PROSTHETICS & ORTHOTICS IMPACT ASSESSMENT

South East Asia: Cambodia and Lao PDR

Veasna walks well with his prosthetic leg and by working as a farm labourer supports himself and his mother in Cambodia.

USAID FROM THE AMERICAN PEOPLE

ISPO

Authors: Sandra Sexton, Mel Stills, Chhoeurn Vuthy, Sisary Kheng

June 2015

Acknowledgements

This impact assessment would not have been possible without the vision and support of Rob Horvath and his team from the Leahy War Victims Fund, United States Agency for International Development.

We also offer grateful thanks to the service users, graduates, managers, local co-ordinators and ministry officials who participated in discussions, interviews and observations.

Acknowledgements are extended to local study co-ordinator Mr Sybounheuang Sansathit, Laos, and to Angie Weatherhead and Diana Corrick for editing.

Together we will continue moving beyond physical disability

International Society for Prosthetics and Orthotics
22-24 Rue du Luxembourg
BE-1000 Brussels, Belgium
Telephone: +32 2 213 1 79
E-mail: ispo@ispoint.org
Website: www.ispoint.org

Contents:

Section 1: Executive Summary

There are an overwhelming and growing number of people with disabilities in the world. Indeed, according to the World Report on Disability (WHO, 2011), between 110 million and 190 million adults experience significant difficulties in functioning. People with physical disabilities often require access to prosthetics and orthotics services to aid their mobility and enable them to be active in society. Only 1 in 10 people in the world can access the essential services that they need and so they remain excluded from attaining their basic rights of inclusion in society.

In developing countries, because of an extreme lack of resources and without robust health systems, people with disabilities are even more likely to be denied basic health services and so left untreated and neglected, their disabilities worsen. Children services, in particular, need to be coordinated with the medical/surgical and therapeutic team. A determination of the natural history of the patient must be made before treatment is undertaken. Accommodation for growth and general wear and tear on devices makes routine follow-up on all child cases mandatory. If left without appropriate treatment this becomes a catch twenty two situation and they experience a downward spiral of ever worsening complexity and disability.

Over many years, multiple agencies have attempted to address this situation. In particular the International Society for Prosthetics and Orthotics (ISPO) and the United States Agency for International Development (USAID) have worked in partnership to develop standards and professional training of the workforce for health and rehabilitation services. They have developed and agreed international standards of professional practice and education for Prosthetists/Orthotists and Orthopaedic Technologists. Additionally, USAID and other agencies have invested in capacity building including scholarship support for individuals from developing countries to train professionally at ISPO recognised schools.

To determine the impact of training professionals to ISPO standards we conducted a series of studies in thirteen countries. This study report is about graduates of the Cambodian School of Prosthetics and Orthotics (CSPO) which is recognised by ISPO as delivering a training programme at ISPO Category II level; a minimum standard for training personnel to treat patients who need prosthetics and orthotics services. CSPO is thus helping to build the capacity of the workforce of Orthopaedic Technologists at ISPO Category II level in South East Asia. A study was conducted to find out about the impact of prosthetics and orthotic professional training at this level in the Kingdom of Cambodia and in the Lao People's Democratic Republic (also known as Laos). Field visits to Cambodia and Laos involved a partial audit of CSPO graduates working with their patients in different prosthetics and orthotics services.

Both Cambodia and Laos are well known as post conflict countries with a legacy of high numbers of peoples with disabilities caused by traumatic injuries resulting from armed conflict. In addition, as low income countries, they carry a heavy burden of poverty related disability. The number of children needing prosthetic orthotic services is not reported but was observed to be high. Birth defects, childhood diseases and trauma all add to the need for prosthetics and orthotics services.

We found that CSPO graduates delivered - and indeed helped to develop – basic, appropriate services for persons with disabilities in Cambodia and Laos. Graduates in Cambodia had also helped to improve such services, but this was limited because of a lack of clinicians working at ISPO Category II and ISPO Category I

level or above. However, graduates tended to struggle to provide services for people with complex disabilities in these circumstances.

Services remain under pressure because there are not enough practitioners working in them for the population in need. There was a lack of clinical leadership, professional practice development and prescription choice for prosthetic and orthotic treatment in the region despite the nature of people presenting with disabilities requiring such solutions for their complex needs. A greater range of prescription choices would include a wider availability of materials or components that will improve comfort, function, durability and fabrication. In Cambodia, there were early signs of positive activity by a professional body, but in Laos there is not sufficient numbers or professional impetus to meaningfully build a professional network to address the issues faced by their population of persons with disabilities.

Section 2: Introduction and context

Across the world physical disabilities limit people's mobility and their ability to participate fully in society. It has been estimated that 0.5% of the world's population with physical disabilities are in need of prosthetic and orthotic devices[1]. However, the World Health Organization calculates that only 5-15% of people with disabilities who need assistive technologies can access them. In effect over 29.4 million people with disabilities experience everyday life without the prosthetic and orthotic technologies they deserve. Efforts to address this injustice have included measures to strengthen the workforce in prosthetics and orthotics services with the aim of increasing the number of personnel and the quality of their training.

A long term partnership between the Leahy War Victims Fund of the United States Agency for International Development (USAID) and the International Society for Prosthetics and Orthotics (ISPO) has been about capacity building in prosthetics and orthotics services. Joint working with the World Health Organization (WHO) led to the publication of standards of professional education in the form of ISPO Category I standards for prosthetists/orthotists and ISPO Category II standards for orthopaedic technologists[1]. These standards are now well established in the field. ISPO's training program evaluations also mean that today, ISPO certifies prosthetists/orthotists or orthopaedic technologists graduating from ISPO evaluated courses of study. Additionally, USAID has, for many years, invested in scholarships for students of ISPO recognised courses. One such course of study for ISPO Category II personnel is the three year program at the Cambodian School of Prosthetics and Orthotics (CSPO). Little is known about the impact that their graduates have in the workplace.

With a view to assessing the impact of CSPO training, USAID funded ISPO through a collaborative agreement to undertake this study of CSPO graduates. We used the USAID Impact Assessment Primer Series as guidance[2] and developed a causal model and analysis framework.

Our study involved field visits to the Kingdom of Cambodia (referred to as Cambodia) and to the Lao People's Democratic Republic (referred to as Laos) to follow up upon the professional practice of ISPO certified graduates. We also listened to service users to learn how services impacted upon their lives.

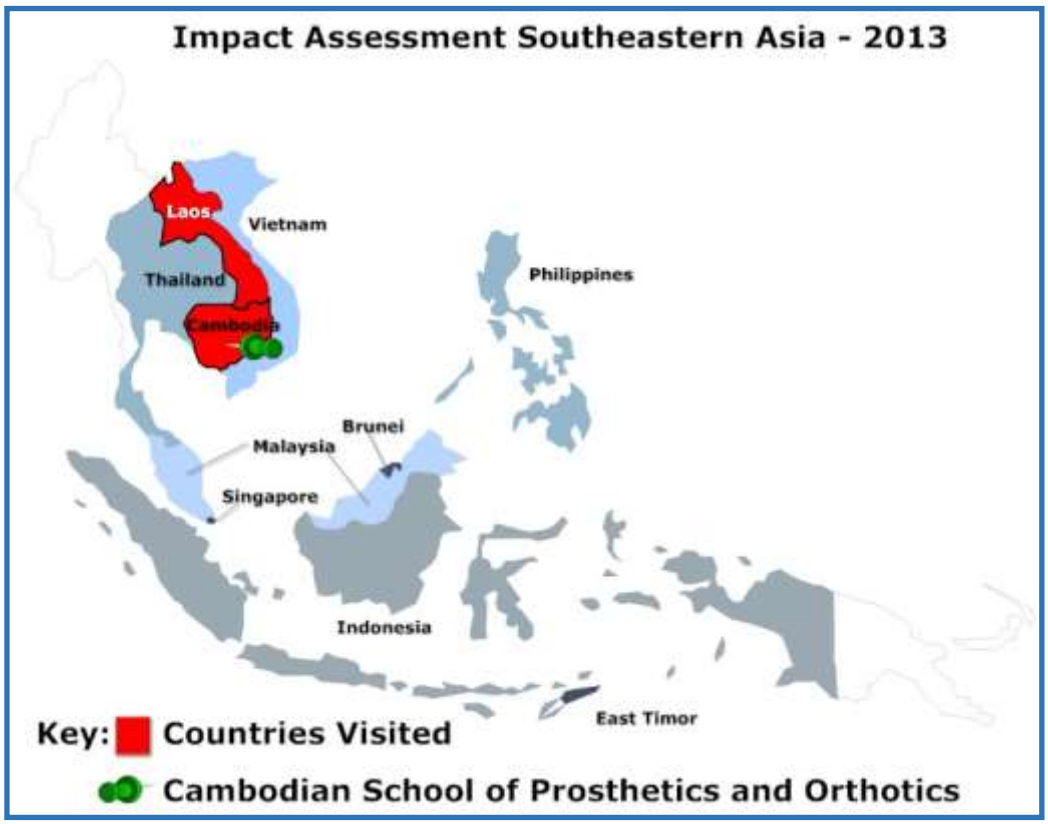


Figure 1. Map of South East Asia highlighting Cambodia and Lao People's Democratic Republic (Laos).

Section 3: Methodology

This impact assessment focussed on completing a partial audit within 2 countries where graduates of an ISPO recognised program were working. Each national follow up of graduates reported on:

1. **Country context and rehabilitation, prosthetics and orthotics services.**
2. **Discussions with government officials, head of services, prosthetics and orthotics service managers.**
3. **Interviews with graduates together with their clients.**

The assessment was conducted by the authors during site visits to the countries from July 13 to 27, 2013.

1. Country context and rehabilitation, prosthetics and orthotics services

Desk based research was augmented by tours of national, regional and local prosthetics and orthotics facilities.

2. Discussions with government officials, head of services, prosthetics and orthotics service managers

Letters of invitation were sent to government officials and heads of services with email or telephone recruitment of prosthetics and orthotics services managers. Discussion guides were used in the following meetings:

A. Courtesy visits with government ministries involved with the delivery of prosthetics & orthotics services: This helped determine the commitment of Governments to develop services for persons with physical disabilities.
B. Meetings with directors of hospital services: This helped determine the history and development of services and facilities, in addition to how prosthetics and orthotics fitted into the overall scheme of services. The service structure and the user population were also explored.
C. Meetings with prosthetic/orthotic services managers: This helped determine the staff profile and established the impact of having graduate personnel working in a prosthetic/orthotic service. Furthermore, leadership, national recognition and service development were discussed.

3. Interviews with Graduates together with their clients

This part of the study had a specific methodology which involved one hour interviews with graduates.

Title: A study of professional skills and development needs of clinical personnel in prosthetics and orthotics in lower income countries.

Investigators: Study investigators led a structured interview with study participants. In each study, investigators were selected from the formal list of ISPO evaluators, regional program heads and/or key senior personnel who have extensive postgraduate experience. In this study the investigators were prosthetists/orthotists Mel Stills (USA), Sandra Sexton (UK) and Sisary Kheng (Cambodia) and orthopaedic surgeon Chhoeurn Vuthy (Cambodia). Sisary Kheng is also Director of the Cambodian School for Prosthetics and Orthotics.

Location: The study was conducted in the workplace; in one or more prosthetic/orthotic clinics in Cambodia and Laos.

Objectives of investigation: The study addressed the wider program objective to assess the impact of ISPO Category I or II training on:

- the end user of prosthetic and orthotic devices
- the quality of prosthetic/orthotic treatment

This South East Asian Graduate Audit survey specifically aimed to:

- determine the scope and level of professional practice
- audit Cambodian School of Prosthetics and Orthotics (CSPO) graduate skills
- determine the professional development needs of the graduate

ISPO Category I and II training aligns with ISPO published professional profiles for prosthetist /orthotists (ISPO Category I) and orthopaedic technologists (ISPO Category II) [1].

Nature of the participants: ISPO certified graduates of the CSPO working in Cambodia and Lao PDR with at least 1 year post-graduate experience and having a scope of practice in lower limb prosthetics and/or lower limb orthotics patient management.

Consents: Written consent was sought from graduate participants following the provision of a Participant Information Sheet. Clients/patients were asked to verbally consent to their involvement following a defined verbal explanation by their participating clinician in the local language.

Recruitment of participants: Potential participants were identified from the graduate lists supplied by the CSPO and verified through the ISPO list of certified professionals. Following study recruitment by letter, email or telephone invitation from the program head, visits to graduates in the clinical settings were arranged in Cambodia (Phnom Penh, Kampong Cham and Battambang) and Laos (Vientiane, Champasak and Luang Prabang). A convenience sample was selected depending on where graduates worked, the available time and budget for each field visit and flight itineraries. The graduate selected client participants.

Structured interview: A structured interview was developed, building on past graduate follow-up work conducted by ISPO over the last decade and funded by USAID. The protocol was recently re-developed following a 2010 graduate audit field trip to Vietnam and then validity testing with two experienced clinicians in Ethiopia and Tanzania. Further to this, the structured interview data collection forms were redesigned to enable improved ease of use. The method was then applied in an East Africa impact assessment. The most recent methodology was presented here.

Prior to entering the interview, the graduates were given a 2 page form to complete regarding demographic data about themselves and their client. They also answered questions about professional practice. Each participating graduate was then interviewed about lower limb clinical care at the end of a client review appointment both with their client (part A) and then without their client present (part B). A data collection form was used and this also acted as an aide memoir to prompt areas for further discussion during the interview.

PART A: With the client present, the interviewer asked the graduate to present their client case. The interviewer took notes on the data collection form during the interview which covered competencies expected of an ISPO certified professional. This part of the interview took about 30 minutes to complete.

PART B: Once the client had left, the interviewer reviewed the interview form with the graduate and identified at least 3 areas for clinical practice development that the graduate could work on alone. It was estimated that this part of the interview took about 30 minutes to complete.

Where graduates demonstrated consistent good practice, other development needs were discussed. At the end of the interview participants were given a note of feedback and a personal development plan.

Independent scrutiny: The methodology was reviewed by Dr Angus K McFadyen, Statistical Consultant from AKM-STATS, Glasgow, Scotland, UK, with a request for advice about the questionnaire design and the intent to perform exploratory data analysis. The methodology was then improved prior to use.

Data collection, storage and security: Data collection was undertaken by the investigators using the structured interview process and hard copy data collection form. Data was made anonymous when electronically processed. Both raw data and electronic data are securely held by the ISPO program manager, and remain the property of USAID until at least 3 years after the last date of the program (3 years after 31 December 2015). At this point the data will be destroyed.

Potential risks or hazards: No risks were identified.

Ethical issues: Participation was voluntary. All forms were coded and no identifying information has been provided in any study report.

Any payment to be made: Participant travel and subsistence expenses were provided for people away from home for over 2 hours.

Participant debriefing: Participants were immediately given their feedback and a personal development plan. Once available, participants will be sent a copy of this final study report.

Outcomes dissemination: The outcomes of the study will be widely published on the ISPO website, presented at conferences and submitted to peer reviewed journals.

Section 4: ISPO certified graduates in Cambodia and Laos

At the time of the study 183 orthopaedic technologists had graduated with certificates from the ISPO Category II program at the CSPO from 15 countries. Graduates were followed up in two countries, namely Cambodia and Laos to determine the impact of such professional training in these nations as part of South East Asia. In the field of prostheses and orthoses the ISPO has certified the following CSPO graduates: 96 from Cambodia and 14 from Laos. The impact assessment took the form of a partial audit in South East Asia.

Graduate participants in this impact study

In total a sample of 20 graduates were interviewed with their patients during the impact assessment. 17 graduates were from the CSPO and three graduates were from the Vietnamese Centre for Orthopaedic Technology (VIETCOT). This report gives details of the CSPO graduate results. The VIETCOT graduate results are reported separately in a summary report. The average age of the CSPO graduate participants was 39 years old, with ages ranging from 25 to 50 years. We saw 13.5% of all CSPO ISPO certified Cambodian personnel, and 29% of all CSPO graduated Laos's personnel. 29% of the total sample was female (compared with about 33% of all CSPO Category II graduates) and thus the sample reflected the whole CSPO graduate population. The average number of years since graduation was 9.1 years.

Number interviewed		ISPO Category I	ISPO Category II
Cambodia	13	1	12
Lao PDR	4	0	4
Total	**17**	**1**	**16**

Table 1: Graduate participant information

	Average age	Age range		Average years graduated
		Low	High	
Cambodia	39	25	50	9
Laos	37	33	46	10
Overall	**39**	**25**	**50**	**9.1**

Table 2: Graduate ages and years graduated

Professional Practice

Scope of practice:

The majority of graduate participants in Cambodia and Laos practiced in all areas of prosthetics and orthotics.

Four graduates reported that they worked in areas of practice as follows:

- Lower limb prosthetics (n=1)
- Lower limb prosthetics and orthotics (n=2)
- Lower limb prosthetics, and orthotics and spinal orthotics (n=1).

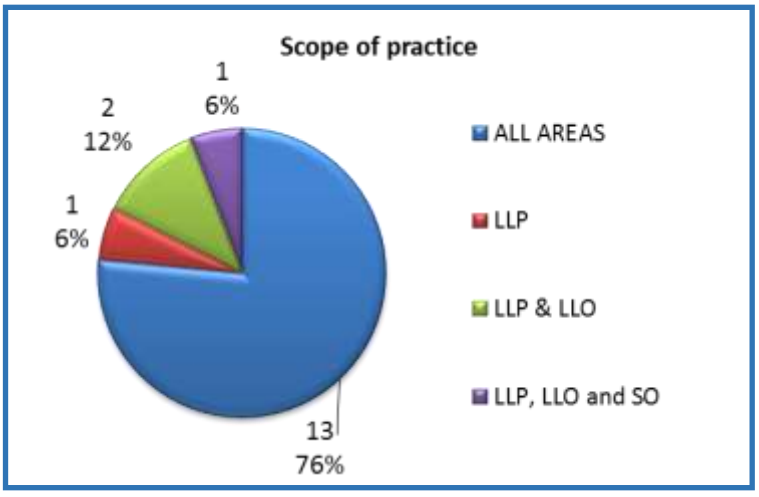


Figure 2

Specialist care: 29% graduates said they specialised in lower limb prosthetics/orthotics when asked the question "Do you specialise in any patient condition or treatment?". No graduates reported that they specialised in any particular condition.

Activities and caseload mix:
Graduates reported that the average proportion of time spent in direct patient care was 69%, with 15% in supervising others as they provided patient care. The remaining time was spent in administrative tasks. The range of time spent in direct patient care varied greatly; from 0% for a Head prosthetist/orthotist to 100% for a prosthetist/orthotist.

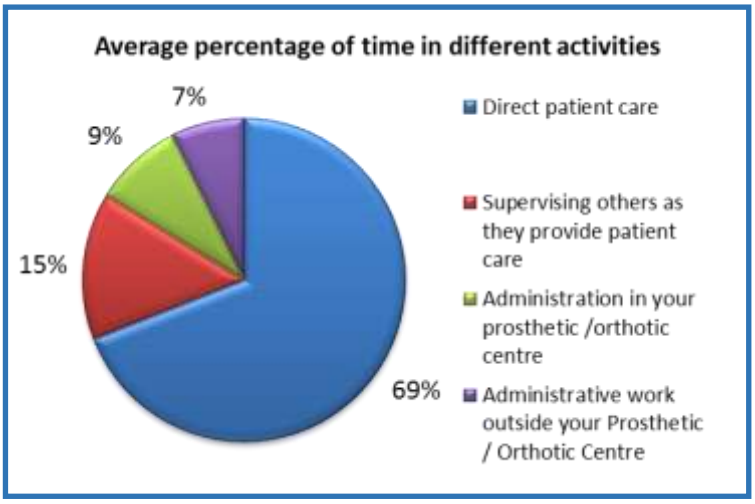


Figure 3

The **patient case load** was mainly lower limb prosthetics and orthotics (totalling 66%). Upper limb prosthetics and orthotics accounted for a total of 25% of the caseload and spinal orthotics for 9%.

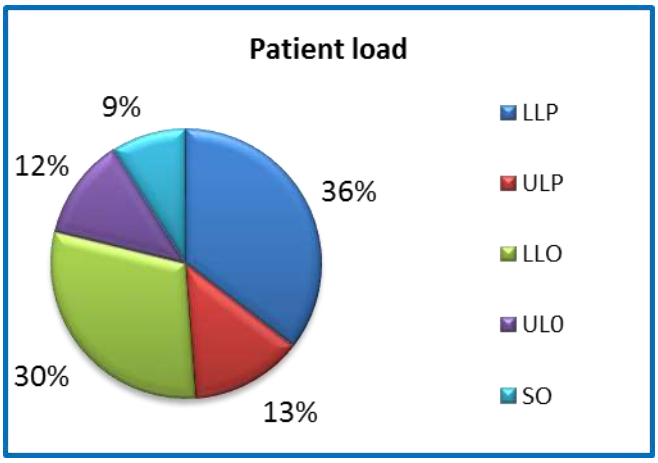


Figure 4

Level of competence:
Most graduates declined to answer this question. It is possible this is because of Cambodia's cultural association of statements of competence with pride, which is viewed a negative personal quality to display.

Five graduates reported that they were most competent in provision of lower limb prosthetics or lower limb orthotics.

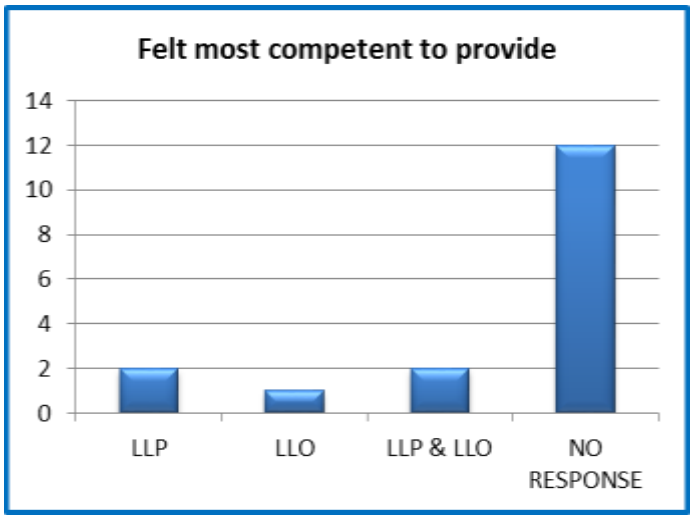


Figure 5

FIGURES 5, 6 & 8 SHOW NUMBER OF TIMES REPORTED

Seeking advice for complex cases:
Graduates reported that they most often sought advice from a therapist or a prosthetics/orthotic professional not recognised at ISPO Category I standard.

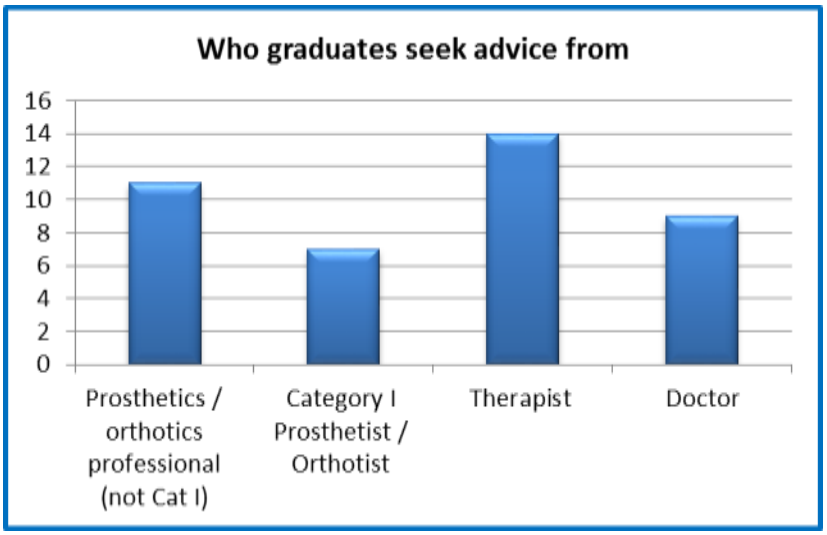


Figure 6

Keeping up to date with information:
Most graduate participants reported that they kept up to date by attending workshops, seminars or short courses. 65% said they were able to access the internet from work.

Only three graduates accessed and read full text journal articles.

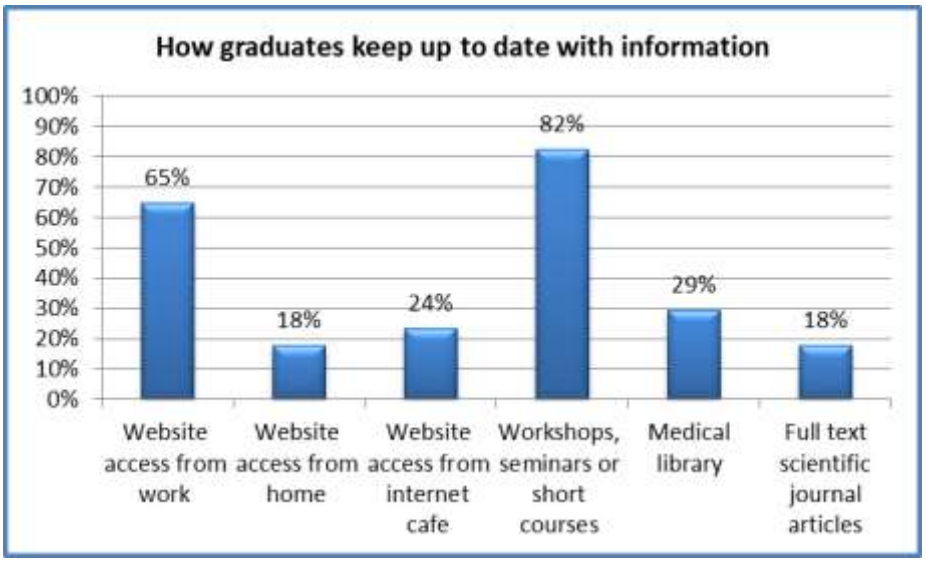


Figure 7

Membership of professional bodies and clinical interest groups: Thirteen of the seventeen graduates working in Cambodia reported that they were a member of the professional association, the Cambodian Association for Prosthetists and Orthotists (KHAPO) which is also an ISPO National Member Society. None of the graduates in Laos were a member of a professional body.

Clinical practice

Seventeen CSPO graduates completed this section.

Eight orthotic clients were presented in the study by CSPO graduates including 6 Ankle-Foot-Orthoses (AFO) users, one of whom had an adapted raised shoe on the non-AFO side, and 2 unilateral Knee-Ankle-Foot-Orthoses (KAFO) users.

Nine prosthetic clients were presented including 6 unilateral trans-tibial amputees (TT), 2 unilateral trans-femoral (TF) amputees and a client with a knee disarticulation (KD).

Referral prescriptions: A referral prescription was available for 23% (n=4) of the sample. Three of these were from medical doctors and one was from a physiotherapist.

Clinical records: 94% (n=16) had clinical records, but only 43% of the clients had records that were completed to include an adequate record of client assessment.

History taking: Most graduates took an adequate medical and social history and were able to present this clearly.

Description of physical disability: Graduates were able to present a description of their client's physical disability but lacked confidence in providing this. Most graduates required prompting to present all relevant aspects about their patient.

Prosthetic/orthotic history: Graduates demonstrated that they had taken an adequate prosthetic/orthotic history from their clients.

Physical examination: Whilst the majority of graduate participants were able to describe the physical examination of their patient, some graduates lacked confidence and required prompting to complete the presentation. In two case presentations graduates clearly indicated that physical examination was done by the physiotherapist and they had not conducted a proper physical examination themselves. One of these graduates stated that they did not measure the range of motion as "the physio did this". Another graduate relied on the physiotherapist to test for muscle spasm and said it was "difficult to test muscle strength".

Functional rating of user: Only two graduates in the study rated the functional grade of the client with the prosthesis/orthosis**.**

Devices meeting client's needs: 76% (n=13) of graduates thought the device met their client's needs.

Appropriateness of device: 24% (n=4) of the devices were not deemed appropriate by the interviewer. These four cases had fitting issues which the graduate recognised. Three of these cases had devices made by someone else and not the graduate.

Prosthetic and orthotic prescription and specification: Choices of prosthetic device were limited because of availability and affordability of components and systems. Components and material supply by ICRC in Cambodia was the only supplier of prosthetic and orthotic parts (known as polypropylene technologies) seen in the audit sample.

All prostheses were of endoskeletal design. All six trans-tibial sockets were Patella Tendon Bearing (PTB) with four of them extended to suspend as supracondylar sockets. Two PTB sockets were suspended by leather cuff straps. Two trans-femoral sockets were made, one of ischial containment design suspended by vacuum (with a suction valve) and one quadrilateral suspended by a Silesian belt. The knee disarticulation socket was end bearing and suspended over the condyles. One trans-femoral amputee had a custom designed rotator manufactured by their service provider which was unique and extremely useful for the user in sitting cross legged on the floor.

Four prostheses were noted to have liners in the socket and these were made from ethylene-vinyl acetate soft sheet material. All prosthetic feet were Solid-Ankle Cushion-Heel (SACH) feet. The three prosthetic knees in use were all uniaxial and locked by choice manually. 44% (n=4) of the prosthetic sockets were noted to be open ended designs.

Durability of device: Thirteen graduates gave an estimate that their client devices would last for an average of 2.6 years before a replacement was required.

Devices: 76% of client participants were wearing devices manufactured by the graduate interviewed. 37% of graduates presented clients were receiving treatment during the study visit and then consented to participate.

Follow up since delivery: 59% (n=10) of the graduates reported the client had attended a follow up since delivery of their prosthetic or orthotic device. Two graduates said their clients would self-refer for review if needed.

Treatment goals identified and noted: Graduates verbally identified very general treatment goals for their clients. Goals were not specific, for example these were stated as "to be able to walk" and were not written in client notes.

Improvements for devices seen: 76% (n=13) of graduates made the devices that their presented client wore. The remainder (n=4) were made by someone else. Graduates were able to critically appraise the quality of their own work and that of others, but this often required prompting. Most improvements were needed around fit (n=4) and alignment (n=6). The misalignment finding represents 35% of alignments seen which falls beyond the typical quality benchmark standard[3] of 15±10%. Four graduates indicated that the prosthetic feet their client used were unsuitable because of poor durability.

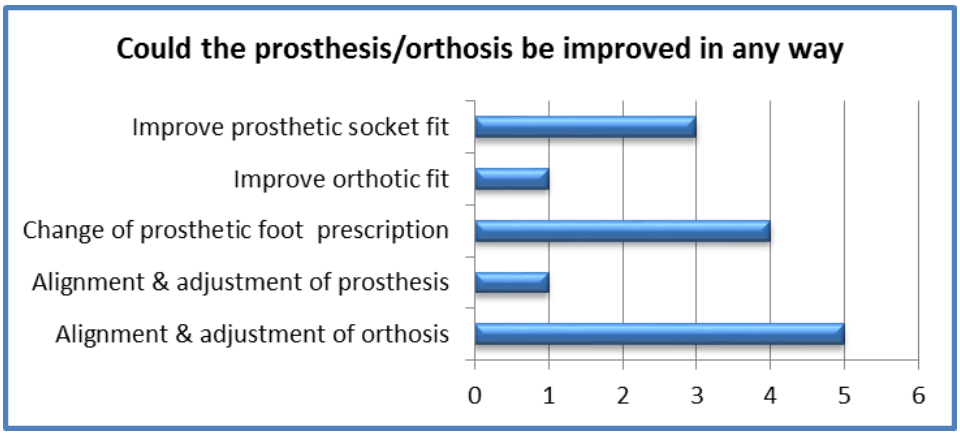


Figure 8

The interviewers then reviewed each device used by the clients and checked a number of factors about the devices, noting "Yes" or "No" against each aspect as to whether they were satisfactory or not. Although prosthetic fit mediolaterally (M/L) and anterioposteriorly (A/P) was satisfactory in the majority of cases, three sockets had socket issues in this regard. The graduates had a tendency to use open ended sockets,

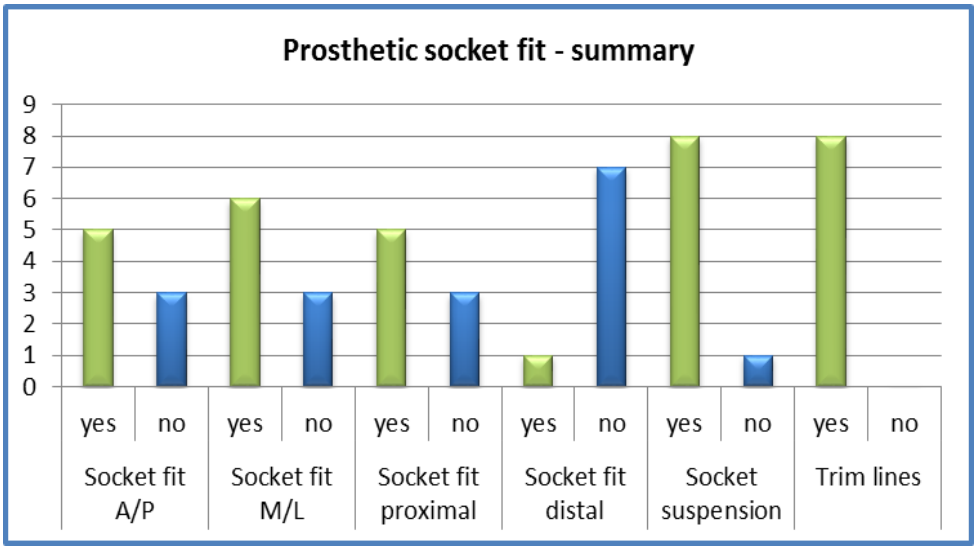


Figure 9

rather than total contact socket designs and changing this practice could improve socket fit.

Prosthetic prescription was noted to be appropriate, given the choice of only one kind of foot or knee in the region. The general finish of manufacture and cosmetic shaping were all found to be satisfactory. Leg length and static alignment were universally correct. Two of the nine devices had issues of dynamic alignment.

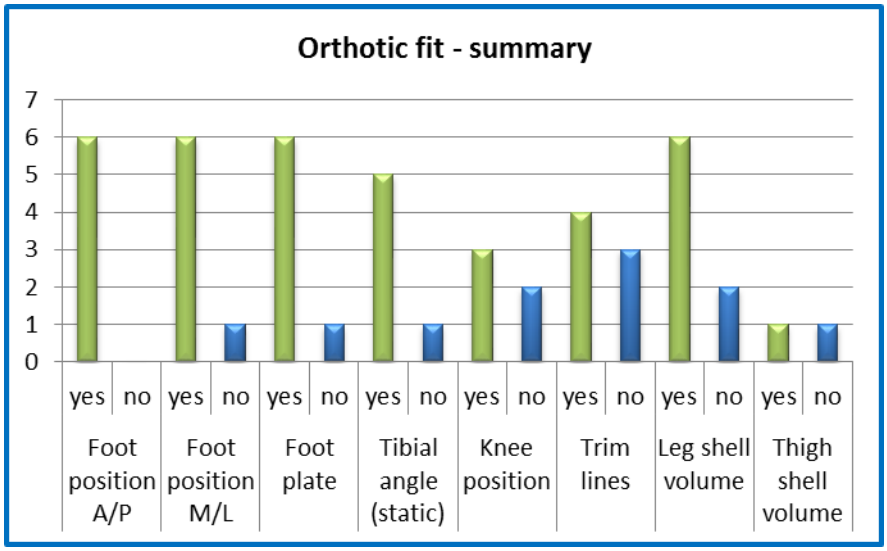


Figure 10

Of the nine orthoses supplied, the orthotic fit was mostly found to be acceptable.

One of the six AFOs had a joint articulation at the ankle which was correctly fitted.

Of the two KAFO's one had problems with joint placement and joint congruence.

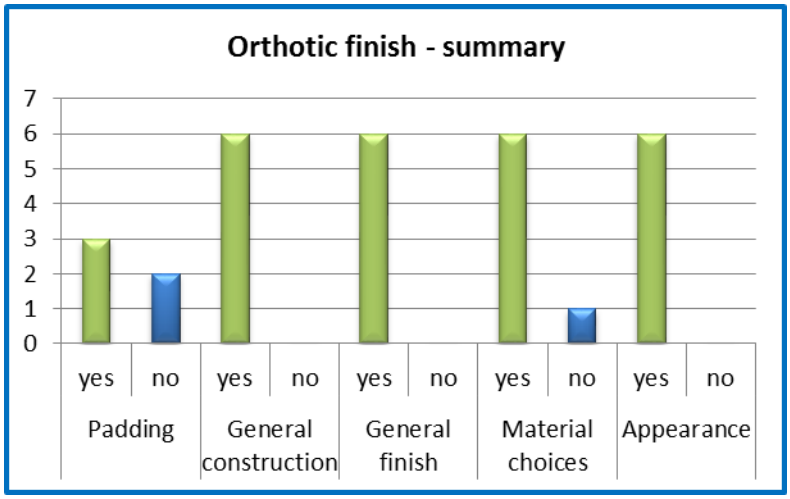
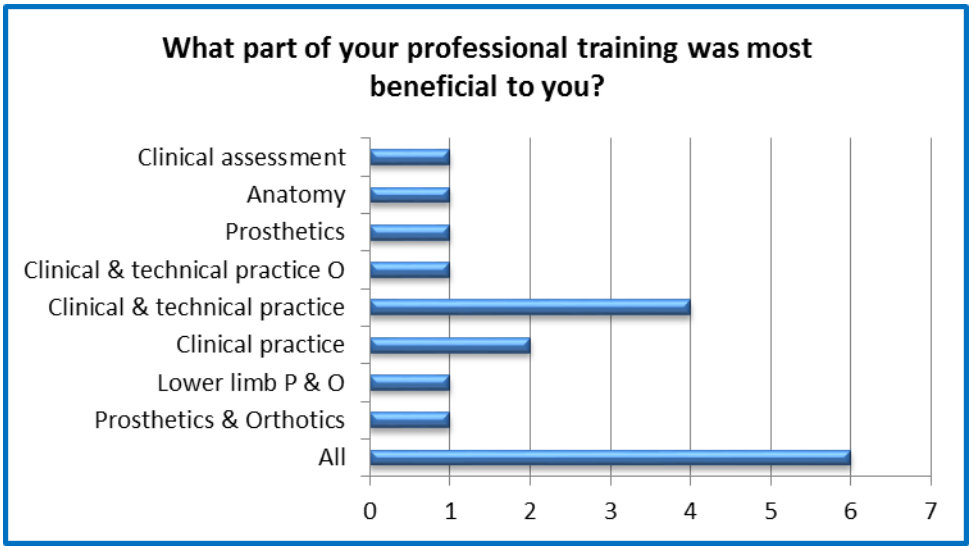


Figure 11

Except for two orthoses which had issues with padding placement, the rest were constructed and finished well. The one orthosis noted to be inappropriate due to material choices was because there was only one choice in the clinic.

Most beneficial part of professional training: Graduates were very positive about their professional training. They most frequently rated all of their course (35%) and also clinical and technical practice as the most beneficial.



FIGURES 12-15 SHOW NUMBER OF TIMES REPORTED

Figure 12

Topics which could have been better covered in course: Graduates reported on a number of topics that they wished they had learned more about on their course. They most frequently reported spinal orthotics and pathology.

.

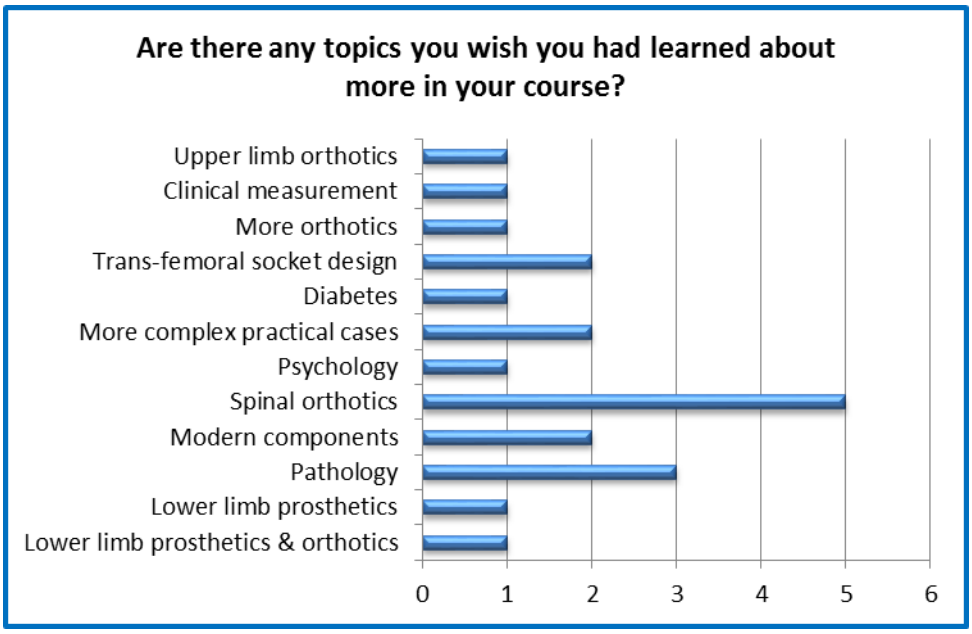


Figure 13

Desire for continuing education courses: Graduates most often reported that they would like to attend courses to update themselves on modern components and techniques, and spinal orthotics. The only components observed were of ICRC design. The only thermoplastic material used was polypropylene.

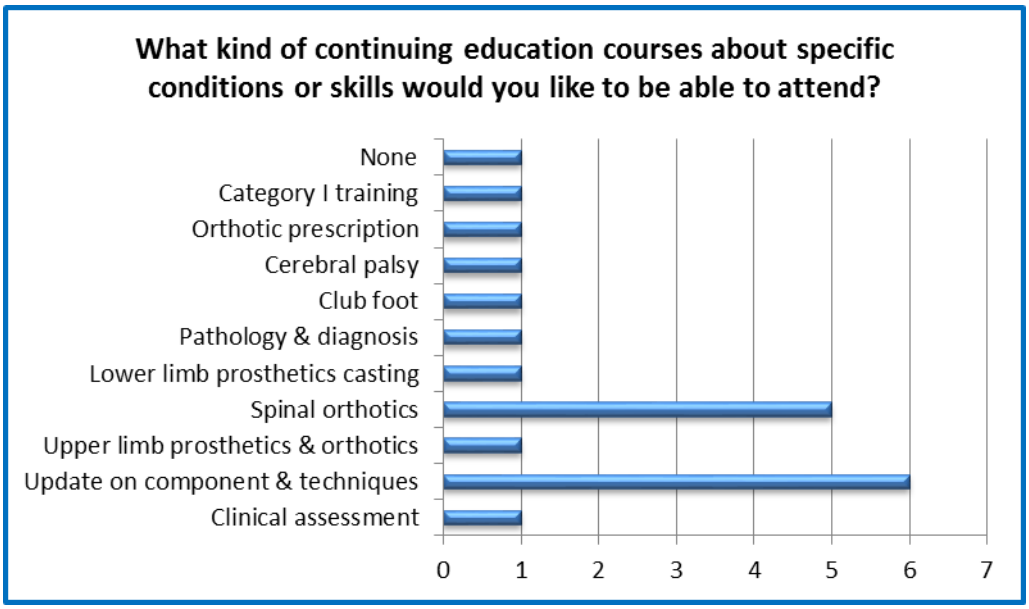


Figure 14

Desire to introduce new technologies: Graduates most frequently wished to introduce new or different materials and components to their centre.

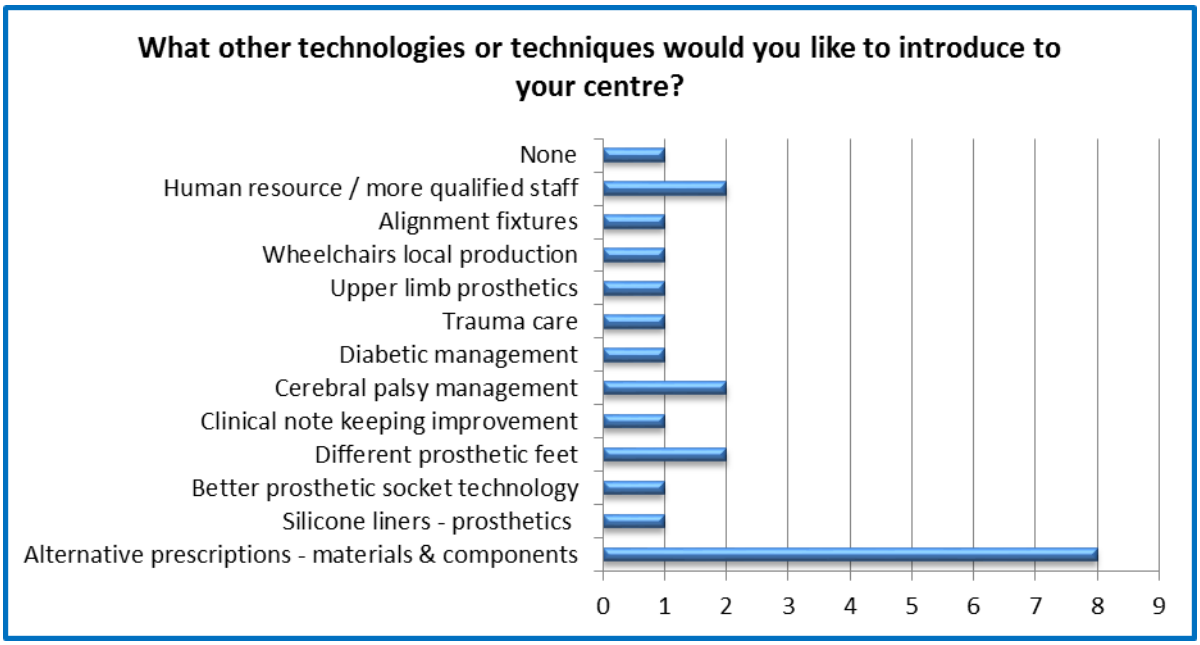


Figure 15

Personal development planning

The data collection form was reviewed by the investigator and graduate without the client present. Three needs were identified for each graduate. The following chart shows a summary of those development needs. Where needs were identified due to the client presentations these were prioritised. Where graduates demonstrated consistently good practice and there were no further issues with their client presentations, other professional development needs were identified through discussion. The most frequently reported development need identified was for graduates to improve their spinal orthotics closely followed by client history taking, assessment and record keeping.

Development needs summary		
Continuing professional development need ranked by number of times identified		**Number of times identified**
Clinical skills updates	Improve history taking, assessment & record keeping.	5
	Improve client case presentations	2
	Sensory testing	3
	Functional assessment	2
	Improve social history taking	2
	Train other staff	2
	Link with professional colleagues	2
	Oedema control	1
	Improve confidence	1
	Mentor new graduates	1
	Neurological examination and differential diagnosis	1
	Spoken English	1
	Introduce complex cases for staff development	1
	Use clinical language to improve dialogue	1
	Improve communications with multi-disciplinary team	1
	Focus on own professional interests	1
Conditions/ pathologies	Cerebral palsy	3
	Club foot	2
Prosthetics & orthotics clinical & technical skills	Spinal orthotics	6
	Update on components & techniques	4
	Record & use measurements - production	1
	Orthotic joint alignment	1
	Prescription & specification of devices	1
	Functional orthotics	1
	Socket design	1
	Suction valves & sockets	1
	Supracondylar suspension for trans-tibial	1
	Calcaneus/ foot casting	1
	Resins & health & safety	1

Table 3

Section 5: How services impact on lives – client stories

The most important impacts emerging from this study were revealed by the service users themselves.

Here we share the feedback that clients gave to their graduate clinicians. We asked

"What difference has the orthotic/prosthetic service made to the user's life?".

In addition to the clients who consented to be presented by the graduates, we also interviewed five additional service users who were happy to openly share their personal stories with us to show the impact of services on their lives. We present these case stories as told by patients attending prosthetics and orthotics services. Story telling is a powerful way of conveying the tremendous impact that prosthetic and orthotics service provision has on the personal and work life of service users in Cambodia and Laos. Such stories provided this research with deeper insights than case studies or anonymised study information.

Client participants

17 clients were seen in total by 17 graduates as each graduate presented a single client. The average age of client participants was 45 years old, ranging from 17 to 77 years old. There were 12 male and 5 female client participants.

The clients presented were typical of clients presenting at prosthetic and orthotic services in developing countries. Their disabilities were exasperated by years of neglect and a lack of access to modern medical and surgical care, meaning their clinical presentations were more complex than in higher income countries.

The clients reported positive benefits associated with use of a prosthesis or orthosis, including better participation in society. Several farming clients reported that they achieved independence with a prosthetic leg. Other orthotic clients described an ease of movement when using their orthoses. Two new clients were unable to explain the difference the service had meant to them.

The study determined that 70% of the client participants were employed or studying (10 people worked and 2 were school students). The following range of occupations was noted: 5 farmers, 1 farmer/labourer, 1 garment worker, 1 construction worker, 1 gardener and 1 cleaner.

Prosthetic clients		**Orthotic clients**	
Conditions	n =	Conditions	n =
diabetes	1	polio*	2
trauma	6	traumatic nerve injury	2
leprosy	2	congenital deformity	1
		stroke	2
		muscular dystrophy*	1
Total	9		8

*upon presentation, the research team determined that the two presentations of polio and one presentation of muscular dystrophy were misdiagnosed and that these were, in fact other conditions (e.g. the muscular dystrophy case was suspected to be Charcot Marie Tooth). In these cases, further assessment was recommended. This demonstrated the need for better referrals to prosthetic and orthotic services and for improved client assessment and diagnosis.

Table 4

Impact and persons with disabilities:

Client stories and feedback are shown on the following six pages.

Miss Prom Ok, landmine survivor

Prom Ok tells Sisary Kheng her story.

is 38 years old with a trans-femoral amputation. She is single and from a family of farmers, planting corn and rice. When she was twelve years old in 1986, Ok was on her way to her grade three class at school when she stepped on a landmine. After her injury she was not able to attend school again. Ok was taken to the provincial hospital for the initial amputation surgery but she had to wait for two years to have a prosthetic leg, as there was no centre in the region. Her first prosthesis had a socket made from leather, but now she uses a plastic socket.

As well as farming, Ok also takes care of her elderly parents and her youngest brother who is 26 years old. Ok comments on her working life: ***"I want to have a better job for a good status and a good income. Farming is very unpredictable in terms of income. I want to have vocational training where I can be employed. But I do not know which skills I should learn".***

"Playing sport helps me to stay fit…"

Ok highlights the importance of being physically active to her social life and wellbeing: ***"I started to play wheelchair basketball in July 2012 and now play every day and I feel like I am good at it. Playing sport helps me to stay fit, get to know other people, show others what I can do and I feel happy for myself. My team is a good team of sixteen women with different kinds of disabilities. We all use wheelchairs when playing basketball".***

"My house is on stilts and I have seven steps to climb up and down all the time. As a woman with disability, I think life is so different from a non-disabled person. I could not get normal education as I was not able to have normal mobility like other kids. I am bounded by accessibility in the community".

The International Committee of the Red Cross (ICRC) physical rehabilitation service which Ok attends is very important to her and helps her plan for the future. Without the service Ok's future would be more uncertain as she says - if the service was not there: ***"I can work like other people but I don't know about my future".***

Walking practice.

Noy Veasna supports himself and his mother.

Veasna, now 22, is the youngest child of three and is responsible for the care of his 64 year old widowed mother. Veasna works as a labourer in farms around his village in Cambodia and earns a subsistence income for himself and his mother.

Veasna uses a trans-tibial prosthesis.

Veasna was born with congenital deficiencies on both hands and both legs. He is missing two toes on the left foot and part of his tibia bone on the right leg. Both his hands miss parts of two fingers and his other fingers are short. During second grade at primary school, when he was nine, Veasna received his first prosthetic limb from the Physical Rehabilitation Service in Kampong Cham. This helped him to walk to school independently. Before this he had relied on someone else to carry him to school.

Veasna knows that he did not have a normal childhood like other children because of his disability. He went to public school until grade 7, but was then was sent to a boarding school called Lavalla School, a special school for children with disabilities. Due to his family's challenges, Lavalla could only admit him to start at grade 6.

Veasna is like other young men of his age; he likes to play soccer. He also wants to learn to repair mobile phones. Veasna believes he can do anything, but does not want to continue to work as a labourer as it involves carrying heavy loads. Doing labouring means he experiences stump pain at the end of his stump due to a sharp boney prominence there.

Veasna shows how mobile he is in the Kampong Cham rehabilitation centre's walking training

He says ***"I want to be able to have a job that is more secure to earn more income and not to just work as a laborer."***

The prosthetic service has assisted with his mobility, but Veasna may need additional support to fulfil his wish for better employment and further improve the quality of his life.

Roeung Sarith's story, Cambodia: "before .... I got stuck in the mud".

Roeung Sarith is 35 year old Cambodian man affected by cerebral palsy, a kind of brain injury sustained before or during birth. He was keen to tell us his story:

"I had no education but I think I have a life like other people. I first received help from a Physical Rehabilitation Service seven years ago. Following physiotherapy training on how to ride a bicycle, I now get my living from collecting junk stuff for sale and earn about 10,000 riels per day. With this income I take care of my mother".

Sisary Kheng asks Roeung Sarith about his story.

Sarith's current ankle-foot-orthosis (AFO) is now more than two years old. He also uses a full length arm splint at night time. Sarith used to have a fixed dropped wrist but because of his treatment the wrist is now flexible. ***"The orthopaedic technologist and physiotherapist worked hard together to give me back my arm".***

Demonstrating his ability to ride a bicycle in the physiotherapy area.

"I used three arm splints and nine jointed AFO so far, without these devices I cannot walk for long distance and cannot ride my bike to collect junk stuff and recycle materials. I want to play football, I never tried it before and I did not know whether I can do it." Sarith is not afraid to try something new to him.

Sarith also has ambitions to raise chickens if he can, but he does not know how and has no money to start this at the present time. ***"Chickens fetch a good price at the market so I could make more money to take care of my mother".***

He said that ***"without the Physical Rehabilitation Service, my life would be miserable. Before treatment I used to look after cattle for my neighbours and I fell down a lot. I got stuck in the mud while other children fell and got up again. Sometimes, I got really stuck and I had to lie down in the mud for a while before someone saw me and helped to lift me up. It happened so many times and I cannot remember how many".***

"I am proud of myself, I now can walk by myself, I can ride a bicycle and I can earn money to buy my mother food."

Sin Chhoeurt, Cambodian war veteran

Mr Chhoert was born during the Cambodian civil war. He does not know his exact age because his identity documents were lost during the civil war. His father died when he was fighting as a Lun Nol soldier and his mother died during the Pol Pot regime, and they did not tell him exactly when he was born.

He lives close to the jungle in a village in Banteay Mean Chey Province about an hour and a half drive from Poi Pet city. He has his own farm where he lives and works with his wife and three children, aged 24, 22 and 9 years. He also has a grandchild. His two storey farmhouse is built on wooden stilts with a floor area 12 x 17 meters. Nine steps lead to the upper floor. Other than rice, a Cambodian staple food, the family also grows potatoes and makes just enough income to survive. The family has no car or motorbike, but they have a mechanical cow (small motorized plough) to help them with ploughing and transportation for the whole family. The family walks when traveling for short distances (less than 3 km).

Mr Chhoeurt was injured by a landmine.

Mr Chhoeurt performed military service from 1979 to 1981, when he was injured by a mine during an operation to protect National Road No 69 between Svay Chek and Thmor Pourk district. He sustained multiple splinter injuries over his whole body, with the main injury lacerating his right foot. Immediately after the accident, he was evacuated to Svay Chek Military Hospital, and surgery preserved his right hind foot. The amputation of his forefoot healed one month later. Mr Chhoeurt then left military service. He could work and walk around and participate in all daily activities walking on his partial foot stump, but not without experiencing some problems. Until 1983, the stump was infected and was trimmed surgically at the Emergency Hospital in Battambang with 3 consecutive surgeries in 9 years. During this 9 year period, he did not receive any prosthesis for the injured limb. The last operation was in 2012, leaving him with a short trans-tibial stump.

Walking on his prosthetic leg for the first time.

After the last surgery, Mr. Chhoeurt was told to go to the Physical Rehabilitation Centre, Battambang to have a prosthetic leg fitted. Unfortunately he could only manage to attend one year after his surgery. Four days before the study visit Mr Chhoeurt was fitted with his first prosthetic leg. He started to learn to walk with this device straightaway, quickly adapting to it and walking pain free. Mr Chhoeurt was very happy to get this artificial limb funded by the ICRC, as he would not have been able to afford it with his own resources. He was deeply appreciative to the staff and to the Centre for providing him his prosthesis to enable him to walk back to his community, with two limbs restored in both function and appearance. He planned to go back home nine days after his prosthetic leg was delivered. Mr Chhoeurt will continue to attend the centre for reviews and follow up of his prosthetic leg.

Mr Pao Kham, Laos

Mr Kham is 55 years old, married with four daughters and one son. His youngest child is still studying. He lost his limb below the knee in 1978 as the result of a landmine injury when he was a soldier during a small conflict in the Xiang Kuan province of Laos. After the accident he went to the 101 military hospital then to the artificial limb centre 686 where he received his first prosthesis in 1979. It took a year from the date of his injury to receiving his first prosthesis as there was only one rehabilitation centre in the country at the time. He became a veteran under the Ministry of Labor and Social Affairs and lived in the province where the prosthetic service was located. He married in 1983 and had a very small house in the province.

Easily negotiating the farmhouse steps with a prosthetic leg.

Mr Pao Kham with the study team at his farmhouse.

In 1990 he moved to an amputee village and in 1994 built his own farm. Mr Kham works as a rice farmer and keeps chickens for his family and for selling to earn a living. Until now he has had a prosthesis every year and can choose to go to the Centre of Medical Rehabilitation (CMR) in Vientiane or to Centre 686. He says he finds the CMR service easier to attend as they have more staff and machinery.

When first injured Mr Kham said he felt hopeless and thought it would not be easy to find a wife. When he went to hospital there were many different amputees who motivated him and made him feel better. The government gave a prosthetic service and this improved things even further in his life. Although Mr Kham found it very difficult and painful at the start he now uses the prosthesis about 8 hours a day. He says now that without a prosthesis his mental health and physical mobility would be profoundly affected.

When Mr Kham lost his limb he did not know what to expect or what the future might hold for him. Now he knows what to expect, he has a more stable life and is more hopeful. He gives advice to new amputees. ***"Do not be worried and do not be hopeless as we have a chance to be part of a normal life".*** Mr Kham feels he is not that much different to other people and he can even climb a tree. The only thing he cannot do now is run!

A typical rice farm.

Client participant responses

We asked "What difference has the orthotic/prosthetic service made to the user's life?"…

"After getting the prosthetic leg it has helped me working and makes my heart feel better." Client 125 (Prosthetic)

"The orthosis has provided independence. Without the orthosis I need crutches but now I am independent." Client 406 (Orthotic)

"I hope to have a leg I can walk with." Client 407(Prosthetic)

"Without the orthosis it is difficult to clear the ground." Client 408 (Orthotic)

"Four months after my amputation I began attending the prosthetic service. I can do everything except using a mechanical cow because my foot gets stuck in the mud". Client 410 (Prosthetic).

"I am more comfortable walking with device." Client 411 (Orthotic)

"With the device I do not use crutches. Without the device things are difficult. Now I can do all that I want." Client 412 (Orthotic)

A mechanical cow is a motorised plough (mentioned by client 410).

"Without my leg I would be limited to be at home. Now I can farm and do as I need". Client 413 (Prosthetic)

"After I got my prosthetic leg my parents gave me land to start farming. My life began." Client 415 (Prosthetic)

"I am able to return to farming and can do what I want." Client 416 (Prosthetic)

"Before the first prosthetic leg I was just hopping. Now I can walk. I am now more mobile and am not hopping but walking and living easier. Walking and doing things makes me feel more confident to go to school and I can be part of friends. I feel a psychological improvement". Client 417 (Prosthetic)

"I feel better and the orthosis controls my foot so there is no foot drop." Client 418(Orthotic)

"I can walk well and walk further. My foot now clears the ground". Client 438 (Orthotic)

"I can go outside and do normal activity." Client 440 (Prosthetic)

"I cannot walk without this." Client 450 (Orthotic)

Section 3: Services in Cambodia

COUNTRY CONTEXT:

Population[4]= 15,135,169;
World Bank Country Classification[5] = Low income country;
Life expectancy at birth[4] = 71.4 years;
Full name: Kingdom of Cambodia

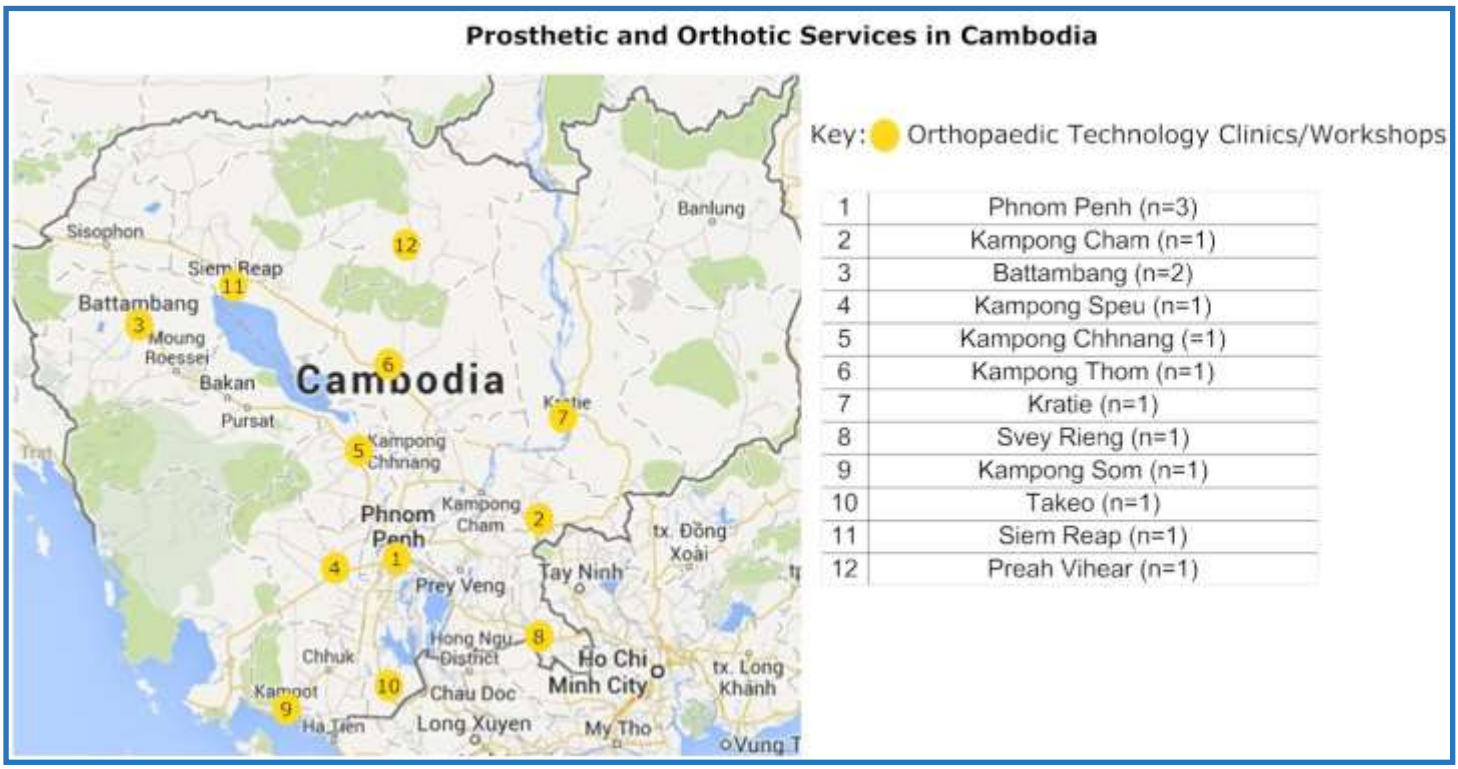


Figure 16

Cambodia carries a heavy burden of disability which has been exasperated by the devastating effects of poverty and war. The Khmer Rouge regime and the Cambodian genocide in the 1970s followed by the Cambodia – Vietnam War (1979-1991) means that the legacy of disability from conflict in the country is significant. It continues to grow because of ongoing landmine injuries and as over time the nature of these injuries has changed. Previously a person would step on a mine injuring themselves and sustaining injuries mostly around the lower body. Now mines are picked up and people gather together around the device to look at it. When it explodes it results in injury to the upper limbs, face, abdomen and chest.

A display of unexploded ordinances illustrate the ongoing risk to the people of Cambodia (source ICRC).

In addition to the high numbers of people requiring treatment for their physical disability, health and rehabilitation services remain under pressure. Since the 1990s services had to build significant capacity in the workforce following the policies of the Khmer Rouge regime which meant a generation of medical personnel and other trained or educated staff were killed in the genocide.

In Cambodia it is estimated that 41% of persons with a disability are estimated to have limitations of physical movement.

Health services in Cambodia are arranged at three levels: national, provincial and local/community level. Prosthetics and orthotics services are available following this model as part of Physical Rehabilitation Services.

For over thirty years, the rehabilitation efforts in Cambodia have been largely implemented by non-governmental agencies. Government involvement has been in policy development with their activity in implementation still relatively low because of a lack of targeted resources for this work. There is a Decentralisation Pracas Number 164 (Royal Decree) to establish and administer Physical Rehabilitation Services. Despite outreach being a standard working practice it is not a part of the Pracas. In 1992 there was agreement in Cambodia to organise and set up Physical Rehabilitation Centres and these are now located in the provinces with two of these in the capital Phnom Penh. Several of the Centres provide outreach services to the community level and are active in identifying persons with disabilities.

Several organisations play a role in the delivery of services for people with disabilities in Cambodia. A policy on Injury, Violence and Disability was created in 1999 and the Ministry of Health (MoH) works closely with the Ministry of Social Affairs (MoSA) on implementing this policy. Legislation follows the United Nations Convention on Rights for Persons with a Disability. MoSA is involved in a campaign to promote disability and there is a national plan legislated for 2014 – 2018. MoSA imposes job creation quotas for persons with disabilities, ensuring 2% employment of people with disabilities in government employment and 1% in private workplaces. Fines occur if recruitment targets are not met, followed by court action if these are not paid. MoSA is also legislating for accessible buildings and public institutions. Additional actions take place at provincial, municipal and national levels.

Today, prosthetics and orthotics services come under the remit of MoSA. Ministry of Education and MoH recognition is essential for a career pathway in Cambodia. A Bachelor's degree is required for recognition by the Ministry of Education. The Cambodian Association of Prosthetists and Orthotists (KHAPO) is a national association of CSPO graduates that holds annual meetings and takes responsibility for professional recognition.

Ideally prescriptions are generated by a referring physician, if not a team which consists of the prosthetist/orthotist or orthopaedic technologist, community worker, the family, as well as the client and a physiotherapist. A patient assessment will be completed and a prescription developed along with a treatment plan. Orthopaedic technologists will only on occasion develop the prescription. Complex physical disorders/conditions that might be progressive are not all investigated and treated by a physician.

Persons with Disability Foundation (PWDF), Phnom Penh

PWDF was established based on a sub decree from the Government of Cambodia in 2010. The Foundation has a rights based approach. It aims to convert the charity model of service provision for physical rehabilitation centres to a national social security model so that care is free to economically poor people. The Foundation wish to realise five activities: the establishment of the charity; the export of components; ensuring the employment quotas of people with disabilities are met; the generation of gifts and in kind support, and a private physiotherapy clinic service. PWDF were in favour of the standardised training approach of the CSPO but were concerned about non-governmental organisations like Handicap International (HI) withdrawing staff incentives as then staff could not fulfil their job role. The Foundation shared their concerns for the physical rehabilitation centres effected, as staff would seek alternative employment thereby reducing service provision significantly. PWDF fully supported the ISPO/USAID bonding agreement for scholarship recipients to work for a number of years for their employer following graduation.

PWDF were keen to undertake research study and planned to seek methods to monitor practice against service standards and sought funding to fulfil this aim. They also stated there were no robust statistics on the number and nature of persons with disabilities in Cambodia and were in support of the ICRC patient management system.

Disability Action Council (DAC), Phnom Penh

The DAC brings together actors from government, non-governmental organisations and the private sector by Interministrial Pratas (Royal Decree). The Secretary General of DAC is assigned by the King of Cambodia by Royal Charter. The five departments of DAC are:

1. Persons With Disabilities Rights Department
2. Rehabilitation Welfare Department
3. Integration of People With Disabilities Department
4. Welfare Department
5. Disability Service Development Department (inc Private practice)

The Council aimed to have a professional register of people working in the field. At the national level there is a prosthetics and orthotics subcommittee under the DAC.

ICRC Factory, Phnom Penh

43 employees work on the production and distribution of prosthetic and orthotic components for use in Cambodia. This approach helps to ensure a regular supply of components to the Physical Rehabilitation Centres which provide prosthetic services.

Prosthetic knee joint assembly at the ICRC factory in Phnom Penh.

Services visited

Kossomack Hospital, Pnomh Penh

This is a main referring hospital for prosthetics and orthotic services as an example of a referring hospital. A visit with the Director of Kossomack Hospital, Pnomh Penh, revealed the hospital was the largest surgical service in Cambodia with 250 beds. The incidence of traumatic injuries due to road traffic accidents was growing. The hospital was among nine large public hospitals in Cambodia and had four neurosurgeons (South Korea trained) and fifteen orthopaedic surgeons (South Korea and French trained). This hospital tended to receive fewer landmine cases then in the past. Landmines injuries were seen by the Veteran's International (VI) clinic who dealt with open amputations and awaited a clean wound before stitching. Kossomack might deal with revision surgery for boney or infected stumps. There have been no new polio cases since 2007.

Cambodia Trust (CT)/CSPO teaching clinic, Phnom Penh

This Phnom Penh Rehabilitation Centre is one of three managed and supported by the CT in Cambodia. (The Centres locations are shown as 1, 5 and 9 in Figure 16 on page 25.) The Phnom Penh clinic is attached to the CSPO. The other two Centres are at Kampong Som and Kampong Chhnang. Services at these three centres include the delivery of prostheses and orthoses, physiotherapy and wheelchairs. Community workers conducted surveys to identify new clients and provided follow-up of the services provided, including the delivery of devices and wheelchairs. The CT also managed a small grants scheme to individuals with disabilities for income generation initiatives.

CSPO students during practical training

The Phnom Penh facilities were well laid out and equipped. An ISO accredited Quality Management System was in place. At the time of the visit only basic prosthetics and orthotics services were available and those services incorporated polypropylene technologies to the ICRC standard. If a client was able to contribute towards covering costs, other technologies could be made available. There were no fees for routine services but those who wish to do so could make a contribution.

The CT was considering opening a private clinic that would focus on the delivery of other prosthetic and orthotic technologies. The target clientele would be those who can financially contribute to the cost of more functional and cosmetic devices.

The range of devices provided by the CT clinic and across the country.

The delivery of appropriate services would not be possible without graduates of the CSPO program. Overall there were approximately 79 CT employees in the country and approximately one third of this work force were people with disabilities. 10 CT ISPO Category II personnel were actively involved in the delivery of services in Cambodia. CT Category I personnel were also involved in the delivery of services, but had more administrative and academic responsibilities. Clinical responsibilities of the Category I personnel were said to be on an "as needed" basis. Other staff included technical assistants, physiotherapists, administrative and clerical staff as well as support personnel. The CT continued to provide an incentive so that salaries were competitive with other allied health professionals. Clinicians were also assigned duties away from Cambodia. At the time of the study visit those assignments included: four in Sri Lanka; two in the Philippines; two in Malawi; and two in Myanmar.

Client referrals came from a number of sources within Cambodia including hospitals, private physicians, non-governmental organisations, self-referrals, and as a result of community outreach activities initiated by the CT.

CT had developed a spinal service in cooperation with local orthopaedic surgeons and two children's hospitals; the National Paediatric Hospital and the Children's Surgical Centre.

Veterans International Centre (VIC), Phnom Penh

VI has three Prosthetics and Orthotics Centres in Cambodia. (The Centres locations are shown as 1, 7 and 8 in Figure 16 on page 24). Personnel are civil servants paid by the Cambodian Government, and the staff profile includes three ISPO Category II orthopaedic technologists, four physiotherapists, six prosthetics and orthotics technician bench workers, seven wheelchair personnel and support staff. Previously staff were upgraded to ISPO Category I level at La Trobe University in Australia, but these staff were now working abroad or at the CSPO.

A work area in the VI workshop.

Wheelchairs were also provided by the VIC

At the time of the visit HI were withdrawing support and handing over Prosthetics and Orthotic Centres to the Cambodian Government. VI were building their role in the future of a fourth centre. The services were limited by capacity. Primary amputees receive planned follow up as did clients receiving club foot treatment.

Other clients were encouraged to return to the centre for review when needed, rather than a formal review appointment being scheduled. There was no doctor within the service and prescriptions (except for spinal conditions) were written by the prosthetics/orthotics team and the physiotherapists.

CSPO graduates were an integral part of services at VI. Over time, CSPO graduates attended upgrading and short courses which in turn contributed to service developments.

Handa Rehabilitation Centre, Phnom Penh

This private clinic officially opened in January 2013. The service advertises physiotherapy, prosthetic, orthotic and wheelchair services. Handa had fifty registered clients which included just two amputees (no orthotic clients). VI is a partner responsible for management support and PWDF is also a partner. The facilities included clinical treatment rooms, but there was no manufacturing facilities or equipment. The service also had workforce issues with no continuous employment of prosthetics/orthotics staff.

Handa Rehabilitation Centre walking training area.

Kampong Cham Physical Rehabilitation Centre, Kampong Cham.

The Kampong Cham area is known as being the province with the sixth most frequent occurrence of landmines. 43% of the caseload relates to illness or disease and 57% to acute trauma including landmine injuries. There was a strong trend of increasing client numbers due to outreach scoping activities. 54% of all clients were children. In Kampong Cham there were close working relationships with a hospital, but generally in Cambodia, there were no prosthetics and orthotic personnel in hospitals. This link had provided support and increased activity.

The well-equipped workshop area at Kampong Cham

A group of new patients support each other in the therapy waiting area.

Handicap International (HI) Belgium had supported the Kampong Cham centre from 1998 – 2002 followed by HI France from 2003. HI were withdrawing support for prosthetics and orthotics services in the country and a handover to government had been in process since 2008. Initially the handover plan was ambitious in terms of time and scope and was anticipated to run from 2008 to 2010, involving 11 Physical Rehabilitation Centres being handed over to government. This was not achieved due to several factors and the strategy was revised with HI committed to 2017, subject to external funding.

The staff profile included four ISPO Category II graduate orthopaedic technologists, four physiotherapists (Diploma, Technical School for Medical Care) and eight expatriate therapists, three social workers (field facilitators), eight bench technicians, plus administrative and support staff. In the past the HI policy was a ratio of one physiotherapist to one orthopaedic technologist and a ratio of one orthopaedic technologist to two technicians, but it was indicated that this ratio might change because of staff retention issues. Among the staff all four of the orthopaedic technologists were members of KHAPO and were recognised by the Government. Two had also accepted 'Civil Servant' status.

The service received 400 new referrals each year and handled 2,200 appointments per year. It was expected that one orthopaedic technologist with two bench technicians produced 1-2 devices per day. Each physiotherapist was expected to run fifteen sessions per day which was busier than common practice.

The CSPO graduates have contributed to an impact on quality, treating a number of clients. They also have extended the time period before clients need to return for repairs by improving the quality of devices and their durability. Their role is more service based than strategically based and strategic planning remained a top down approach rather than a participatory plan. The Head of Centre was an orthopaedic technologist with management responsibilities, but not for leadership.

Common follow up of clients was needed. Some follow was done by field facilitators with physiotherapists and orthopaedic technologists. Quality of Life (QoL) measures were used, but not systematically. This was mostly done with children with cerebral palsy at the first screening and then at 5 years old. Individual improvements about social inclusion had been found as a result. The Patient Management System was introduced in 2013 and analysis and results were pending.

The Physical Rehabilitation Centre could not function without the prosthetics and orthotic personnel. Without the Centre people with disabilities could not be supported.

Battambang Provincial Hospital.

The Battambang Centre was established in 1991 and received referrals from five provinces and offered prosthetics, orthotics, wheelchair, physiotherapy and society services (outreach and repairs). In 2012 the Centre provided physical rehabilitation services to 8097 clients. The main activity was with amputees, with 6,513 in 2012. The service is supported by the ICRC Special Fund for the Disabled[7].

The reception area at the Battambang Service.

Facilities included clinical, technical and therapy areas. The clinical areas were somewhat basic with some simple client assessment rooms and equipment. Technical areas were spacious and well equipped as was external therapy areas. Client accommodation was located within the Centre grounds.

A client assessment and casting area.

There was a large staff of 67 personnel that included a centre manager, four deputy managers, seven ISPO Category II graduate orthopaedic technologists (one post was vacant), one non-graduated prosthetics/orthotics worker, seven physiotherapists, one physiotherapy assistant, fifteen bench technicians, one wheelchair technologist, one social worker, one field repair person, plus administrative and support staff.

Despite the large number of clients seen annually, clients in more remote locations reported to staff that they did not receive sufficient information on, or access to the services at the centre and the human resources capacity of the centre was stretched. Technical staff in particular had limited knowledge and skills which meant it was difficult to maintain and develop the quality of production.

Workshops were spacious and well equipped.

ISPO Category II graduates were all ministry staff with a salary of $50 per month. An incentive from the ICRC of $200 - $250 per month provided staff with a principal wage and a position wage of $250+ per month.

It was noted that orthopaedic technologists had no possibility after work to do extra funded work, so people had left the field. The Centre Manager expressed concerns that the withdrawal of incentives would see half the staff leave the Centre. The Manager was also very keen for CSPO to follow up Category II personnel and to support, motivate and encourage graduates to continue to develop their skills and knowledge as they said that this had not been done very often before this research study.

There was evidence of some research and development efforts ongoing at the Centre involving the orthopaedic technologists and technicians. This included the design and production of a rotator for a trans-femoral prosthesis that allowed the user to sit cross legged on the floor; a typical Cambodian sitting position. Other developments included a uniaxial prosthetic foot prototype.

Research and development had resulted in a rotator fitted distal to this user's prosthetic socket. This client was then able to walk in the usual way and sit cross legged on the floor.

Section 4: Services in Laos

COUNTRY CONTEXT:

Population[4] = 6,769,727;
World Bank Country Classification[5] = Lower-middle income;
Life expectancy at birth[4] = 67.1 years.
Full name: Lao People's Democratic Republic

Prosthetic and Orthotic Services in Laos

Key: Orthopaedic Technology Clinics/Workshops

1	Centre of Medical Rehabilitation, Vientiane
2	Luangprabang Rehabilitation Centre, Luangprabang Hospital
3	Champasack Rehabilitation Centre, Champasack Hospital
4	Savannakhet Rehabilitation Centre,
5	Xieng Khuang, Xieng Khuang Hospital
6	Rehabilitation Centre 686

Figure 17

Poverty and a long history of conflict in Laos means that conflict related disabilities are highly prevalent in the country. Laos was subject to significant cluster bombing in the Vietnam War and has also endured a civil war. It is known as the most heavily bombed country on earth. The map to the right shows in red the bombed areas which obliterated vast areas of the country and devastated the population.

The National census in 2005 estimated about 7% of the population of the country had a disability. The census estimate was likely to be very low as the definition of disability was not clear and counting was not accurate.

Prosthetics and orthotics services in Laos are limited in capacity by both staff numbers and resources. Orthopaedic surgeons are the head of rehabilitation teams with prosthetists/orthotists and orthopaedic technologists as members.

Six prosthetics and orthotic services serve five provinces as shown in figure 17. Previously, landmine and unexploded ordinance injuries was the biggest cause of client attendance to centres, but more clients now present with disabilities because of road traffic accidents, diabetes and leprosy.

The Lao PDR Government contributes little by little to infrastructure, but the main support comes from the international organisation ICRC who support three centres, and from the non-governmental organisation COPE who are funded by donations and grants, including support from USAID's Leahy War Victims Fund.

The pattern of bombing in Laos (source COPE).

Cooperative Orthotic and Prosthetic Enterprise (COPE)

The COPE Visitor Centre raises awareness and helps to raise funds for service provision.

In 1997 seven different organisations helped to support the establishment of COPE. COPE is a non-governmental, not for profit organisation working to support government activities through technical and financial support to the Centre for Medical Rehabilitation (CMR) in Vientiane. Since 2009 local non-profit organisations can register in Laos. Prior to this no organisation of this type could exist in law. COPE is registered as a local non-profit organisation and is particularly interested in capacity building and trains and mentors national personnel to improve their skills.

COPE's activities included mentoring to develop skills in orthotics. The mentoring plan included long term student and mentor agreements to make connections between people. It also drew upon regional strategies especially for physiotherapy and occupational therapy. The mentor model is a one year contract with the expectation of retaining an orthotic mentor for longer.

COPE was supporting a clinical core group looking at developing care pathways for cerebral palsy, back pain and fracture management. In Laos cerebral palsy cases present with very complex disabilities.

COPE provides funds to support the CMR which has a prosthetics/orthotics, physiotherapy and occupational therapy services. Together, the government and COPE support government staff.

Services visited

Centre of Medical Rehabilitation (CMR), Vientiane

CMR is the national rehabilitation centre co-ordinating national activities. CMR oversees five centres and they are all under the authority of the Ministry of Health.

The Centre planned to train doctors through the charity CBM in Ponsetti and surgical techniques. Following an ISPO course in cerebral palsy management in September 2012, the number of clients had increased. In an outreach program to assess clients, nine provinces out of seventeen in the country were covered and the network was expanding. Awareness raising had been helped by television and radio broadcasts with ethnic group translations for better awareness.

In Laos fourteen clinicians worked with clients and seven people worked in administration. Around ten people were bench technicians.

The study team meet with the Director of CMR

The Director explained that in 2020, Laos would need at least 20 ISPO Category II personnel and 5 Category I personnel. There was a plan to improve sub-centres like Luang Prabang. This indicated there was a long-term need for ISPO to help support a plan to increase the number of qualified personnel and scholarships.

The plan for capacity building was to begin with training ISPO Category II personnel and upgrade some of these graduates to ISPO Category I level in partnership with the University of Mahidol.

CMR also planned to support the Rehabilitation Centre 686 which was originally a military support initiative, but now supported clients with other kinds of disabilities as well

With reference to prosthetics/orthotics personnel, CMR has seventeen staff; eight people treat clients on a regular basis including one ISPO Category I graduate and three ISPO Category II personnel working in lower limb prosthetics and orthotics. Four personnel are locally trained prosthetists/orthotists and there are three volunteer bench technicians. An average of twenty prostheses and orthoses are produced each month.

The impact of having ISPO certified personnel had been positive. The graduates offered services and followed the guidelines for services. The manager had been in position since 2009 and in the CMR since 1976. After CSPO graduates were introduced changes occurred with new techniques being initiated. Polypropylene techniques were brought in and the number of devices produced was raised. The ISPO certified graduates also contributed both leadership and expertise to service development.

Each month data was collected to produce a summary of production numbers. Orthotics activity was increasing and the CMR was also extending services for mental health.

All the clinical staff were recognised by the Government, but none of the technical staff. The clinical staff receive a government salary and incentives from COPE. Staff not yet recognised as government officials received a much lower income. Retention and upgrading of trained personnel had been an issue for CMR and a new retention strategy was to be officially developed by the Government to address this problem. An example of this was that four people were supported from Laos to upgrade to ISPO Category I but only two passed the course, with the main problem being the quality of the candidates selected.

Annually the CMR holds a meeting with CBM support. Club foot clinics are in the rehabilitation centres and were started in 2005 by CBM. One surgeon was supported by CBM to train in neglected club foot in Iowa. The general hospitals cannot treat clubfoot and CMR was planning for mobile clinic interventions using the Ponsetti method.

Dr Vuthy and Mel Stills discuss a case of spinal TB.

Champasack Provincial Hospital

The Ministry public health department works closely with hospitals and the community. There are ten districts in the province and four of these were served, spanning 15 – 20 villages. The remaining six districts were not supported for disability services because of a lack of resources.

The public self-refer to the hospital for treatment and people with disabilities are channelled through by a community rehabilitation team. The number and nature of people with disabilities in the province is unknown but it is thought that there are around 900 people with disabilities. Their most common presenting conditions were stroke, trauma (especially mine accidents) and paraplegia.

In the province the strategic plan was for 98% of children to attend school. A number of children dropped out or did not go to school because of disabilities. The CBR team identified children with disabilities and then proposed treatment interventions to their school.

Seven staff members attended the recent Lower Limb Orthotics course in Laos. At the Physical Rehabilitation Centre in the hospital, seven orthopaedic technologists and eight physiotherapists were employed. Of the orthopaedic technologists, two had full ISPO Category II training and four were trained in lower limb care. The ISPO graduates had made a beneficial impact on the service and had good techniques to deliver appropriate services. They have improved the quality of production and this in turn had improved clients' walking ability.

A patient satisfaction form with multiple questions on staff helpfulness and the use of prostheses and orthoses had been used for some time as part of an annual audit process which took two days in a particular village. 20 clients were sampled in the chosen village. Since 1999 over 2000 people in four provinces have participated in the audit and the results are used to plan quality improvements in the service. At district level, fifteen to twenty patients were seen each month. This represented a big change in the service, as prior to this in 2006, three clients might have been seen in a month.

Graduates were keen to learn more to help them develop the services. Their salaries were based on their length of service which meant that an ISPO Category I graduate did not necessarily earn more than their Category II colleagues.

Sisary Kheng and Mel Stills in discussions with staff at Champasack Provincial Hospital

Rehabilitation Centre 686

This service started in 1965 and was known as a "factory". Bak Mai Hospital, Vietnam started the service with twenty five personnel. The workshop moved North of Laos in 1976 and then in 1986 the service moved to its current location. Although the majority of clients were veterans, civilians also attended the service. Army personnel received a free service plus a per diem for the days they needed to attend. Civilian clients also received free service, but needed to pay privately the per diem charge for the days they attended. The Centre cared for 1,100 people with military injuries including 300 veterans who were registered for the prosthetic service. The Centre had a budget for over 600 people who needed prostheses, although only 300 attended.

The spacious grounds of Rehabilitation Centre 686

The 686 team and workshops were equipped to deal with conventional metal prostheses and orthoses, thermoplastics (polypropylene) and laminations, but needed Local Exhaust Ventilation for resin fumes.

Four students were at VIETCOT studying on the ISPO Category II course supported by scholarships funded from USAID through ISPO at the time of the visit. The students were expected to return the Centre to help develop the service and will need to be mentored for one or two years after they graduates by more experienced and qualified staff (preferably an ISPO Category I mentor).

A total of fifty seven personnel worked at the Centre with thirty seven technical workers who were arranged in groups and some of this team also worked clinically. In 2009 nine of the technical workers trained in lower limb prosthetics with the Laos Government Course in Vietnamese. There are also six physiotherapists and twenty administrative staff, but no doctor or medical worker.

The service was at a very basic level offering devices constructed from metal or plastics and the centre managers wished to develop the service and human resources. They had plans to firstly concentrate on improving prosthetic production and physiotherapy services for primary amputees. They also wished to upgrade staff with short course training from 1 week to 1 month at the CMR and to continue to support staff at VIETCOT and CSPO.

Conventional metal prostheses are still made at the Centre as are conventional metal and leather orthoses.

Luang Prabang Provincial Hospital

The Luang Prabang Centre is a small rehabilitation centre to the North of Laos. One ISPO Category II graduate from CSPO worked as a lone practitioner in the Luang Prabang prosthetics and orthotics service. They sometimes felt it was difficult to discuss complex cases with another practitioner and indicated they would value more opportunities to link with the CMR team for advice and support.

The population of the province is 407,012. Extrapolating the figure that 0.5% of the population requires prosthetic and orthotic devices, this means the lone practitioner could potentially have a caseload of 2,035 clients. The WHO/ISPO suggests a caseload of 250 clients per practitioner. The gap illustrates the need to extend the provision of prosthetics and orthotics service in Laos so as to reach a rural population.

The client treatment facilities were small and so the bench workshop area also doubled up as a client fitting room. A range of manufacturing machinery in the form of ovens and routers meant that devices could be manufactured and adjusted on site.

Clients were fitted with prostheses in the workshop area at Luang Prabang

The small walking training area.

Section 8: Summary and Recommendations

Impact on the establishment of services:

Our study found that ISPO certified graduates from CSPO trained to the professional standards ISPO Category I and ISPO Category II provided and indeed improved prosthetic and orthotic services for persons with physical disabilities.

The number of ISPO certified graduates from CSPO working in Cambodia provide a critical mass of professionals in prosthetics and orthotics who have established and maintained prosthetics and orthotics services in the country. If we consider a reasonable annual client caseload to be 250 per professional, the 96 Cambodian graduates could have a combined caseload of 24,000 clients. However, when we extrapolate the numbers of persons with disability in Cambodia estimated to need prosthetics and orthotics services based on the *Guidelines for training personnel in developing countries for prosthetics and orthotics services*[1], we estimate that 75,675 persons in Cambodia need such services. The CSPO graduates along with a small number of graduates of other training programmes are attempting to meet the needs of the population alongside untrained personnel.

Similarly, if we extrapolate the Laos population of persons with disabilities needing prosthetics and orthotics services to be 33,848, around 135 prosthetics/orthotics professionals would be needed and yet there are relatively fewer graduates per client in Laos compared to Cambodia. There is a sparse professional group in Laos and although services have been established helped by the efforts of ISPO certified graduates, there are limited possibilities for growth or seeding of new services because of limited capacity. A number of graduates have left the field and of those working in prosthetics and orthotics services, few have any significant prosthetics and orthotics clinical service time.

RECOMMENDATION 1: There is a need to increase the number of ISPO certified graduates in Cambodia and Laos to serve the unmet needs of persons with disabilities who need prosthetics and orthotics services.

RECOMMENDATION 2: Prosthetics and orthotics services need to improve the work environment and resolve pay issues to be able to retain and motivate graduate personnel.

Impact on the appropriateness of prosthetic and orthotic service delivery:

The ISPO graduates in this study generally provided appropriate prosthetic and orthotic services to their clients. Although the researchers found that the devices prescribed by CSPO graduates were appropriate technologies, the choice of prescription options available in Cambodia and Laos is very limited because of limited funding for prosthetics and orthotics services and there are no alternative supply chains.

The nature of clients is more complex in less resourced settings because of poor medical and surgical care and neglected disabilities. These clients need a wider range of prescription choices of prosthetic and orthotic components and materials to better match their needs with their device designs, and yet they have less choice. This situation must be addressed by service providers.

RECOMMENDATION 3: ISPO certified graduates should keep up-to-date with methods and prescriptions for prostheses and orthoses provision.

RECOMMENDATION 4: Service providers should strive to expand the inventory of components and materials to provide prescription choices for clients who need prosthetic and orthotic devices.

RECOMMENDATION 5: ISPO, prosthetists/orthotists, orthopaedic technologists and employers should develop and follow guidelines to better structure the post-graduate experience.

Some graduates lacked confidence in presenting their clients to the researchers. Graduates need to take greater ownership of client assessment and not leave essential assessment techniques to other therapy personnel. They should focus on improving their client assessment skills and should keep fuller, more accurate clinical records that include treatment goals, objective clinical findings and associated outcomes. Graduates can then use this information to reflect upon their practice and services can utilise the information for clinical audit and quality management improvement. A greater understanding of pathology is essential to accomplish improved client assessment. Improved client assessment will result in even better prosthetics and orthotics services provision.

Graduates sometimes worked in a uni-disiplinary way and need to improve their approach to involve others in the clinical team, especially for complex cases.

Recommendation 6: CSPO graduates should develop an interdisciplinary approach to client care as part of assessment, treatment planning, check out and follow up in prosthetics and orthotics services. This is especially important for complex cases.

RECOMMENDATION 7: CSPO graduates should improve their client assessment skills and knowledge.

Graduates generally had good technical skills, but a need for improved proficiency in socket design, especially total contact sockets, and alignment was identified. Graduates did not always take full responsibility for the technical aspects of the device if manufactured by a technician and should supervise and take responsibility of all technical work.

RECOMMENDATION 8: Graduates should continue to provide well designed and manufactured devices whilst improving their skills in socket design and device alignment.

RECOMMENDATION 9: Graduates should take more responsibility for the quality of prosthetic and orthotic devices. If they do not manufacture devices, they should be responsible for and supervise the work of their technician.

Graduates were proficient in lower limb prosthetics and orthotics service provision and desired to extend the scope of their services to clients requiring spinal orthotics and upper limb prosthetics and orthotics.

RECOMMENDATION 10: Services in Cambodia and Laos should plan and be supported to extend their services to include more spinal and upper limb prosthetics and orthotic provision. This will require skills development, capacity building and clinical leadership.

The ISPO short course in cerebral palsy management in Laos in 2012 had resulted in more clients with cerebral palsy being treated. Such short courses are a catalyst to service improvements and should be encouraged and followed up. Short courses should be tailored to the context of the national situation so that techniques and methods taught can be readily implemented.

RECOMMENDATION 11: ISPO, along with other organisations should continue to provide its short course program. It is suggested that ISPO also follows up on the impact of short course provision in developing countries to better understand and design future offerings.

Services in both Cambodia and Laos rely heavily on international and national aid provision to be able to supply prostheses and orthoses to clients. Early considerations of a private service was under consideration in Cambodia. Changes in international aid provision were presenting services with challenges in maintaining levels of service. Donors

and services need to work together to realise mixed models of funding that include both public and private services and mixed models of provision.

Some ISPO graduates were seen to be naturally creative and innovative in their development and design of new devices. Nurturing product design and development as business opportunities could provide an income to reinvest in national services.

RECOMMENDATION 12: CSPO graduates with naturally creative talents should be encouraged to be innovative and entrepreneurial.

Impact and clinical leadership:

Clinical leadership is considerably limited by the low numbers of ISPO Category I certified personnel working in prosthetics and orthotics services in Cambodia and Laos. This situation is exasperated because ISPO Category I trained personnel are allocated teaching or management posts and thus are not actually working directly with clients. This has limited the potential of the workforce who, with additional clinical leadership, could further enhance the level and nature of service provision to match the strong technical aspects of services provided.

RECOMMENDATION 13: A greater number of ISPO Category I graduates are needed to work as clinicians and to provide clinical leadership in Cambodia and Laos.

CSPO graduates make good use of the internet to keep up to date with information. However, only 18% of graduates accessed and read full text journal articles. The few ISPO Category I graduates in country are trained in use of the evidence to inform clinical practice and also in research methods, but ISPO Category II personnel are not normally trained in such use of information. Some instances of clinical practice in the inappropriate prescription of orthoses were noted in the study. This included the over prescription of orthoses for the treatment of infantile tibia vara and the use of spinal orthoses in the treatment of back pain. An understanding of the published literature on this topic would have informed such practices.

RECOMMENDATION 14: ISPO Category I graduates and qualified expatriate staff should provide clinical leadership by referring to the best available evidence to inform their practice and that of their teams. They should then supervise and lead ISPO Category II personnel in appropriate evidence based practice.

Graduates did not specialise in any particular condition. Rather, they focussed their practice on levels of care, mainly practicing lower limb prosthetics and orthotics. Clinical practice in both Cambodia and Laos could benefit from graduates specialising in the treatment of distinct client groups, for example, neurological conditions or paediatric care. Graduates could then form special interest groups to further the knowledge and skills of the specialist group through self-study, mentoring and sharing experiences. They can then help to provide clinical leadership to other practitioners in their country.

RECOMMENDATION 15: CSPO graduates should develop their practice to provide a more client centred approach. This requires the development of clinical leadership in the care of persons with disabilities from distinct client groups.

Impact and professional communities:

The nature and number of CSPO graduates in Cambodia has produced a suitably qualified and interested workforce who engage in their professional community. There are much fewer graduates working in Laos and so building a professional community is more challenging, but not impossible. ISPO graduates need to take the initiative in building their own professional communities, rather than relying only on other managers or organisations to initiate this.

RECOMMENDATION 16: ISPO graduates from CSPO should be proactive and not reactive in their efforts to meet together professionally.

Impact of "Prosthetics and Orthotics" and "Orthopaedic Technology" as a career:

The study revealed that CSPO graduates are recognised professionally in both Cambodia and Laos. However, there are concerns that their career pathway does not match their salary level and in reality recognition of their work is not fully rewarded by salary. Many graduates received an incentive from a partner organisation on top of their government salary to ensure retention and motivation in the workplace. This proved problematic when a partner organisation retracted from supporting services and leads to loss of staff in the long term.

RECOMMENDATION 17: CSPO graduates should ensure that they are active in their professional association and that they engage in workforce planning and career development pathways with government.

RECOMMENDATION 18: Prosthetics and Orthotics services should ensure that new ISPO certified graduates are fully inducted into the work place and that they have some element of professional mentoring and supervision by more experienced and qualified staff.

Provision of assistive technologies was shown to impact on the lives of persons with disabilities:

Prosthetics and orthotics service provision was found to have a profound and enabling influence on the lives of persons with disabilities. Service users told us of the transformational changes that happened to them on receiving a prosthetic or orthotic device. Several clients interviewed had lived their lives without provision of a prosthesis or orthosis for many years and were able to explain the positive difference in their physical ability and mental wellbeing following service provision.

Service users who shared their stories with us not only told us about the impact of assistive technology provision on their lives, but also told us about their ability to support their families. Clients also shared their hopes for their future and desired to have better employment and income generation possibilities.

There remains an unmet need for services to reach clients in rural and remote locations.

RECOMMENDATION 19: ISPO and other organisations and services providers should continue to collect and share stories about the impact of prosthetic and orthotic provision on the lives of their clients. These stories should be used in advocacy and awareness raising campaigns to promote appropriate service provision and to improve access to services.

Professional Training:

This study has highlighted the fact that the professional training by CSPO produces graduates who have the skills, knowledge and competencies to provide appropriate prosthetics and orthotics services. The association of CSPO with ISPO through the formal recognition of the program as an ISPO Category II program has proved to be positive.

RECOMMENDATION 20: CSPO should continue to pursue ISPO recognition for its ISPO Category II program.

There is a need for more ISPO Category I graduates to work in clinical service provision in Cambodia and Laos and thus CSPO should seek to find partnerships both nationally and internationally to not only upgrade ISPO Category II staff to ISPO Category I, but also to identify and support school leavers with appropriate qualifications from Cambodia and Laos

to train at a Category I level. There have been successful initiatives[8] to upgrade ISPO Category II personnel to ISPO Category I level through upgrading programs at La Trobe University, Australia and at Mahidol University, Thailand.

RECOMMENDATION 21: An ongoing program of upgrading ISPO Category II to ISPO Category I for selected academically suitable candidates is encouraged. CSPO should be strongly involved in helping to co-ordinate this initiative to generate a greater number of ISPO Category I personnel.

RECOMMENDATION 22: The number of prosthetists/orthotists and orthopaedic technologists needs to increase in Cambodia and Laos. Therefore, ISPO Category I initiatives should not only be restricted to upgrading efforts because this does not grow the size of the workforce. Additional identification and support of academically suitable school leaves (and equivalent) candidates are needed to attend full ISPO Category I training. These will be the clinical leaders of the future.

Section 9: Glossary of acronyms

AFO	Ankle Foot Orthosis
A/P	Anterioposteriorly
CMR	Centre of Medical Rehabilitation
COPE	Cooperative Orthotic and Prosthetic Enterprise
CSPO	Cambodian School of Prosthetics and Orthotics
CT	Cambodia Trust
HI	Handicap International
ICRC	International Committee of the Red Cross
ISPO	International Society for Prosthetics and Orthotics
KAFO	Knee Ankle Foot Orthosis
KD	Knee Disarticulation
KHAPO	Cambodian Association for Prosthetists and Orthotists
LLP	Lower Limb Prosthetics
LLO	Lower Limb Orthotics
M/L	Mediolaterally
P & O	Prosthetics and Orthotics
PTB	Patella Tendon Bearing
PWDF	Persons with Disability Foundation
SACH	Solid-Ankle Cushion-Heel
SO	Spinal Orthotics
TF	Trans-femoral
TT	Trans-tibial
ULO	Upper Limb Orthotics
ULP	Upper Limb Prosthetics
USAID	United States Agency for International Development
VI	Veterans International
VIETCOT	Vietnamese Centre for Orthopaedic Technology
WHO	World Health Organization

Section 10: References

1. WHO/ISPO. (2005) Guidelines for training personnel in developing countries for prosthetics and orthotics services. Geneva, World Health Organization/ISPO.

2. USAID (2006) Impact Assessment Primer Series.

3. Jensen JS et al (2005) Quality benchmark for trans-tibial prostheses in low-income countries. Prosthet Orthot Int. 2005 Apr; 29(1):53-8.

4. Word Bank. (2013) Data. [Online]. [Accessed 04/02/2015] Available from: http:databank.worldbank.org

5. World Bank Group. (2015) Country and Lending Groups. [Online]. [Accessed 30/01/2015] Available from: http:databank.worldbank.org

6. Landmine Monitor. (2013) International Campaign to Ban Landmines. [Online]. [Accessed 06/01/2015] Available from: http://www.the-monitor.org

6. ICRC. (2012) Physical Rehabilitation Programme Annual Report.

8. Kheng, S. The challenges of upgrading from ISPO Category II level to Bachelor Degree level by distance education. 2008. Prosthetics and Orthotics International. Vol. 32, No. 3, Pages 299-312.