# PROSTHETICS & ORTHOTICS IMPACT ASSESSMENT
## India and Bangladesh

*A young client from Bangalore at his house with his family, community workers and the study team. He has been provided with ankle foot orthoses and adaptive equipment for standing.*

USAID FROM THE AMERICAN PEOPLE

ISPO

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June 2015

# Acknowledgements

The impact assessment was funded by the United States Agency for International Development (USAID). The International Society for Prosthetics and Orthotics (ISPO) appreciates the support of USAID in strengthening our understanding of prosthetics and orthotics training and services.

The authors are grateful to all of the participants in this study, especially the graduates, clients and the individual people with disabilities and their families who shared their stories with us.

In addition the authors would like to thank Mr. Rajdeep Kumar from India and Mr. Imran Shoaib S.M. from Bangladesh, the local liaison officers for their respective field visits. We also extend our gratitude to representatives from the Government Ministries in India, non-governmental organisations in India and Bangladesh, as well as the Directors and Managers in all of the centres visited. Edited by Sandra Sexton, Angie Weatherhead and Diana Corrick.

***Together we will continue moving beyond physical disability***

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# Contents:



Appendices are available separately:

# Section 1: Executive Summary

In South Asia the need for services that mitigate the effects of disabilities is clear as population based estimates report the number of persons with disabilities at 10%[1]. For India and Bangladesh with a combined population of almost 1.4 billion and an estimate of more than 9 million persons[2] with mobility related disabilities the need for prosthetics and orthotics services is amply demonstrated.

Mobility India is the only ISPO recognised program in India offering training for ISPO Category II single discipline. At the time of the study since 2002 Mobility India has enrolled two hundred and twenty-one students.

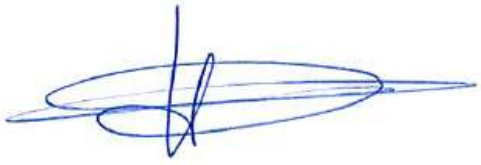
Our study was conducted in association with ISPO's current USAID funded programme: '*Rehabilitation of physically disabled people in developing countries'*. We carried out field visits to India and Bangladesh, interviewed Ministry officials, Heads of Clinical Services and Heads of Prosthetic and Orthotic Departments. We conducted a partial audit of graduate clinical skills and competencies and determined the professional development needs of graduates in selected South-East Asian countries. We also listened to service users, hearing stories of how services had directly impacted upon their lives.

During the field visit there was evidence that ISPO recognised graduates from Mobility India had a positive impact on:

- The establishment of services in Bangladesh
- The on-going development of standards for clinical services and prosthetic/orthotic education in India
- The overall appropriateness of prosthetic /orthotic services
- Professional communities and collaborations
- The long-term sustainability of prosthetic /orthotic services

The most profound impact appeared to be on the lives of persons with disabilities and their families. Repeatedly the team heard from the volunteer patients how the devices had positively influenced their independence through increased access to employment, education, social activities and their community. The devices allowed the patients to not only contribute to the social and economic development of their community, but to aspire to far more than they had previously thought possible. Families reported that the impact of devices delivered to their loved ones had also changed their lives, with parents seeing a future for their children that had once been unimaginable. Many individuals reported feeling less fear of the future and their entire family experienced less of the stigma commonly associated with being related to a person with disabilities in these countries.

In both countries ISPO recognised graduates had good working relationships with other disciplines, worked at or above the level expected of an ISPO Category II graduate of a single discipline and were sought after and well respected by employers. Limitations exist in both countries with respect to resources in terms of both the size and profile of the workforce, and in infrastructure and fiscal/material resources. This study has made 22 recommendations to help to further develop prosthetic and orthotic services.



Helen Cochrane, CPO (Canada) MSc
ISPO Study Team Lead

# Section 2: Introduction and context

The International Society for Prosthetics and Orthotics (ISPO) certifies prosthetists/orthotists (ISPO Category I) or orthopaedic technologists (ISPO Category II) graduating from ISPO evaluated courses of study. ISPO has a programme of activity grant funded by the United States Agency for International Development (USAID) named *'Rehabilitation of physically disabled people in developing countries'.* One of the objectives of the grant is to assess the impact of ISPO Category I and II training.

In South Asia the need for services that mitigate the effects of disabilities is clear as population based estimates report the number of persons with disability at 10%[1]. For India and Bangladesh with a combined population of almost 1.4 billion people and an estimated more than 9 million persons[2] with mobility related disabilities, the need for prosthetics and orthotics services is amply demonstrated.

Mobility India (MI) is the only ISPO recognised programme in India offering a range of training from ISPO Category II single discipline courses to educating community level workers tasked with increasing awareness of disabilities, related issues and livelihood programs to alleviate poverty associated with disabilities. MI targets India's underserved southern, eastern and north eastern region with service delivery and education. The training centre is located in Bangalore in the southern state of Karnataka. The school is open to applicants from across India as well as international enrolment and there are students from across the region. At the time of the study, since 2002 MI has enrolled 221 students with 44% of enrolments being international students, primarily from 13 countries from Asia and Africa. 25% of students are people with disabilities. MI has received support from USAID through a scholarship program to train ISPO Category II single discipline prosthetic and/or orthotic professionals. Since 2009 USAID has sponsored 23 professionals, 20 males and 3 females, 11 in prosthetic practice and 12 in orthotic practice, from six countries (Bangladesh, Nepal, India, Malawi, Yemen and Angola). MI has also received direct grants from USAID for a twenty-seven month project to support improvements in rehabilitation therapy programmes in eight conflict-affected states in India.

We considered various ways to measure impact from published literature and used the USAID Impact Assessment Primer Series as guidance[3] and developed a causal model and analysis framework. 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."**

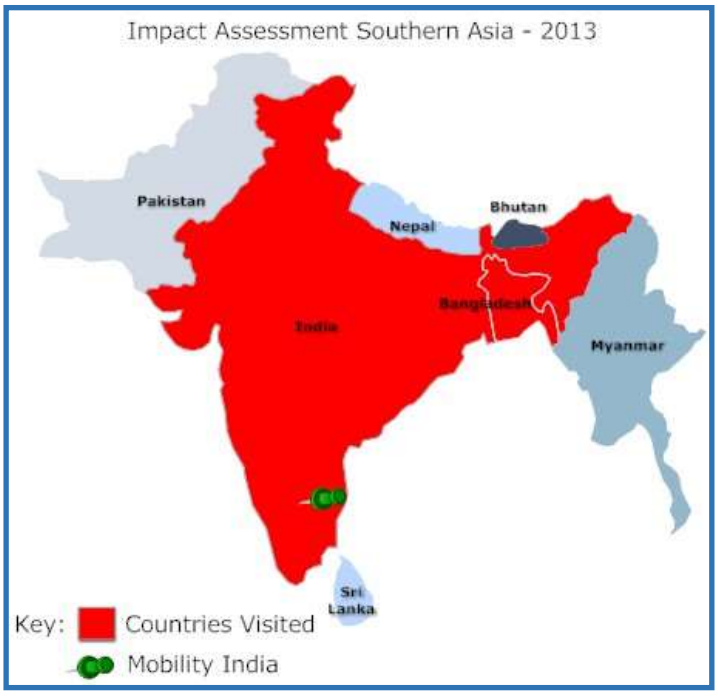



*Figure 1. Map of Southern Asia highlighting India and Bangladesh.*

# Section 3: Methodology

This impact assessment focussed on completing a partial audit within 2 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, 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 7th to 15th August 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 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 India and Bangladesh.

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 Graduate Audit survey specifically aimed to:

- determine the scope and level of professional practice
- audit MI graduate skills
- determine the professional development needs of the graduates

ISPO Category I and II training aligns with ISPO published professional profiles for prosthetist /orthotists (ISPO Category I) and orthopaedic technologists (ISPO Category II) [4].

Nature of the participants: ISPO certified graduates of MI working in India and Bangladesh 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 MI 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 India (Bangalore, Chamrajnagar and Kolkata) and Bangladesh (Dhaka). A convenience sample was selected depending on where graduates worked, the available time and budget for each field visit and flight itineraries. The graduates 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 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 India & Bangladesh

In the last ten years MI has trained ISPO Category II prosthetists and/or orthotists. At the time of the study no ISPO Category I recognised programmes existed in India. India and Bangladesh were selected as countries for field visits for inclusion in the impact assessment because each county has a sizeable MI alumni population. Five centres in India and three centres in Bangladesh were visited to assess the graduates of the ISPO recognised programme.

**Graduate participants in this impact study**

A sample of 24 ISPO certified graduates entered the study, 115 in India and 9 in Bangladesh. The average age of the MI graduate participants was 29 years old ranging from 24 to 44 years. We saw 17% of all MI ISPO Certified Indian personnel, and 39% of all MI graduated Bangladeshi personnel. 38% of the sample was female (compared with 30% of all MI Category II graduates). The average number of years since graduation was 5 years.

| **Number Interviewed** | | **ISPO Category I** | **ISPO Category II** |
|---|---|---|---|
| India | | 0 | 15 |
| Bangladesh | | 0 | 9 |
| **Total** | | **0** | **24** |

*Table 1: Graduate participant information*

| | Average age | Age range | | Average years graduated |
|---|---|---|---|---|
| | | low | high | |
| India | 29 | 24 | 44 | 6 |
| Bangladesh | 31 | 24 | 39 | 4 |
| **Overall** | **29** | **24** | **44** | **5** |

*Table 2: Graduate ages and years graduated*

# Professional Practice

Scope of practice: Of the 24 participants, there were 9 graduates who had completed both the prosthetics and orthotics modules at MI. 10 had completed the orthotics module, 5 had completed the prosthetics module and none of the graduates had completed the upper limb/spinal module.

34% of the participants reported their case-load was exclusively lower limb orthotics. 21% of the graduates reported they worked exclusively in lower limb prosthetics. 25% of graduates reported they worked in both lower limb prosthetics and orthotics. 8% of the participants reported they worked in all levels of prosthetic, orthotic and spinal while 8% reported they worked in upper and lower limb orthotics. Only 1 participant reported that their caseload included upper and lower limb prosthetic interventions.

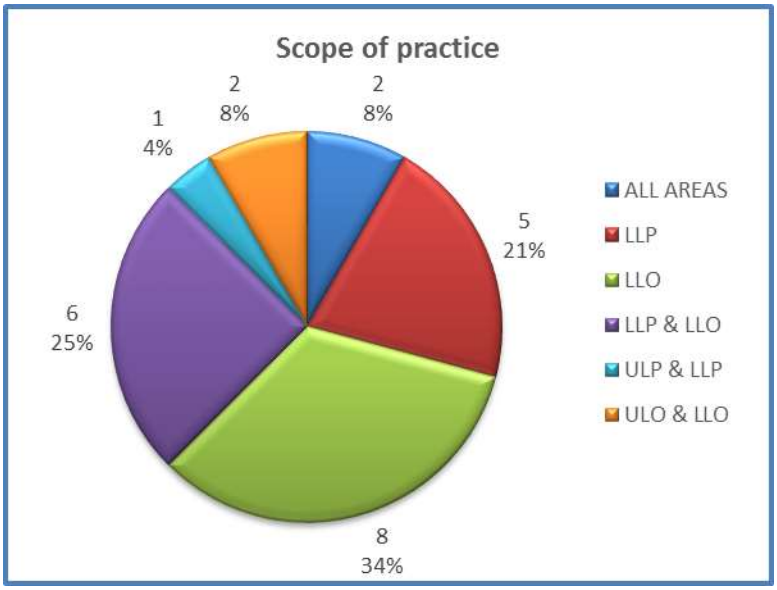



*Figure 2*

Specialist care: 38% of graduates reported they specialised in a particular device type or pathology. Most of those who considered themselves specialists included multiple areas of specialty.

Lower limb orthotic devices and related pathologies were the examples most often provided. For prosthetic specialties congenital short limb was most often reported with three graduates listing it as their specialty.

Activities and caseload mix: On average the graduates reported they spend 69% of their time delivering direct patient care. Graduates reported 20% of their time is spent supervising others while they provide direct patient care. Graduates reported 7% of their time was spent on administrative tasks within their centre and 4% of their time was spent on administrative tasks outside their centre.

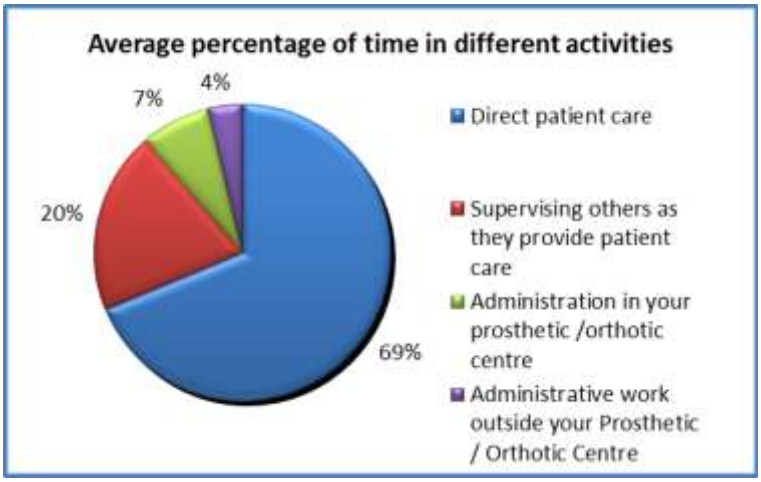



*Figure 3*

Graduates reported that lower limb prosthetics and orthotic comprised the majority of their case-load with 42% lower limb prosthetic and 48% lower limb orthotics.

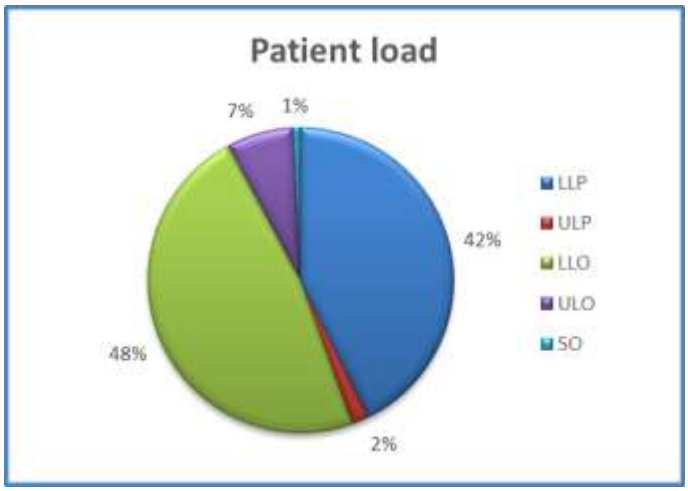



*Figure 4*

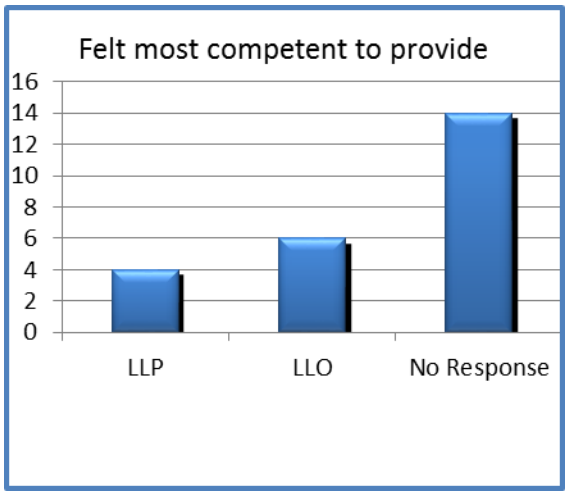



*Figure 5*

Level of competence: Fourteen graduates did not respond to this question. Those who did respond reported feeling most confident in lower limb orthotics with six graduates indicating this as their most confident area and four graduates indicating they felt most confident in lower limb prosthetics.

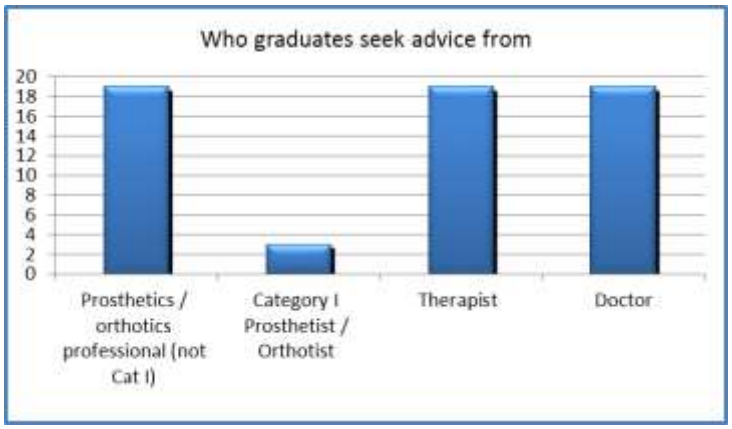



*Figure 6*

Seeking advice for complex cases: All graduates indicated that they had someone they could access for advice for complex cases. Nineteen graduates indicated they had access to other prosthetists/orthotists, therapists and/or doctors. Three graduates indicated that they had access to ISPO Category I prosthetists/orthotists.

Keeping up to date with information: 88% of graduates reported that they kept up to date by participating in workshops or seminars and 64% reported that they had access to the internet at work. 28% had access to a medical library, 16% could access the internet through an internet café and 8% had home access to the internet. Only one participant reported accessing full text journals to keep up to date with information.

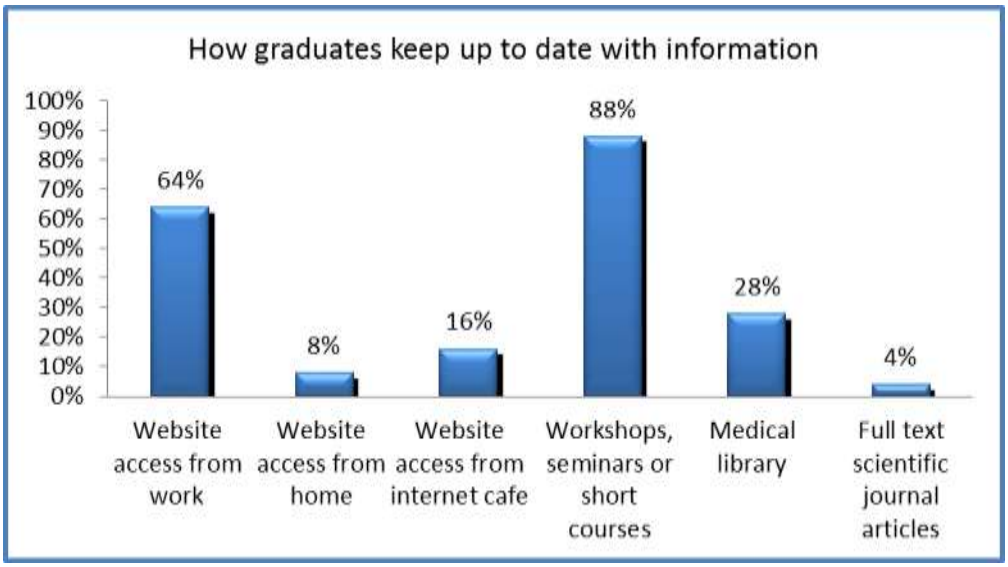



*Figure 7*

Membership of professional bodies and clinical interest groups: 36% of graduates reported being a member of a professional body. This thirty-six percent is comprised of nine graduates from Bangladesh who indicated they are members of the Bangladesh Society for Prosthetics and Orthotics. None of the graduates from India reported that they were part of professional body or clinical interest group.

## Clinical practice

Twenty four MI graduates completed this section and they presented twenty-nine clients. Fifteen orthotic clients and fourteen prosthetic clients were reviewed.

In one centre no clients were able to be reviewed as local political unrest in Dhaka forced the change of the evaluation date at short notice resulting in two graduates being interviewed without their volunteer clients present. Multiple presentations were done by graduates who had completed both the lower limb prosthetic module and the lower limb orthotic module, presenting one volunteer patient from each discipline.

**Referral prescriptions**: 14% of case records included a referral from a medical doctor.

**Clinical records**: In most centres clinical records were available with 83% of the cases having some type of record available. However records were only considered to be complete in 31% of cases. Where clinical records were incomplete there was a range of missing data. 86% did not include a doctors' referral and medical history was often noted as missing as were measurement charts, clinical examinations and specifically gait assessments.

**History taking:** All graduates reported some medical history including how the mechanism of the injury incurred and/or history of the disease process. All records included a social history.

**Description of physical disability:** 69% of the graduates listed the functional impact of the client's disability. 28% also reported the impact of the disability on some aspect of the quality of life or activity of an individual client. 24% of graduates included no functional impact or quality of life report or commented listing only the cause or diagnosis that resulted in disability. No graduates indicated that they used a scale or tool to measure or record the degree of disability.

**Prosthetics and orthotics history:** 55% of graduates reported a detailed history. 17% of graduates reported a history but some details were considered to be missing. In 28% of cases the client was receiving their first device.

**Physical examination**: Most graduates could complete a basic assessment. In many cases some aspects of assessment were missing and in some centres the graduates were not always involved in the physical examination. At times the findings reported were more generalised and did not investigate deeply into the case or condition.

**Functional rating of user:** 69% of graduates reported on the functional grade of the volunteer client they presented. Only one graduate used a scale to determine and report the functional level of the client.

**Devices meeting client's needs**: Graduates reported that the device provided was meeting their clients' needs in 100% of cases presented during the study. Most devices displayed signs of being regularly worn and clients reported that the devices were very helpful to them and meeting their needs.

**Appropriateness of device:** All graduates reported that the device provided met their clients' needs. In 69% of cases the investigators agreed that the device was meeting the clients' needs given the local context, limited materials and resources. In 17% of cases the investigators thought the device was not meeting the clients' needs.

**Prosthetic and orthotic prescription and specification:** Twelve of fourteen prosthetic cases presented were trans-tibial, with one bilateral trans-tibial, one extension prosthesis and one trans-femoral case.

In general there appeared to be a limited range of components available for prosthetic intervention in the centres that were visited. All devices were endo-skeletal, with six resin sockets and nine thermoplastic. Ten of the trans-tibial sockets were patellar tendon bearing design and the only trans-femoral socket presented had a quadrilateral socket. Eleven of the feet were solid ankle cushion heel design. There were three Jaipur modular feet and one multi-axis foot. There were eleven supracondylar suspensions, with one client also using a sleeve to augment suspension. In addition, two circumferential cuff suspensions were presented. Apart from the trans-femoral, all prosthetic devices included a foam liner for skin interface and/or suspension. The only knee joint presented was a uni-axial knee joint.

In total nineteen orthotic devices were seen between the fifteen clients. There were ten ankle-foot orthoses presented including one bilateral case, who also used a knee orthosis for contracture management and a modular standing frame fitted by the participating graduate. Six knee-ankle-foot orthotics were presented as well as one foot orthotic and one wrist-hand orthosis. Many of the knee-ankle-foot orthotics used a blend of custom fit ankle foot shells and modular thigh shells with ischial weight bearing brim design.

**Durability of device:** Most devices were new with the average age of all devices being six months old. Those that were more than twelve months old generally showed signs of being used regularly over time. Graduates reported a normal rate of repair/adjustment and plan for follow up.

**Devices:** In all but one case the graduate presenting the case had fabricated the device. In the one case the device had been made by one of the other ISPO Category II graduates working in the same centre.

**Follow up since delivery**: In 55% of cases follow up had been planned and/or completed. Where it had not been completed it was usually because the device was recently delivered to the client.

**Treatment goals identified and noted:** In 34% of prosthetic cases the graduates identified a treatment goal and in 66% of prosthetic cases the goals were at least partially identified. The evaluators observed that in 73% of orthotics cases the deformity and instability in the joints was reduced and/or gait was improved.

**Improvements for devices seen:** In 24% of the cases graduates did not identify any areas of improvement. 48% of graduates indicated that they would like to change their prescription if resources allowed. In 21% of cases graduates identified that they would like to change the fit of their device. The evaluation team generally agreed with these findings.

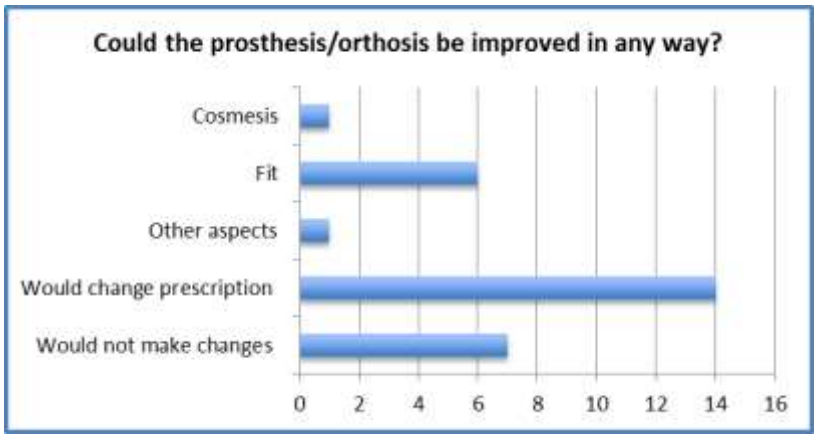



*Figure 8*

**Most beneficial part of professional training:** Few graduates identified a specific aspect of their training as most beneficial. 17% stated that clinical practice was the most useful part of their training.

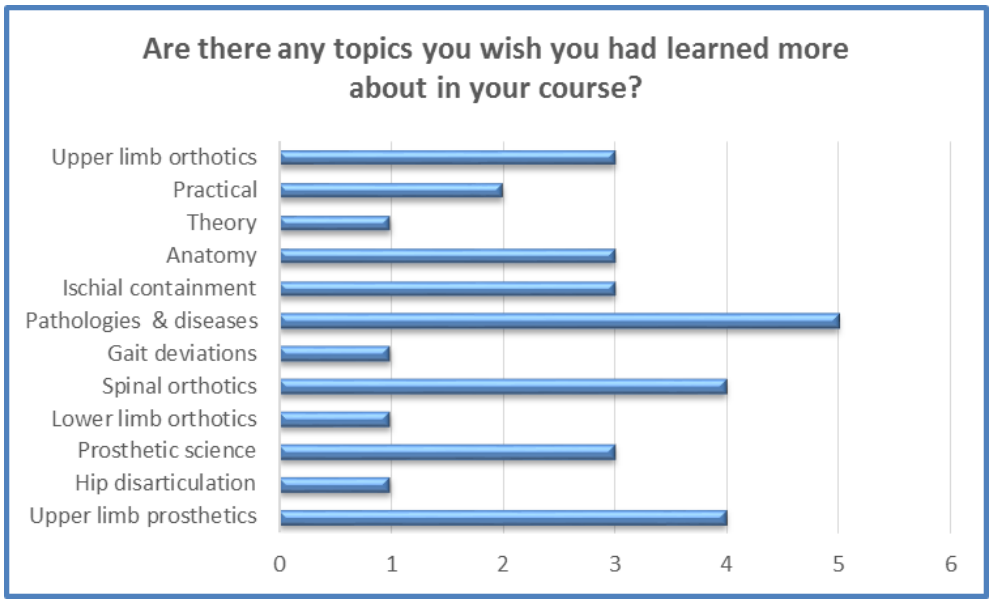



*Figure 9*

**Topics which could have been better covered in course:** Graduates most frequently reported that they wished to learn more about pathologies and diseases. They also highlighted lower limb prosthetics and in particular about socket design for trans-femoral amputation.

**Desire for continuing education courses**: Most graduates expressed an interest in completing additional modules to broaden their clinical scope. When asked specifically about their interest in continuing professional development, higher levels of amputation and higher level lower limb orthotics were areas where graduates most frequently indicated they would like to participate in continuing education. These were specifically prosthetic componentry, trans-femoral socket design and orthotic management for a condition that indicated a knee-ankle-foot orthosis may benefit the client.

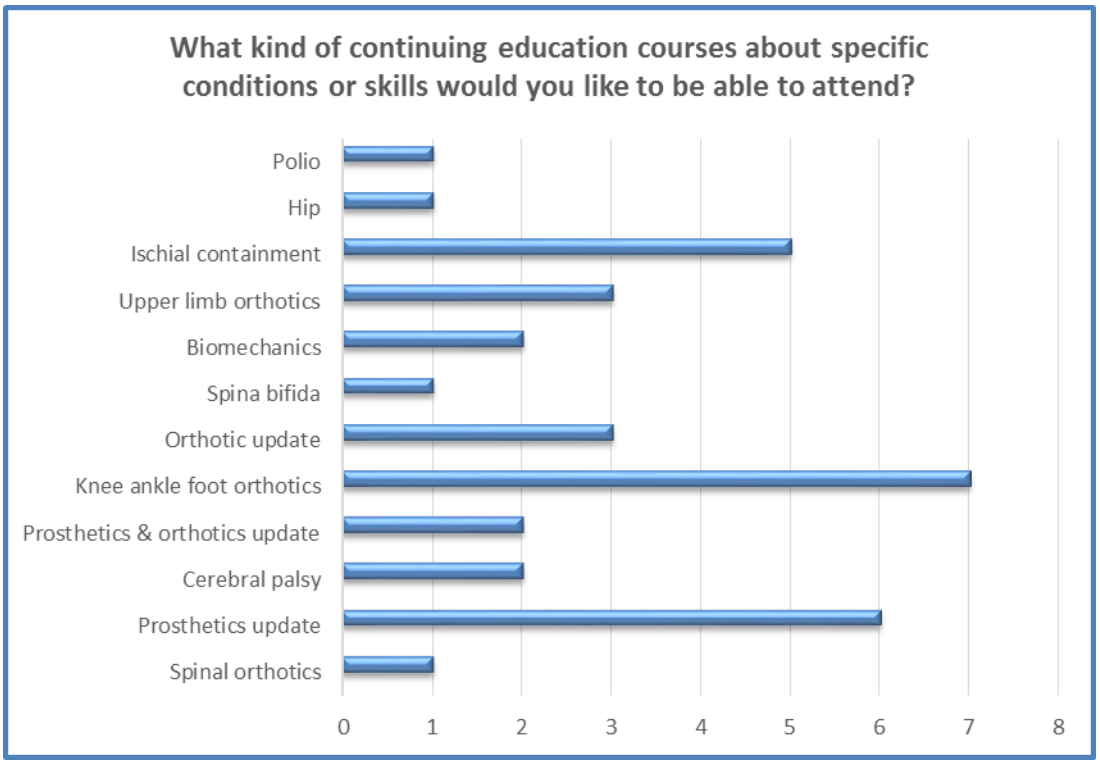



*Figure 10*

**Desire to introduce new technologies**: Graduates most frequently reported that they would like to see an increased range of modular components for prosthetics introduced to their centre. Most graduates had a limited awareness of the range of technology that may be available. 66% of graduates did not provide an answer to this question.

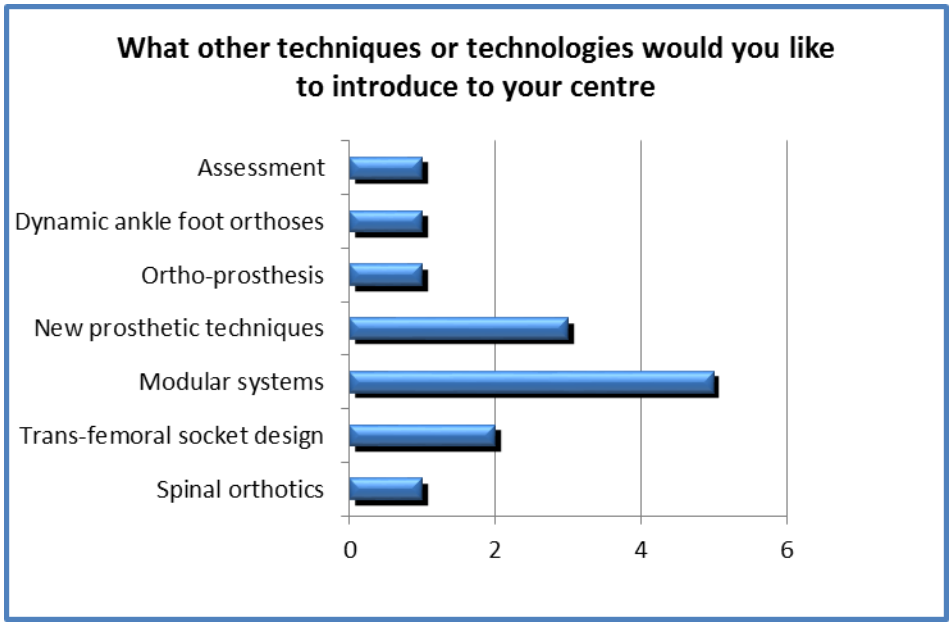



*Figure 11*

# Personal development planning

The investigator and graduate reviewed the data collection form without the client present. Three needs were identified for each graduate. The following table shows a summary of the development needs. Where needs were identified because of 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 greatest development need identified was for graduates to improve their clinical skills. The most common areas of need were gait assessment, general clinical assessment, foot assessment and the systematic recording and reporting of their clinical assessment. Upper limb and spinal interventions were also noted as an area where graduates would benefit from development as many were treating these cases in the absence of any formal training.

| Development needs summary | |
|---|---|
| **Continuing professional development need ranked by number of times identified** | **Number of times identified** |
| Clinical skills updates | |
| Gait assessment | 8 |
| Systematic recording and reporting | 8 |
| Clinical assessment | 5 |
| Foot assessment | 4 |
| Skin conditions | 3 |
| Engage a clinical mentor | 3 |
| Goal setting | 2 |
| Conditions/pathologies | |
| Polio | 1 |
| Paediatric pathology | 1 |
| Cerebral palsy | 1 |
| Stroke | 1 |
| Spasticity | 1 |
| Prosthetics and Orthotics clinical & technical skills | |
| Upper limb/spinal | 12 |
| Communication | 4 |
| Knee ankle foot orthotics | 3 |
| Device delivery criteria | 2 |
| Alignment orthotics | 2 |
| Socket design | 2 |
| Prescription criteria | 1 |
| Biomechanics | 1 |
| Hip disarticulation management | 1 |
| Alignment prosthetics | 1 |
| Patient education | 1 |
| Orthotic components | 1 |
| Ankle foot orthotics | 1 |

*Table 3*

# Section 5: How services impact on lives – client stories

Service users clearly made known the life changing impacts that the prosthetics and orthotics services had made on their lives.

In this section we share the feedback that clients gave to their graduate clinicians in response to the question:
***"What difference has the orthotic/prosthetic service made to the user's life?"***

As well as the 29 clients who consented to be presented by the graduates, we also spoke to 6 service users who shared their personal stories with the study team. Their stories better informed us of the ways in which services influenced and enabled them.

## Client participants

| Prosthetic clients | | Orthotic clients | |
|---|---|---|---|
| **Conditions** | **n=** | **Conditions** | **n=** |
| Diabetes | 2 | Club foot | 2 |
| Trauma | 10 | Congenital leg length discrepancy | 1 |
| Congenital | 2 | Stroke | 1 |
| | | Trauma | 1 |
| | | Cerebral Palsy | 2 |
| | | Polio | 8 |
| **Total** | **14** | **Total** | **15** |

*Table 4*

29 clients were presented by 24 MI graduates. There were 16 male and 13 female clients with an average age of 29 years ranging from 2.5 to 70 years.

Provision of a prosthesis or orthosis meant that clients are enabled to participate in education, work and social activities. They reported that they were more mobile and active in their communities when wearing a device.

Of the 29 clients, five were children under 16 (two of whom were under school age). The three children of school age attended school. Two clients were students at college and two were housewives.

Sixteen people were in employment with job roles stated as follows: tea sellers (2); HR manager (1); construction worker (1); building contractor (1); orthopaedic technician (1); garment worker (1); shop keeper (1); sari seller (1); shop worker (1) and 3 clients were employed, but employment type was not noted.

## Impact on persons with disabilities

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

*Working as an orthopaedic technologist.*

**Venkateswaramma** is 29 years of age, from Andrha Pradish in India, a rural area where she grew up with a loving and supportive family. When she was only one and a half years old she could not move her left leg and she was taken into the hospital where a devastating diagnosis of polio was made.

The effects of polio delayed her learning to walk and prevented her from playing with other children. When she was old enough she went to school, but walking with her stick meant she could only manage to go to and from school. Things that others take for granted like household chores and wearing sandals were an impossibility for her.

In 2000 Venkateswaramma received her first orthoses from Mobility India after surgical intervention. She was finally able to walk independently without the aid of a walking stick and for much longer distances. She was able to help with household chores and noticed that strangers stared at her much less than before. This made her feel more comfortable and confident. Then in 2002, she was offered a chance to train as an orthotist at MI. It was not an easy decision as her parents took some convincing that it would be the right move for her, but eventually they came to see it was an opportunity that could change her life forever.

After successfully completing the orthotics module Venkateswaramma went on to complete the prosthetics module. She works for MI, is married and lives a very happy and fulfilling life. Venkateswaramma says that without the orthosis life is very difficult. She can remember the time when she needed a stick for walking and was not able to do almost anything, but most of all, she remembers the way people used to look at her and how this made her feel.

Being fitted with the orthosis represented a huge difference in her life as she can do anything any other person can. Venkateswaramma is especially grateful to her parents who always took care of her as she is aware of other people with disabilities who have not been so fortunate. As for the opportunity to be trained by MI as a professional prosthetist/orthotist she welcomed the prospect of helping other people in need. It has changed both her and her family's lives.

**Hamada** is 27 years old and lives in Kolkata, India. At five months old, in spite of being vaccinated, Hamada acquired polio. She endured years of therapy and other treatments. Although her mother encouraged her, Hamada was still not able to do all the same things that other children did. Her hand had to be used to support her knee to stop it from buckling under her.

All that changed when she was ten years old and she received her first orthoses. She walked independently for the first time. As she got older she grew out of orthotic devices but the designs got lighter and even more comfortable for her.

*Hamada fabricates prosthetic feet.*

In 2002 she was recruited as part of a group of women with disabilities to be trained at Mobility India in Jaipur foot fabrication. After the training she stayed as a staff member. Hamada loves her job, is married and has a lovely daughter.

Hamada says that ***"the orthosis allowed me not only to have better mobility, but the opportunity to go out, meet people and live independently".***

Being at MI has given her the opportunity to meet other people with any kind of disability at any stage of their life. From this Hamada understands that she is not the only person with mobility difficulties, while her experience has made her self-confident and able to trust in herself.

*Ram tells Dr Rosario his story.*

**Ram Prasad Sardar** is an amputee living just outside Kolkata, India.

At ten years of age he had an accident that resulted in the amputation of his right leg. During the following two years he received physical therapy and walked with crutches. Ram's life was very different from other children of his age and he could not carry even the smallest thing.

At age twelve he received his first prosthesis which was made of local materials. It meant he could walk without crutches, for longer distances and faster. However Ram still experienced pain and pressure areas in the stump. At the age of twenty-five years he got married and has two wonderful children.

Ram's life became even harder as with poor education and a family to support he could only take labour intensive jobs. This type of work began to take a heavy toll on him.

Then the International Committee of the Red Cross sent him to MI in Kolkata to get a new prosthesis. It was the first time in all his treatment he had seen an ISPO certified graduate.

At the time of the study Ram was 40 years old and had had his new prosthesis for only two weeks. Even from this short time period Ram said that his new prosthesis was excellent compared with the earlier prosthesis. The socket fitted better with the prosthesis being much lighter and made him feel much more comfortable. He described it as the best he ever had, and was thankful to Mr. Sanni the Prosthetist for making this device for him. Ram can now walk longer and even run! He practices sport like boxing, rides a bicycle, works hard and share the joys of life with his family.

For Ram the prosthesis meant an opportunity to live a truly normal life.

*Ram demonstrates his walking ability.*

*Adul works as a prosthetics/orthotics technician.*

**Abdul Aziz** from Bangladesh is 24 years old. In 1997 he was riding his bicycle when he was struck by a passing truck. The accident caused Abdul to have bilateral trans-tibial amputations.

Recently Abdul has completed his level twelve education and was referred to the Centre for the Rehabilitation of the Paralysed where he not only received two new prosthetic limbs but the chance to enrol in a part-time programme offering computer training to persons with disabilities. While in the process of having his new limbs fitted, staff at the centre offered him a further opportunity to learn a new vocation - to train as a technician in the centre. He now continues his computer training in the morning, before going to work in the prosthetics/orthotics department fabricating limbs.

One day he thinks he would like to become a prosthetist/orthotist but currently he is happy to have comfortable legs that allow him to work and attend school each day, as well to ride his bicycle and motorbike!

**Afnan** is a shy two and half year old girl in Bangladesh. She was born with a right clubfoot and her mother and father were concerned she would have a problem walking and living a normal life in the community. Her parents were also worried about how they would pay for the treatment. Eventually she entered a local programme offering the Ponsetti Method treatment for the condition. The process went well initially, but when she started wearing splints the provider (who was not a trained orthotist) was not able to explain what they should do or why. The family could not afford to pay for the devices and didn't understand the treatment, so naturally they discontinued the treatment altogether. Afnan's feet then seemed to get worse again.

Eventually the family was referred to the Centre for Disability in Development in Bangladesh where they met the staff of the prosthetics/orthotics department. Afnan was given an ankle foot orthosis and worked with the physical therapy department. Now she can walk and plays with her brother. Her mother worries less about what her future might hold for Afnan. The family is very happy with the help Afnan has received and the support of the professional staff at the Centre for Disability in Development.

*Afnan at the orthotic service.*

**Nilanjuna** is an ISPO Category II single discipline graduate from MI. She is a prosthetist working at the BRAC limb-fitting centre in Bangladesh.

Fourteen years ago she was working in the health program at BRAC. While riding her motorcycle in the city she was hit by a truck. Her leg was badly injured in the crash. At the time Nilanjuna was also seven months pregnant. Her leg could not be saved but in order to save her baby she had to have the amputation without anaesthesia.

*Nilunjuna and the team from BRAC.*

*Nilanjuna is proud of her son.*

With great courage she braved an amputation above the knee and managed to carry the baby to full term having a normal delivery while still recovering from the accident. Her son is now studying in standard grade 8 and is reported to be a very good student!

BRAC held her job open so she could return to work after she recovered from her ordeal. They then offered her training in pathology and finally the opportunity to go to MI to be trained as a prosthetist. She returned to the BRAC centre in Dhaka in 2005, to work as a prosthetist.

Nilanjuna is a dedicated prosthetist and proud mother. She is also a fantastic example to all those around her, having been an influential advocate for the limb centre and for all the new graduates who follow behind her.

Nilanjuna says ***"Do not lose confidence, life should go on, look forward"***

## Client participant responses

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

*"I use crutches without the prosthesis which hamper everyday activities. Without the prosthesis I facing difficulty while getting in a bus and would not be able to join college."* Client 126 (Prosthetic)

*"I am able to do my job and am independent since using the prostheses. Hands free and pain free walking."* Client 127 (Prosthetic)

*"I am able to walk long distances and do more heavy work."* Client 128 (Orthotic)

*"It is easy to move and stand."* Client 129 (Orthotic)

*"I will be dependent on someone without the prosthesis. It will not be possible to do work without prosthesis."* Client 129 (Prosthetic)

*"More comfortable, can wear sandals, can do anything."* Client 130 (Orthotic)

*"Able to go outside and do business."* Client 131 (Prosthetic)

*"With the orthosis, I am able to walk independently and do daily activities without help."* Client 132 (Orthotic)

*"I can join temple and am independent overall."* Client 133 (Orthotic)

*"Before, walking was difficult. Now I can climb, stand longer, carry luggage more easily - can do everything."* Client 136 (Orthotic)

*"Helped for studies and to get the job."* Client 200 (Orthotic)

*"I am able to walk long distances, do my job and feel very comfortable."* Client 200 (Prosthetic)

*"I was very active before the accident, when the accident happened I was very limited. After getting the prosthesis, I started to regain all the function and achieved self-confidence."* Client 206 (Prosthetic)

*"I can drive a motorcycle and can travel long distances."* Client 207 (Prosthetic)

*"After getting the prosthesis, I got a job, have my mobility and am earning money and taking care of my family."* Client 209 (Prosthetic)

*"I am able to attend school, business and even can swim."* Client 214 (Prosthetic)

*"I am now married with one child since the amputation."* Client 215 (Prosthetic)

*"I carry my child, walk and do work. I have no pain in my back. With the new orthosis, I walk straight."* Client 216 (Orthotic)

*"I can walk, go to my original job, can do 5km cycling every day and have increased self-confidence."* Client 216 (Prosthetic)

*"Satisfied. Comfortable. I meet people and am even able to attend work."* Client 217 (Prosthetic)

Eight data collection forms did not specify what the client said, but noted:

*Highly motivated before this and now very active.* Client 126 (Orthotic, child)

*Excluded in classes without the device.* Client 134 (Orthotic, child)

*Mom is happy. Helps to attend School.* Client 137 (Orthotic, child)

*Long term wearer.* Client 135 (Orthotic)

*Prevent deformity. Reduce Pain.* Client 205 (Orthotic)

*Active in play, school, society.* Client 208 (Orthotic, child)

*The prosthesis has not been delivered yet. His expectation is to be functional and as soon as he gets the prosthesis he will go to his parents' grave to pray.* Client 210 (Prosthetic)

*Corrected deformity and it lead to inclusion of patient and family into the society.* Client 211 (Orthotic, child)

# Section 6: Services in India

## COUNTRY CONTEXT:

Population =1,252,139,596 (2013) [6]
World Bank Country Classification =Lower-middle-income[5];
Life expectancy =66 years (2012)[6];

In India there are reported to be almost twenty-two million persons with disabilities[2], of these almost twenty-eight percent (27.9%) are reported to be persons affected by disabilities related to movement[2].

There is a complex system within government to plan and deliver services for people with disabilities across the twenty-eight states and seven territories that make-up the country. Due to India's large population, diverse cultures and the economic challenges of delivering services in a lower-middle income country, there are various statutory bodies involved in wide range of activities related to persons with disabilities. In India a large number of acts, rules, regulations and guidelines are aimed at ensuring rights and protection for individuals with disabilities. These initiatives govern both service delivery and education.

The Ministry of Social Justice and Empowerment is reported to be the most important body with responsibility for a number of the departments that plan, co-ordinate, implement and oversee various programmes. Within the Ministry the Department of Disability Affairs deals with service delivery and the Rehabilitation Council of India regulates the training of prosthetist/orthotists as well as other health care providers.

Rehabilitation services are delivered through public, private and non-profit models. There are four levels of prosthetics and orthotics training recognised by the Rehabilitation Council of India. In all there are twenty-six schools registered through the Rehabilitation Council of India. They include a one year certificate course, a two and a half year diploma course, a four year and six month Bachelor's degree and a two year Master's programme. MI is the only school with ISPO recognition operating in India, therefore the centres visited were comprised of a sample of the centres where ISPO recognised graduates are working in Karnataka and West Bengal.

**PROSTHETICS & ORTHOTICS SERVICES WITHIN THE WIDER REHABILITATION SERVICES:**

There was no known list of centres providing prosthetic/orthotic services, however local experts estimated there were more than seven hundred centres delivering devices across India in both public and private settings. The composition of teams was highly variable and government officials reported that there are no central referrals centres in Karnataka for rehabilitation services. New government plans were expected to begin which would see centralised access to rehabilitation services increase.

# Services visited

Our sample audit of graduates took us to five departments offering prosthetic and orthotic services:

- Mobility India, Bangalore
- Mobility India, Chamrajnagar
- Rehabilitation Aids Workshop by Women with Disability, Bangalore
- Mobility India, Kolkata
- Asha Bhavan, Kolkata

During these site visits the assessment team met with respective directors/managers and evaluated graduates in each department. The investigators also meet with Karnataka State officials from the Directorate for the Empowerment of Differently Abled and Senior Citizens and the Director of the Chamrajnagar District Disability Welfare Office.

**Reflections on the impact of ISPO recognised programmes:**
The ISPO recognised programme has had an important impact on service delivery in the areas included in the study, particularly in access for individuals with disabilities living in rural communities. It appears that the ISPO recognised programme is valued by the government agencies the study team met with and that they are seen as an important resource for consultation and collaboration. Many employers indicated that their organisation had future staff currently enrolled on ISPO programmes to maintain sustainability or expand existing services.

While India has many prosthetic/orthotic programmes it was noteworthy that with only one ISPO recognised programme, terminology specific to the ISPO guidelines on training personnel had begun to be incorporated into national training standards.

**Mobility India (MI), Bangalore**
This site operates as a central hub for the co-ordination of various programmes operated by MI including the co-ordination of community programmes, advocacy, clinical services and education. This centre is the academic centre which is also involved in delivery of both prosthetics and orthotics services across a full range of devices categories. There are one hundred fifty-two employees in the various programmes operated by MI, with forty-two of the staff reported to be people with a disability.

*MI Rehabilitation, Research & Training Centre.*

In the service delivery centre in Bangalore there were twelve staff members. The professional prosthetics and orthotics staff was comprised of a total of five clinicians. Four of these had undergone Bachelors level training and one had completed a full ISPO Category II training programme and was currently enrolled in upgrading training. There were also three support staff for day to day operations, two store keepers, one receptionist and one shoemaker.

Prosthetics and orthotics service delivery was the key element of the services provided in the Bangalore centre. About three hundred and fifty patients were seen through the clinical service delivery centre each month. The funding structure was a blended model with majority of funding coming from donors including an international Christian development organisation (CBM) and the International Committee of the Red Cross, an international organisation (ICRC). MI reported that about thirty percent of service users could pay for their device while the remaining seventy percent received various levels of subsidy, with all users contributing to the cost of the service they received.

MI planned to continue with the programmes in operation at the time and to work with government to improve access to services. MI had recently begun an advanced clinical science programme and hoped to eventually seek Category I accreditation for it.

**Mobility India (MI), Chamrajnagar**

This is an MI operated community based rehabilitation centre in the Chamrajnagar District. Its services include therapy, community outreach/education, livelihood programmes, as well as prosthetics/orthotics services.

*A client has her orthosis reviewed by study team lead, Helen Cochrane, at MI, Chamrajnagar.*

There were 36 staff members at the Chamrajnagar District centre largely comprised of community health workers, a therapist and administration staff. There are three full time ISPO Category II single discipline staff working in the centre.

Orthotics is an important part of the services offered at Chamrajnagar. Clinicians work with a rehabilitation therapist to assess and prescribe treatments. Clinical interventions are completed at community level from casting to fitting/delivery of devices. The centre is equipped to make minor repairs and adjustments. Graduates independently complete fabrication at the centre in Bangalore. Graduates working in the more isolated settings of the community are expected to use regular trips to the Bangalore centre to consult /collaborate with more experienced clinicians.

The district was reported to have almost 360,000 inhabitants in area of about 1,200 kilometres[7]. Local experts reported that there were about four thousand persons with disabilities known to live in the district. 675 of these individuals were reported to receive services through the Chamarajanagar centre. Three hundred received therapy and three hundred and seventy five had received lower limb orthotic interventions.

MI was planning to build a new community resource centre in Chamrajnagar, which was expected to include prosthetics and orthotics services with the aim of expanding services in this underserved area.

**Rehabilitation Aids Workshop by Women with Disability, Bangalore**

Located in Bangalore in the grounds of Cheshire Homes, the Rehabilitation Aids Workshop by Women with Disability is a non-profit centre that began in 1997 as a MI project. The project aims to employ and train women and it aspires to focus on the employment and training of women with disabilities to provide prosthetics and orthotics services.

A young client and her mother visit the Rehabilitation Aids Workshop.

The centre employed eight women; seven provided direct clinical services with one administrator. Four are recognised by the Rehabilitation Council of India and three were trained by MI before its programme was officially recognised.

Clinicians worked in the small centre with the focus on prosthetics and orthotics device delivery and maintenance. While the centre was not located in a multidisciplinary setting, it worked in collaboration with a local hospital directly across the street from Cheshire Homes. Graduates reported a good working relationship with the medical centre and have on occasion delivered training to doctors about prosthetics and orthotics services.

The Rehabilitation Aids Workshop by Women with Disability is a registered Trust and is funded through small donors with some support from the Ministry of Social Justice and Empowerment. They also work in collaboration with partner organisations like Cheshire Homes which provides the space for the centre in exchange for services.

At the time of the study the centre had one staff member in training in the lower limb prosthetics module at MI. The Trust hoped to raise enough funds to move to an independent, expanded centre to increase its capacity to deliver services and employ more women with disabilities.

**Mobility India (MI), Kolkata**

There were a total of eighteen staff members at the MI centre in Kolkata, of which seven were prosthetists and/or orthotists. Four were from MI's training programme. Of these, two were from the ISPO recognised programme, two had diploma level university based training and one had a Bachelor's degree in Prosthetics/Orthotics.

There were two physical therapists working in the centre, one with a Master's degree in Physical Therapy and one with a Bachelor's degree. There was also one community therapist and three community based rehabilitation workers, one shoemaker, two administration staff and one cleaner.

Prosthetics and orthotics services are delivered in the centre, which also has a community outreach programme. A Bachelors level clinician completes the assessments with the physical therapist and the prosthetist/orthotist completes the recommended device from casting to delivery/follow up.

The MI centre in Kolkata provided services to about eight hundred and fifteen individuals with disabilities.

*The MI team and investigators discuss the service in Kolkata.*

**Asha Bhavan Centre, Kolkata**

Asha Bhavan Centre is a non-governmental organisation working for marginalised communities in India. Established in 1999 in West Bengal it began as a care centre for disabled children to receive comprehensive integrated support and services. The organisation later expanded to include: rehabilitation for mentally ill women, community based rehabilitation, education/training, supplementary education, a slum development programme, orthopaedic workshop, outpatient department, supplementary nutrition for malnourished children, emergency relief and rehabilitation.

The organisation initially only offered repair services for prosthetics and orthotics devices. However recognising the need for services in the communities they served, in 2003 they sent students to MI for training. Following their return in 2005 the orthopaedic workshop was established.

*Asha Bhavan Centre staff with the study team*

Across all of its programmes the Asha Bhavan Centre employ a total of 259 staff members. This includes 39 therapists (physical therapy, occupational therapy and speech therapy), 51 teachers and 2 technicians as well as support staff. The orthopaedic workshop is staffed by one prosthetist/orthotist, one prosthetist and three assistants with an additional clinician planned to join the centre after completing training.

Prosthetics/orthotics are an integral part of the Asha Bhavan Centre and are integrated into all programmes. The prosthetics/orthotics staff participated in the development and review of planning for the workshop meet with administration staff in "United Meetings" and serve admitted patients in coordination with physical therapists. They also assess and treat outpatients at the orthopaedic workshop and are integrated with the community based rehabilitation programme. Furthermore, they set and participate in meetings with other professional associations to promote prosthetics/orthotics services. The centre is very content with their work and the community recognise and respect them as professionals.

43,811 direct and indirect beneficiaries were reached by Asha Bhavan Centre through its various initiatives in 2011-2012. In the same year the centre distributed 565 prosthetics and orthotics devices to people with disabilities and conducted seven camps for measurement and casting with a total of 163 recipients. Orthotics were the main device category produced, with cerebral palsy being the diagnosis most often treated. The centre fabricated thirty to forty orthotic devices and usually just three to four prosthetic devices each month. Funding sources for Asha Bhavan Centre came from different donors, with the City of Joy Foundation the largest contributor at 80% of the annual budget. A small amount of government support was also received.

At the time of the study the Asha Bhavan Centre had nine sub-centres and planned to open three more. They aimed to include prosthetics and orthotics services in all of them with the prosthetic/orthotics professionals providing services.

**Directorate for the Empowerment of Differently Abled and Senior Citizens**

During the study the investigators were fortunate to meet with Jayavibhava Swamy, Director and Staff of the State of Karnataka Directorate for the Empowerment of Differently Abled and Senior Citizens. Staff in this department included two full time prosthetist/orthotists. The department's representatives discussed the importance of prosthetics and orthotics services to the national plan for rehabilitation and highlighted plans for ongoing services development, which included increased access to centralised services.


*The team visit the Directorate for the Employment of Differently Abled and Senior Citizens.*

**Chamrajnagar District Disabled Welfare Office**

Mr Jayaramu, District Child Protection Officer, (former District Disabled Welfare Officer) Chamrajangar District reported that the office had regular collaboration with the MI team in the District in community settings and was familiar with their work. He described a positive relationship and impacts from the services provided by graduates.

He described the challenge of service delivery with a set of complex rules and regulations, combined with social factors such as a high level of poverty, difficulty in accessing services due to geography, population dispersion and total population volume. These themes where echoed by many local experts.

*At the Chamrajangar District Disabled Welfare Office.*

**Impact of graduates in Indian services:**

Centre managers reported that ISPO recognised graduates worked well in the clinical and practical realm. At least one manager noted the quality of service by ISPO recognised graduates was very good in terms of their practical production. The manager cited that they were efficient, required less monitoring, and had faster fitting faster times with better results when compared with graduates of other programmes. The population volume, distribution and poverty had a significant impact on access to services in India, while beneficiaries appreciated the support of ISPO recognised graduates working at the district/community level.

# Section 7: Services in Bangladesh

## COUNTRY CONTEXT:

Population =156,594,962 (2013) [6]
World Bank Country Classification =Low income[5];
Life expectancy =70 years (2012)[6];

According to the United Nations more than 13 million people in Bangladesh are believed to have disabilities, with more than 22.5 % of these reported to be individuals affected by physical disabilities[2].

In Bangladesh the National Coordinating Committee under the Ministry of Social Welfare is the focal point for coordinating activities related to disability[2]. During the study the team was unable to meet with any members of government departments responsible for disability. There are no prosthetics and orthotics education programmes reported to exist in Bangladesh, therefore all formally trained prosthetist/orthotists known to be working in the country have received training through programmes in other countries. There also do not appear to be any regulatory bodies governing either education or service delivery for prosthetics/orthotics. The Bangladesh Society for Prosthetics and Orthotics is the only professional organisation known to exist in Bangladesh. It is a voluntary association of individuals working in the rehabilitation sector.

## PROSTHETICS & ORTHOTICS SERVICES WITHIN THE WIDER REHABILITATION SERVICES:

No known lists of service providers exist. Local experts reported that in addition to the departments visited there were a number of private workshops which were (generally) staffed by informally and/or untrained persons. In a small number of workshops graduates of various international programmes are believed to be working in Bangladesh.

There did not appear to be prosthetic/orthotic services available in government run hospitals and no national referral centres were providing prosthetic/orthotic services at the time of the study. The National Institute of Traumatology and Orthopaedic Rehabilitation was an important prosthetics/orthotics referral centre. However this department was reported to have closed after thirty years in operation when the last of its long time staff retired about one to two years previously. Local experts considered this closure to be indicative of a general lack of awareness of the need for services within the higher levels of the government/hospital system.

Local experts indicated that most services are delivered through non-governmental organisations that are staffed by graduates of various programmes and that ISPO recognised graduates are particularly valued within their organisations. Local experts also reported that the mass casualty event at the Rana Plaza - where a garment factory collapsed - has had an important impact on the collaboration between organisations and increased the profile of rehabilitation in Bangladesh both at national and international levels. The awareness and resources committed to rehabilitation following this event has created a generally positive impact on services. However in some cases the commitment was to only provide short-term access to services. This resulted in less than optimal clinical/functional outcomes and poor sustainability.

Polypropylene technology (specifically the ICRC system) is the main component/raw material with Solid Ankle Cushioned Heel (SACH) feet for prosthetics used in the centres visited during the study.

Overall prosthetics/orthotics services, while not known to be included in the public sector, were well integrated with other services within most of the centres in the study and represented an appropriate model for service delivery.

# Services visited

Our field visit took the study team to three departments offering prosthetic and orthotic services:

- Centre for Rehabilitation of the Paralysed, Dhaka
- Centre for Disability in Development, Dhaka
- BRAC (formerly Bangladesh Rural Advancement Committee), Dhaka

The team also interviewed managers of these departments and meet with ICRC and the Bangladesh Society of Prosthetics and Orthotics.

There were a relatively small number of ISPO recognised graduates in Bangladesh. These individuals though have been able to establish career pathways within their organisations and are generally valued by their respective organisations' leadership.

There were a limited number of mentors or individuals with advanced training in prosthetics and orthotics. There did not appear to be any ISPO Category I prosthetist/orthotists native to Bangladesh at the time of the study. Most centres optimised the resources available to them and where possible, engaged with other disciplines and/or international mentors.

The level of care within each centre was similar across graduates although some variation existed between centres. Graduates who participated in care from the time of assessment and/or who worked in multidisciplinary teams appeared to have greater confidence and problem solving abilities.

ISPO recognised graduates have had a clear impact within their service area in Bangladesh. They have demonstrated initiative to advocate for the services, to promote the discipline, to collaborate with national/international partners, to set and maintain professional standards and to encourage continuous professional development.

**Centre for Rehabilitation of the Paralysed (CRP) Dhaka**
CRP is a non-profit, non-governmental organisation that began in 1979 offering a holistic approach to care for poor people with disabilities. The headquarters at Savar houses the prosthetics/orthotics department. It also hosts a 100 bed in-patient spinal cord injury facility that provides specialist medical care, nursing and various therapy programmes.


*Touring the CRP, Dhaka*

The centre also has a paediatric unit, vocational training, community based rehabilitation and an inclusive primary school. Its Bachelor of Science programmes in physical therapy, occupational therapy and speech language therapy are recognised by the Bangladesh Health Professions Institute. Diplomas and certificate programmes in nursing, radiography and laboratory medicine are also offered. In addition to the programmes at the headquarters, the centre has nine community-based centres with a range of services in other areas of the country and works in disability research and advocacy. Since its inception the organisation estimated that their programmes have helped over seventy thousand beneficiaries.

*Ratul, an amputee client of CRP.*

There were more than 700 staff working in the various programmes offered by the Centre for Rehabilitation of the Paralysed. Within the prosthetics/orthotics programme there were 6 clinical service providers, 2 being single discipline ISPO recognised graduates and 10 technicians trained in-house.

Prosthetics/orthotics were one part of a large and comprehensive programme. Overall the service and ISPO graduates seemed to be highly valued members of the multidisciplinary team. There were also two clinicians working in one of the community centres, which was planned and set up by the ICRC. There were multiple pathways for referral to the service. Assessments were reported to be completed in a multidisciplinary environment with doctors, physical therapists and prosthetists/orthotists providing joint assessments. Physical therapists received special training from ICRC to work with the beneficiaries of the prosthetics and orthotics devices.

Leaders of the centre reported that special consideration has been given to the recruitment and retention of trained staff, by offering increased salaries to ISPO recognised graduates when compared with other professionals with similar education or skills. Clinicians were encouraged to collaborate with other professionals and participate in national initiatives, such as the Bangladesh Society of Prosthetics and Orthotics.

The prosthetics and orthotics department was supported by the ICRC special fund for the disabled for the majority of its material costs.

At the time of the study there were five clinicians who were being trained by MI and two from VIETCOT planned to return in June 2014 to join the prosthetics and orthotics clinical service.

**Centre for Disability in Development, Dhaka**

The Centre started in 1996, recognising a need in Bangladesh for direct services, employment and education for persons with disabilities. The organisation aims to promote mainstream inclusive development of disability with the belief that those with disabilities should be included in all mainstream services. They work in partnership with more than 350 non-governmental organisations to increase awareness, help develop policy and provide training to support the integration of services. The organisation works within all realms of disability from vision to mobility.

*Clinical facilities and a demonstration of skills at the Centre for Disability in Development.*

The total staff of the Centre for Disability in Development is one hundred and sixty five. At the time of the study the centre employed fourteen persons with disabilities, with most individuals working in training roles.

Within the prosthetics/orthotics department there were thirteen staff members. The staff included four MI graduates who provided clinical services, two assistants/technicians, one storekeeper, two cleaners, one sewing machine operator, one physical therapist and one physical therapy assistant.

The Executive Director reported that prosthetics/orthotics and assistive devices were a main part of all its programmes. Within the Dhaka centre individuals needing prosthetics/orthotics devices were referred by partner organisations. Referrals were generally made to the doctors, who then referred patients on to the prosthetic/orthotic department. In general they saw more complex cases that required closer collaboration than can be achieved in community settings.

In addition to the centre in Dhaka there were four workshops within its partner organisation for which they provided training. In these centres the Executive Director of the Centre for Disability in Development reported clinicians are formally trained prosthetists and/or orthotists for whom the organisation provided continuing education.

The Centre for Disability in Development hosted 1500 courses annually, which were open to partner organisations and provided for a range of disability issues.

The study team with staff from the Centre for Disability in Development, Dhaka.

Through its network of partner organisations referrals were received from across the country for its clinical service centre. Twenty to twenty-two percent of its income was self-generated through other programmes. The remaining funding was provided by a combination of donor-funded projects through its partner organisations or government schemes, including CBM, the Australian Agency for International Development and the United Kingdom Department for International Development, and the European Commission. Prosthetics and orthotics services were included in all funding schemes. The centre received some support from local government who might pay for devices or training as identified. Ultimately prosthetics/orthotics services were free to the end user.

The Centre for Disability in Development planned to continue to work with international organisations and local partners. Sustainable funding was considered their main challenge, while the retention of graduates was a key strategy to ensuring accessible, affordable and appropriate services.

The organisation had made an effort to ensure that graduates working in the prosthetics/orthotics department received opportunities to develop. The management team reported that the diversified role, which included training and collaboration with other disciplines, helped to maintain motivation and ensure retention. Graduates were encouraged to participate in the ongoing development of the Bangladesh Society of Prosthetics and Orthotics. The centre had previously engaged a clinical mentor for a three month placement and was planning for training in other types of technology, with the support of its partner organisations, as well as training for partner organisations.

**BRAC (formerly Bangladesh Rural Advancement Committee), Dhaka**

A large development agency, BRAC began working in 1972 in remote rural communities to improve the lives and health of those living in poverty.

BRAC are involved in a wide range of activities including: rural development, health programmes, micro finance, health education, water, sanitation, gender issues, migration, child protection, enterprise activities, microcredit, maternal health and child care. Their prosthetics/orthotics programme began in 2000 after a local doctor lost his leg in a 1999 road traffic accident. He received a limb from Jaipur and was sent for prosthetic/orthotic training to help establish the service.

BRAC now has two prosthetics/orthotics centres. The first in Dhaka at the National Hospital for Rehabilitation and Rheumatology, which was the centre the team visited. The second in Mymensing at a multidisciplinary rehabilitation centre.

*The study team with the BRAC team.*

The centre has a total of fourteen staff. This includes four graduates of MI, three from the ISPO prosthetics/orthotics single discipline programme and one therapy assistant. There are two physical therapists and one physical therapy assistant, five technical assistants (who had received one to three months training from Jaipur), plus one doctor and an accounts officer.

BRAC is a very large organisation and prosthetics/orthotics comprised only a small part of the health sub–division. In general doctors prescribed and the physical therapists carried out the clinical examination, while prosthetists/orthotists completed the recommended device from casting to delivery/follow up. Most prescriptions came from the Rehabilitation and Rheumatology Hospital which is affiliated to the centre. 70% of BRAC's funding was generated from internal enterprises. In the past there was also one known direct donor who has targeted their funds for prosthetics/orthotics services. The fee for service was determined based on financial need. Individuals assessed to live below the poverty line were given devices at no cost.

BRAC planned to open a third centre to be located in the Demra area of Dhaka. There were four candidates enrolled in MI who planned to return to work in the new centre.

**Bangladesh Society for Prosthetics and Orthotics**

MI ISPO recognised graduates formed the Bangladesh Society for Prosthetics and Orthotics in 2010. At the time of the study there were thirty-nine members and most of the executive was comprised of ISPO recognised graduates. Since the Society was formed they have developed relations with national and international partners. The Society has also planned and facilitated continuing professional development programmes and advocated to government and other organisations the need for professional services and regulations for prosthetics and orthotics.

Each member paid the equivalent of about two dollars and fifty cents (2.50 USD) per quarter to be a member to cover operational and administration costs. The society sought funding for members to participate in education opportunities both inside and outside the country. In 2014 the Society hoped to produce a small journal and with the support of ISPO

Japan, planned to become an ISPO National Member Society.

The formation of the Bangladesh Society for Prosthetics and Orthotics appeared to have improved the collaboration between professionals, encouraged professional development and to have allowed greater access to government.

*Representatives from the Bangladesh Society for Prosthetics and Orthotics meet with the study team.*

**International Committee of the Red Cross (ICRC)**
The ICRC has played an important role in the professional development and mentoring of prosthetics and orthotics graduates in Bangladesh. It has promoted prosthetics/orthotics, encouraged collaboration and a multidisciplinary setting. During the visit the team was fortunate to meet with the Head of Delegation, Christine Cipolla and Philip Morgan the Physical Rehabilitation Project Manager. Mr Morgan reported that the annual plan for the ICRC's involvement with prosthetics/orthotics services included continued support for professional development, in addition to support for the prosthetics/orthotics school that will be implemented at the Centre for Rehabilitation of the Paralysed.

ICRC planned to continue to support the Bangladesh Society for Prosthetics and Orthotics, with its main focus on the education sub-committee. ICRC had agreed to support an Ischial Containment Socket Design course that was being planned for January 2014, with proceeds going to the Society to engage and develop other activities.

In the next five to seven years the primary objective was the establishment of the school at the Centre for Rehabilitation of the Paralysed. At the time of the study the ICRC had funded three candidates for Category I training, to return as lecturers after a period of clinical experience. ICRC planned to provide the equipment and raw materials for the school and had sought funding for the rotation of experienced educators to come to the school to deliver modules in the first two to three years. In addition a distance-learning model was being considered.

**Impact of graduates in Bangladeshi services:**
The number of formally trained prosthetists/orthotists in Bangladesh is insufficient to meet local needs. ISPO recognised graduates in Bangladesh appear to have made an important impact on the services available within the centres included in the study. Devices were largely appropriate in design based on practicalities of the local situation. They were well fitted and users were satisfied with the care/devices they had received.

There appeared to be the beginning of in-roads to larger impacts through the Bangladesh Society for Prosthetics and Orthotics and international collaboration. Graduates of recognised programmes appeared to have demonstrated the value of formal training as evidenced by the efforts to begin a local prosthetics/orthotics education programme.

# Section 8: Summary and Recommendations

## Impact on the establishment of services:

In India it was difficult to isolate the impact that ISPO recognised Category II graduates have had on the establishment of service delivery at the national level. India had a complex local training system with many schools training at various levels. National or state run schools, which were not ISPO recognised institutions existed among the twenty-six national recognised schools for prosthetics/orthotics. However, there was clearly effects of the ISPO recognised programme within the education system, with the WHO/ISPO training standards influence beginning to appear in the national training requirements set by the Rehabilitation Council of India.

With respect to establishment of clinical services, ISPO graduates were having an impact in the MI target areas in the underserved areas of South India and in rural communities.

In Bangladesh ISPO recognised graduates were having an important impact on the services being established. Non-governmental organisations were well established with plans in place for future development and sustainability of the service. Graduates appeared to be an integral part of service delivery, planning and advocacy.

**RECOMMENDATION 1: The school and graduates should continue to work with governments advocating standards for services delivery and education.**

**RECOMMENDATION 2: The school and graduates should support government strategies to co-ordinate services and support strategic planning.**

## Impact on the appropriateness of prosthetic and orthotic service delivery:

### Orthopaedic technology services and ISPO graduates:

Most graduates demonstrated knowledge at or above the level expected at graduation from an ISPO Category II single discipline programme. Service delivery was generally appropriate within the local context. The centres visited primarily focused on polypropylene technology and in some cases had access to local variants of components, such as SACH feet and single axis knees. In some cases although the device was correctly prescribed, additional functional improvement could have been achieved with minor adjustments, such as rocker soles or slight changes to the angle of bracing.

While most graduates completed some level of assessment, in some centres clinicians did not participate in a full clinical assessment with other disciplines or a selected clinician completed the assessment and developed a prescription.
In most centres graduates were limited in their prescriptions by the range of available technology. In general, low cost durable devices were recommended and were based on the range of equipment available. Most graduates identified that their clients would have benefitted from other types of technology that allowed for either increased function or more light-weight alternatives.

Clinical notes varied between clinicians and varied greatly between centres. Most graduates struggled with gait assessment and this aspect was rarely documented in any detail, although when prompted most could report more aspects than had been documented. Overall where cases were clearly documented there appeared to be a positive type of relationship with the device outcome because graduates were working more closely to the expected standards. . When records were more complete the outcome of the device also appeared to be better.

Those who worked with centres where collaboration between disciplines was possible and/or who had access to clinical mentors, demonstrated the greatest evolution in understanding and generally improved clinical outcomes.

Graduates were seen to be the key to a long-term sustainable service. Most employers prioritised retention and in many centres employers had sent additional students to be trained at ISPO recognised programmes.

**RECOMMENDATION 3: A course in clinical decision-making may allow graduates to identify and document the key aspects that influence device design.**

**RECOMMENDATION 4: Graduates may benefit from a review of technology/design.**

**RECOMMENDATION 5: Graduates should seek to maximise the benefits of their prescription by including details, such as footwear in their prescription.**

**RECOMMENDATION 6: Efforts should be made to increase the available range of appropriate cost effective components and raw materials.**

**RECOMMENDATION 7: All graduates should be encouraged to complete or participate in the client assessment and the full findings should be documented in systematically stored records.**

**RECOMMENDATION 8: Gait assessment should be reinforced at both the school and clinic level and graduates should be encouraged to systematically approach gait assessment and document their findings.**

**RECOMMENDATION 9: A strategy to ensure that all graduates have the opportunity to receive clinical mentoring after graduation should be explored.**

**RECOMMENDATION 10: To ensure the ongoing quality and sustainability of services there is a need to increase the number of trained professionals at all levels of prosthetic/ orthotics categories in both India and Bangladesh.**

**RECOMMENDATION 11: Where possible the school and graduates should work with their respective governments, hospital directors, organisations of persons with disabilities and other stakeholders to advocate for and support, the development of central services.**

## Impact and clinical leadership:

The importance of clinical leadership cannot be understated. In many situations in both India and Bangladesh graduates worked in the community, in workshops with limited or modified multidisciplinary teams and in some cases, with the complete absence of multidisciplinary networks. In some centres clinicians abdicated or were prevented from taking responsibility for clinical assessment by organisational structures. In both these situations the ability of individuals to take on clinical leadership roles was reduced.

In some cases Category II single discipline recognised graduates were excluded from leadership roles, as graduates with higher-level training were assigned to leadership positions.

There were some clear instances of leadership skills in development and also of good clinicians; however there did not appear to be a strong combination of both skills in many centres. The capacity to gather, evaluate, interpret and document information to formulate clinical decisions is paramount to a successful service for the user and for developing leadership skills.

**RECOMMENDATION 12: Graduates should make efforts to meet for case conferences to discuss, collaborate and problem solve both within their discipline and with other disciplines.**

**RECOMMENDATION 13: Graduates with strong clinical skills should be encouraged to develop the skills relevant for leadership.**

**RECOMMENDATION 14: Clinical leadership should be cultivated both among clinicians working through upgrade programmes to attain full Category II competence and/or through upgrade or direct Category I training.**

## Impact on professional communities:

In India the system of governance is complex and the large number of schools teaching prosthetics/orthotics at various levels made isolating the impact of one school quite challenging. The discipline is regulated; qualified programmes and their graduates are recognised by the Rehabilitation Council of India. Graduates in India did not report they were members of a professional body which may suggest that most graduates are not actively involved in professional associations or similar organisations.

Graduates in India appeared to have good relationships with other professionals within their respective organisations. Most graduates reported that they communicated well with other allied health disciplines when they have direct clinical links. Training was offered at one time to medical students through the ISPO recognised programme, however that training did not appear to be ongoing at the time of the study.

In Bangladesh there is an absence of structure specifically aimed at prosthetics/orthotics services. Graduates had therefore followed existing structures for national bodies and for other disciplines. Although the services and structure was relatively new in Bangladesh these graduates appeared to have made great strides in having the profession acknowledged and building collaboration within the community.

Overall graduates working in centres with the opportunity to work in collaboration through multidisciplinary or interdisciplinary settings appeared to have better clinical understanding/outcomes and demonstrated increased leadership skills than those who worked in more isolated conditions. This suggested that graduates benefitted from collaboration both within their own discipline and with other disciplines.

**RECOMMENDATION 15: Graduates should be encouraged to actively participate in local and national activities that promote collaboration and continuing education either through prosthetics/orthotics specific associations or in groups that target populations relevant to prosthetics/orthotics services such as pathology specific organisations (e.g. Cerebral Palsy Association) or other professional organisations (e.g. ISPO).**

**RECOMMENDATION 16: Graduates and the school should be encouraged to actively seek opportunities to collaborate with other disciplines not only to increase awareness of prosthetics/orthotics but to broaden professional experiences and networks.**

**RECOMMENDATION 17: Improved leadership and problem solving skills associated with the ISPO recognised Category I training could also be an important step in increasing collaboration with other disciplines, making contributions to the multidisciplinary team and professional communities.**

## Impact on prosthetics/orthotics and orthopaedic technology as a career:

In India ISPO Category II recognised graduates were valued within their organisations for their clinical independence. However these individuals may have limited career advancement available to them associated with national opportunities for Bachelors and Masters level training. Career advancement beyond direct clinical service may be difficult within the current structure.

In Bangladesh ISPO Category II recognised graduates appeared to be highly valued for their specialised skills within the centres that were visited. Clinicians in this country were making efforts to promote the discipline, develop their leadership skills and increase the availability of services. There was evidence of professional advancement for more experienced clinicians.

In both countries there appeared to be a positive relationship with other disciplines. On-going collaboration particularly during assessments and decision-making could allow for further advancement and improved outcomes for patients.

**RECOMMENDATION 18: ISPO recognised graduates should engage or continue to participate in professional associations and advocacy activities.**

**RECOMMENDATION 19: Experienced clinicians should be encouraged to participate in continuous professional development, both through subject specific training activities and generalised management/communication courses to help develop skills that could allow for professional advancement.**

**RECOMMENDATION 20: It may be of importance in both India and Bangladesh to seek upgrade pathways from the single discipline Category II towards fully Category II and to extend the pathway to include Category I. A nationally recognised Bachelors level training programme that meets the ISPO standard may be highly valued by employers. It could also help to improve the on-going advancement of the profession by allowing skilled clinicians a more equal footing with other professions and strengthen clinical decision making to ultimately improve the service received by patients.**

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

Very few of the participating centres reported that they used formal methods to evaluate the impact of services. Rarely were clinical/client goals documented at the beginning of the service, outcomes tended to be subjective and poorly documented in most centres. Clients reported a very positive impact from services provided by ISPO recognised graduates. There were clear improvements in function, access to education and employment. In addition many users and local experts commented on the social stigma associated with disability in both countries. This can be an additional burden not only on the user, but their family and others may experience exclusion and/or discrimination based on their relationship to a person with disabilities. The impact of the service provided helped to reduce the stigmatisation of the user and how they felt in their community.

**RECOMMENDATION 21: Graduates should document goals of treatment and attainment of the specified goals.**

**RECOMMENDATION 22: Graduates, the school and/or centres should implement formal feedback methods (e.g. patient satisfaction surveys) to ensure that the needs of the patients are being fully meet.**

# Section 9: Glossary of acronyms

| | |
|---|---|
| AFO | Ankle Foot Orthosis |
| A/P | Anterioposteriorly |
| BRAC | formerly Bangladesh Rural Advancement Committee |
| CBM | formerly Christian Blind Mission |
| CRP | Centre for Rehabilitation of the Paralysed |
| ISPO | International Society for Prosthetics and Orthotics |
| KAFO | Knee Ankle Foot Orthosis |
| KD | Knee Disarticulation |
| LLP | Lower Limb Prosthetics |
| LLO | Lower Limb Orthotics |
| MI | Mobility India |
| M/L | Mediolaterally |
| P & O | Prosthetics and Orthotics |
| PTB | Patella Tendon Bearing |
| 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 |
| WHO | World Health Organization |

# Section 10: References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