The Ponseti Method in Latin America:
Initial Impact and Barriers to its Diffusion and Implementation

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Abstract

The Ponseti method for correcting clubfoot is a safe, effective, and minimally invasive treatment that has recently been implemented in Latin America. This study evaluates the initial impact and unique barriers to the Ponseti method throughout this region. Structured interviews were conducted with 30 physicians practicing the Ponseti method in three socioeconomically diverse countries: Chile, Peru and Guatemala. Barriers were classified into the following themes: physician education, health care system of the country, culture and beliefs of patients, physical distance and transport, financial barriers for patients, and parental compliance to the method. The results yielded several common barriers throughout Latin America including lack of physician education, physical distance to the treatment centers, and financial barriers for patients. Information from this study can be used to implement specific strategies to improve the diffusion and implementation of the Ponseti method for treating clubfoot throughout Latin America.
Introduction

Clubfoot, the most common musculoskeletal birth defect, is a deformity that results in complete inwards turning of the foot. Clubfoot can be idiopathic or occur in conjunction with other disorders, such as myelomeningocele or arthrogryposis. It is estimated that the incidence for congenital clubfoot worldwide is about 1-1.3/1000 live births.

The traditional treatment for clubfoot has been casting shortly after birth, followed by surgical intervention, usually a postero-medial soft-tissue release. This surgical procedure has a high complication and relapse rate and results in disfiguring scars on the legs and feet of the child, and long term pain. Surgical procedures are expensive, and in developing countries especially, this has been a barrier to children receiving treatment for clubfoot. Untreated clubfoot is both a physical and social deformity, as babies with this defect are often abandoned, and older individuals are often ostracized from their communities.

In recent years, the Ponseti method for correcting clubfoot, created in the 1940’s by Dr. Ignacio Ponseti, is becoming the gold standard for treating this deformity around the world. The Ponseti method uses a combination of manipulations and casting to correct the deformity, requiring a minimal, office-based procedure – an Achilles tenotomy. After the casting period, the child wears a foot abduction brace until the age of 4 to prevent relapse\textsuperscript{1-2}. The Ponseti method has been shown to achieve
complete correction in as little as 16 days in > 95% of patients. Additional surgical release is required in as few as 1% of patients\(^3\).  

Within the last few years, the Ponseti method has been diffused and begun to be implemented throughout Latin America. Latin America contains a diverse group of countries and has a population estimated at 577 million people. This study looked at three socioeconomically diverse countries in this region: Chile (population of 16.6 million; GDP of $16,600); Peru (population of 29.5 million; GDP of $8,500) and Guatemala (population of 13.3 million; GDP of $5,100) to identify the challenges faced for the diffusion and implementation of the Ponseti method\(^5\). By identifying those barriers, specific strategies can be employed to improve the diffusion and implementation throughout these and the other countries in this region. Awareness of knowledge and attitudes about the Ponseti method will allow culturally appropriate changes to be implemented.

**Materials and Methods**

Face-to-face structured interviews were conducted in Spanish with physicians practicing the Ponseti method in Chile, Peru and Guatemala. These providers were chosen both from lists of attendees to Ponseti training workshops and from referrals made by Ponseti providers in each respective country. A total of 30 physicians were interviewed, 22 of who attended Ponseti training workshops and 6 of whom trained on their own. Two of the physicians interviewed were practicing a modified version of the Ponseti method, and were therefore not included in this
study. A total of 28 physicians interviewed were the final group for this study. In addition, observations of health care practices in both hospital and clinical settings were recorded which provided an in-depth look at the health care system of each country and the initial impact and barriers faced by diffusion of the Ponseti method.

Interviews were conducted by a medical student fluent in Spanish and English. Responses were collected in Spanish over a period of 10 weeks, and the results were translated into English and sorted into themes. Participant’s names were removed from the data and the data was stored in a secure location. Informed consent was obtained by having participants review a consent letter. This study was approved by the University of Iowa Institutional Review Board.

**Results**

Ponseti workshops were first held in Santiago, Chile in 2005, in Lima, Peru in 2007, and in Guatemala City, Guatemala in 2009. Courses consisted of a 2-day workshop with lectures and hands-on practice in models and patients, and case presentations and discussion. Today it is estimated that Ponseti trainings have educated 23 physicians in Chile, 75 physicians in Peru, and 25 physicians in Guatemala. The majority of participants in Chile work in Santiago, but there is 1 physician trained per region (totaling 10 regions). In Guatemala the participants came from several regions, but in Peru all are concentrated in Lima.
Twenty-eight physicians from the three countries were interviewed, including 9 in Chile, 11 in Peru and 8 in Guatemala. In Chile, all physicians interviewed were practicing in Santiago (9). In Peru, all physicians interviewed were practicing in Lima (11). In Guatemala, physicians were interviewed in Guatemala City (6) and Quetzaltenango (2). Since the implementation of the Ponseti method in these countries, the majority of physicians responded that after their training they treat their patients with the Ponseti method when before they would perform surgery. There were, however, a few physicians who still did some surgery for complicated cases. More importantly, they have treated approximately 1,740 clubfoot patients per year. Of these patients, an estimated 1,705 (98%) were treated using the Ponseti method, and 35 (2%) were treated using surgical techniques, most often a posteromedial soft-tissue release.

Physicians were asked to identify which of the following themes were barriers to the diffusion and implementation of the Ponseti method in their country: physician education, health care system of the country, culture and beliefs of patients, physical distance and transport, financial barriers for patients, and parental compliance to the method.

**Physician education**

Nine of 9 physicians in Chile, 9 of 11 physicians in Peru and 5 of 8 physicians in Guatemala identified physician education as a barrier to the diffusion and implementation of the Ponseti method. Currently in Chile and Peru, for example, the
Ponseti method is not being taught as a method of treating clubfoot in medical schools and residency programs. In order to attend a Ponseti training session, physicians must take time off of work and pay a nominal fee (~100$US) to attend; therefore there is little financial incentive for physicians to learn the Ponseti method. Additionally, some physicians that have attended training sessions may see only a few clubfoot patients each year. They may have enough training, but lack adequate experience to successfully treat patients using the Ponseti method. Six of the physicians interviewed had not attended formal training sessions, but had learned the method from other physicians or over the Internet. Several physicians interviewed expressed distrust in those who had not been formally trained in the Ponseti method because they have seen unsatisfactory results mostly due to modifications of the technique and protocols. Implementation of the Ponseti method is relatively new in Guatemala, as the first training course took place in 2009. Some of the physicians there cited a widespread lack of knowledge and trust in the Ponseti method, as well as a lack of incentives for continuing education, as primary reasons for physicians not receiving Ponseti training in Guatemala.

*Health care system of the country*

Eight of 9 physicians in Chile, and 9 of 11 physicians in Peru and 6 of 8 physicians in Guatemala cited their nation's health care system as a barrier to the Ponseti method. In each country, the Ministry of Health has not yet accepted the Ponseti method as a treatment for clubfoot. In Chile, this means that there has been little publicity about the benefits of the method. In Peru, several physicians explained that though many
people have some form of insurance, some insurance companies will not pay for treatments related to congenital birth problems. Likewise, private hospitals may cover all treatment costs, while in a public hospital, the patient assumes the entire cost of treatment. Several physicians also described the deficient knowledge or providers of the Ponseti method outside of Lima. In Guatemala, there is little knowledge of the benefits of the method, though CURE International is currently leading a widespread publicity campaign. In the public sector of the health care system in this country several physicians identified the poor quality of casting materials available as being a barrier. The poor quality of materials makes the casts more uncomfortable for the children and also means the treatment is more difficult to perform for the physicians. Many Guatemalans are uninsured, therefore all treatment costs must be paid out of pocket.

Culture and beliefs of patients

None of 9 physicians in Chile, 3 of 11 physicians in Peru and 7 of 8 physicians in Guatemala described the culture and beliefs of patients as being a barrier to the Ponseti method. In Chile, some parents initially reject using the abduction brace because of the social stigma they associate with children in orthotics braces. However, this does not appear to be a long-term issue with compliance to or acceptance of the method. Several physicians in Chile have structured their appointments so that all clubfoot patients are treated on the same days of the week. This provides an opportunity for parents and children undergoing different stages of the Ponseti method to interact with one another. This has made a sizable
difference in the attitudes of the parents as well as the compliance because the parents not only hold one another accountable for consistent use of the brace, but also parents of children in the casting phase of the treatment can see the corrected feet of children in the later bracing phases of the treatment, giving them hope that that Ponseti method will be able to fix their child’s feet.

In Peru, similarly to Chile, some parents initially reject the use of the abduction brace because of the social stigma. However, most parents tend to comply after the physician explains that the brace is required to prevent regression of the clubfeet. In Guatemala, one of the largest cultural barriers that the Ponseti method faces is the language barrier. There are many different dialects and languages besides Spanish spoken throughout Guatemala, especially in the indigenous populations. With few translators available, it is difficult for physicians and patients to communicate effectively with one another. Several of the physicians interviewed stated that it was especially difficult to explain the bracing schedule to the parents, and that this is one of the major barriers they face when using the Ponseti method.

Another issue in Guatemala is that of child abandonment. Many children in rural Guatemala are born in family homes with midwives or other relatives present, and children born with birth defects are often abandoned shortly after birth. This may be due to a number of factors, including lack of midwife education about clubfoot treatments and the social stigma surrounding people with disabilities. If parents have no knowledge of clubfoot treatment methods, they may not want to raise a
child with a disability who may be ostracized from their community and unable to work later in life.

**Physical distance and transport**

Four of 9 physicians in Chile, 9 of 11 physicians in Peru, and 8 of 8 physicians in Guatemala identified physical distance and transport as a barrier to the Ponseti method. In all three countries, the frequency of appointments the patient is required to attend during the casting portion of the Ponseti treatment pose a significant barrier for implementation of the method. In all three countries, the majority of Ponseti physicians are located in the capital cities. For families living outside of the capital city, this means they must travel a great distance each week for their child to receive treatment. This presents many issues for parents; many of them have to request time off work in order to make the journey into the city, or find alternate childcare for their other children remaining at home. Many families are reliant on public transportation, which may not be reliable. In Peru, for example, the Andes Mountains, which traverse the majority of the country, make it very difficult and time consuming for people to reach Lima, where the only Ponseti physicians are located. Some families elect to stay in the capital city for the entirety of the casting portion of the Ponseti treatment. However, this option, while convenient, is not financially feasible for many patients. Physicians in all three countries identified physical distance and transport as a major reason for patients abandoning the treatment regimen, or choosing surgical procedures, which require only one physician visit.
Financial barriers for patients

Nine of 9 physicians in Chile, 7 of 11 physicians in Peru and 7 of 8 physicians in Guatemala described finances as being a barrier to the Ponseti method. In all three countries, costs of the treatment can have a large impact on initiation of treatment and compliance. The most expensive portion of the treatment, universally, is the bracing portion. As a child grows, they will need approximately four abduction braces to complete the treatment course. Physicians in all three countries stressed that costs of the braces are the biggest factor in patient non-compliance to the treatment, as many families cannot afford to keep buying braces through the duration of the treatment.

In Chile, the costs of treatment depend on the patient’s insurance, and whether or not they are receiving care in the public or private system. One physician estimated the total cost of treatment, including transportation and several abduction braces, to be approximately 1,000$US. Another physician has started a program of collecting and reusing shoes to defray the treatment costs. Parents donate the shoes used on the abduction brace when their child has outgrown them, and the shoes are attached to a new bar to be used by another child. This program allows patients to complete their treatment using the Ponseti method without their parents assuming the entire cost of several new braces, each estimated to cost about 120$US.
In Peru, there is currently only one orthotics company producing the abduction braces, and each brace costs around 200$US. As previously discussed, some insurance companies will pay for treatment costs, while others will not because clubfoot is a congenital birth problem. No insurance company will pay for the cost of the braces, so families must assume those costs on their own.

In Guatemala, there is no cost for the casting portion of the treatment, but families must pay out of pocket for the abduction braces, each of which costs about 90$US. Families must also pay out of pocket for the transportation costs of getting to the treatment facility.

*Parental compliance to the Ponseti method*

Three of 9 physicians in Chile, 6 of 11 physicians in Peru, and 3 of 8 physicians in Guatemala identified parental compliance as a barrier to the Ponseti method. In all three countries, many of the physicians stated that once a child is in the bracing portion of the treatment, and parents see a corrected foot, they think the child is “cured,” and discontinue bracing before the child has completed the treatment. Parents may also stop coming to the treatment center because they cannot afford the braces or the transportation costs. Both of these lead to regression of the clubfoot in the majority of cases. In Peru, two physicians estimated that 10% of parents abandon the treatment program after they see the corrected feet.
Discussion

Latin America, with a population of 577 million people and an estimated incidence of 15,400 children born each year with clubfoot, represent a world region in which the development of effective clubfoot treatment programs has the potential for huge impact on the lives of many children and families\(^6\). Each of the twenty countries that make up Latin America is unique; however, they share a common cultural heritage and values. Therefore, evaluation of the three countries chosen in this study was considered to be representative for the region and could provide information on the impact and barriers to the diffusion and implementation of the Ponseti method.

Interestingly, when one considers the Ponseti method as an innovation in health care, the framework on how innovations disseminate could be applied to it and lessons learned in other fields could be used to improve it. In “Diffusion of Innovations,” EM Rogers discusses three basic clusters of influence that correlate with the rapid spread of a change: perceptions of the innovation, characteristics of the people who adopt the innovation, or fail to do so, and contextual factors\(^7\). When considering how to successfully continue the diffusion and implementation of the Ponseti method, these concepts can be applied to the data collected in this study and others done previously in China, Uganda, Malawi, and rural areas of the United States.

The first influence on the rapid spread of change of an innovation is the perception of the innovation. Rogers discusses the perceived benefit of the change—people are
more likely to adopt an innovation if they think it will help them. In Latin America as a whole, there is a widespread lack of knowledge about the Ponseti method. As the first training sessions took place just a few years ago, many physicians and patients have not heard of the benefits of the Ponseti method. In rural areas, many families may not even know that there is a treatment for clubfoot. These results are comparable to those initially found in Uganda and Malawi, however, national clubfoot treatment programs have been initiated in each of these countries. In Uganda and Malawi, hundreds of healthcare workers, including orthopaedic officers, midwife and immunization teams have been trained in the early detection and referral of the patients. This has resulted in increased access to care for hundreds of children born with clubfoot in these countries, but the treatment is concentrated in specialized clinics since clinical experience and materials are more available.

The second influence on the rapid spread of change of an innovation is the characteristics of the individuals who adopt the innovation, or fail to do so. Rogers classifies several groups of people based on how they adopt an innovation: the “innovators,” first to adopt a new innovation, followed by “early adopters,” “early majority,” “late majority,” and last, the “laggards.” Typically “innovators” and “early adopters” are often leaders within their hospitals or communities—in Latin America, these are the physicians who heard about the Ponseti method over the Internet or at a conference and sought out a training session. The “early majority” of the physicians are those who have heard about or learned the method from the “innovators” and “early adopters.” These three groups of people represent the
physicians interviewed for this study. These are the physicians who took the incentive to learn about the Ponseti method on their own. The other two groups of physicians, the “late majority” and “laggards,” will likely not adopt the Ponseti method until it is being taught at a national level in medical schools and residency programs. Because there are many physicians who have not yet even heard of the Ponseti method, and because there are still countries where no training sessions have even been held, it is necessary to increase the number of Ponseti training sessions available in Latin America. But most importantly, these courses should be targeted first to those individuals that are very interested and willing to practice the method rather than as a mass teaching program. Unless the courses build capacity for successful treatment, there is a high risk for deterioration of the results over time. A potential mechanism to help resolve issue is the use of virtual videoconferencing for continual medical education. This mechanism would enable a Ponseti physician to discuss and present cases to any other physician throughout Latin America. Potentially, physicians in both cities and rural areas could be trained in the Ponseti method, decreasing the transportation barriers that many patients and families face. The feasibility of training physicians using Eluminate Live! is currently being studied.

The third influence on the rapid spread of change of an innovation is the contextual factors surrounding the innovation. Things like poverty and communication within the social system of these countries may improve or impede the spread of the innovation. In the countries where the Ponseti method has been evaluated, many
patients face financial hardship, and the frequency with which patients must visit their physician during the casting phase of the treatment, combined with the out-of-pocket costs of the braces, can result in discontinuation or decreased use of the method\textsuperscript{11}. Though China and Latin America have different health care systems and insurance standards, universally for patients, the cost of transport and of the abduction brace seems to be the most financially constraining.

Communication between physicians and parents of children undergoing Ponseti treatment has also been shown to be a barrier to the diffusion of the method. In countries in Latin America and even in the rural United States where different languages and dialects are spoken, it can be difficult for parents to understand the bracing schedule for their child\textsuperscript{12}. Lack of understanding of the bracing protocol can lead to early termination of bracing and regression of the corrected feet.

**Looking toward the future**

The Ponseti program in Latin America can benefit greatly from the findings of the programs in China, Uganda, Malawi, and the rural United States. In order to increase the diffusion of the Ponseti method throughout this region, the Ponseti method must achieve national recognition in each country, as has been done in Uganda and Malawi. This would involve gaining approval from the Ministry of Health, training large numbers of healthcare providers throughout the countries, and integrating the Ponseti method into the medical school and residency program curricula. Increasing the number of Ponseti providers by implementing more training opportunities
would also ensure that rural providers would have the chance to be trained, possibly decreasing the transport barriers for patients living in rural areas. As previously discussed, these programs should be first targeted toward individuals who are very interested and willing to practice the method. Additionally, nationwide publicity campaigns to educate the public that clubfoot is treatable without surgery, mirroring current campaigns by the Sustainable Clubfoot Program in Uganda and CURE International in Guatemala, would be of great assistance.

Finally, studies in Uganda, have shown that an effective, low cost brace can be produced for as little as 10$US\textsuperscript{13}. By streamlining a brace production program in Latin America, either in each country or centrally, effective, low cost braces could be produced, eliminating the financial barriers that the current bracing system places on families. Also, to facilitate increased communication between physicians and parents, pamphlets of information with photos and directions translated into as many native dialects as possible could be distributed. This would give families something tangible to take home with them that they could refer back to with questions about treatment protocol. Increasing parental understanding of the method could go a long way to reducing the rates of regression of corrected clubfoot.

**Conclusion**

This study identified several potential barriers to the diffusion and implementation of the Ponseti method in Latin America. Three diverse countries were studied, but
many of the barriers facing the Ponseti method were common regardless of socioeconomic differences. Overcoming these educational, social, and financial barriers will allow the continued diffusion of the Ponseti method throughout Latin America, resulting in better access and patient care.

References


