experiences and perspectives of amputees using a Microprocessor Prosthetic Knee to inform policy and practice

Sean Gray
New Zealand Artificial Limb Service

Nicola Kayes
Auckland University of Technology

Alison Elston
New Zealand Artificial Limb Service

Introduction
The New Zealand Artificial Limb Service (NZALS) is the national provider of prostheses to amputees in NZ. Our statement of intent outlines a commitment to improving patient experience, equity and access, while being responsive to advances in prosthetic technology. This includes drawing on user experience to inform policy and practice. The aim of this study is to explore the experiences and perspectives of amputees regarding their transition to and use of a microprocessor prosthetic knee (MPK).

Method
This was a Qualitative Descriptive study using semi-structured interviews.

Subjects (n=13) were adults (>18 years) with transfemoral amputation who had been fitted with an MPK.

Procedure of purposeful sampling was used to capture diversity on key characteristics including traumatic (n=6) vs. non-traumatic (n=7) amputation, time since first MPK (range: 3 months-12 years), gender (n=9 male; n=4 female), and age (range: 26-73 years).

Data analysis was completed using Conventional Content Analysis.

Results/ Discussion
Participants reported experiencing a greater sense of normality and confidence to manage varied terrain. The MPK opened up their world, now being able to engage in more diverse activities and enjoy the destination rather than focus all their energy on the journey. Participants spoke of a process of relearning to walk as they transitioned to an MPK, requiring them to forget the old habits learnt while using a mechanical knee. Participants expressed some frustrations with current service provision, including reliance on centralised services.

Conclusion
The findings offer an in-depth understanding of the experiences of amputees using an MPK which is missing in current literature. They have also proven formative to NZALS in helping to articulate the possible cost-benefit argument for MPKs, informing service outcomes frameworks and guiding service improvements. Meaningful uptake of findings into NZALS’ policy and practice has the potential to optimise outcomes that matter for the people we provide services.
**KEYNOTE ADDRESS**

**Osseointegration and targeted muscle reinnervation changing lives**

Mr Frank Bruscino-Railoa

Limb amputations result in a major disability. Pain, prosthetic retention and function remains a major problem together with the psychological impact on the individual. The Alfred hospital in Melbourne has a long history in dealing with amputees with the first limb osseointegration in Australia performed in 2000.

A multidisciplinary approach that brings experts from different areas together is crucial to deliver the best possible results. In 2014 we set up an advanced surgical and rehabilitation programme that addresses problems faced by amputees.

At the core of its service are the techniques of Osseointegration, Targeted Muscle Reinnervation (TMR) and soft tissue reconstruction. Osseointegration using the O.P.R.A. system deals with the issues of retention and eliminates sockets and their related problems. Targeted muscle reinnervation and neurotization techniques are used to improve myoelectric control and more recently to improve pain. Soft tissue reconstruction techniques are vitally important in dealing with the metal soft tissue interface.

The keynote address is an overview of the Alfred experience the current work and future directions.

**EXPLORING ORTHOTIC SPECIALTIES**

**Client education can improve your service: a paediatric facility example**

**Brianna King**  
**OrthoKids**

**Introduction**  
Why is patient education important?

Patient education is known to improve patient compliance with treatment. If there is an increased understanding of the service being provided it allows families to be better equipped to take part in the treatment process. Good patient education is also valuable for a service and its practitioner. Through the delivery of clear and consistent education practitioners can demonstrate their knowledge of the clinical presentation and treatment options, thereby providing reassurance of their clinical expertise and establishing credibility with the family. Patient education is particularly important for families of children with disabilities, who are often burdened with large amounts of new information in each appointment. Clear and consistent patient education materials support the uptake of new information.

**Implementation of patient education at OrthoKids:**

**Example One:** Increased education in the fitting of Dennis Browne Boots and Bar.

Multiple steps have been taken to increase parent information, from the introduction of markings on the brace, to a 1 page information sheet, right through to a full booklet with pictures. As each step as introduced, there was a decreased in phone calls from concerned families, therefore leading us to believe there has been an increase in information uptake.

**Example Two:** Increased education for the provision of helmet therapy for the treatment of plagiocephaly

Again multiple steps have been taken to increase information provide to parents, in particular in a written format, as often initial appointments can be overwhelming to take everything in. Pre-appointment information is provided to families, followed by more if the decision is made to go ahead with a helmet. At the fitting appointment, families are given an information booklet that they can keep to refer back to if needed. This process works to ensure families are well educated and understand the process, allowing for a happier process for all involved.

**Conclusion**

OrthoKids has focussed on the development of a suite of patient education resources, aiming to support our clients and families through their decision and the intervention process. This presentation shares two clinical examples, which we use to highlight the value of the new resources and approach for both clients, families, practitioners and the service.

**Managing diabetic feet: using objective outcome measures to guide treatment and optimise outcomes**

**Tim Jarrott**  
**Director, Head to Foot Orthotics**

**Introduction**

Foot ulceration is a significant complication of diabetes mellitus and represents a precursor to
lower limb amputation\(^1\). The incidence in Australia is around 2% annually, with a lifetime risk of between 19% and 34\%.\(^2\) Hospitalisation, reduced quality of life, increased morbidity and the significant impact on health expenditure require the treatment and prevention of foot ulceration to be of high importance. Therefore it is incumbent on clinicians to keep abreast of the latest guidelines and technology available to assist with optimising patient outcomes.

**Discussion**

Objective pressure measurement has now become an integral component of our treatment regime for complex diabetic foot management. Subjectively we believe that this has directly led to:

- Improved outcomes
- Reduced re-attendance rates
- Greater knowledge about offloading techniques
- Assisted with patient engagement and compliance
- Improved credibility and relationships with referrers

**Pressure Measurement Options**

Our facility has been utilising the Pressure Guardian\(^4\) system for the past 1-2 years to guide and verify the effectiveness of offloading. Specifically we utilise this technology to quantify peak and average pressures for ‘difficult to manage’ high risk feet, typically recording:

1. Baseline pressure
2. Post intervention pressures
3. Pressures post modification (to guide the extent and location)

**Offloading guidelines**

We know that diabetic foot ulcers are typically caused by repetitive stress, both shear and pressure. Orthotic management therefore is usually aimed at ‘offloading’ pressures at the site of injury. In order to adequately manage these pressures we must first be able to adequately define what is ‘normal and acceptable’, versus what is likely to cause injury.

What do we aim for when designing an offloading device? The latest guidelines for managing diabetic feet provide some insight into this:

- Reduce peak pressures below 200kPa\(^2\)
- Reduce plantar pressure by 30%\(^3\)

**Conclusion**

Improved patient outcomes have been noted as a direct result of incorporating objective measurement of pressures in the high risk diabetic foot, using Pressure Guardian\(^4\) technology.

**References**


---

**SATURDAY 6TH OCTOBER 2018**

**Gait analysis: sagittal plane segment kinematics made easy for a busy clinic**

Daniel Baldwin

SSS Prosthetics and Orthotics

**Introduction**

AFO tuning in the sagittal plane was first documented in an unpublished study on cerebral palsy in 1984 (Meadows 1984). There has been many publications identifying these techniques since (Eddison & Chochalingam 2013), utilising 3D gait analysis and force platforms. Most facilities do not have access to gait laboratories, and the process can also be time consuming and costly. This does not mean the basis behind the theories can be ignored in a clinical setting.

**Method**

To identify the kinematics of normal gait and the movements of the below and above knee segments. How these segments relate to other forces and muscle activity. Then to examine the importance of mid to late stance in the gait cycle.

Then we will look at the history and studies behind AFO tuning.

By using these fundamental AFO tuning principles, SSS has developed a technique to look at sagittal plane kinematics, making it easier to identify gait deviations, plan treatments, and most importantly communicate with clients and other health professionals.

**Conclusion**

Segment kinematics can be used as an easy tool for gait assessments, treatment planning and measuring outcomes for various pathologies. It also provides a valuable educational tool for clients and other health professional to understand.

**References**


Yielding AFOs: an overview of design and function for stance and swing control

Paul Sprague
Neuromuscular Orthotics

‘There is but very little motion in the ankle joint; and limited as that motion is, it is of a character that cannot be imitated by mechanical means.’ (Marks, 1905).

To restore efficient and physiologic gait for an individual with lower limb neuromuscular impairment presents a significant challenge for Orthotists. The evidence for the use of AFOs to improve walking ability is not conclusive (Shrivastara, 2014), yet the characteristics of many traditional AFOs studied do not facilitate normal foot and ankle motion, so perhaps it is not surprising to find limited support in the peer reviewed literature.

Whilst preventing foot drop during swing phase can be easily achieved with most readily available AFOs, ankle kinematics from heel contact through the toe off are often severely compromised. Double-action ankle joints have been available for decades to allow independent control of plantarflexion and dorsiflexion range of motion, but they offer primitive mechanical control in contrast to the precise concentric and eccentric action of the dorsiflexors and plantarflexors.

The recent introduction of more advanced orthotic metal ankle joints, elastomer bumpers and components, carbon fiber springs and monolithic laminated designs has greatly added to the suite of options which the orthotist might present to their clients. Some of these components offer post-fitting adjustability, and so a detailed understanding of the four periods within stance phase of gait is required, in order to optimise the characteristics if this category of Yielding AFOs.

References

TECHNOLOGY OF TODAY AND TOMORROW: PROSTHECTICS

A responsible approach to incorporating digital prosthetic manufacturing into service delivery

Sean Gray
New Zealand Artificial Limb Service

Bernard Guy
Victoria University, Wellington

Aaron Johnston
New Zealand Artificial Limb Service

Introduction
The New Zealand Artificial Limb Service (NZALS) are the national provider of prostheses to amputees in NZ. Our statement of intent outlines a commitment to improving patient experience, equity and access, while being responsive to advances in prosthetic technology. This includes responsible adoption of new prosthetic manufacturing technology to improve service user experience, engage and develop our expert workforce and optimise available funding. The aim of this study was to retrospectively review NZALS’ adoption of digital prosthetic manufacturing technology and relationship with Victoria University of Wellington School of Design to inform future digital investment and collaboration decisions.

Method
• Retrospective quantitative analysis of 1911 digital scans from 5 years of socket manufacturing.
• Reflective observation of NZALS design and digital manufacturing collaboration with Victoria University of Wellington over 4 years; including 6 summer research scholarships, internships, professional development and two master’s thesis projects.
• Digital landscape and applied learning to determine future digital manufacturing integration into service delivery.

Results
1. The use of digital scanning in the manufacturing of prosthetic sockets increase from 167 to 526, 2013 to 2017 respectively; 223% increase in 2015.
2. A dedicated additive manufacturing research programme with Victoria University of Wellington providing a design-led user-focused approach to implementing digital manufacturing.
3. Purchasing an Industrial Fused Deposition Modelling 3D printer to phase in the manufacture of hybrid digital and traditional prosthetic sockets for people living with transtibial amputation which will reduce production time by 30-50%.

Discussion/Conclusion
Insights gained on our digital manufacturing journey:
• Has shown scanning capability is a core competency for providing digital manufacturing in the future.
• Requires internal leadership in technology adoption. As such, NZALS will be establishing a national design and digital manufacturing advisory group who will guide adoption overtime.
• Engaging our expert workforce and collaborating researchers has positioned NZALS well to innovate and adopt new digital technology (printers and materials) as they become available.

SATURDAY 6TH OCTOBER 2018

E: admin@aopa.org.au P: (03) 9816 4620 F: (03) 9816 4305
Is Osseointegration The Definitive Answer to Amputee Reconstruction? Examining the Complication And Re-Operation Rates After Osseointegrated Reconstruction

William Lu
The Osseointegration Group of Australia

Munjed Al Muderis
Macquarie University Hospital, Norwest Private Hospital

Introduction
Osseointegration has emerged as a promising alternative to rehabilitating with a traditional socket mounted prosthesis. A major concern of the Osseointegrated approach lies in the risk of infections occurring from the permanent transcutaneous opening often referred to as the stoma. In addition to commonly anticipated complications including fractures, surgical debridements or revisions, we have identified several significant events in which a patient may require to be readmitted and go through additional surgery. The objective of this study is to look into the rate of occurrence of all subsequent complications requiring a re-operation after a patient receives osseointegration surgery. It is essential to perform such an analysis to provide a realistic evaluation on the effectiveness of the treatment and reveal any hidden underlying complexities.

Method
Subjects: A total of 261 surgeries have been identified with a minimum 12-month follow-up time (mean follow-up time 33.1±16.14 months) and included in this study. The surgeries took place in Sydney Australia at three different hospitals (Norwest Private Hospital, Macquarie University Hospital and Hurstville Private Hospital) and were all performed by a single surgeon. Procedure: All subjects received an osseointegration implant by the Osseointegration Group of Australia between 2010 and 2017. Data Analysis: All events leading to a readmission and subsequent re-operation have been identified through hospital operation records and pooled together for meta-analysis. Events identified include: revision of implants, periprosthetic fracture fixation, surgical debridement due to infections, neurectomies and soft-tissue refashioning.

Results
Among all cases, there were a total of 130 re-operation events recorded which occurred among 66 patients, indicating a high recurrence rate among the same patients. We recorded a total of 29 debridements, 29 neurectomies, 43 soft tissue refashions, 22 implant revisions and 7 periprosthetic fracture fixations. Interestingly, the rate of debridements and soft-tissue refashions were found to be reduced for patients who were operated using a single stage surgery.

Discussion
Many events leading to readmission after the primary surgery may not necessarily be graded as a complication of the osseointegration technique, but will still amount to a significant inconvenience for the patient and financial burden of the healthcare system. In this study, we have identified several additional possible reasons in which an osseointegration patient may need to be re-admitted into hospital for additional surgery.

Conclusion
Through the implementation of improved surgical techniques and rehabilitation protocols, the rate of several of these re-operation events can be largely reduced, thus improving the overall outcomes of patients undergoing osseointegration surgery.

Governmental perspectives on the quality improvement for provision of bone-anchored prostheses

Laurent Frossard
YourResearchProject, University of the Sunshine Coast, Queensland University of Technology

Debra Berg
Queensland Artificial Limb Service

Introduction
Bone-anchored prostheses (BAP) using osseointegrated implant are gaining recognition as a suitable alternative prosthetic attachment particularly for individuals who are unsatisfactorily fitted with socket-suspended prostheses. To date, only the Queensland Artificial Limb Service has established and shared a specific procedure and subsequent health economic evaluations of provision of BAP including cost-effectiveness analysis from governmental perspective (Frossard et al., 2017b, Frossard et al., 2017a, Frossard et al., 2017c). However, the need for better assessment of the customers’ satisfaction has risen as this initial procedure is implemented.

The purpose of this study is to determine how the current quality improvement procedure originally designed to assess provision of socket prostheses is also suitable to assess provision of BAP.
Method
The qualitative appraisal of the suitability of the current quality improvement procedure relied on content analysis of three key surveys completed by customers fitted with socket prosthesis with strong emphasis on identification of items related specifically to the delivery of the whole prosthesis, socket and BAP.

Results
All surveys combined, a total of 42%, 27%, 23%, 6% and 2% out of 125 possible answers related to administration of survey, appraisal of service provider as well as the quality of the delivery of prosthesis, socket and BAP, respectively.

Discussion
This study showed that only 2% of the current quality improvement procedure is solely relevant to customers fitted with BAP. Approximately, 69% and 6% of the procedure are possibly transferable and unsuitable to BAP-specific procedure, respectively.

Conclusion
This study showed the limited adaptability of current typical quality improvement procedure to assess delivery of BAP. Altogether, this diagnostic study is an initial stepping stone in the design of BAP-specific quality improvement procedures.

References

Toward Neural Control of Powered Legs
Levi Hargrove
Shirley Ryan AbilityLab
John Spanias
Northwestern University
Suzanne Finucane
Shirley Ryan AbilityLab
Ann Simon
Shirley Ryan AbilityLab

Introduction
Technological advances have allowed for the development of powered prosthetic legs that can provide energy to assist in activities such as stair climbing or sit-to-stand transfers (Lawson et al., 2013; OSSUR). Providing safe and reliable control remains a challenge. Our research program aims to enable intuitive and natural control over these devices, including use of EMG signals when appropriate.

Method
Subjects: Eight subjects (6 male, 2 female) with a unilateral transfemoral or knee disarticulation amputation participated. All subjects were capable of ambulating at variable cadences with a passive knee prosthesis.

Apparatus: Subjects were fitted with a custom designed socket capable of collecting EMG signals and were taught how to ambulate on a powered knee-ankle prostheses designed by Vanderbilt University (Sup et al., 2009).

Procedure: Subjects completed a set of ambulation circuits on two days with seamless transitions between walking over level ground, stairs, and slopes (Young et al., 2014). EMG and mechanical sensor data from Day 1 was used to create a pattern recognition-based control system that automatically predicted what activity they wished to perform. On Day 2, the control system adapted to changes in EMG signals.

Data Analysis: We completed a two way ANOVA to evaluate the contribution of EMG signals and adaptation on the percentage of steps correctly predicted.

Results
The control system that incorporated EMG signals and allowed for adaptation resulted in fewer errors (p <0.05) compared to a control system that did not include EMG signals or did not adapt.

Discussion
Powered leg prosthesis have great potential but more work needs to be completed to ensure safe and reliable control over the device. We are hopeful that the developed system would be suitable for a long-duration home trial, which is the next phase of our work.

Conclusion
Inclusion of EMG signals in combination with a control system that adapts to new and changing data is effective for predicting users’ activity. We envision this to help control the power delivered from the device to the user and result in an improved overall control system.

References
AOPA FORUM: IMPROVING ORTHOTIC/PROSTHETIC POLICY IN AUSTRALIA

Discover future changes to O&P Policy in Australia, with presentations from experts and key policy makers regarding DVA, NDIS and PHI developments.

The AOPA Policy Forum will provide an introduction and overview of significant changes to orthotic/prosthetic policy in Australia. Speakers from the Department of Veterans Affairs’ (DVA), Private Healthcare Australia (PHA), the National Disability Insurance Agency (NDIA) and the Australian Orthotic Prosthetic Association (AOPA) will introduce attendees to new developments and ongoing advocacy projects. Catherine Walsh, from DVA, will provide an overview of new processes for orthotic/prosthetic services. Kristy Domitrovic, PHA, will discuss improving recognition of orthotic/prosthetic services amongst private healthcare insurers. Jackie O’Connor, on behalf of the NDIA, will provide an update regarding the Assistive Technology Redesign Project. Luke Rycken, AOPA, will discuss ongoing work toward implementing access to orthotic services under Medicare.

Catherine Walsh
Executive Director Department of Veterans’ Affairs
Catherine is the Executive Director, Wellbeing Programs from the Department of Veterans’ Affairs and is responsible for the program management of transport, aids and appliances, hospitals and home care. As a Royal Australian Air Force officer and veteran herself with over twenty years’ experience in the full-time and reserve forces, Catherine brings a practical and operational lens to the work undertaken by the Department.

Kristy Domitrovic
Director of Engagement, Policy and Strategy Private Healthcare Australia
Kristy is the Director of Engagement, Policy and Strategy at Private Healthcare Australia (PHA). PHA is the Australian private health insurance industry’s peak representative body that currently has 20 registered health funds throughout Australia and collectively represents 96% of people covered by private health insurance. Kristy has previously worked as a ministerial adviser and a competition lawyer in Australia and the UK. She has worked with the Government and private health insurance sector to deliver significant industry reforms.

Jackie O’Connor
Director of Engagement, Policy and Strategy Private Healthcare Australia
Jackie is an accomplished orthotist/prosthetist with over 15 years of clinical, managerial, project, policy and research experience. Jackie is the founder and managing director of Allied Health Specialist Consultants whose goal is to ensure all Allied Health service provision delivers efficient and effective outcomes for consumers. Jackie wishes to apply her skills to help as many people as possible improve their health. Jackie has recently completed her Master of Health Service Management including research related to Person Centred Care. Jackie is currently engaged by the National Disability Insurance Agency (NDIA) as an Orthotic and Prosthetic Subject Matter Expert and will be joining the AOPA Policy Forum to discuss the National Disability Insurance Scheme (NDIS).

Luke Rycken
Policy and Advocacy Officer
Luke Rycken is the Policy and Advocacy Officer at the Australian Orthotic Prosthetic Association. Luke is a certified orthotist/prosthetist and is responsible for AOPA’s ongoing advocacy work and government relationships. In this role, Luke has worked to improve the clinical recognition of orthotist/prosthetists and access to orthotic/prosthetic services for the community. Luke has an extensive understanding of the regulatory and legal frameworks in which the industry operates, as well as an ability to pre-emptively determine the effects of various changes that may influence the orthotic/prosthetic industry. Luke is currently completing a Juris Doctor and examining the impact of the National Disability Insurance Scheme (NDIS) on the rights of persons with disability.

CLOSING PLENARY: DESIGNING THE FUTURE OF O&P

Innovation at 1 Gig – The future is accellerating

Michael Holland
Hy5

Introduction
Connectivity and improved access to technology has reduced the barriers to development in the prosthetic industry and innovation is no longer the domain of a few companies. This improved social and technological connectivity will continue to accelerate change in the prosthetic industry.
Discussion
Technological change is moving at a faster rate than ever before. We live in a world where internet access is regarded as a given and high access speeds of 1 gigabyte are becoming common. This means that small, previously disconnected, communities now have access to the latest data and information instantly. However, enhanced connectivity is also allowing greater communication between devices, including prostheses. Emerging markets are also part of this trend, with mobile devices becoming ubiquitous in many markets. Emerging technologies, including 5G and the ‘internet-of-things’ will ensure that prostheses become more iterative and adaptive to the environment.

These changes will be precipitated by the decreased cost of competition and reduced barriers to entry for emerging companies. Low cost 3D scanning and printing, high powered CAD solutions available as software-as-a-service and AI powered cloud computing will allow emerging companies to innovate and compete in a changing industry.

Conclusion
Connectivity and the availability of new technologies will accelerate development and innovation in the prosthetic industry. This will improve consumers access to new prostheses and will require the prosthetic industry to move quickly. The future will be open sourced, customer centric, connected and fast moving.

Sources
Amazon, 2016, “Driving change and managing innovation in a cloud-first business reinvention”, aws.amazon.com
Forbes, 2014, “Three ways cloud computing is driving rapid innovation”, le Blanc R., forbes.com/sites/ibm
IBM Institute, 2017, “Beyond Agility, how cloud is driving business innovation”, public.dhe.ibm.com

The Future of Intuitively Controlled Bionic Limbs
Levi Hargrove
Shirley Ryan AbilityLab

Introduction
Loss of a limb causes a major disability that profoundly limits everyday activities such as dressing, eating, mobility and personal hygiene; impacts social interactions, personal relationships, and mental health; causes debilitating phantom limb or neuroma pain; and can threaten basic independence. While capable new prosthetic limbs—both arms and legs—have recently been introduced to the market, control of these devices limits their functionality.

Discussion
Skin surface electromyographic (EMG) signals, generated by contraction of underlying muscles, have been used for decades for controlling powered prosthetic arms (Parker and Scott, 1986) and more recently, to improve control of powered prosthetic legs (Hargrove et al., 2015). Traditionally EMG control was limited to amplitude based control approach of from residual limb muscles, but more recently pattern recognition has become a viable alternative to extract more information. Furthermore, surgical techniques such as targeted muscle reinnervation, in combination with pattern recognition have allowed from tremendous improvements in control of both powered arms (Kuiken et al., 2009) and powered legs (Hargrove et al., 2013). While placing electrodes inside the patients socket while maintaining comfort can be challenging, osseointegration, again in combination with targeted muscle reinnervation and pattern recognition can provide excellent outcomes.

Conclusion
Many new technologies are available to provide improved functional outcomes for amputee patients. While some are now available clinically, many more are expected to emerge in the years to come. Engaging the clinicians will be critical to ensure that technologies broadly deployed for the benefits of patients.

References

The future of data, business intelligence and analytics in O&P
Paul Prusakowski
CPO, FAAOP

Introduction
What is your data story and what does the data that you collect say about your clinical, operational and financial outcomes? Data can be powerful, but in order to benefit you must first make a commitment.

Fully implantable systems that measure EMG signals from small and deep muscles or residual nerves, and which also provide sensory feedback to patients are now in advance phases of development, with many first in man demonstrations ongoing (Ortiz-Catalan et al., 2015; Tan et al., 2014). With these technologies, coupled with new sensorized robotic limbs provide the foundation for simultaneous and proportional control which will last over long durations.

Conclusion
Many new technologies are available to provide improved functional outcomes for amputee patients. While some are now available clinically, many more are expected to emerge in the years to come.Engaging the clinicians will be critical to ensure that technologies broadly deployed for the benefits of patients.
to collect appropriate data. Having a long-term vision with the ability to see the value of collecting comprehensive clinical and operational information in a routine manner will pay dividends to all who make the commitment to do so.

Discussion
Healthcare is all about data and orthotist/prosthetists must develop data strategies to better inform practice and future change. Practitioners should collect clinical, financial, demographic and comorbidity data as well as patient reported and functional outcomes and meaningful patient satisfaction data. This data should enable practitioners to improve the efficiency of their care, compare results against national and international benchmarks as well as peers and should be used to author more informative and meaningful reports.

In clinical care settings, data analytics is helpful in quantifying what it is that we do so that we can describe our contribution to the overall health of a population of patients. For example, with a strong data strategy your practice or a group of practices will be able to tell a data story that demonstrates the value and effectiveness of orthotic/prosthetic care in a better way than we ever have before. With consistent data collection for all patients, within minutes you may be able to clearly demonstrate that your clinical care facility improves return to work status for patients, reduce dependencies on prescription pain medications, has reduced the number of falls and reduced fall risk of all patients that are provided appropriate technology.

As patient reported and functional outcomes and meaningful patient satisfaction data. This data should enable practitioners to improve the efficiency of their care, compare results against national and international benchmarks as well as peers and should be used to author more informative and meaningful reports.

The tools that are used to enable solid data analytics processes are standardized data collections processes within an organization. Strong and consistent processes consistent drive behaviours that lead to collection of data that is necessary to perform continuous quality improvement projects. Once data is collected, a number of data visualization tools are becoming available on the market that provide great starting points for bringing data to life. Tools such as Tableau, Qlikview, FusionCharts, Power BI, Highcharts, and R Studio are advancements on the basic pivot tables that you may be making in excel. But rather than spend time trying to become a data scientist in addition to trying to care for your patients, keep an eye on tools that are being brought to the healthcare community that take the learning curve out of the process and lead you directly to how to ask better questions to get the answers that you can act upon.

Conclusion
The orthotic/prosthetic profession risks commoditisation and deterioration of our status as healthcare professionals if we do not make the individual and professional commitment to evolving our data strategy. Business intelligence and analytics tools have transformed North American practices and clinical patient outcomes through the better use of data. It’s never too soon to plan your own data strategy, but it will be too late if you never start. What story do you want to tell?

The future of O&P clinical practice in Australia
Paul Sprague
Neuromuscular Orthotics
What do you do? Are you a clinician, fabricator, designer, fitter, administrator, technician, scientist, coach or manager? Is your role threatened or enhanced by technology?

Our seasoned colleagues were schooled in how to carve sockets from timber, and incorporate custom welded ferrules into orthopaedic footwear. Yet they now operate multiple bespoke software interfaces, produce 3D printed check sockets and analyse objective kinematic gait data. What will the role of the Orthotist/Prosthetist look like in the future?

Australia faces a growing demand for health services at every level. A comfortable and rewarding life is no longer a luxury but an expectation for many in our privileged society, not only during our younger years but for decades after retirement. With this expectation comes a need for world class health care, with an expert workforce to deliver results.

Orthotist/Prosthetists are in a truly unique position with our current knowledge of materials, components, biomechanics and fabrication techniques. But to facilitate an ideal solution for our clients, we must first understand the problem in each case: what is important to the user of this technology? What are the current barriers to achievement? What shortcomings are there in the interface between my client and their environment, that I could help to overcome to facilitate greater participation?

The shift from providers of hard technology to facilitators of client satisfaction, continues in this exploration of the role of Orthotist/Prosthetist, as we consider the question: What will you do?