

Prosthetics & Orthotics Impact Assessment Latin America: Mexico, Guatemala and Colombia



For Alfonso
his prosthetic legs
meant
“to become alive again.”

Cover image: Alfonso on his daily journey delivering farm eggs to one of the local stores.

Aguascalientes, Mexico



USAID
FROM THE AMERICAN PEOPLE



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Together we will continue moving beyond physical disability.

in memory of Alfonso

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Section 1: Executive Summary

Prosthetics and orthotics services for people with disabilities have been strengthened through the sustained efforts of a number of agencies and organisations. In particular, the Leahy War Victims Fund of the United States Agency for International Development (USAID) has supported the International Society for Prosthetics and Orthotics (ISPO) and the World Health Organisation to publish international standards of professional practice and training for prosthetists/orthotists and orthopaedic technologists. These standards are known as ISPO Category I and Category II respectively.

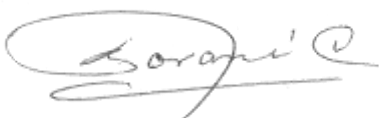
In El Salvador the Don Bosco University (UDB) is a recognised ISPO Category I and II training provider and has a regional training remit for Latin America. This study is a partial audit following up twenty seven graduates of UDB in Mexico, Guatemala and Colombia. We interviewed graduates, toured a range of services and spoke to service users and managers.

The Prosthetic and Orthotics Impact Assessment, performed in different regions around the world, proved that training personnel to ISPO Category I and II standards is essential to overcome disability. The impact of training and scholarships provided to people from Latin America is changing the future for all involved, a situation that is being extended to other parts of the world. The fact that many of the beneficiaries are now proficient in orthotic and prosthetic care implies that the service provided to the community is enhanced and improved with a higher level of expertise.

We found that ISPO certified graduates provided appropriate and safe services that enabled service users to be mobile, independent and to lead more social and economically active lives. Graduates showed an eagerness for professional development. They were interested and engaged in service developments and sought to improve their clinical practice.

The professional future for ISPO graduates is extended beyond their own countries' borders. With the USAID grant administered by ISPO many bridges were established, helping to reduce the gap between communities at the same time as delivering hope throughout orthotic and prosthetic services.

The initial effort to accomplish these results needs to continue and to be enhanced. There is much more to do with regard to education. As a result of this study fifteen recommendations are suggested. I believe the interest and need for continuous education and training for professionals in those countries visited (Mexico, Guatemala & Colombia) reflect also the requirements for the entire Latin-American region.



Rosielena Jované C.
ISPO Chair, ISPO-USAID Steering Committee

Section 2: Introduction and context

The establishment and strengthening of prosthetics and services for people with physical disabilities globally has been achieved through the long term investment of significant resources by the International Society for Prosthetics and Orthotics (ISPO), the United States Agency for International Development (USAID) and other non-government and governmental agencies. These investments have included workforce capacity building activities including the publication of standards of professional education and patient care¹, training programme evaluations and professional scholarship provision. Today, ISPO certifies prosthetists/orthotists (ISPO Category I) or orthopaedic technologists (ISPO Category II) graduating from ISPO evaluated courses of study. There are twenty six ISPO recognised programmes worldwide.

Little is known about the impact that these professionals have in the workplace. With a view to assessing the impact of ISPO recognised training, USAID funded ISPO through a collaborative agreement to undertake a study series of graduates of ISPO recognised professional training programmes in developing countries. In order to measure the impact we generated a causal model and analysis framework based on the USAID Impact Assessment Primer Series². We developed observational techniques and interviews for use with the graduates and their clients in the field.

The aim was to test our hypothesis that: **“Training personnel to ISPO Category I and II standards provides basic knowledge, skills and experience to enable them to offer and/or improve prosthetic and orthotic services for persons with physical disabilities.”**

We conducted a study programme across 13 countries. This report is about a study of graduates of Don Bosco University (UDB) working in three countries, namely Mexico, Guatemala and Colombia. The University campus is based in El Salvador. UDB is a Latin American regional training hub for prosthetics and orthotics with international students in two courses that meet the ISPO Category II and ISPO Category I standards.

We interviewed government officials, heads of hospital services and heads of prosthetic and orthotic departments and conducted a partial audit of graduate clinical skills and competencies in Mexico, Guatemala and Colombia. We also listened to service users hearing the stories of how services had directly impacted upon their lives.

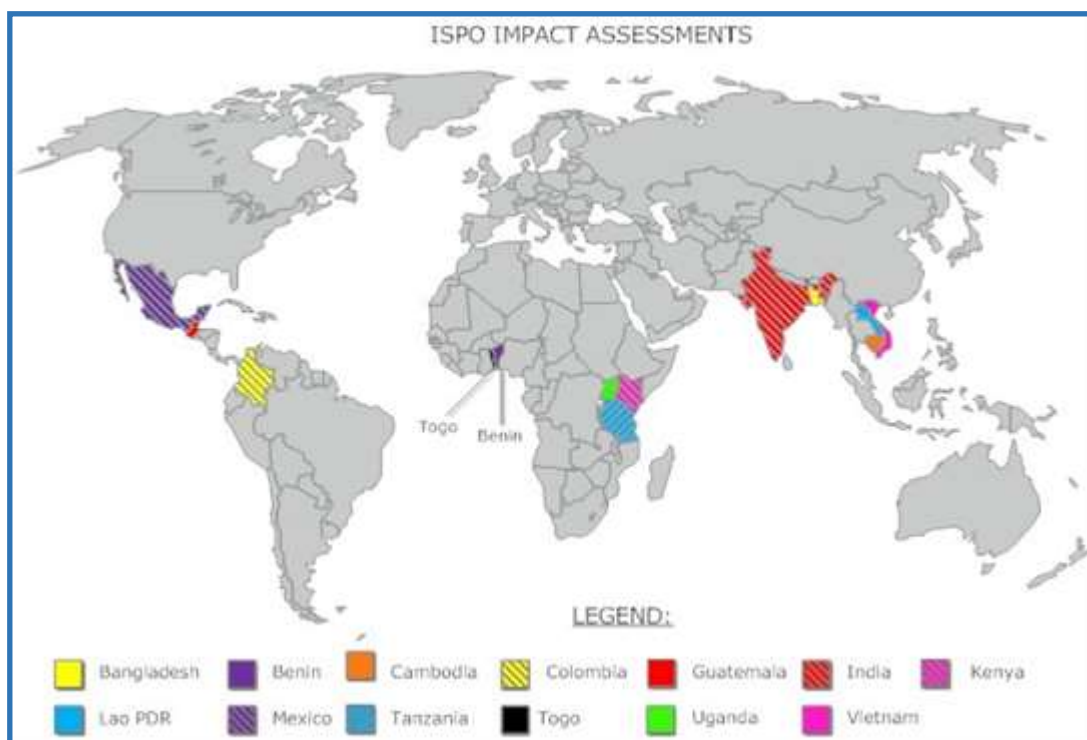


Figure 1. Map showing country field visits.

Section 3: Methodology

This impact assessment focused on completing a partial audit within 3 countries where graduates of an ISPO recognised programme 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 and 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 26 May to 8 June 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 and 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 service 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 was also explored.
- C. Meetings with Prosthetic/Orthotic Service 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 programme heads and/or key senior personnel who have extensive postgraduate experience.

Location: The study was conducted in the workplace; in one or more prosthetic/orthotic clinics in Mexico, Guatemala and Colombia.

Objectives of investigation: The study addressed the wider programme 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 Latin American Graduate Audit survey specifically aimed to:

- determine the scope and level of professional practice
- audit UDB 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 Don Bosco University working in Mexico, Guatemala and Colombia 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 verbal explanation by their participating clinician in the local language.

Recruitment of participants: Potential participants were identified from the graduate lists supplied by the Don Bosco University and verified through the ISPO list of certified professionals. Following study recruitment by letter, email or telephone invitation from the programme head, visits to graduates in the clinical settings were arranged in Aguascalientes, Torreon and Mexico City in Mexico; Guatemala City in Guatemala; and Cali and Bogota in Colombia. We selected a convenience sample depending on where graduates worked, the available time and budget for each field visit and available flight itineraries. Graduate selected client participants.

Structured interview: A structured interview was developed, building on past graduate follow-up work conducted by ISPO³ 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 by 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 showing 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 that 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 programme manager, and remain the property of USAID until at least 3 years after the last date of the programme (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 3 Latin American countries

At the time of the study around 240 prosthetists/orthotists and orthopaedic technologists from fifteen countries have graduated with certificates from ISPO Category I or II programmes at the UDB since 1998. Graduates were followed up in three countries, namely Mexico, Guatemala and Colombia to determine the impact of such professional training in these nations. In the field of prosthetics and orthotics ISPO has certified the following UDB graduates: 22 students from Mexico; 6 from Guatemala; and 33 from Colombia. The impact assessment took the form of a partial audit in Latin America.

Graduate participants in this impact study

A sample of 27 ISPO certified graduates working in Mexico, Guatemala and Colombia participated in this study comprised of 3 Category I personnel and 24 Category II personnel. Their average age was 40.4 years old ranging from 25 to 74 years old. We saw 55% of all ISPO certified Mexican personnel, 50% of Guatemalan personnel and 36% of Colombian personnel. 22% of the sample was female (comparing with about 33% of all UDB Category I and II graduates).

Number interviewed		Category I	Category II	Blended learning	Face to face	Male	Female
Mexico	12	2	10	8	4	9	3
Guatemala	3	0	3	0	3	2	1
Colombia	12	1	11	6	6	10	2
Total	27	3	24	14	13	21	6

Table 1: Graduates participant information.

	Average age	Age range		Average yrs graduated
		Low	High	
Mexico	44	25	74	7
Guatemala	39	34	44	10
Colombia	38	25	52	6
Overall	40.4	28.0	56.7	7.6

Table 2: Graduates ages and years graduated.

The oldest participant was a service manager who had attended the training to improve his skills and provide a leadership example to his team. The average number of years since graduating was 7.6 years. 48% (n=13) of the graduates had attended face-to-face teaching at UDB and 52% (n=14) had attended through blended learning: a mixture of online and face to face teaching and teaching/learning.

Professional Practice

Scope of practice: The majority of graduates (59%) were involved in all areas of prosthetics and orthotics practice. All but one graduate were involved in lower limb prosthetics and/or lower limb orthotics practice. This graduate worked with spinal orthotics and upper limb orthotics.

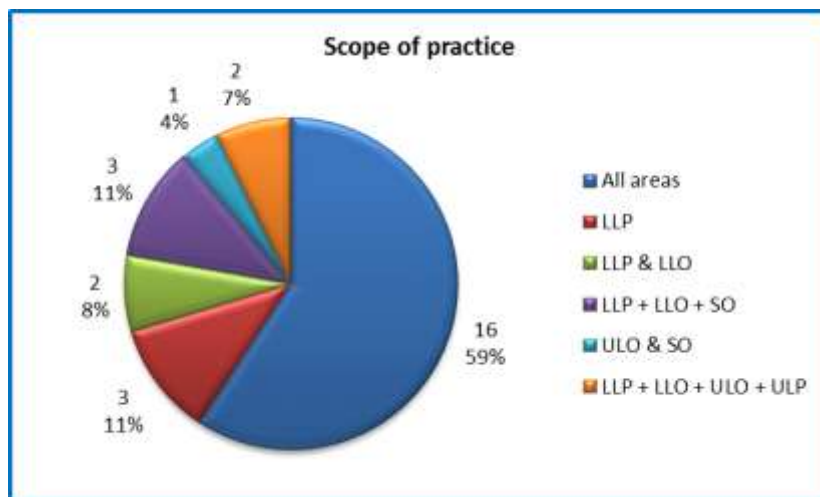


Figure 2

Specialist care: 59.3% (n=16) graduates reported that they specialised in treating patients, mainly by level of device (for example trans-femoral prosthetics). One graduate reported that they specialised in myo-electric prostheses.

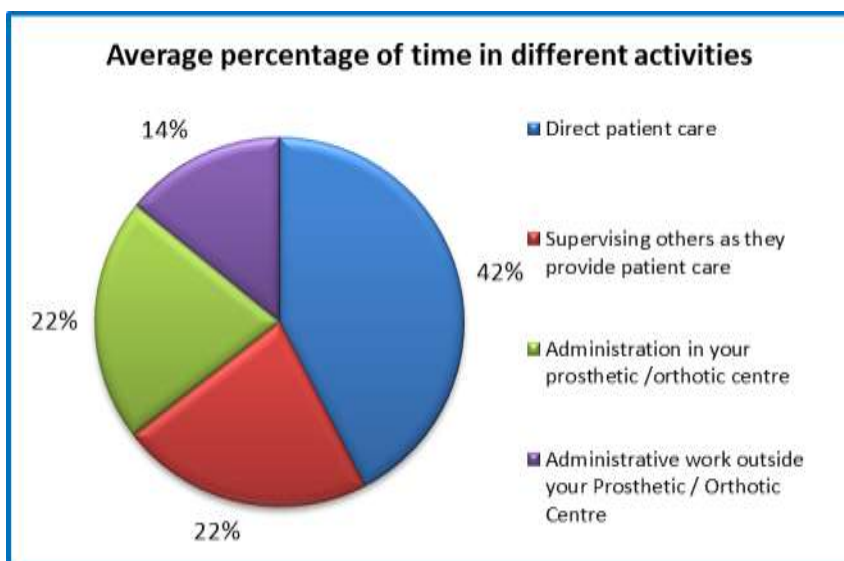


Figure 3

Activities and caseload mix: The greater part of graduate time (42%) was spent in direct patient care or in supervising others as they provided patient care (22%). The remaining time was split between administrative tasks within their prosthetic/orthotic centre (22%) or outside the centre in wider health, business and professional networks (14%).

FIGURES 5 & 6 SHOW
NUMBER OF TIMES
REPORTED

Most of the **patient case load** consisted of lower limb prosthetics cases (34%) and lower limb orthotics cases (30%). Upper limb cases accounted for a total of 22% of patients. Spinal orthotics accounted for only 15% of the total patient cases.

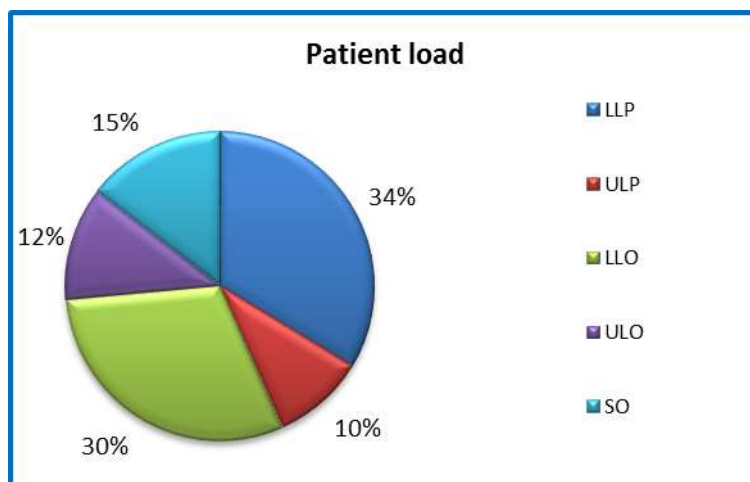


Figure 4

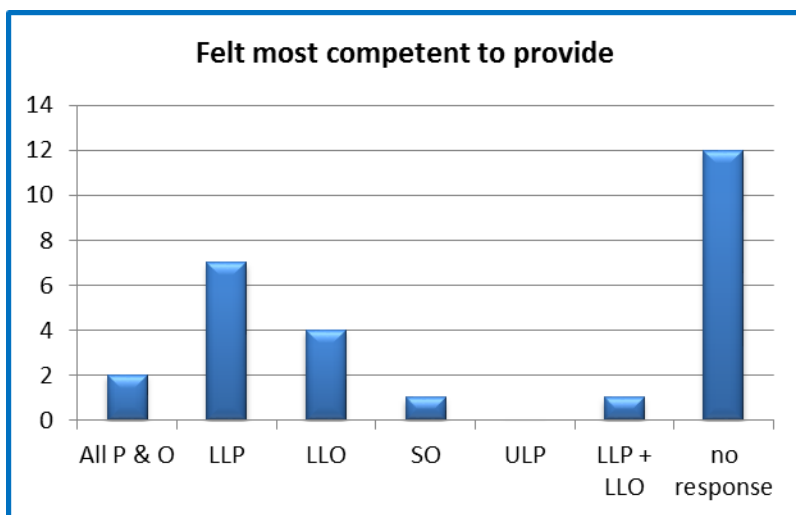


Figure 5

Level of competence:

Fifteen graduates indicated areas of practice where they felt most competent and this was aligned with their patient load.

Twelve of the graduate participants did not respond to this question. This could be because of the way the question was phrased and they therefore found it difficult to identify one or more aspects of their work.

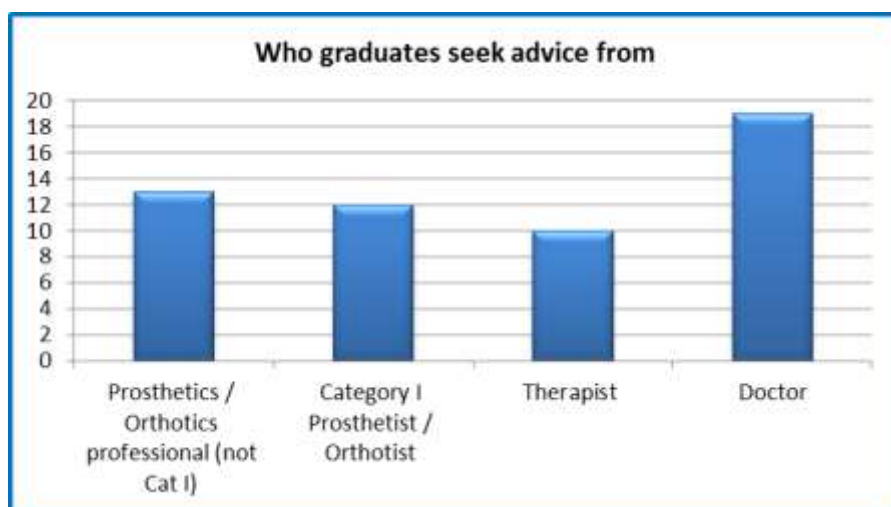


Figure 6

Seeking advice for complex cases:

Graduates most frequently reported seeking advice from a doctor. They also sought advice from other prosthetics/orthotics professionals and therapists.

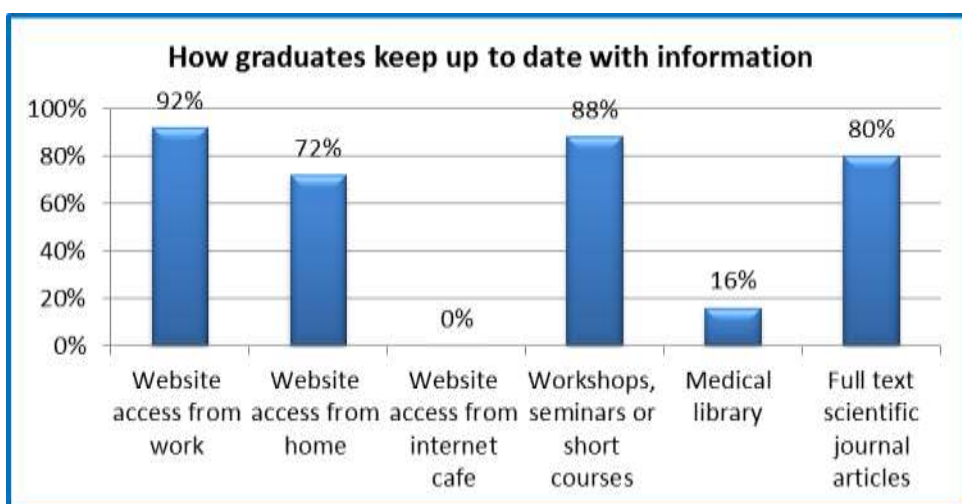


Figure 7

Keeping up to date with information:

Graduates reported that they were connected to the internet both at work and at home. They often kept up to date with information by attending workshops, seminars or courses. 80% of graduates reported that they read full text journal articles. Only 16% of graduates kept up-to-date via a medical library.

Membership of professional bodies and clinical interest groups:

16 graduates reported that they were members of a professional group.

Professional practice:

Twenty seven graduates completed this section.

Five orthotic clients with seven affected limbs were presented by the graduates. These included two unilateral knee-ankle-foot orthoses users, one ankle-foot orthosis user, one thoracolumbar hip-knee-ankle-foot orthosis user and one reciprocating gait orthosis user.

Twenty two prosthetic clients with twenty five affected limbs were presented by the graduates. They included twelve trans-tibial amputees (two of whom had bilateral amputations), nine trans-femoral amputees and one bilateral amputee with knee disarticulation and trans-femoral amputation.

Referral prescriptions: Three records were not available for review as the clients were not at their normal clinical service location. Of the remaining records, 71% (n=17) had a referral prescription available, mostly from a doctor.

Clinical records: 50% of clinical records were complete with an adequate assessment recorded in the record. Details about client history and clinical assessment information were omitted from five client files.

History taking: 96% (n=26) of graduates took an adequate social history.

Description of physical disability: All graduates presented a clear description of their client's physical disability.

Prosthetic/orthotic history: All graduates were aware of their client's prosthetic and orthotic history.

Physical examination: Most graduates demonstrated their skills and knowledge of comprehensive physical examination with their clients. However 11% (n=3) graduates failed to present sound side and upper limb function when assessing a lower limb client. 7% (n=2) graduates omitted to check for a level pelvis for prosthetic clients.

Functional rating of user: Most (85%) of graduates described the functional level of their client, but only 52% used a functional rating scale as an objective measure.

Devices meeting client needs: 78% (n=17) of graduates determined that the device was meeting their client's needs. One graduate determined that a different device design would have been better for their client. Five graduates stated the device was only partly meeting their clients' needs. For four graduates their clients wanted to be more active than they were currently, whilst one graduate had a client with socket fitting issues.

Appropriateness of device: 48% (n=10) of devices were assessed as being entirely appropriate to the clients' needs by the researchers. However 37% (n=10) devices could have been made more appropriate - five due to socket fitting issues and others because of alignment, prescription choice and cost to the client. Two devices were assessed as not appropriate because of poor socket fit and alignment.

Observed values for University of Don Bosco Graduates who presented clients with devices that they had made.			
	Graduates who attended face to face course	Graduates who attended blended learning course	Total
No fitting issues	7	5	12
Fitting issues	3	4	7
Total	10	9	19

Table 3

Face to face versus blended learning approach to professional training: We were interested to find out the if there were any differences between the quality of fit of devices made by graduates who had attended either the face to face or the blended learning ISPO Category II UDB training courses. 13 face to face alumni and 14 blended learning alumni participated in the study and of these, 19 graduates presented clients who wore devices that the graduates had made. An analysis

of investigator observations about fitting issues for the graduate made devices was conducted. (The prosthetic fitting issue categories: were socket fit antero-posterior, socket fit medio-lateral, socket fit proximal and/or socket fit distal. The orthotic fitting issue categories were: foot position medio-lateral, tibial angle (static) and/or leg shell volume.) The statistical software package SPSS was used to determine a Fisher's Exact test result. The results yielded $p = 0.650$ hence there was no association found between the mode of learning and the quality of fit of prosthetic and orthotic devices.

Prosthetic and orthotic prescription and specification:

All prostheses were of modular endoskeletal design. The most common prescription of prosthetic feet was energy storing feet (68%).

Fourteen trans-tibial prostheses were provided. The majority of sockets ($n=8$) were Total Surface Bearing (TSB) with the remainder ($n=6$) being of Patella Tendon Bearing (PTB) design. Two of the PTB sockets were suspended by cuff straps, one by supracondylar suspension. The remaining trans-tibial sockets were suspended by gel liners and sleeves.

Four of the trans-femoral sockets were clearly ischial containment designs. Seven sockets were variants of ischial containment. These were less difficult to describe as graduates had incorporated different design concepts. Eight trans-femoral users used vacuum suspension (one of whom supplemented the suspension with a waist belt). Two used a liner. Eight of the trans-femoral prostheses incorporated polycentric knees and two uniaxial knees. One client was prescribed a pylon.

Materials used for prostheses: Fourteen prostheses were noted to have laminate resin sockets. The remaining sockets were thermoplastic polypropylene.

In total, eighteen sockets were noted to have a liner present. The types of interface liner are shown in the pie chart in Figure 9.

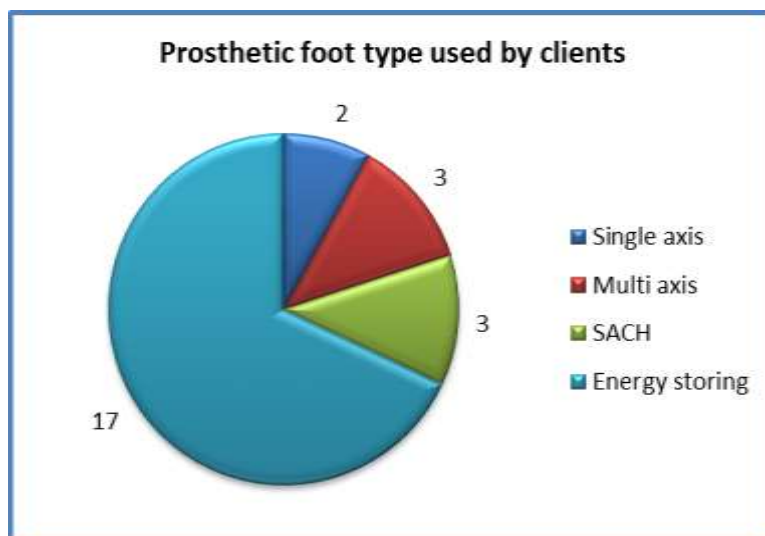


Figure 8

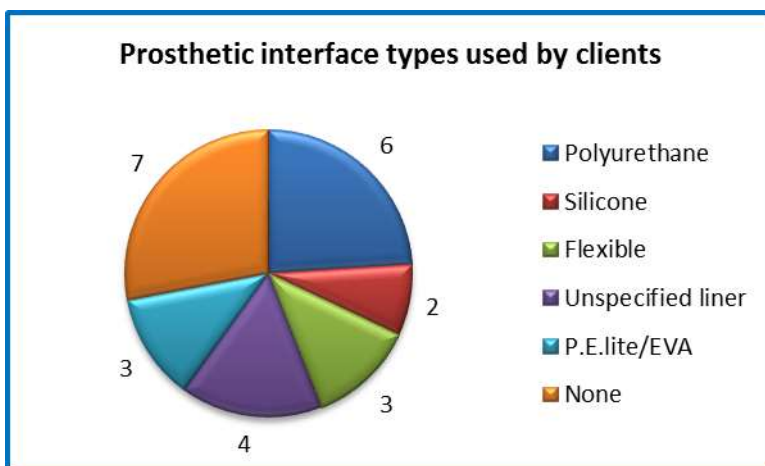


Figure 9

Suppliers: Graduates utilized a range of component suppliers to provide their prescriptions to their clients. This reflected the active Latin American prosthetics and orthotics supplier markets and gave the graduates the opportunity of choosing a range of components to best suit the needs and circumstances of their clients.

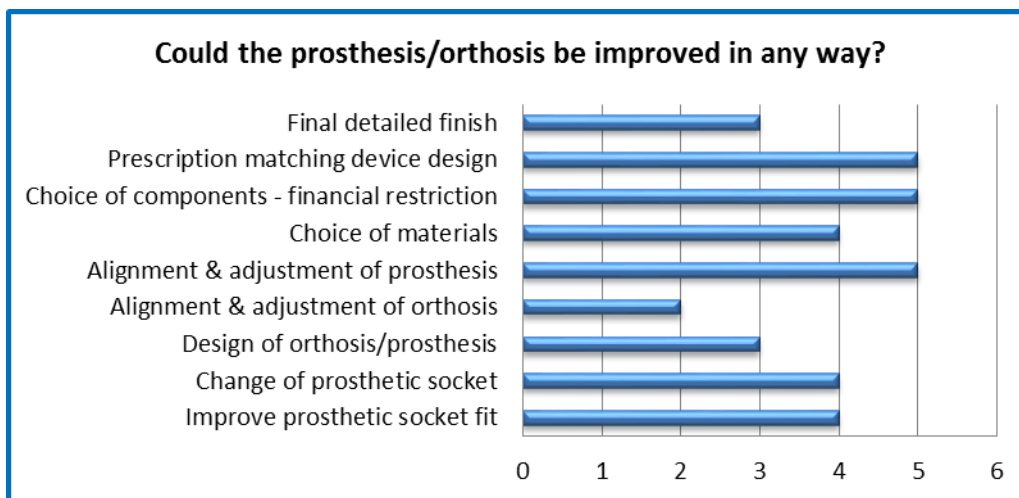
Durability of device: Graduates reported that the devices used by clients were durable. They estimated an average of 3.3 years before the devices needed replacement.

Devices: 63% of client participants were wearing devices manufactured by the graduate interviewed. 37% of graduates presented clients who were either co-opted into the study away from the graduates' workplace or who were attending review appointments during the study visit and then consented to participate.

Follow up since delivery: 85% (n=23) of the service users had been followed up since the delivery of their prosthetic or orthotic device. Of the remaining clients, one could not be located for any follow up.

Treatment goals identified and noted: All graduates identified appropriate treatment goals with their clients.

Improvements for devices seen: Graduates were able to critically appraise the prostheses and orthoses that they presented. They reported on a number of factors that could be improved upon, as shown in Figure 10.



FIGURES 10-14
SHOW NUMBER
OF TIMES
REPORTED

Figure 10

Most beneficial part of professional training: Overall, graduates were positive about their professional training. 33% appreciated the clinical assessment aspect of their training as being most beneficial to them, followed by biomechanics (26%).



Figure 11

Topics which could have been better covered in course: Graduates reported a wide range of topics that they wished they had learned more about on the course. This was most often upper limb prosthetics followed by knee, hip and shoulder disarticulation prosthetics.

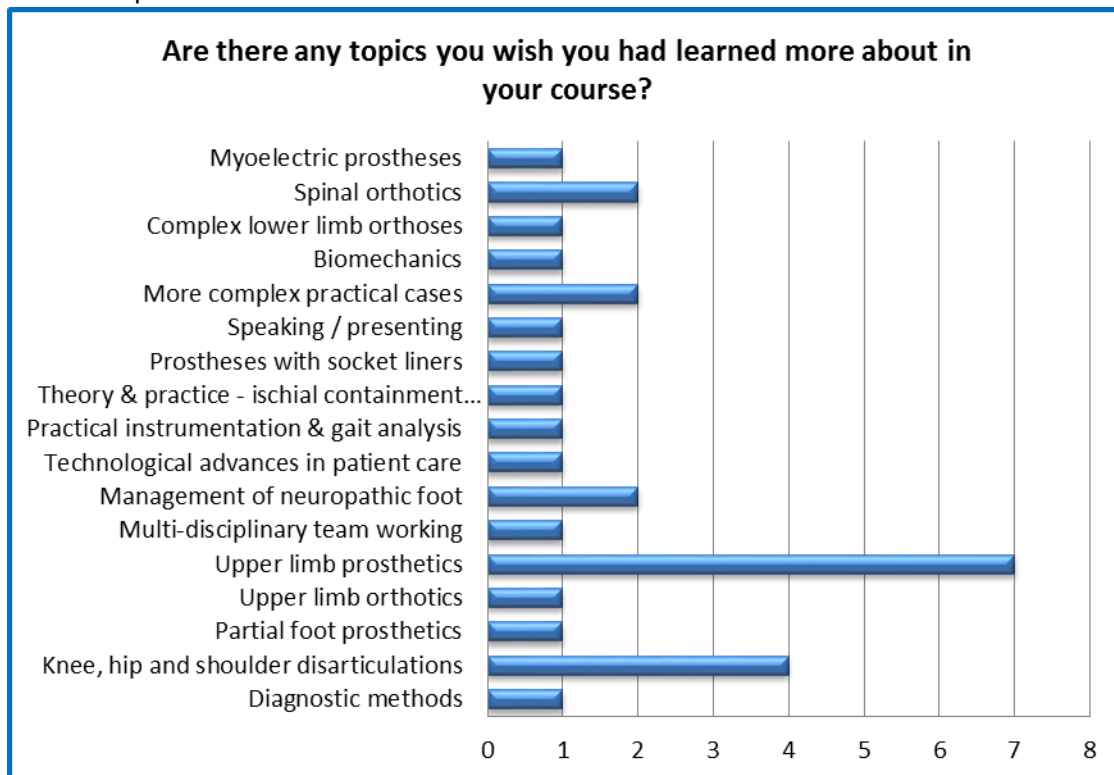
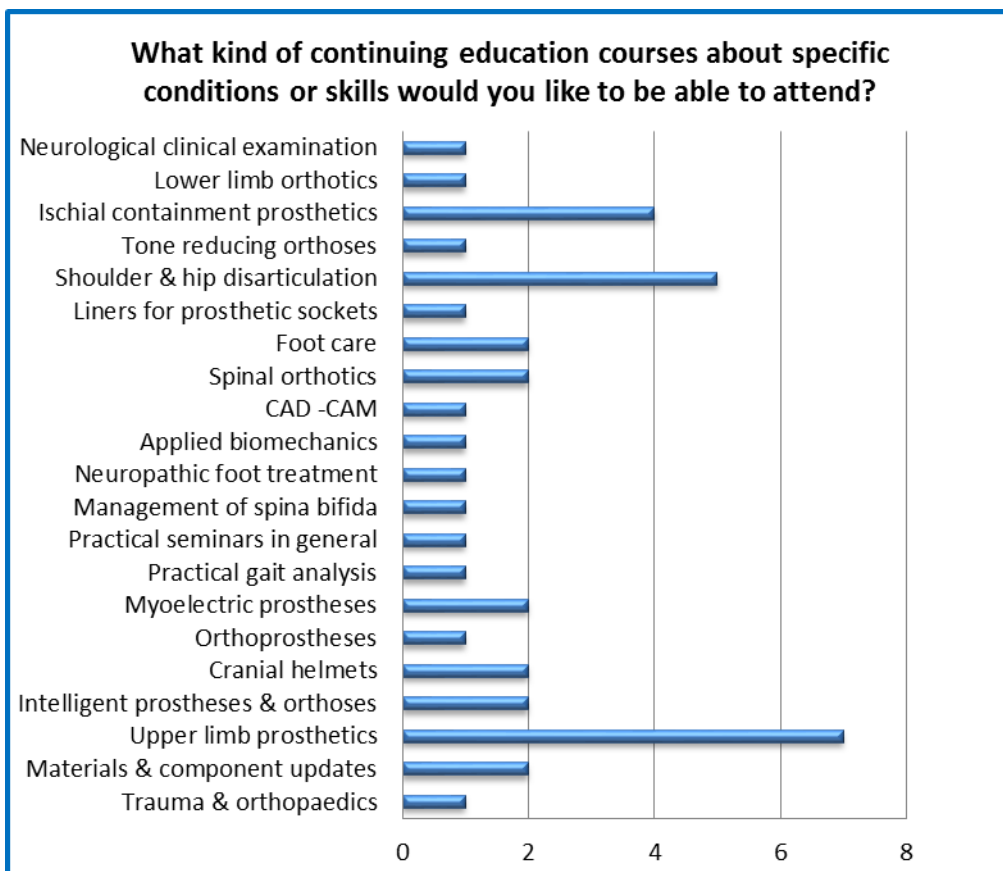


Figure 12

Desire for continuing education courses:

There was a strong desire among the graduates to improve their knowledge and skills. They reported twenty one topics associated with the needs of their services. Upper limb prosthetics was the most frequently requested, followed by shoulder and hip disarticulation seminars and then ischial containment sockets.

Figure 13



Desire to introduce new technologies: Graduates were keen to introduce a number of new technologies to their practice. These mainly represented more advanced technologies and techniques that reflect the strongly emerging Latin American technology services and markets.

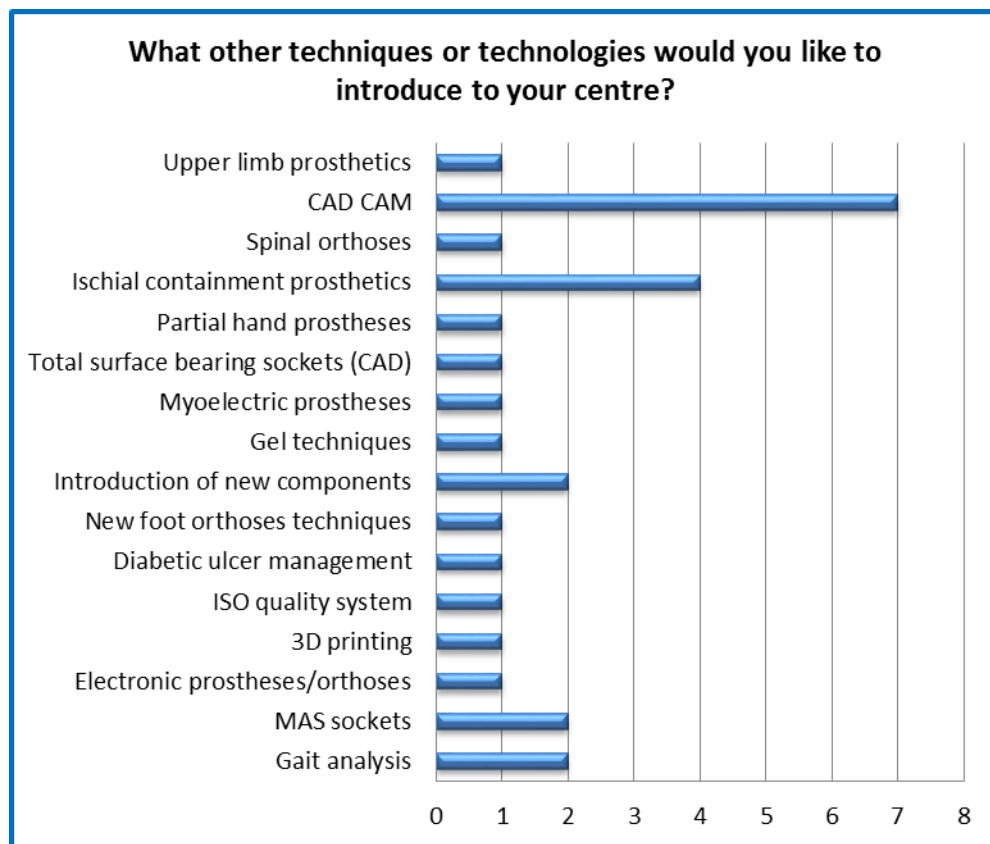


Figure 14

Personal development planning

The data collection form was reviewed by the investigator and graduate without the client present. Three development needs were identified for each graduate. The following chart shows a summary of those 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 client history taking, assessment and record keeping. In total thirty one developments needs topics were identified.

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	15
	Document functional levels	4
	Involve others from the multidisciplinary team	3
	Document muscle strengths	2
	Monitor patients through regular review	1
	Improve knowledge about pain	1
	Reduce delivery times	1
	Source finances to attend professional conferences	1
Conditions/ pathologies	Diabetic & neuropathic foot management	4
	Hip disarticulation prostheses	2
	Fracture management	1
	Pathology knowledge	1
Prosthetics & orthotics clinical & technical skills	Trans-femoral socket design, including ischial containment	8
	Upper limb prosthetics	7
	Components, materials & manufacturing update	4
	Clinical gait analysis	3
	Upper limb - myoelectric prostheses	3
	Prosthetic alignment	3
	Total surface bearing socket design theory & practice	2
	Spinal orthotics - idiopathic scoliosis	2
	Hip disarticulation prostheses	2
	Trans-tibial socket design	1
	Orthotic management of the pronated foot	1
	Orthotic finishing	1
	Upper limb orthotics	1
	Microprocessor knees	1
	CAD-CAM technology	1
	Hip Knee Ankle Foot Orthoses	1
	Orthoprosthesis	1

Table 4

Section 5: How services impact on lives – client stories

We found how prosthetics and orthotics services impact on the lives of service users in two ways.

Firstly, we interviewed clients directly to ask them about their individual story. Story telling gave us important insights about service users. Our study invited local organisers to identify and seek consents from three service users who would be willing to tell us their stories to help us better illustrate and understand the impact of service provision on their lives. In this report, Alfonso, Francisco and Richard share their stories.

Secondly, during the graduate interviews with their clients, we asked the graduate to present their client cases to our assessment team.

Client participants

Twenty seven clients were recruited to the study and presented to the researchers by the graduate participants. The average age of clients was 36 years old, ranging from 11 to 61 years of age. Twenty three male and four female clients were presented.

Twenty two clients were prosthesis limb users and five were orthoses users. The main cause of amputation is shown in Figure 15 below and the main presenting conditions of the orthotic clients in Figure 16.

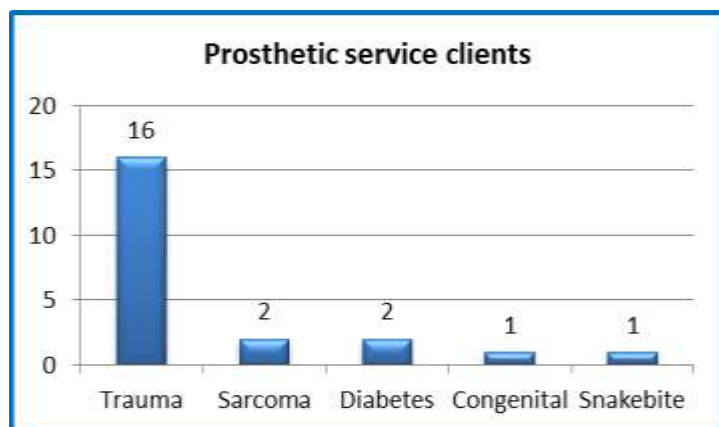


Figure 15

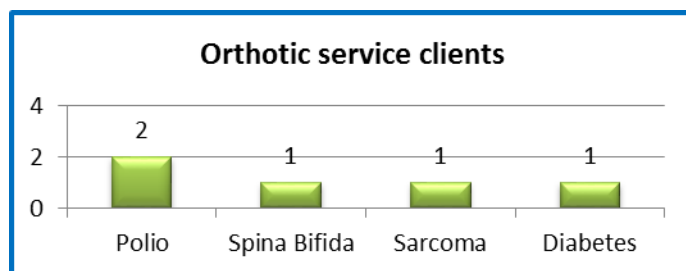


Figure 16

During the graduate presentations about their clients to the researchers, it was determined that 70% of the client group were employed or studying (17 people worked, 2 people were students). A diverse range of employment was noted: 2 teachers, 2 farmers, 2 business owners, 2 clinicians, 1 stylist, 1 manager, 1 administrator, 1 waiter, 1 salesperson, 1 hospitality and tourism worker and 1 factory worker. Two graduates did not give the occupations of their clients, but did state that they worked.

As part of a structured interview we asked

“What difference has the orthotic/prosthetic service made to the user’s life?”

Our client stories and feedback are shown on the following 6 pages.

Alfonso is a 66 year old diabetic service user who became a bilateral trans-tibial amputee eleven years ago. In 2002 Alfonso remembers enjoying walking on the beach with his wife when something hurt the sole of his left foot. The following day the foot was very inflamed and a dark colour. He was taken into hospital where three toes were amputated. Unfortunately this procedure did not control the clinical problems. An arteriogram was performed which revealed a lack of blood flow in his left leg and foot, so a trans-tibial amputation was performed.

A year later his right foot also became inflamed and dark in colour. An arteriogram showed no blood flow in the extremity. A sympathectomy was performed without success and so a second trans-tibial amputation was carried out. Alfonso says that although he always had the support of his family, wife and five siblings, he became very depressed and nothing could motivate him due to his changed circumstances. One day, a young lady came to visit the family. She was a trans-femoral amputee wearing a prosthetic and she was totally independent. At that time he thought: *“if she could, I can”*. She visited him a few more times to talk to him and finally he was ready to re-start his life. One of the things Alfonso missed the most was going to the baseball field as he had been a professional baseball player when he was younger. Prostheses have now completely changed Alfonso’s life. They meant not just Alfonso being able to go to the baseball field again to meet friends, but have restored his independence by allowing him to be able to continue running his business as he has been doing for the last 40 years: distributing eggs. He purchases eggs wholesale, packages them and delivers the eggs to about 25 clients a day. Alfonso can now drive his car again and enjoys a full social life with his family and friends.



Alfonso has two prosthetic legs.

Alfonso receives his prosthetic care from ISPO Certified Orthopaedic Technologist, Mr Juan Carlos Camacho, from the Research and Development Centre for Prosthetics and Orthotics (CIDOP), who has been working with him to provide

prosthetic legs. One day, Juan suggested to Alfonso to add decorative designs on a new prosthetic leg and he agreed. Alfonso told his wife “I am going to have a tattoo on my leg”. She replied, “No, no, no are you crazy? Don’t you remember you are diabetic? This is going to make you be sick”. He smiled and left. And when he came back he had the “tattoo prosthesis”. Juan Carlos included the names of important members of the family in the prosthesis: mother and father, his wife, sons and daughters. He also added symbols representing Alfonso’s life: baseballs and bats, coca cola bottles as Alfonso worked for the company for some years, and eggs! Alfonso says his “tattoo one” is like a book where his life story can be read. For Alfonso his prosthetic legs meant, *“to become alive again”*.



Alfonso can drive his car again.

Mr Francisco Felix Flores, 65 years old, repeatedly thanks ISPO Certified Orthopaedic Technologist Juan Carlos, CIDOP, Mexico, for providing his prosthetic leg. Francisco has been diabetic for 30 years and in 2001 underwent a kidney transplant. In 2003 he had a minor injury to his left foot which would not heal. The wound became infected and as a life-saving procedure he had to have his leg amputated below the knee.

His diabetes has also affected the sight in his right eye, but he still has good vision in his left eye. Francisco also sometimes experiences back pain because of a herniated disc making bending painful. Despite these health challenges, he owns and manages a shoe repair business with four members of staff and regularly drives his car. With the aid of his prosthetic leg Francisco accesses his two storey home and even walks the 16 steps up to the front door!

A great family man, Francisco has 3 children and 7 grandchildren. He enjoys being with his family and often goes out with his grandchildren. As a big soccer fan he particularly enjoys supporting his favourite football team 'Cruz Azul' and has taken his grandchildren with him. He also likes to socialise with friends. Francisco says *"I can walk with no crutches and do not need a wheelchair. No-one needs to carry me. If I didn't have any prosthesis I would feel very vulnerable"*.



In the prosthetics and orthotics clinic.



If Francisco experiences a problem with his prosthetic legs, he telephones or attends CIDOP facilities immediately. He can either drive or might even choose to walk for 40 minutes to the Centre. He does not depend on insurance and is able to pay for his prosthetic limb service provision. In 2003 he paid 6,600 US dollars for his leg and is still using it.

Francisco says *"I never regretted my decision to proceed with a prosthetic leg"*.

Mr Flores with his granddaughter.

Richard, Colombia: Amputation Without Limits

Richard Villadiego Aguirre was just 20 years old when his life changed completely. In 2000 he stood on a land mine in the fields of Antioquia, Colombia and lost his right leg. Richard was working as a farmer on his brother's land and returning home shortly after six o'clock. At 33 he can still remember hearing a loud explosion that threw him to the ground. Initially he did not know what had happened; he just heard a noise in his ears. He then tried to stand up, but fell again. Richard looked down at his legs and saw that his right foot was destroyed and attached to his body by only a flap of skin. His left hand was also injured and his wounds were bleeding

profusely. Richard was on an isolated road and almost no-one was passing at the time. With no alternative Richard began to try to crawl slowly to where he could get help. The pain was intense and he saw that he was bleeding a lot. Richard took off his shirt, and wrapped it around his hand like a bandage, and continued to drag himself along on very inaccessible rural trails. Eventually he crossed a stream to get to a neighbouring farm near his home.



Richard being interviewed by Dr Rosario.



The landmine damaged his left arm and right leg.

As Richard lived in a small rural village transport was limited to a vehicle coming in and out only once a day. But at that hour of the night, the shuttle was no longer available. Given this reality, Richard's friends and family organised themselves and carried him out of the village in a hammock to walk the long distance to reach the nearest health centre. Unfortunately the severity of his injuries meant the centre could not provide the care he needed. Richard was then taken to the Hospital de Zaragoza, but they also did not have the facilities to help him. He was then sent to the Hospital de Caucasia about 300 kms from his home. Richard was admitted at six o'clock the next morning, about 12 hours after the explosion.

Due to the severity of his injuries and the tremendous loss of blood, it was decided to give him a transfusion before surgery, but the hospital did not have the blood type that Richard needed. Thanks to local management a local donor was found and the operation began at three o'clock in the afternoon of 15 November.

Richard's foot was in such a bad condition that nothing could be done to save it so a trans-tibial amputation was carried out. Doctors also advised his left hand should be amputated, but Richard's father objected. This was a challenge for the doctors who began to clean the wounds, hoping to save the hand. Richard was in hospital for three months and during this period several operations were carried out to regain functions in his left hand. Richard returned home after this terrible ordeal, but without having received a prosthesis or any rehabilitation. It was a situation that continued for the following two years.

In 2003 as part of the Seeds of Hope programme the rehabilitation centre CIREC contacted Richard during a meeting of landmine survivors. At CIREC his first prosthetic leg was made and he was sent for rehabilitation to learn to adapt to it. CIREC also treated him to improve the function of his left hand. These new experiences allowed him to find work in CIREC as a fabrication assistant in orthotics and prosthetics, something he immediately liked. This job has allowed him to restart his studies – previously Richard had only studied up to the sixth grade. In August 2013 Richard proudly received his Bachelor's certificate.



Richard has attended some training courses and has been working in the field of orthotics for 9 years. In 2012 he unfortunately lost his full-time job but has since carried out some temporary activities responding to the call of workshops in the area. Additionally, Richard has taken advantage of the time doing CCTV security courses (the installation of cameras) to which he devotes part of his working time.

Richard lives with his wife and daughter, a 16 year old girl who has a left leg trans-tibial amputation as a result of a car accident when she was only six years old. For Richard, the prosthesis has allowed him to function independently both in his workplace and to move from one place to another without any help. Richard in no way feels limited by his prosthesis! He plays mini-soccer, hall soccer, goes cycling and even participates in marathons. Richard enjoys going to all social activities and dances, saying **"there is nothing I cannot do - and to do it my prosthesis is essential"**.

"There is nothing I cannot do."

Client participant responses

By asking a question about what the service meant to the client, we elicited responses that were most important to the client. 93% of clients (n=25) commented that the service aided them in the workplace and/or in their mobility and independence. Only one client who had not yet had a chance to try a new device was unable to respond.

The majority of client responses were about **MOBILITY AND INDEPENDENCE:**

“Walking without the brace is impossible. The brace is my life”. Client 455 (Orthotic)

“I use the orthosis for more than two hours and move freely in a wheelchair. The orthosis is an aid to independence”. Client 465 (Orthotic)

“I have been recovering lower limb strength, all ulcers have practically disappeared. I spend less time sitting”. Client 466 (Orthotic)

“I move very well in my neighborhood. It allows me to mobilise over "all terrain". Client 470 (Orthotic)

“It has made me independent and active and has given me the confidence to do things”. Client 458 (Prosthetic)

“It took two weeks to use the prosthesis. This was exciting while frustrating because before this I was slow to achieve goals”. Client 459 (Prosthetic)

“I regained independence by having the prosthesis and stopped using both crutches”. Client 460 (Prosthetic)

“I received the prosthesis about a year after amputation. That represented a recovery of independence”. Client 461 (Prosthetic)

“I have increased activity because it weighs less...the foot is not rigid. Life is easier. I can ride a bike”. Client 462 (Prosthetic)

“The prosthesis is important for movement”. Client 468 (Prosthetic)

“It allows activity - the socket allows my muscles to respond to activity”. Client 471 (Prosthetic)

“I was dependent and now feel completely independent. I progressively increased my expectations”. Client 473 (Prosthetic)

“I am most active and can perform all activities, even dance. Is better now than my own leg which hurt, bled and finally had bone cancer”. Client 474 (Prosthetic)

“My prosthesis meets all my personal, sporting and social needs”. Client 483 (Prosthetic)

“It allows me to work, use public transport and a bicycle. It gives me independence”. Client 484 (Prosthetic)

“More freedom to move”. Client 477 (Prosthetic)

“The prosthesis has given the opportunity for rehabilitation and to live my life. I have worked in the same company since 2008”. Client 478 (Prosthetic)

“There is no need for external help in work and sport”. Client 479 (Prosthetic)

Only one client had a negative remark about function ***“The prostheses is lighter with a softer liner. I feel that the foot pushes backwards while climbing ramps.”*** Client 482 (Prosthetic)

Other responses included comments about **EMPLOYMENT:**

“It has removed the pain. I can work at my workplace (stairs and driving) and I no longer use the cane”. Client 464 (Orthotic)

“With this prosthesis I do not get tired. Students do not know I am an amputee”. Client 451 (Prosthetic)

“I am able to integrate into the workplace. With this new prosthesis I can do things that I did not imagine such as walking faster”. Client 456 (Prosthetic)

“I went to study and got a job and do it properly”. Client 457 (Prosthetic)

“This current modular system is 100% better than conventional in work activities”. Client 469 (Prosthetic)

“Amputation was not limiting me to achieve permanent employment”. Client 480 (Prosthetic)

Another comment was about **COMFORT:**

“The new prosthesis seems more comfortable”. Client 467 (Prosthetic)

Section 6: Services in Mexico

COUNTRY CONTEXT:

Population (2012)⁴ = 120,847,477;

World Bank Country Classification (2015)⁶ = upper middle income;

Life expectancy at birth (2012)⁴ = 77.1 years;

PROSTHETICS & ORTHOTICS SERVICES WITHIN THE WIDER REHABILITATION SERVICES:



Figure 17

In Mexico 5.7 million people have a disability and of these 3.5 million people have mobility disabilities⁴. Rehabilitation services are delivered through different governmental, non-governmental and private organisations such as:

- Centro Nacional de Rehabilitación (INR), with research functions
- Instituto Mexicano de Seguro Social (IMSS), with several rehabilitation centres nationwide
- Desarrollo Integral de la Familia (DIF); 34 Centres with rehabilitation and orthotics/prosthetics services, 4 in Mexico City and 30 Centres in different states.

Although some of the prosthetic and orthotic services are located in rehabilitation centres, many are independent services which clients choose through a medical referral. Mexico has an emerging private market for prosthetics and orthotics services. Several aid-funded or public services for prosthetics and orthotics are sub-contracted to companies.

There are almost two thousand prosthetics/orthotics clinicians working in Mexico. Just two hundred and fifty of these professionals have formal training. The former prosthetics/orthotics school at the Centro Nacional de Rehabilitación (INR) was closed four years ago as an administrative decision after ten years of work. Most of the services visited shared a common concern that there was no national school offering clinical training. Mexico needs to build services and there was a move to create a retention plan for the workforce. There was a plan to re-open the school in two to three years.

Orthopaedic devices costs are high, especially for prosthesis, and most people cannot afford to pay for them. Therefore, governmental and non-governmental organisations donate the prosthesis to provide them at low cost to people in need.

Services visited

Six facilities were visited across three cities to see prosthetics/orthotics services with national, regional and local provision.



Mr Rodríguez, National Institute's orthopaedic workshop.

National Rehabilitation Institute, Mexico City

This service is under the supervision of the Medical Director and was recently incorporated into the Research Department. The service employed ten graduate technicians from the former national school who then obtained a bachelor degree (licenciates) after passing special tests. Three of the employees were women.

Orthosis fabrication was limited to those prescribed by the Burns Hospital, as well as compressive garments. Prosthesis provision required inpatient admission of the client and thus access to provision depended on the availability of a bed. The inpatient service was multidisciplinary over a 2 week stay. Prescriptions were made by rehabilitation physicians

for 140 – 150 prosthesis a year. The cost of the prostheses were cheaper than through commercial

provision and varied depending on a socio-economic evaluation of the client. Continuing professional development of the prosthetics/orthotics personnel was exclusively provided by component suppliers. As part of their benefits, the staff can attend any training course, but there was no financial support.

Ortopedia Técnica Rojas S.A. de C.V. , Mexico City

This is a private prosthetics/orthotics service and a family business. The father and son are dedicated to prosthetics/orthotics provision and the facilities were being remodelled to add a gym where the daughter will work as physiotherapist. There were no graduate technicians.

The facilities were spacious and accessible on three levels by the use of an elevator. Patient evaluation took place and the service was well equipped for manufacturing.



*Ortopedia
Técnica Rojas
is a family
business.*



The study team visit Shriners Hospital, Mexico.

Shriners Hospital, Mexico City

Shriners Hospital is dedicated to comprehensive paediatric care; principally neuro-musculo-skeletal conditions and physical disabilities. The hospital belongs to the Shriners network and is a non-profit organisation which offers free care to children until they reach 18 years of age. Since 2006 the hospital has had 60 beds, 2 operating rooms and 16 outpatient examination rooms. Principally the service is provided for people from the State of Mexico, but referrals are also received from Central and South America. Although all services are free to clients, many people find it difficult to attend appointments due to travel costs.



Members of the Shriner's team with children's orthoses.

Since 2003 the hospital has been providing a combined prosthetics and orthotics service delivered from a dedicated facility. The service is sub-contracted to different companies. Clients are mostly orthopaedic related and the case load is mostly on lower limbs. Rehabilitation and therapy services included physiotherapy, occupational therapy, speech therapy and a school. The prosthetics/orthotics service had eight clinicians (seven prosthetics/orthotics, one seating) and two of whom practiced on upper limbs. The hospital previously employed two UDB graduates who had now moved away. Each month around 150 prostheses and 500 orthoses were delivered. Delivery times are 4-6 weeks. The medical team included social, medical and therapy personnel.



The CIDOP personnel with the study team.

Research and Development Centre for Prosthetics and Orthotics. (CIDOP), Aguascalientes

CIDOP is a private workshop for prosthetics and orthotics services in Aguascalientes. Three UDB graduated ISPO Category II personnel lead and manage the service provision.

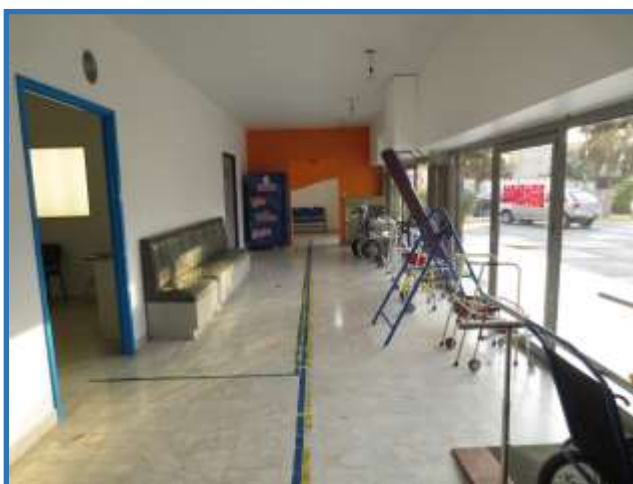
Within this large facility, the different clinical and technical areas were both well laid out and well equipped. Should clients require additional services such as

physiotherapy or psychology, they were referred to local services.

The CIDOP team had a history of investment in modern technologies. They had functioning Computer Aided Design and Computer Aided Manufacture equipment (including a digital shape capture system and a milling machine) for production. The team provided a wide range of prostheses and orthoses and also sold mobility aids.



Mr Juan Carlos Camacho, CIDOP.



The reception area, CIDOP.

Teletón, Mexico City and Aguascalientes

The Teletón Foundation runs an annual 24 hour television and radio fundraising appeal for children's disability services. Teletón is a non-profit non-governmental organisation with 22 rehabilitation centres where children with disabilities from 0-18 years old receive treatment. This is extended to 21 years of age if the child is studying.

They offered medical services and also psychological, physical therapy, recreation therapy, social work and spiritual support. At the centre in México City they had an orthopaedic laboratory.



Outside physiotherapy area, Teletón.

Ortoprotésica HighTech (Torreón)

This family business has served the Torreón community with prosthetics/orthotics provision for over 50 years. In addition they also have offices in Cuahuila and Durango, and were opening another office in Monterrey. There were five graduated ISPO Category I and II among their staff, four of whom were family members and owners of the workshops.

The facilities were well laid out making a pleasant environment. They had invested in modern assessment and manufacturing equipment and fabricate all kinds of orthopaedic devices. There was also a physiotherapy service for training their clients in the adaptation and use of prosthetic and orthotic devices.



A wide range of modular prostheses was available in Torreón.



One of the Ortoprotésica HighTech clinical examination rooms.



Spinal orthoses are manufactured using both CAD/CAM and plastics draping techniques.

Section 7: Services in Guatemala

COUNTRY CONTEXT:

Population (2013)⁴ = 15,468,203;

World Bank Country Classification (2015)⁶ = lower middle income;

Life expectancy at birth (2012)⁴ = 71.7 years;

PROSTHETICS & ORTHOTICS SERVICES WITHIN THE WIDER REHABILITATION SERVICES:



Figure 18

Guatemala does not publish country data about disability and there is no specific plan for rehabilitation services as there are other priorities at the Ministry of Health. Rehabilitation services are delivered mainly through institutions such as the Guatemalan Institute of Social Security (IGSS). This assists workers who pay for insurance and their children up to 7 years old or 12 years old, if their parents work for IGSS. There are also private services but almost all of these are delivered in Guatemala City. There is a lack of services in other urban or rural areas of the country so clients have to travel to the capital city.

Three prosthetics/orthotics laboratories are based in institutions, while others are private prosthetics/orthotics services. Some of the services employ trained personnel, but some private orthopaedic laboratories do not have prosthetics/orthotics clinicians with formal training. There are also charity organisations which distribute and/or fabricate prostheses and orthoses, but the qualification of their “technicians” is unknown.

There are seven clinicians in Guatemala graduated from UDB. Another four clinicians have some training, two from Cuba and two from the Centre International de Rehabilitation (CIR) at North Western University. Regulations for professional certificates are managed through the Universidad San Carlos and professional practice is regulated by Professional Colleges. The position of prosthetist/orthotist is not recognised as a profession, but as a service. This is mainly due to a lack of demand by prosthetics/orthotics clinicians to ask for a formal recognition of their profession.

Services visited

Centro de Atención a Discapacitados del Ejército de Guatemala (CADEG), Guatemala City

CADEG was founded in 1999 to fulfill the Guatemalan Peace Agreements that followed the internal armed conflict between 1960 and 1996. The Centre assists injured veteran soldiers. They serve a client population of 1,500 of which 255 are amputees. The Centre offers rehabilitation, orthopaedic, psychology, nursing and clinical laboratory services. This includes prosthetics/orthotics services and vocational training to reintegrate people back into work. Vocational training is conducted after many tests to identify the client's wishes and abilities. Community facilities are used to accomplish the training programme.



Local co-ordinator Claudia Cáceres Recari with Colonel David Guillermo Rodríguez at a painting by a veteran at CADEG.



The wide range of prostheses available from CADEG.

CADEG had thirty five employees, and just two were military personnel, including the Director. Two UDB ISPO II, graduates worked there and they offered different types of prosthesis, orthosis and ortho-prosthesis using a range of components and materials, including polypropylene technology and other modular components.

To make the service accessible for clients, CADEG paid for transportation and meals, and coordinated with the Military Hospital for accommodation during the treatment period. CADEG also conducted regional outreach missions for medical and prosthetics/orthotics services (e.g. repairs). The service had a protocol of replacing the conventional prostheses every three years, modular prostheses every two years and providing socks every three months.

Paediatric Infections and Rehabilitation Hospital, Guatemala City

At this hospital there were rehabilitation services including a prosthetics/orthotics service. The service was led by a graduate of a former prosthetics/orthotics training programme which the World Rehabilitation Fund developed in the Dominican Republic, (sponsored by USAID) during the late 1980s and early 1990s. No other personnel had formal training. There were basic facilities and equipment to be able to produce 3 prostheses, 3 Hip Knee Ankle Foot Orthoses (HKAFO's) and 20 or more Ankle Foot Orthoses (AFOs) a month. Polypropylene technology from CRE Équipements Ltd was frequently used and the hospital received a donation of materials and components from the International Committee of the Red Cross, Special Fund for the Disabled.

The Director is also head of a private School of Physical Therapy and Occupational Therapy. The School was founded in 1992 to fulfill the need for teaching professional technical degrees in physiotherapy and occupational therapy. It is

recognised by the Ministry of Public Health and Social Assistance. It was intended to open a technical degree programme for prosthetics and orthotics of seven semesters in duration and, at the time of visit, teaching staff were being recruited.

Instituto Guatemalteco de Seguro Social (IGSS), Guatemala City

IGSS had excellent facilities in Guatemala City, where they offered medical services to affiliates of the insurance system and their children up to seven years of age, or up to twelve years of age if their parents are IGSS employees.

The prosthetics/orthotics service had a large facility which was well equipped with modern machines. 24 prosthetics/orthotics personnel worked there, led by the Director who is a UDB ISPO Category II graduate. Four other personnel have also had training; two in Cuba and two in the International Rehabilitation Centre (CIR) at North Western University. There was the opportunity to work with any kind of materials and components at the facility and a wide variety of orthopaedic devices were fabricated and supplied. Annual production was approximately 2,000 orthosis, 140 lower limb prosthesis and 40 upper limb prosthesis. IGSS paid for transportation, meals and accommodation while clients received treatment.

Clínica de Ortopedia y Rehabilitación, S.A. (CLORSA), Guatemala City

CLORSA is a private service for persons with neuro-musculo-skeletal disorders which require prostheses or orthoses. When visited, the physical area was in a remodelling phase to improve the space, especially the therapeutic gym. The facilities had adequate equipment enabling the manufacture of a range of prostheses and orthoses. The multidisciplinary team included a physiatrist, orthopaedic doctors, physical therapist, and a graduate ISPO Category II orthopaedic technologist.



Touring the CLORSA facilities.

During the visit to CLORSA a young client was attending the service for a prosthetic leg. His situation illustrated the difficulties that people with disabilities faced in accessing assistive technology services in Guatemala. Out of necessity and as he was a skilled carpenter, he had designed and made his own prosthetic leg from football shin guards, wood and springs. Although he was able to walk after a fashion on the home made leg, it was uncomfortable and broke regularly. He

was pleased to receive a prosthesis from a UDB graduate which he found comfortable and much easier to walk with.



The client's self-made prosthesis stands beside his new prosthetic leg (above). The images (right) show the details of the home made prosthetic leg.



Section 6: Services in Colombia

COUNTRY CONTEXT:

Population (2013)⁴ = 48,321,405;

World Bank Country Classification (2015)⁶= upper middle income;

Life expectancy at birth (2012)⁴= 73.8 years;

PROSTHETICS & ORTHOTICS SERVICES WITHIN THE WIDER REHABILITATION SERVICES:

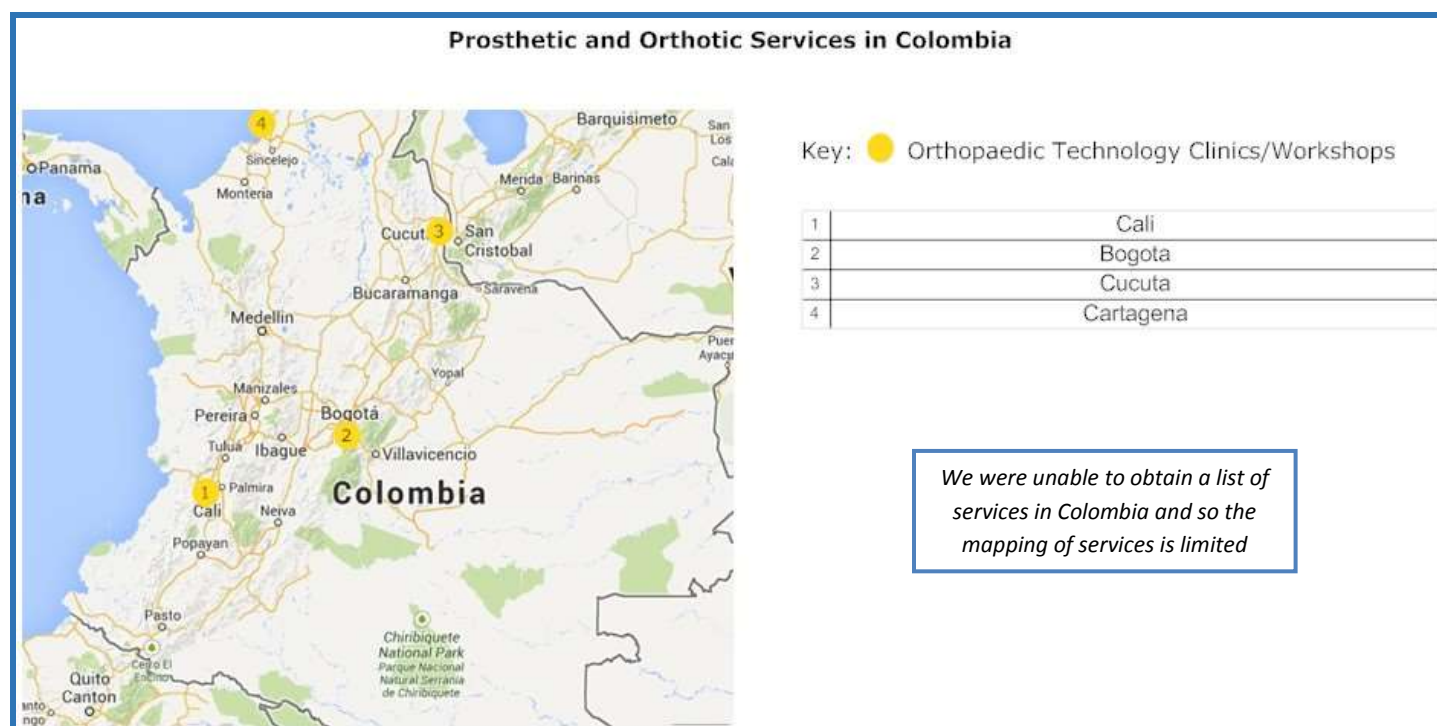


Figure 19

According to the Colombian 1993 Census, 4.8% of the population had some kind of disability (2.1% male and 1.7% female). However some organisations, including Mercy Corps, have been working in the field making a door to door census about people affected by the internal war. They found 24,000 persons affected directly or indirectly by the war. Colombia has the second highest incidence of land mine injuries in the world⁷. Most bombs were and are crude “homemade” ordinances. These cause significant injuries and although estimates vary, there is undoubtedly a sizeable amputee population through such ordinances.

New unpublished data by the Drugs and Health Technologies Directorate, Ministry of Health and Social Protection, reported that data from 2005 census referred to about 6.3% of the population having a general disability, with 47,300,000 inhabitants in Colombia. The data indicates that 8.5% of the population has a disability and 24.5% of those have a physical disability, with 10,200 victims of landmines. It also shows that 1.7 million people have Diabetes Mellitus.

In Colombia the law gives all individuals rights to access health services, including rehabilitation services and prosthetic and orthotic services. Those services are funded through two systems: private contribution health insurance (where the person pays a monthly insurance amount) or a subsidised system of government health insurance. There are many governmental, non-governmental and private organisations with the capacity to offer services. These are concentrated in Bogotá City and other large cities, with a lack of services in rural and remote areas. Although the law is universal and inclusive, access is limited in such areas because of the absence of services and qualified professionals.

The profession of orthopaedic technologist is recognised by a division of the Drugs and Health Technologies Department, INVIMA, which regulates and controls professions and areas of orthopaedic laboratories. The main problem that prosthetics/orthotics professionals face in Colombia is the possible consequence from the application of regulation 1319 that demands qualifications for those working in any profession. Qualifications obtained in foreign countries such as UDB diplomas and degrees should be recognised by the authorities, but there is no national system to allow this. Professionals graduated from foreign schools have difficulties in having their qualifications approved and to be included in the system, as services providers.

There are three different prosthetics/orthotics associations in Colombia: Asocopro, with 300 members (both graduated and experientially trained); personnel from Colombia, with 30 members, and an emerging association with graduates from UDB. The two prosthetics/orthotics training programmes in Colombia were both interested in ISPO guidelines and showed interest in recognition, namely: the National Apprenticeship Service (SENA), Bogota; and the Instituto de Técnicas Integradas Múltiples de Occidente (TIMDO), Cali.

The visit stimulated a round table meeting of organisations involved in prosthetics/orthotics.

Services visited and meetings held

Mercy Corps

A meeting with representatives of Mercy Corps confirmed the fact that although the health law is universal, accessibility to prosthetics/orthotics services for persons with disabilities is often not possible because of the lack of services and professionals, especially in remote and rural areas. To address this situation, Mercy Corps was working to train professionals for non-served areas. At the time of the visit some students attended the UDB programmes, funded by USAID via Mercy Corps with the collaboration of SENA. Mercy Corps was also developing a community based rehabilitation strategy to increase the services provision in areas where services are missing.

National Apprenticeship Service (SENA), Bogota

The National Training Centre for Orthopaedic Technology has been active at SENA since 2010. Its objectives are to contribute to improve the situation of disabled people in Colombia and to establish a training centre of orthopaedic technologists according to ISPO Category II guidelines.



The spacious technical teaching facilities at SENA.



Dietrich Niklas who is leading educational developments at SENA.

The programme is three years in duration and is recognised by the Ministry of Education. The facilities and equipment were modern and functional.

Three UDB, ISPO II graduates were among the SENA team. The first group of fifteen students graduated in 2013.

Ortoprotésicos Especializados Ltda, Bogota

This is a private business offering a prosthetics and orthotics service. There were good facilities and equipment as well as qualified personnel. The service was led by an UDB ISPO Category II graduate, and there was the capacity to make any kind of prostheses or orthoses. A range of suppliers mean that prescription choice was possible for both prostheses and orthoses.

*Ortoprotésicos
Especializados
Ltda provided
prosthetics and
orthotics services.*



International Committee of the Red Cross (ICRC), Bogota

A meeting was held with the Head of the Physical Rehabilitation Programme. ICRC supports a special fund for terrorist victims, which pays for a first prosthesis plus a replacement every 5 years. Additional support comes from physical rehabilitation services for Internally Displaced Persons. ICRC's provision of prosthetic limbs is steadily decreasing year on year because of the development of government funded prosthetic provision⁸. Two years ago they provided 79 prosthetic legs, this was reduced to 49 last year.

ICRC has had a long history of supporting services in Colombia, providing support for a wide range of activities, including those for persons with physical disabilities. Initially, a decentralisation plan for physical rehabilitation services with multiple ICRC services was designed to improve accessibility for amputees and other injured citizens away from the main cities to deal with the post conflict legacy. The decentralisation plan included the donation of machinery, equipment and a supply of consumable materials. ICRC also sponsored 9 students to attend the UDB courses in prosthetics and orthotics, qualifying in 2010. ICRC sponsored the government's first resolution on prosthetics and orthotics services.

Since 2011, the Colombia delegation has strategically shifted focus away from the delivery of physical rehabilitation services to being more focussed on supporting the implementation of government resolutions under a Memorandum of Understanding (MoU) with the Ministry of Health in Colombia. At the time of the meeting a new resolution was being designed with the Minister of Health, Colombia. The strategic focus of the MoU between ICRC and the Government has three themes: Accessibility, Quality and Sustainability. ICRC has reduced to two Physical Rehabilitation Services - one in Bogota at a hospital and the other in Cali at the private TIMDO training institute. Both involved a three party agreement. ICRC distributed polypropylene technology, this was exclusively for manufacturing prostheses or orthoses for children with disabilities.

ICRC co-ordinates a very active short course training programme of around 30 courses for multidisciplinary teams (physiotherapists, physicians and orthopaedic technologists) that include short courses on 'Amputation Surgery and Amputee Rehabilitation'. An example of this was a 10 day Amputee Rehabilitation short course hosted in Colombia for 10 clinicians (6 from Colombia, 2 from Nicaragua, 1 from Dominican Republic and 1 from Peru. Colombian delegates were hosted by ICRC and international delegates by the Special Fund for the Disabled (SFD). Resources such as a book on 'Amputation Surgery' have been developed as part of the courses' learning resources.



A clinical teaching area at TIMDO.

Instituto de Técnicas Integradas Múltiples de Occidente (TIMDO), Cali

The Institute offers nursing and dental technicians some careers in the health sector. It also offers a training programme in prosthetics and orthotics in two ways: a year long programme for experienced workers to give them some recognition of their abilities (ten people had completed this); a two and a half year programme with the first promotion of seven technicians graduating in 2014.

Students received practical experience at the Universidad del Valle where the multidisciplinary team evaluated clients. Two UBD ISPO Category II graduates are professors.

Round Table Discussion: ISPO-Colombia, Prosthetists/Orthotists and Colombian Associations

Representatives from ISPO Colombia (ISPO-Colombia), prosthetics/orthotics practitioners, ICRC, SENA and TIMDO were present at this meeting. The team presented this study's aims, objectives and methodology.

Two specific issues were then discussed: clarification about the constitution and board of ISPO-Colombia; and the situation of the orthopaedic technologists and prosthetists/orthotists graduated from foreign schools, specifically UBD, regarding recognition of their certificates. Those present agreed in principal to work together to improve prosthetics/orthotics practice. They would also explore a proposal to call all prosthetics/orthotics practitioners, graduated or empirical to take a final exam with SENA. This could provide a solution to recognition to allow them to come into the system as health services providers. This exam could be taken just once, but other measures should be determined for future development.



Round table discussions, Colombia.

Section 9: Summary and Recommendations

Impact on the establishment of services:

ISPO certified graduates demonstrated that they have set up, developed and delivered prosthetics/orthotics services. In comparison to the number of people with disabilities who desperately need the service provision, the number of trained professionals in Mexico, Guatemala and Colombia was inadequate. The consequence is that many individuals with disabilities cannot access appropriate and much needed treatment.

RECOMMENDATION 1: A greater number of ISPO certified personnel is needed for the establishment of more prosthetics and orthotics services in Mexico, Guatemala and Colombia.

Impact on the appropriateness of prosthetic and orthotic service delivery:

ISPO certified graduates provided appropriate and safe prosthetics/orthotics care to their clients. Graduates in this study fully understood the needs of their clients, identified treatment goals and were able to prescribe appropriate prostheses and orthoses.

Graduates showed they were keen to improve their practice and both needed and wanted to strengthen certain aspects through continued professional development. A particular area highlighted in the study was the need for improvement in the graduates' clinical record keeping, especially in objectively documenting client assessment and outcomes. This should then form the basis for reflective practice and clinical audit. Graduates should seek to continually improve aspects of prosthetic and orthotic fit and alignment. By developing a clearer understanding of the design concepts of prosthetic sockets and orthoses and reducing the application of hybrid designs, this should result in perfected fitting and alignment outcomes for the end user. Clients would also benefit from graduates working more closely with a multi-disciplinary team to provide a more holistic approach to service provision. This would increase the positive impacts of prosthetic and orthotic service delivery on clients' lives.

There was a wide range of prostheses and orthoses available in Mexico, Guatemala and Colombia. Graduates should keep abreast of new and emerging technologies and techniques to ensure continued appropriateness of provision to their clients.

RECOMMENDATION 2: ISPO certified graduates provide appropriate prosthetics and orthotic services. ISPO should continue to promote the adoption of its standards of professional practice.

RECOMMENDATION 3: UDB ISPO certified graduates should continually reflect upon their practice and strive to improve it.

RECOMMENDATION 4: Graduates should improve their clinical performance by:

- Better clinical record keeping.
- Maintaining a focus on the fit and alignment of the prosthetic and orthotic devices that they provide.

RECOMMENDATION 5: Graduates should promote their own participation in a multidisciplinary team to ensure all aspects of their clients' needs are met, and thus achieve the best possible outcomes.

RECOMMENDATION 6: Graduates should keep up-to-date with new technologies and techniques in the field of prosthetics and orthotics.

Impact and clinical leadership:

There is a shortage of ISPO Category I personnel at national referral centres. ISPO category I personnel are expected to provide clinical leadership to their peers and to ISPO Category II personnel. Indeed, there is a dearth of both ISPO Category I and ISPO Category II personnel in the workforce at national levels. The WHO/ISPO Training guidelines state “8 Category I/II per national centre”. Without the establishment of ISPO Category I personnel at this level, adequate supervision, clinical leadership and professional development cannot take place. Where available, ISPO Category I professionals tend to be earmarked for teaching or management posts, rather than providing clinical leadership within services.

RECOMMENDATION 7: The number of ISPO Category I certified personnel should be increased at national referral centres in Mexico, Guatemala and Colombia and should work to fulfil the Category I professional profile. The number of ISPO Category II personnel should also be increased.

RECOMMENDATION 8: National referral centres for prosthetics and orthotics should provide greater clinical leadership to other services in their country. National referral centres may be identified in both the public and private sectors and public/private partnerships should be encouraged. The specialist knowledge and skills of ISPO graduates should be built on and developed to achieve this outcome.

Impact on professional communities:

Only 59% of graduates in our study reported that they were members of a professional group. The total number of ISPO certified graduates in Mexico, Guatemala and Colombia numbered 61, and those interested in professional affairs were seen to be active in their national communities. There was a noticeable interest in regional Latin American activity, especially from Mexican and Colombian graduates who participated in the regional ISPO professional congress - United Frontiers. There is the potential to collectively build a stronger professional community by engaging more UDB graduates in the region. Without such a focus, some of the graduates who work in smaller or more remote services may become isolated.

RECOMMENDATION 9: ISPO certified graduates should actively participate in a recognised professional community with the purpose of contributing to professional affairs as part of their clinical skills development.

RECOMMENDATION 10: ISPO National Member Societies should influence the new generations of rehabilitation professionals, including prosthetists/orthotists and orthopaedic technologists.

Impact of ‘Prosthetics and Orthotics’ and ‘Orthopaedic Technology’ as a career:

Prosthetists/orthotists and orthopaedic technologists have a clear scope of practice and nature of work. In Mexico, Guatemala and Colombia ISPO certified graduates have dedicated themselves to professional practice. Although career pathways are not clearly defined nationally, many graduates have achieved careers and/or developed businesses in prosthetics and orthotics services. Several graduates have demonstrated leadership and management skills. Recognition of qualifications from foreign universities is not common in the countries that were visited so graduates struggle with professional recognition, which can hinder their work.

RECOMMENDATION 11: ISPO certified graduates should strive for recognition of their profession through discussion and negotiation with their national peers and recognition bodies.

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

This study demonstrates that prosthetic and orthotic services have a profound impact on the lives of the clients that they serve. Service users with disabilities achieve greater mobility, independence, and employment prospects through the provision of prostheses and orthoses. Where the treatment was provided by ISPO certified graduate clinicians service users were more confident that the standard of care was appropriate, compared to being treated by untrained personnel.

In principal, children with disabilities are funded to access prosthetics and orthotics services in Mexico, Guatemala and Colombia. These services are provided in a few selected urban locations. Large geographical distances and mountainous terrains are real barriers to children and their families accessing these services. Many adults with disabilities find the provision of services even more difficult to access particularly if they are not part of health insurance schemes or if they are not war veterans.

RECOMMENDATION 12: ISPO certified graduates should continue to contribute to national workforce planning in their countries with a view to reaching unserved adults and children in need of prosthetics and orthotics services.

Professional training

UDB has played an important role in capacity building for services in Mexico, Guatemala and Colombia. UDB should continue to respond to the professional developments needs of their ISPO certified graduates at both undergraduate and postgraduate level. As part of this UDB should remain in contact with their alumni. UDB has a strong regional role to play in developing and delivering educational opportunities in Latin America.

RECOMMENDATION 13: UDB should continue to work with the ISPO standards of professional training and maintain recognition at ISPO Category I and II level. At the same time, communications and dialogue should be reinforced between all involved.

RECOMMENDATION 14: UDB consider the results of this study when reviewing the undergraduate curriculum and implement as needed the report recommendations.

RECOMMENDATION 15: There is a need to develop postgraduate short courses and upgrade training related to prosthetics and orthotics. Considering that the service provided by graduates are primarily based on a doctor's prescription, it is important to also involve/motivate the referrer on these short courses. A number of educational providers and professional associations can contribute to addressing the development needs identified in this study.

Section 10: Glossary of acronyms

AFO	Ankle Foot Orthosis
A/P	Anteroposteriorly
CADEG	Centro de Atención a Discapacitados del Ejército de Guatemala
CIR	Centre International de Rehabilitation
CIREC	Centre Integral de Rehabilitacion de Colombia
CCTV	Closed-circuit Television
CIDOP	Research and Development Centre for Prosthetics and Orthotics
CLORSA	Clínica de Ortopedia y Rehabilitación, S.A.
ICRC	International Committee of the Red Cross
IGSS	Guatemalan Institute of Social Security
ISPO	International Society for Prosthetics and Orthotics
KAFO	Knee Ankle Foot Orthosis
KD	Knee Disarticulation
LLP	Lower Limb Prosthetics
LLO	Lower Limb Orthotics
M/L	Mediolaterally
P & O	Prosthetics and Orthotics
PTB	Patella Tendon Bearing
SACH	Solid-Ankle Cushion-Heel
SENA	National Apprenticeship Service
SO	Spinal Orthotics
SPSS	Statistical Package for the Social Sciences
TF	Trans-femoral
TIMDO	Instituto de Técnicas Integradas Múltiples de Occidente
TSB	Total Surface Bearing
TT	Trans-tibial
UDB	University of Don Bosco
ULO	Upper Limb Orthotics
ULP	Upper Limb Prosthetics
USAID	United States Agency for International Development
WHO	World Health Organization

Section 11: References

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