ORIGINAL RESEARCH

International Continuing Education for Rehabilitation Workers in Honduras: a Pre-test, Post-test Evaluation

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ABSTRACT

***Background**: The knowledge of Honduran healthcare workers who deliver rehabilitation services can be enhanced by support from community-engaged academic collaborations outside the country.*

***Objective**: This study aimed to evaluate reactions and learning linked to two continuing education workshops for rehabilitation workers in northern Honduras.*

***Method**: A pre-test post-test study design was used. In September 2017, faculty from Canada and Colombia, together with health professionals from Honduras, facilitated two neurorehabilitation workshops - one in a rehabilitation centre and the other in a family support organisation located in northern Honduras. The participants were physiotherapists, physicians, nurses and educational professionals, as well as a psychologist, kinesiologist, and non-professionals trained onsite. Seventeen participants attended the 'Acquired brain injury/spinal cord injury workshop' (adult workshop), and 15 attended the 'Rehabilitation for children with impaired neuromotor development workshop' (paediatric workshop). They completed three questionnaires before the workshops: one on sociodemographic information; one related to knowledge; and, the Modified Stages*

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of Learning Questionnaires (MSLQs). Three questionnaires were completed after the workshops: the Modified Kirkpatrick; a knowledge questionnaire; and, the MSLQ.

***Results**: Most of the participants agreed that the workshops had positive effects in two of the four Kirkpatrick levels that were evaluated: reaction and learning. In the MSLQs of the paediatric workshop, there was a statistically significant change in the percentage of participants who moved from scanning/evaluation stages in the pre-test to learning/gaining experience in the post-test, in three of the six topics. Three of the knowledge questions showed important learning effects.*

***Conclusion and Implications**: Workshops offered through an international collaboration resulted in enhancing learning and knowledge of neurological rehabilitation workers in Honduras. This initiative has the potential to improve the quality of care for people with neurological conditions in the region. Participants evaluated the workshops as relevant and held very positive attitudes about the perceived outcomes. The inclusion of local practitioners in planning the workshops and selecting the topics appeared to have aided their relevance. It is recommended that workshop planners take adequate time to ensure relevancy.*

***Key words:** physical therapy specialty, rehabilitation, nervous system diseases, continuing education, global health*

INTRODUCTION

Honduras, situated in Central America, is a country of nine million people. It hosts a mix of traditional culture and modern lifestyles (Central Intelligency Agency, 2019). Based on 2013/2014 statistics, an estimated 4.6% of the Honduran population aged 18-65 had a disability, i.e., 220,800 out of nearly five million people (Flores et al, 2015). Colon, Atlantida and Yoro, the geographical area of study, had a disability prevalence of 4.3%, 5.5% and 6.1%, respectively (Flores et al, 2015). In addition, extremely disabling sequelae of non-fatal injuries have been documented, such as organ removal, loss of limb and paraplegia (Yacoub, Arellano & Padgett-Moncada, 2006).

Health System in Honduras

Bermudez-Madriz, Saenz, Muiser & Acosta (2011) described the Honduran health system as two-tiered, with public and private providers. As part of the

public system, the Secretary of State for Health (Secretaria de Salud) provides direction for the health system as a whole and also provides health services to the population. The Secretary of State for Health serves the whole population but mainly takes care of those who are unemployed and live in poverty in urban and rural areas. The private sector provides health services to 5% of the population, namely those with enough income to pay for health services. It is estimated that 17% of the total population has no access to any health service at all (Bermudez-Madriz et al, 2011).

In Honduras, there are several rehabilitation clinics for people with disabilities (United Nations, 2015). The Secretary of State for Health operates five clinics located in public hospitals, and two hospitals for persons with mental or psychosocial impairments (United Nations, 2015). Furthermore, the Honduran Social Security Department (a government body that provides pensions and healthcare coverage) has two rehabilitation centres in the main cities of San Pedro Sula and Tegucigalpa that employ physiatrists and qualified technical staff and have modern rehabilitation systems (United Nations, 2015). In addition, the Teleton Foundation (a non-governmental organisation) operates six rehabilitation clinics, none of which are located in northern Honduras (Teleton Foundation, 2018). In La Ceiba, Atlántida, the Centro de Rehabilitación Integral del Litoral Atlántico (CRILA) employs physiatrist and qualified technical personnel such as functional therapy technicians, and in Tocoa, Colon, the Centro de Rehabilitación Integral del Litoral Atlántico (CRICOL) operates with functional therapy clinicians. Honduras has adopted community-based rehabilitation guidelines, as advocated by the World Health Organisation and the Pan American Health Organisation, as a strategy to improve access to rehabilitation and community integration for persons with disabilities (United Nations, 2015). Community-based rehabilitation is a rehabilitation approach used in rural areas. However, there are many barriers to the implementation of community-based rehabilitation in rural communities due to limited local professional capacity and administrative and language barriers (United Nations, 2015). Similar to other low- and middle-income countries, rehabilitation centres and services have sprung up in a haphazard manner and are fully reliant on philanthropic funding sources provided by Honduran citizens and non-governmental organisations (Kay, Kilonzo & Harris, 1994; Descoteaux et al, 2018).

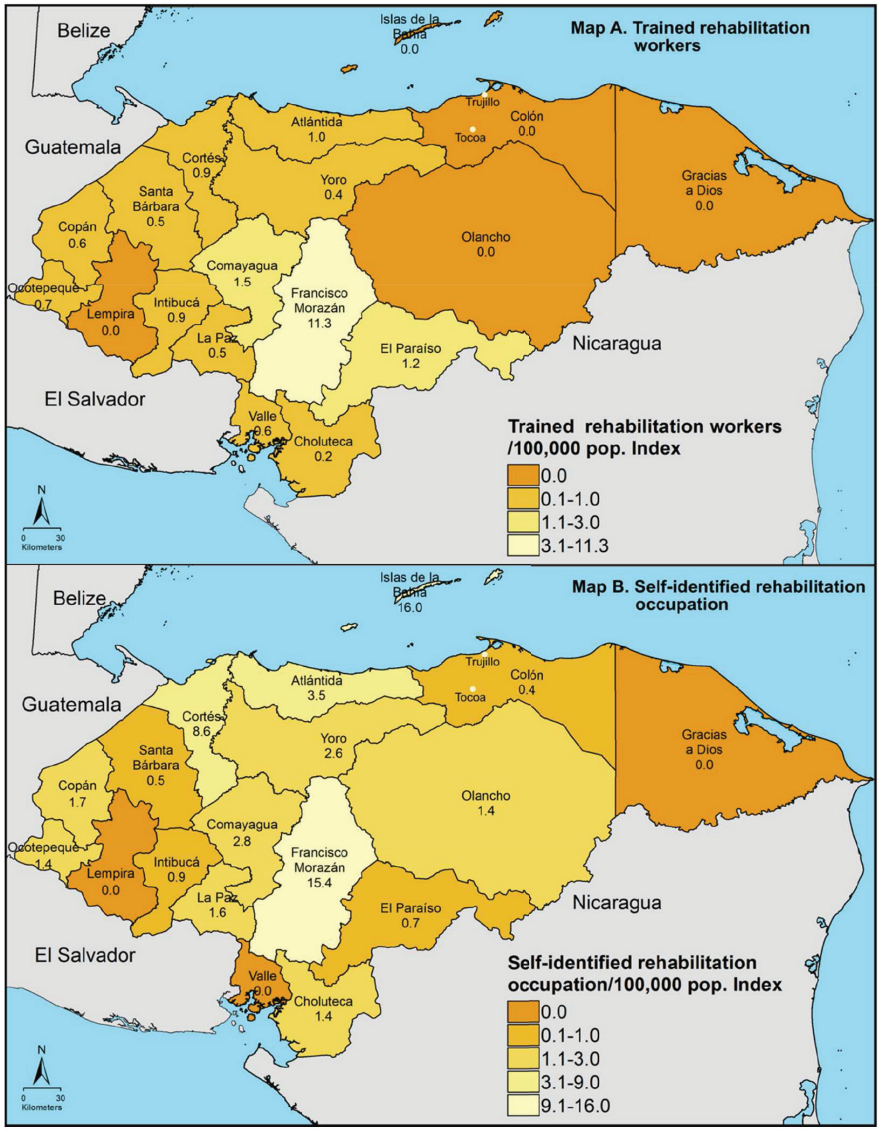
Rehabilitation Training

Despite the number of people with disabilities in Honduras, there is only one private university that provides a four-and-a-half-year Baccalaureate programme in rehabilitation (a combined physical therapy and occupational therapy degree) but as yet has no graduates. Other rehabilitation training programmes available in the Universidad Nacional Autonoma de Honduras include a medical degree in physical medicine and rehabilitation, a technical degree in functional therapy, a Baccalaureate degree in phono-audiology, and a diploma in integrated community rehabilitation. There is no formal system of post-professional training opportunities to support rehabilitation workers such as physical, occupational or speech language therapists, nor training beyond the Baccalaureate level.

According to the 2013 census (Instituto Nacional de Estadistica Honduras, 2013), in Colon, a northern province of 271,723 people, there were no qualified rehabilitation workers: physiotherapists, phono-audiologists, functional/physical therapy technicians, or community rehabilitators (Figure 1, Map A). Moreover, the distribution of self-identified rehabilitation workers in Colon was 0.4 per 100,000 people (Figure 1, Map B). It is likely that the higher density of self-identified rehabilitation workers indicates that other professionals and community members such as nurses, primary school teachers, special education teachers or family members have attempted to fill the gap in the rehabilitation workforce in the province.

As the country is now building capacity in rehabilitation, regulatory structures and/or professional associations for the professions of physical therapy, occupational therapy or phono-audiology may emerge. The slow development of the rehabilitation professions and small public investments in rehabilitation infrastructure greatly restrict the care and treatment available for the population.

Figure 1: Distribution of Trained Rehabilitation Workers (Map A) and Self-identified Rehabilitation Occupation Index (Map B) by Province in Honduras



Source: Prepared by the first author, based on data from the Instituto Nacional de Estadistica Honduras (2013)

Since 2016, a grassroots organisation initiated by the authors of the Network of Rehabilitation Workers of the Americas (Red de Rehabilitadores de las Américas) has undertaken to support the professional education needs of the rehabilitation workforce in the northern states of Colon, Atlantida, and Yoro by developing north-south collaboration and sponsoring a visiting professor programme.

The Network of Rehabilitation Workers of the Americas includes members from the University of Saskatchewan in Canada, Universidad de Santander in Colombia, from Norway, and rehabilitation workers in Colon and Atlantida in Honduras. Workshop curricula, developed by rehabilitation professors from the aforementioned universities and the staff of local organisations, have been implemented as part of this programme. The objective of this study was to evaluate reaction and learning – two of the four levels as described in the Kirkpatrick Model - linked to two continuing education workshops for rehabilitation health workers in these states, designed by an international group of academics and community-engaged rehabilitation workers.

Theoretical Models

Evaluation of participants' neurorehabilitation knowledge and learning was based on the Kirkpatrick Model (Kirkpatrick Partners LLC, 2009; Praslova, 2010) and Slotnick's four Stages of Learning Model (Slotnick, 1999; Moore & Slotnick, 2006). The Kirkpatrick framework was originally designed to evaluate human resource development training programmes (Praslova, 2010; Kirkpatrick & Kirkpatrick, 2016). It specifies four levels of training evaluation: reaction (engagement, relevance, and learner satisfaction); learning (acquisition of intended knowledge, skills, attitude, confidence, and commitment); behaviour (critical behaviours, required drivers, on- the-job monitoring); and results (the degree to which participants apply what they learned during training).

The Modified Stages of Learning Questionnaires (MSLQs) use clinical scenarios constructed to address learning objectives (Slotnick, 1999). According to Moore and Slotnick (2006), the learner's level of engagement with respect to a given learning objective can be classified into one of four stages of learning: 1) Scanning – the learner is aware of potential problems that might require attention; 2) Evaluation – the learner evaluates the potential problems on the basis of applicability to his/her own situation, the likelihood of finding a solution, whether there are resources available for learning to develop solutions to the problems, and whether the learner is learning how to solve the problem relevant for practice; 3) Learning – the learner gains skills and knowledge applicable to the problem; and, 4) Gaining experience – the learner puts what has been learned into action.

The Network of Rehabilitation Workers of the Americas hypothesised that a better understanding of the effects of the workshops can give insights to improve future efforts to build rehabilitation capacity in Honduras.

Objective

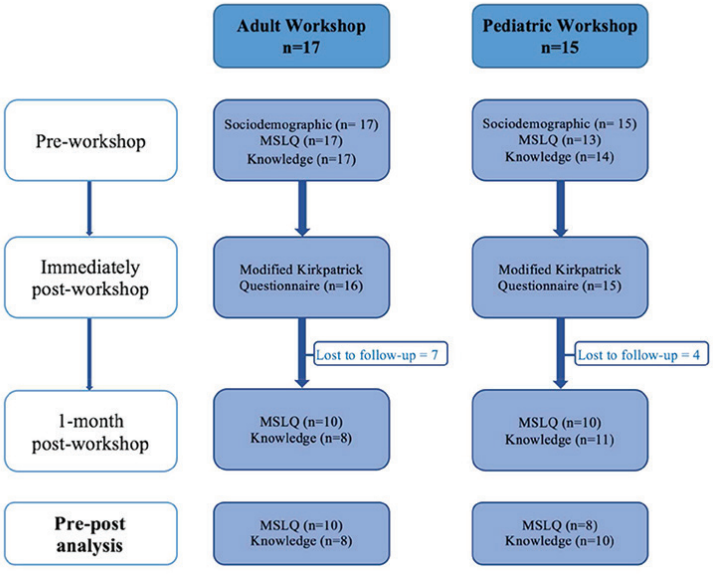
The objective of this study was to evaluate reaction and learning linked to two workshops that were delivered through the visiting professor programme for health rehabilitation workers, in two rural cities, Tocoa and Trujillo, in northern Honduras.

METHOD

Study Design

A pre-test post-test design was used to evaluate the reaction and learning effects of two workshops. Based on initial feedback, the questionnaires were modified and translated between English and Spanish by bilingual members of the team and approved by the Continuing Education in Rehabilitation Science unit at the University of Saskatchewan. The language of the workshops and data collection was Spanish. The sociodemographic questionnaire, the MSLQs and Knowledge Questionnaires were administered to the participants online or in paper format prior to the workshop (Figure 2). The MSLQs were administered immediately after the workshop as post-tests. The MSLQs and Knowledge Questionnaires were sent to participants one month after the workshops, in paper form.

Figure 2: Flow of the Study (MSLQ =Modified Stage of Learning Questionnaire)



Participants

The workshop on adult acquired brain injury/spinal cord injury (hereafter referred to as adult workshop) was held in Tocoa, Colon. Individuals working in healthcare, with an interest in neurological rehabilitation, were invited by the host rehabilitation centre, CRICOL, through email sent to other rehabilitation centres and hospitals in the region. Seventeen participants attended this first workshop. The second workshop, focusing on the rehabilitation of children with impaired neuromotor development (hereafter referred to as the paediatric workshop) was held in Trujillo, Colon, and was attended by 15 individuals. All rehabilitation workers from the host centre - Little Hands, Big Hearts - a family support organisation, and those working at CRICOL were invited. Five participants attended both workshops.

Workshops

The third author, a Colombian physiotherapist with a Master's degree in neurorehabilitation who has been teaching at the Universidad de Santander, Colombia, for more than 10 years, conducted the adult (neurorehabilitation) workshop with the assistance of a physiatrist and a local physiotherapist. The physiatrist had 2 years' experience in neurorehabilitation in public and private Honduran clinics, and the local physiotherapist 7 years. The third author instructed the paediatric neurorehabilitation workshop independently.

Workshops were planned in partnership with four institutions: 1) CRICOL in Tocoa and Little Hands, Big Hearts in Trujillo, 2) the School of Rehabilitation Science, University of Saskatchewan, Canada, 3) Universidad de Santander, Colombia, and 4) Continuing Education in Rehabilitation Science, University of Saskatchewan, Canada. The themes were selected considering the reported needs of the local rehabilitation workers from CRICOL in Tocoa and Little Hands, Big Hearts in Trujillo. After several online meetings between the members of the Network of Rehabilitation Workers of the Americas and local rehabilitation workers, the learning objectives for the workshops and clinical cases were developed. In addition to considering the local context, the workshops were carefully constructed with evidence-based learning objectives using Bloom's taxonomy (Bloom, Krathwohl & Anderson, 2001).

The adult workshop included nine objectives related to neurorehabilitation in adults with acquired brain injury, spinal cord injury, and cerebral vascular accidents (Appendix 1) and was conducted over two consecutive days (12 hours

duration). It had lectures using PowerPoint, interactive content (class discussion), demonstrations, practical activities among peers, and case discussion and assessment/treatment demonstrations on an adult client with cerebral vascular accident.

The paediatric workshop addressed seven objectives linked to rehabilitation for children with impaired neuromotor development (Appendix 2). It was a one-day workshop (7 hours duration) and included lectures using PowerPoint, interactive content (class discussion), demonstrations with a doll, and case discussion and assessment/treatment demonstrations on two paediatric clients with cerebral palsy.

Outcome Measures

Both Kirkpatrick's reaction and learning levels were evaluated with the Modified Kirkpatrick Questionnaire; in addition, the MSLQs and the Knowledge Questionnaires evaluated Kirkpatrick's learning level.

The Modified Kirkpatrick Questionnaire - The Kirkpatrick website (Kirkpatrick Partners LLC, 2009) provides several examples of questions that can be used to measure all four levels of training evaluation. A set of 18 questions that measured two levels - reaction and learning - was used (Appendix 3). The behaviour and results levels of the model were not evaluated.

The Modified Stages of Learning Questionnaires (MSLQs) - Authors developed and validated the MSLQs (Appendix 4A, 4B and 4C). In summary, the MSLQ for the workshop on adult neurorehabilitation had five questions related to the first scenario and three questions related to a second scenario. The MSLQ for the paediatric workshop had one scenario and six questions. The questions used in the MSLQs each represented a specific workshop learning objective (Appendix 4D). There were nine 'yes/no' items for each question. Each item was tagged to one of the Stages of Learning (i.e., Evaluation, Learning, Gaining experience) (Appendix 4E). Using a classification grid based on the pattern of responses, each participant was classified into a unique stage for each question. The first stage of learning – Scanning - was determined by exclusion (Appendix 4F).

Knowledge Questionnaires - There were two workshop-specific questionnaires based on the learning objectives for the workshops (Appendices 1 and 2). The questionnaires included a 5-point Likert scale (strongly disagree, disagree, neutral, agree, strongly agree) to indicate the learner's level of agreement with

statements directly related to the learning objectives of the workshops. A score from '0' to '4' for each statement was obtained, where '4' was the maximum knowledge score.

Data Analysis

Each workshop was analysed separately. Quantitative data was described using frequencies, medians, and interquartile ranges (IQR). The four Stages of Learning were collapsed into two categories: 1) Scanning/Evaluation; and 2) Learning/Gaining experience. Pre-to-post-workshop changes from the Scanning/Evaluation stages to Learning/Gaining experience stages were evaluated using the Exact McNemar test. Pre-to-post-workshop changes in the Knowledge Score were evaluated using Sig Test for repeated data. Non-responders were not included in the pre-to-post analyses. A significance level of 0.05 was used. Data analyses were conducted using STATA 13.1 (Stata-Corp, College Station, TX, USA).

Ethics

The research proposal was reviewed and exempted by the Behavioural Ethics Board of the University of Saskatchewan, Canada (June 30, 2017). Participants provided written consent to be part of the study.

RESULTS

Sociodemographic Characteristics

Sociodemographic characteristics are included in Table 1. Most of the participants were from Colon (70.6% adult workshop and 100% pediatric workshop) and more than half had studied in Honduras (52.9% adult workshop and 66.7% pediatric workshop). Most were working in a rehabilitation centre/family support organisation (76.5% adult workshop and 86.7% pediatric workshoop) as shown in Table 1. Figure 2 shows participant numbers for each outcome measure, as well as participants who were lost to follow-up. Attempts to contact all participants for follow-up evaluation were made by email and phone. If people did not respond within 3 weeks, they were classified as non-responses.

Table 1: Sociodemographic Characteristics of the Workshop Participants

Variable	Adult Workshop (n=17)	Paediatric Workshop (n=15)
	Me (IQR)	Me (IQR)
Age (years)	33.0 (26-37)	29 (24-38)
Experience working in health sector (years)	2 (1-7)	4 (2-7)
Experience since the highest degree was obtained (years)	4 (1-7)	2 (1-4)
	n (%)	n (%)
Gender		
Women	14 (82.4)	14 (93.3)
Men	3 (17.6)	1 (6.7)
State		
Colon	12 (70.6)	15 (100)
Yoro	3 (17.6)	0 (0.0)
Atlántida	2 (11.8)	0 (0.0)
Profession		
Physiotherapist	6 (41.2)	4 (28.6)
Physicians/nurses	3 (17.6)	3 (21.4)
Education professionals or other non-physiotherapists	8 (41.2)	7 (50.0)
Workplace		
Hospital	4 (23.5)	2 (13.3)
Rehabilitation Centre/ family support organisation, clinics	13 (76.5)	13 (86.7)

Me= Median; IQR= Interquartile Range

Modified Kirkpatrick Questionnaire

In relation to the reaction level of the Kirkpatrick questionnaire, participants found the workshops engaging, relevant and favourable, with over 82% and 87% of responses rating "agree" or "strongly agree" in the adult and paediatric workshops, respectively. Similarly, a high percentage, over 82% and 80% of participants attending the adult and paediatric workshops, respectively, agreed or strongly agreed with the items of the skills, attitude, confidence and commitment components of the learning level of Kirkpatrick's model (see more details in Appendix 4).

Stages of Learning

There were no changes in the MSLQs in the adult workshop. However, in the paediatric neurorehabilitation workshop, there was a change in the number of participants who moved from Scanning/Evaluation stage in the pre-workshop evaluation to Learning/ Gaining experience stage in three different topics, in the one-month post-workshop evaluation. In the questions: "Can you describe the developmental milestones that Jose should have completed up to one-year

old?" (p=0.031), "Can you explain how rehabilitation could improve Jose's motor control?" (p=0.016), and "Can you apply strategies to stimulate the child's motor development?" (p=0.008), the number of participants who moved from Scanning/ Evaluation stage (pre-test) to Learning/ Gaining experience stage (post-test) were 6 out of 7, 7 out of 8, and 8 out of 8, respectively. For the remaining topics, no significant changes in the MSLQs were identified.

Knowledge Score

Table 2 shows that there was a significant change in the pre-to-post knowledge score in the item "I am able to describe the fundamentals of cognitive therapeutic exercise (referring to Perfetti Method) in a client with acquired brain damage". The median score changed from 0.0 (IQR=0.0-2.0) to 3.0 (IQR=1.0-3.0), p=0.016.

Participants who attended the paediatric neurorehabilitation workshop increased their knowledge about concepts of development, learning and motor control (pre-test: 2.5 IQR= 1.0-3.0, post-test= 3.0 IQR= 3.0-4.0, p= 0.016) and milestones of neuromotor development between 0 and 12 months (pre-test: 3.0 IQR=1.0-3.0, post-test: 4.0 IQR= 4.0-4.0, p=0.008).

Table 2: Changes in Knowledge Score Pre-and Post-Workshops

Item	**Pre-test**	**Post-test**	**p-value**[4]
Adult Workshop			
I am able to…	*Median (IQR)*	*Median (IQR)*	p-value
Describe the pathophysiology of acquired brain injury and spinal cord trauma[1]	2.5 (0.0-3.0)	3.0 (2.0-3.0)	0.500
Describe the concept of neuroplasticity[1]	2.5 (2.0-3.0)	3.0 (3.0-4.0)	0.250
Demonstrate the physiotherapeutic assessment in adults with acquired brain injury[1]	2.0 (0.0-2.5)	2.5 (1.0-3.0)	0.375
Demonstrate the physiotherapeutic assessment in adults with spinal cord injury[1]	0.0 (0.0-2.0)	3.0 (1.0-3.0)	0.070
Plan the physiotherapeutic intervention in adults with acquired brain injury and spinal cord injury[1]	2.0 (0.0-2.5)	2.5 (1.0-3.0)	0.219
Describe the fundamentals of cognitive therapeutic exercise (Perfetti Method) in an adult with acquired brain injury[1]	0.0 (0.0-2.0)	3.0 (3.0-3.5)	**0.016**
Apply the proprioceptive neuromuscular facilitation techniques to control the trunk in adults with acquired brain injury[1]	0.0 (0.0-2.0)	2.0 (1.0-3.0)	0.125
Apply proprioceptive neuromuscular facilitation techniques proposed to reinforce the residual musculature in adults with spinal cord injury[1]	0.0 (0.0-2.0)	2.0 (1.0-3.0)	0.125
Demonstrate the physiotherapeutic intervention in a sedentary and bipedal position in an adult with acquired brain injury[1]	0.0 (0.0-2.0)	3.0 (1.0-3.0)	0.070
Paediatric Neurorehabilitation Workshop			

I am able to…			
Briefly describe the embryonic development of the central nervous system[2]	2.5 (2.0-4.0)	3.0 (3.0-3.0)	0.289
Define the concepts of motor development, motor learning and motor control[2]	2.5 (1.0-3.0)	3.0 (3.0-4.0)	**0.016**
Describe the milestones of neuromotor development between 0 and 12 months[2]	3.0 (1.0-3.0)	4.0 (4.0-4.0)	**0.008**
Define the concept of neuroplasticity[3]	3.0 (1.0-4.0)	4.0 (3.0-4.0)	0.188
Apply the principles of intervention selected in children with deficits in neuromotor development[3]	3.0 (1.0-3.0)	4.0 (3.0-4.0)	0.125
Propose a functional adaptation for children with motor development deficit[3]	3.0 (2.0-3.0)	3.0 (3.0-4.0)	0.219

[1]n=8; [2]n=10; [3]n=9; IQR= Interquartile Range; [4]Statistically significant p-values boldfaced

DISCUSSION

Through engagement with community and local Honduran neurological rehabilitation centres, the Network of Rehabilitation Workers of the Americas planned, executed and evaluated two neurorehabilitation workshops for a mixed professional audience in northern Honduras. The workshops had positive effects on the Kirkpatrick Levels of reaction (engagement, relevance, satisfaction) and learning (skills, attitude, confidence and commitment). Positive effects were also found in Stages of Learning and Knowledge questionnaires.

Reaction to the Workshops

Kirkpatrick's first level evaluates participants' reactions to workshops. Most participants were engaged since they agreed that the physical environment of the workshop helped the learning, the workshop was interesting, and most of them also reported commitment to the workshop activities. Similarly, most participants considered the workshop relevant; the material was useful and applicable to their work and client care. In addition, there was a high level of satisfaction. Most respondents agreed that participating in these workshops was worth the time. The positive reaction to the workshops could in part be due to the fact that the themes and the cases were selected following discussions with local health workers who knew the needs and context of northern Honduras. Several training evaluation studies have relied on the first level of Kirkpatrick's model as the only area of evaluation (Morgan & Casper, 2000). The authors in those evaluations considered their results encouraging, even when a positive reaction does not guarantee learning, changes in behaviour, or results (Reio, Rocco, Smith & Chang, 2017). The current study also evaluated learning effects, which is a

unique contribution to this area of research.

Evaluation of Learning

The evaluation of learning was divided into three parts: Modified Kirkpatrick's Questionnaire (dimensions include skills, attitude, confidence and commitment); Moore and Slotnick's Stages of Learning; and finally, the findings of Knowledge questionnaires.

Modified Kirkpatrick Questionnaire - Regarding Kirkpatrick's second level (learning) which evaluates the extent of knowledge, skills, attitude, confidence and commitment (Kirkpatrick & Kirkpatrick, 2016), most participants: 1) reported that they would be able to use what they learned right away (skills); 2) believed their attendance at the workshops would have positive impacts on quality of care, personal confidence, client satisfaction, relations with colleagues, and respect of colleagues (attitudes); 3) felt confident in correctly applying the knowledge and techniques they had learned without harming their clients (confidence); and 4) felt committed to apply what they had learned in the workshops at work (commitment).

Stages of Learning - The MSLQ showed acceptable content validity. Because the scenarios and questions used in the MSLQs were based on the workshop objectives, they can only be used for future workshops that have the same objectives. However, the structure (objectives, scenarios, questions, items) of the MSLQ and the 'yes/no' items themselves could be transferable to classify Stages of Learning related to other workshops having a clinical focus.

No change in the MSLQ was found in the adult neurorehabilitation workshop. However, a significant improvement in the MSLQ was found for three areas in the paediatric workshop: 1) the concepts and processes of foetal development; 2) motor learning and motor control; and 3) the concept of neuroplasticity. These concepts are foundational for the application of rehabilitation interventions; thus, effects in these areas of learning represent meaningful change.

These workshops were brief and intensive and did not include time for direct observation of practical skills. As stated by Moore and Slotnick (2006), "the options accompanying each vignette did not ask how the problems should be handled; rather, the options sought to identify each respondent's educational status or the learner's stage, relative to the problem in the vignette (i.e., scenario)." Assessment of clinical/skill learning is difficult even in the context of formal education (Kogan,

Holmboe & Hauer, 2009) but in the context of workshops of two days or less, it is possible only for extremely systematised instruction such as cardiopulmonary resuscitation training (Makinen, Niemi-Murola, Makela & Castren, 2007). The MSLQs and scenarios were used to help assess the application of knowledge to real life situations, thereby overcoming some of the challenges of measuring the effects of this brief, concentrated format of adult learning.

Knowledge - Participants in the adult neurorehabilitation workshop improved their knowledge in cognitive therapeutic exercise (Perfetti Method). For the participants in the paediatric neurorehabilitation workshop, a significant increase was noted in knowledge about concepts of development, learning and motor control as well as milestones of neuromotor development between 0 and 12 months.

To the best of the authors' knowledge, there are neither any published applications of the Kirkpatrick Model and the MSLQs to neurorehabilitation workshops, nor to the application of these tools in an international collaborative teaching and learning context for health workers. The few studies that are documented using the MSLQs are in the area of medical education and veterinary medical informatics (Moore & Slotnick, 2006); however, these studies used a different approach to the classification of the Stages of Learning (Experience, Learning, Evaluation, Scanning). In addition, only one training evaluation study specific to rehabilitation was found. In this study (McEwen, Szurek, Polatajko & Rappolt, 2005) learning was evaluated after completion of an online module in stroke rehabilitation for 108 occupational therapists, physical therapists, registered nurses, and speech-language pathologists from Canada, which is not comparable with the present study.

Strengths

Rehabilitation practice and continuing education should consider the local context, its needs and practices (Wickford, Hultberg & Rosberg, 2008; Edwards, Wickford, Adel & Theoren , 2011; Wickford & Duttine, 2013). In this sense, the strength of the current study was the collaborative approach. This project brought rehabilitation workers together with local peers and with international partners from Colombia and Canada. Workshop themes were selected by establishing an ongoing dialogue and considering the needs of the Trujillo and Tocoa rehabilitation workers; this mutually beneficial collaboration in all likelihood contributed to the fact that the workshops' curricula were well appreciated.

Future curriculum should be designed to include group activities that foster continuing collaborations including partnership with a local university.

Another strength of this study was that the learning evaluation included different approaches. First, several tools were applied to evaluate the different components of the learning levels. Second, different time-points were used to evaluate learning: before the workshops, immediately after them, and one month post workshops, which allowed for the assessment of changes in learning.

Limitations

Lack of a control group limits conclusions about whether observed changes in knowledge and stages of learning are the result of the workshops, rather than other factors. Second, the study has a high percentage of post-test non-respondents (33%-60%). In addition, the small sample due to the limited number of workers in the region could reduce the power of the study to detect an effect. These factors can also limit generalisability of the results. The findings will be more generalisable to small neurological continuing education workshops developed in collaboration with instructors, community members and researchers.

A major limitation with this evaluation of training effects was that only levels 1 and 2 of the Kirkpatrick model were evaluated: reaction and learning. Evaluations of both behaviour and results were not done. Moore and Slotnick (2006) acknowledge that "documenting change in clinical behaviour is difficult". To evaluate change in clinical behaviour, it would be necessary to directly observe changes in the clinical setting. Implementing rigorous measurement of behaviour change in the clinical practice of workshop participants with heterogeneous professions, formal training, work assignments, and distributed across different centres, would be costly, time consuming and a formidable undertaking. In the absence of evidence of Kirkpatrick's levels 3 and 4, the study cannot imply that the positive effects observed in reaction and learning will translate into changed behaviours or positive results in the clinical environment.

Implications

Based on the results of this study, iterations of the Network of Rehabilitation Workers of the Americas visiting professor programme and workshops held in 2018 and 2019 were designed to maximise opportunities to establish the rehabilitation professions and develop local leadership through: a) incorporating

an active teaching role for Honduran professionals in future workshops, b) establishing further linkages with the rehabilitation and medical professions (including physiatrists, neurologists, nurses, psychologists), c) visiting rehabilitation centres for applied learning and mentorship, d) interacting with local universities, and e) advocating for inclusion of persons with disabilities in all aspects of society.

Historically, capacity building in developing countries has been externally driven (Goldberg & Bryant, 2012). The Network of Rehabilitation Workers of the Americas is a professional, interdisciplinary north-south collaboration focused on rehabilitation capacity building that utilises a participatory approach. The work of the Network of Rehabilitation Workers of the Americas is relevant and timely, and despite its urgent need for strong leadership in rehabilitation there are no other such collaborations in Honduras. This collaboration will be continued to improve leadership and professional capacity needs for stronger health systems and improved outcomes, as well as to alleviate the burden of disease and disability in Honduras.

CONCLUSION

Workshops offered to the mixed healthcare workers in Honduras through a community-engaged international academic network resulted in a positive reaction; acquiring of skills, attitude, confidence and commitment; advanced learning opportunities; and acquisition of relevant knowledge which has the potential to improve quality of care for people with neurological conditions in the northern region of the country. Case-based learning and a supportive peer environment were used during the workshops and were important elements in promoting learning. Future visiting professor workshops will expand on this successful pilot to include more opportunities for applied learning and interprofessional collaboration.

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APPENDICES

Appendix 1: Objectives of the Adult Workshop

Workshop - Neurorehabilitation in adults with acquired brain injury, spinal cord injury, and cerebral vascular accidents. Tocoa, September 8 and 9, 2017. Intensity: 2 hours

(Taller de Neurorehabilitación en pacientes adultos con daño cerebral adquirido y trauma raquimedular)

1) Describe the epidemiology, pathophysiology, clinical presentation of acquired brain injury (cranioencephalic trauma, stroke) and spinal cord trauma
2) Describe the concept of neuroplasticity
3) Demonstrate the physiotherapeutic assessment in adults with acquired brain injury according to the presented problem
4) Demonstrate the physiotherapeutic assessment in adults with spinal cord injury according to the American Spinal Injury Association
5) Plan the physiotherapeutic intervention in adults with acquired brain injury and spinal cord injury according to the needs of the client
6) Describe the fundamentals of Cognitive Therapeutic Exercise (Professor Perfetti Method) in clients with acquired brain injury
7) Apply proprioceptive neuromuscular facilitation techniques (Kabat and Knott) to control the trunk in clients with acquired brain injury (stabilisation, isometric)
8) Apply proprioceptive neuromuscular facilitation techniques (Kabat and Knott) to reinforce the residual musculature in clients with spinal cord injury (rhythmic stabilisation, isometric, repeated contractions)
9) Demonstrate the physiotherapeutic intervention in a sedentary and bipedal position in a client with acquired brain injury using the Bobath concept and motor relearning

Appendix 2: Objectives of the Paediatric Workshop

Workshop - Rehabilitation for children with impaired neuromotor development. Trujillo, September 13, 2017. Intensity: 7 hours

(Taller 2. Rehabilitación en niños con alteraciones del desarrollo neuromotor)

1) Briefly describe the embryonic development of the Central Nervous System
2) Define the concepts of motor development, motor learning, and motor control
3) Describe the milestones of neuromotor development between 0 and 12 months
4) Define the concept of neuroplasticity
5) Describe the major dysfunctions of movement in children with cerebral palsy (for example, hypotonicity, hypertonicity, ataxia, flaccidity)
6) Apply the principles of intervention selected in children with deficits in neuromotor development
7) Propose a functional adaptation for the child with motor development deficit

Appendix 3: Modified Kirkpatrick Questionnaire

A. Reaction Level

Level/Dimensions/Items	Adult Workshop		Pediatric Workshop	
	In disagreement/ Neutral	Agree/Strongly agree	In disagreement/ Neutral	Agree/Strongly agree
	n (%)	n (%)	n (%)	n (%)
1. Reaction Level				
1.1. Engagement				
The physical environment of the workshop helped me to learn	0 (0)	16 (94)	1 (7)	**13 (87)**
This workshop kept my interest	1 (6)	15 (88)	0 (0)	14 (93)
I was committed to what was happening during the workshop	0 (0)	16 (94)	0 (0)	14 (93)
1.2. Relevance				
The workshop material will be useful for my future work with clients	1 (6)	15 (88)	0 (0)	14 (93)
The information in this workshop is relevant and applicable to my work	2 (12)	**14 (82)**	1 (7)	14 (93)
I think the content of this workshop is important to improve client care	0 (0)	16 (94)	0 (0)	15 (100)
I think it will be worthwhile to apply at work what I learned in the workshop	1 (6)	15 (88)	0 (0)	15 (100)
1.3. Customer Satisfaction				
The information I received before the workshop was useful	0 (0)	15 (88)	0 (0)	15 (100)
Taking this workshop was worth my time	0 (0)	16 (94)	0 (0)	15 (100)

Lowest percentages boldfaced.

B. Learning Level

Level/Dimensions/Items	Adult Workshop		Paediatric Workshop	
	In disagreement/ Neutral	Agree/ Strongly agree	In disagreement/ Neutral	Agree/Strongly agree
	n (%)	n (%)	n (%)	n (%)
2. Learning Level				
2.1. Skills				

I will be able to use what I learned right away	2 (12)	**14 (82)**	0 (0)	15 (100)
2.2. Attitude				
If I consistently apply what I have learned, I believe that				
... the quality of care will improve	0 (0)	16 (94)	0 (0)	15 (100)
... my personal confidence will increase	1 (6)	15 (88)	0 (0)	15 (100)
... client satisfaction will increase	1 (6)	15 (88)	1 (7)	14 (93)
... relationships with my colleagues will improve	1 (6)	15 (88)	1 (7)	13 (86)
... the respect of my colleagues towards me will increase	2 (12)	**14 (82)**	3 (20)	**12 (80)**
2.3. Confidence				
I can correctly apply the knowledge and techniques that I have learned	2 (12)	**14 (82)**	2 (13)	13 (87)
I can apply the knowledge and techniques that I have learned without harming my clients	2 (12)	**14 (82)**	1 (7)	14 (93)
2.4. Commitment				
Q13. I am committed to apply what I learned in the workshop at work.	2 (12)	**14 (82)**	1 (7)	14 (93)

Lowest percentages boldfaced.

Appendix 4: Development and Content Validation of the Modified Stages of Learning Questionnaires

A. Methodology

Four physiotherapists on the research team developed two MSLQs, one for each workshop. Six Spanish-speaking experts in neurorehabilitation independently evaluated the MSLQs. The experts' median age was 41 years (IQR=37-45); three were from Colombia, two from Honduras and one from Argentina. Four were physiotherapists and had a Master's degree in neurorehabilitation, one was a physician with a diploma in rehabilitation and one was a physiatrist. The mean of experience working in neurorehabilitation was 8 years (IQR=5-22). The self-reported expertise in adult and paediatric neurorehabilitation was 10 (8-10) and 8.5 (6-10), respectively, on a scale from 0 to 10 (0 was no experience at all and 10 was the maximum neurorehabilitation experience imaginable).

Each of the experts was asked to rate the relevance of the clinical scenarios, the questions, and the items of the MSLQ using the following 'yes/no' question: Do you consider this clinical scenario/question/response scale relevant?

In addition, experts were asked to comment using open-ended questions about how the clinical scenarios, questions or response scales could be improved.

B. Data Analyses

An item content validity index (I-CVI) was calculated for each scenario, question and item of the MSLQ. The I-CVI is the proportion of experts who rate its content as valid (a 'yes' response to the relevance question) divided by the number of experts (Polit et al, 2007). A scale content validity index (S-CVI) was then calculated for the overall questionnaire. The S-CVI is the average of all the I-CVIs of the individual scenarios, questions and response scales. An acceptable S-CVI should be greater than 0.80 (Polit et al, 2007). Comments from the six experts were discussed by the four physiotherapists until consensus was reached. Before using the final MSLQ version, the questionnaire was sent to a local physiotherapist who was asked whether the scenarios, questions, or response scales were understandable. If 'no', she could give suggestions for improvement.

C. Results

The I-CVI of the three clinical scenarios and the nine response scales was 1.0. The

lowest I-CVI was obtained in the question linked to the Cognitive Therapeutic Exercise (I-CVI=0.67) followed by the questions "Can you describe the components of the physical therapy evaluation according to the American Spinal Injury Association for a complete spinal cord injury level T10?" and "Can you apply the technique of repeated contractions (proprioceptive neuromuscular facilitation) to the upper limbs of Mary to facilitate the strengthening of the trunk?", which obtained an I-CVI of 0.83. The I-CVI of the remaining 11 questions was 1.0. The S-CVI was 0.97 indicating evidence of acceptable content validity. After the content validation process, minor suggestions were given to improve the clarity of the wording. The translated final version of the scale can be found below.

D. Clinical Scenarios and Questions of the Modified Stages of Learning Questionnaires

Clinical Scenario: Acquired Brain Injury in Adults
Diego is a 40-year-old man who had a traumatic brain injury as a result of an automobile accident. The lesion occurred on the left side of the brain. There is hemiparesis of the right arm and leg. He is able to sit with someone's help and can lift his arm about 80 degrees for shoulder flexion. He cannot stand without moderate help due to weakness of the right leg and difficulty maintaining balance.
1. Diego's wife wants to know about traumatic brain injury. Can you explain the injury and how neuroplasticity will benefit Diego's rehabilitation?
2. Begin with an assessment. Can you describe the evaluation parameters that a physiotherapist applies in this case?
3. It is necessary to design the intervention plan to improve the balance in the standing position. Can you propose the therapeutic strategies to achieve this goal?
4. Can you explain what the Cognitive Therapeutic Exercise adds to Diego's rehabilitation?
5. It is necessary to improve Diego's postural alignment in sitting posture by proprioceptive neuromuscular facilitation. Can you apply these techniques?
Clinical Scenario: Spinal Cord Injury
Maria is a 22-year-old woman with a fracture of the tenth thoracic vertebra (T10) and a complete spinal cord injury as a result of a motorcycle traffic accident. She is functional in a wheelchair and has proper bowel / bladder management.
6. Can you explain to Maria what the clinical manifestations are of a complete spinal cord injury level T10?
7. Can you describe the components of the physical therapy evaluation according to the American Spinal Injury Association for a complete spinal cord injury level T10?
8. Can you apply the technique of repeated contractions (proprioceptive neuromuscular facilitation) to Maria's upper limbs to facilitate the strengthening of the trunk?
Clinical Scenario: Paediatric Client

José is an 8-year-old boy with spastic diplegia. His legs are affected by weakness and muscle tension in the hips, knees, and feet with contractures causing him to walk on tiptoe. He has lived in a rural area without access to rehabilitation services but has just moved to Trujillo. His family is very excited about the availability of care in the clinic. Both Mum and Dad have arrived at their first treatment session.
1. Can you help Jose's mother understand the problems of her child's movement?
2. Can you describe the developmental milestones that Jose should have completed up to one year old?
3. Can you explain how rehabilitation could improve Jose's motor control?
4. Can you explain to Jose's parents how spasticity affects Jose's movement?
5. Can you apply strategies to stimulate the child's motor development?
6. Can you recommend a functional adaptation for Jose?

E. Clusters of questions in each of three categories: Evaluation (E), Learning (L), and Gaining Experience (Ex)

Yes	No	Stage	Items
O	O	E1	This question is appropriate for me
O	O	E2	There is a solution to this question
O	O	E3	Learning to solve this question will benefit my practice.
O	O	L1	I am taking action to resolve this question
O	O	L2	I am learning the knowledge required to solve this question
O	O	L3	I am learning skills to solve this question
O	O	Ex1	I am applying my knowledge to solve this question
O	O	Ex2	I am practicing effective skills to solve this question
O	O	Ex3	I have confidence in applying my knowledge / skills to solve this question

F. Classification Grid showing the Patterns of Responses that were associated with the four Stages of Learning

	Classification of Stages of Learning			
Number of Items		Evaluation	Learning	Experience
3	Experience	3	3	3
3	Learning	3	3	<3
3	Evaluation	3	<3	<3
0	Scanning	Otherwise		

Reference for this Annexure: Polit DF, Beck CT, Owen SV. (2007). Is the CVI an acceptable indicator of content validity? Appraisal and recommendations. *Research in nursing and health, 30*(4), 459-467.