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THE NEED FOR A PHYSICAL THERAPY CLINIC IN PUCALLPA, PERU

A MASTER'S PROJECT SUBMITTED TO THE GRADUATE FACULTY

GRADUATE SCHOOL BETHEL UNIVERSITY

BY

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IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR DEGREE OF

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Abstract

In developing countries, complications from traumatic injuries account for a significantly higher number of deaths annually compared to developed countries. Not only are traumatic injuries more likely to occur in developing countries, but limited access to quality healthcare and adequate funds to pay for services make it much more likely for individuals to be left with lifelong disabilities. With that, this community service project worked with Scalpel at the Cross (SATC), an orthopedic medical ministry based in Pucallpa, Peru to expand their ability to provide free orthopedic surgeries and physical therapy following traumatic injuries.

The community service project will help SATC accomplish their goal of building a new physical therapy clinic by providing them with a resource that demonstrates the need for physical therapy following traumatic injuries and amputations. A literature review regarding the challenges of living in Pucallpa, consequences of traumatic amputations, and the benefits of physical therapy was done in order to create an informational packet. The informational packet highlights the key components of the literature review as well as presents patient testimonies and logistics of the physical therapy clinic. The packet will be used at future SATC fundraising events to raise the necessary funds for the construction of a new physical therapy clinic. The informational packet login information was given to the SATC Board of Directors for feedback and future implementation. The project implementation is currently on hold due to the COVID-19 global pandemic.

Acknowledgements

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Chapter 1: Introduction

Introduction

The following research explores the history, lifestyle, and hardships of those who live in the Peruvian Amazon with an emphasis on Pucallpa, Peru. Specifically, this project worked in collaboration with Scalpel at the Cross (SATC), an orthopedic medical ministry based in Pucallpa, Peru, to research traumatic injuries and amputations in developing countries. SATC plans to build a new physical therapy clinic that will aid in patient treatment as well as recovery and this project will help raise funds to build the clinic by demonstrating the need and importance of physical therapy. Chapter one is a brief introduction and background of the problem, including a needs assessment, the purpose of the project, and the significance of it relating to the healthcare field. Chapter two contains the extensive literature review on the challenges of living in Pucallpa, consequences of traumatic injuries and amputations, and the benefits of physical therapy. The goal of the community service project is to demonstrate the need for a new physical therapy clinic in Pucallpa, Peru.

Background to the Problem

Scalpel at the Cross is a medical ministry located near the Amazon border in Pucallpa, Peru. SATC was developed in 2004 by Dr. Peter Cole and his wife, Nancy Cole, with the goal to “support and amplify on-going Christian ministry within the country of Peru” and offer “much needed aid to an area with a long history of poverty, medical neglect, and suffering” (“Scalpel At The Cross...”, 2015, para. 1).

From the desert conditions of the Pacific coastline to the tropical Amazon, Peru is undoubtedly host to a wide variety of environments. The diverse Peruvian ecosystems are often inhospitable to their inhabitants and present many challenges (“Scalpel At The Cross...”, 2015). Additionally, Peru has been under military rule and a corrupt government system for years,

which has resulted in unstable conditions for the citizens. As a result, 20% of the country, or about 6 million people, live in poverty (Arboccó, 2018). Though the poverty rate is lower (~15%) in urban areas, it spikes up to 44% in rural areas (Arboccó, 2018). The sparse living conditions means that many of the people do not have access to basic necessities such as clean water, food, medical care, and clothing.

In the city of Pucallpa, the cramped housing conditions, unclean markets, and poorly maintained streets present even more obstacles (“Scalpel At The Cross...”, 2015). Additionally, no street lighting exists which leads to further unsafe driving conditions contributing to many motor vehicle accidents, which is among the top reasons for death in this region (Lezak et al., 2019). Violence is another common source of injuries in Peru, which is especially prevalent in rural areas, such as Pucallpa. Recently, homicide rates have been increasing as well due to drug trafficking, interpersonal conflicts, and disagreements involving land ownership (Sousa, 2015).

An additional challenge for the Peruvians of Pucallpa is that farming is nearly impossible as the ground dries up in the dry season and floods during the wet season. The main sources of employment are “subsistence farming, artisan craftwork, small shop owners, or mototaxi drivers” (“Scalpel At The Cross...”, 2015, para. 11). Working wages in Pucallpa range from 24-480 US dollars per paycheck and the poverty rate remains at 20.1% (Porro et al., 2014). Due to the unreliable farming conditions and low wages, providing basic nutrition and medical care for families is challenging.

As a result of Peru’s land and cultural obstacles, many individuals have unmet medical needs. In fact, “injuries are a neglected epidemic in developing countries, causing more than five million deaths each year, roughly equal to the number of deaths from HIV/AIDS, malaria and

tuberculosis combined” (Gosselin, 2009, para. 1). SATC recognized a need for orthopedic medical care and are working to decrease the mortality rate related to traumatic injuries.

SATC exists to improve the lives of the residents in Pucallpa by sharing the love of Christ through offering much needed orthopedic surgical care. People come from all over Peru to receive treatment and pursue the opportunity to walk again (“Scalpel At The Cross...”, 2015). In addition to direct orthopedic care, SATC trained Isaac Mendoza, a local physical therapist, to guide patient recovery, enhance patient outcomes, and share the love of Christ. Isaac also helps SATC strengthen their relationship with the local hospital, Hospital Amazonico, by acting as a liaison and utilizing his connections within the hospital (“Scalpel At The Cross...”, 2015). However, SATC is without an official physical therapy clinic, so Issac is currently working out of a small office. While he has been able to provide care for many patients, his impact is limited due to inadequate space and resources (“Scalpel At The Cross...”, 2015).

Needs Assessment

Although SATC has put forth great efforts to raise money to support their mission, their funding has not matched what is required to operate optimally (Lezak, Cole, & Schroder, 2019). The vision of SATC is to build a physical therapy clinic in the next five years. Funding is required in order to start building the clinic. SATC has requested assistance in their fundraising efforts by developing an informational packet to “sell the project” to potential donors (“Scalpel At The Cross...”, 2015). The packet will include a summary of SATC’s mission and project, as well as a preliminary list of how the funds will be utilized. The goal of the packet is to create a compelling case for donors to contribute financially towards building a new physical therapy clinic. A compelling case will be created by informing potential donors of the current challenges Peruvians face to receive medical care through facts and testimonies. The informational packet

will also include information regarding traumatic injuries and amputations, and the benefits of physical therapy. SATC has a fundraising goal of \$500,000 over the next five years (“Scalpel At The Cross...”, 2015). The plan is to host a fundraiser to trial the informational packet, however hosting a fundraiser is not the primary goal of this project.

Problem Statement

An estimated 5 million deaths occur annually in developing countries as a result from complications of injuries (Gosselin, 2009). In a developing country such as Peru, this statistic alone creates a plea for the obvious gap in availability of medical treatment, including surgery, and post-surgical rehabilitation such as physical therapy. Thankfully, SATC has made orthopedic care following injuries more readily available for those living in Pucallpa and the entire Ucayali region. In order to support SATC’s mission “to be a lighthouse for Christ through a medical ministry” (“Scalpel at the Cross: A Christian Medical...”, 2015, p. 2.), SATC believes a new physical therapy clinic is necessary. The clinic will expand the scope and services that SATC can offer by enriching patient experiences and improving quality of life following an injury. SATC has purchased the land to build the clinic, but progress remains stagnant while funds are being raised.

Purpose of the Project

The purpose of this project is to create an informational packet that demonstrates the need for a physical therapy clinic to help raise funds for the clinic in Pucallpa, Peru. An informational packet explaining the need and benefits of physical therapy will be created as a fundraising tool to help SATC reach their goal. Upon completion of this project, the informational packet will aid in raising funds for multiple years to build a physical therapy clinic that will have a lasting impact on the people of Pucallpa.

Significance of the Problem

The project is aimed at demonstrating the need for a physical therapy clinic in Pucallpa, Peru. A clear gap in healthcare accessibility exists in developing countries. Most people in developing countries have limited access to healthcare. Financial barriers and geographic isolation in the Peruvian Amazon contribute to lack of healthcare accessibility. As a profession, Physician Assistants desire to provide care to all individuals in need. An informational packet will bring awareness to the lack of healthcare accessibility, including physical therapy, and in turn provide better medical care for the people in Pucallpa, Peru.

Barriers to Community Service

SATC faces challenges in caring for the people in Pucallpa, and this informational packet comes with its own challenges. The barriers to the project include creating a compelling informational packet without a background in marketing, lacking firsthand experience in Pucallpa, Peru, and communicating information in a way that is understood by all.

Without a solid background in marketing, selecting relevant testimonies from the people of Pucallpa for the informational packet may be difficult. The goal of the informational packet is to leave donors feeling compelled to donate. However, testimonies leave different impressions on people depending on their personal experiences. There is no way to predict how different individuals will interpret the testimonies. In order to help overcome this barrier, the informational packet will be sent to SATC's marketing director who will provide initial feedback. Additionally, SATC will have the ability to make changes to the informational packet over the next five years as needed.

Another barrier that will require consultation, is a lack of first-hand experience of life in Pucallpa, Peru. First-hand experience can be extremely powerful in fundraising, which

unfortunately will not be incorporated into the informational packet. The testimonies used in the informational packet will come from a secondhand source, but direct quotes will be included in an attempt to overcome this barrier.

Finally, the last barrier is communicating information in a way that is understood by all. The informational packet must be well understood by people of the medical community and those outside of the medical community. This barrier will be overcome by intentionally choosing the language used and avoiding complex medical terminology.

Term Definitions

Terms that are used in the paper that may be poorly understood are defined below:

Amputation - “to cut a limb from the body” (Merriam-Webster, 2019).

Biodiversity- variety of landscape, climate and organisms inhabiting a region (Sawe, 2017).

Ecosystem - living organisms interacting with each other as well as the land and climate in which they reside (Rodriguez & Young, 2000).

Orthopedics – “A medical specialty that focuses on injuries and diseases of the musculoskeletal system, including bones, joints, ligaments, tendons, and muscles” (Orthopaedics, n.d., para. 1).

Amazon- “biome of dense moist tropical forest that encompasses 6.7 million km² that spans eight countries, including Peru” (WWF, 2019).

Prosthesis - “an artificial device to replace the missing limb” (Merriam-Webster, 2019).

Mechanical loading – “force per unit area that measures the intensity of internal forces acting within the body as a reaction to external applied force.” (Donatelli & Wooden, 2010, p. 7)

Conclusion

SATC is an organization that was founded to help those in need in Pucallpa, Peru. The organization does so by providing medical care to those in need of orthopedic surgery. Most

individuals require physical therapy after surgery in order to return back to their pre-injury functioning level. Therefore, SATC is determined to raise funds for a physical therapy clinic. This community service project is aimed at creating an informational packet to help raise the necessary funds. The following research in chapter two outlines Peru's history and climate, the long-term effects of traumatic injuries and amputations, and lastly the benefits of physical therapy. The literature review for this project is aimed at compiling the necessary information and evidence to create an informational packet used to raise funds for a new physical therapy clinic in Pucallpa, Peru.

Chapter 2: Literature Review

Introduction

The need for access to a physical therapy clinic in the Peruvian Amazon was assessed by first looking at the ecosystem, climate, history, living situation, and violence in Peru, specifically looking at the Ucayali region. Violence leads to injuries requiring orthopedic surgeries, and often leads to amputation. Therefore, this literature review focused on the effects of traumatic amputations on physical, social, and economic outcomes. Post-amputation care in the United States was compared to post-amputation care in developing countries in order to gain a better understanding of the need for a physical therapy clinic in Pucallpa, Peru. Finally, the consequences of immobilization and benefits of physical therapy were discussed to further demonstrate the need.

Peru Ecosystem and Climate

Peru is located on the west coast of South America surrounded by Ecuador, Columbia,

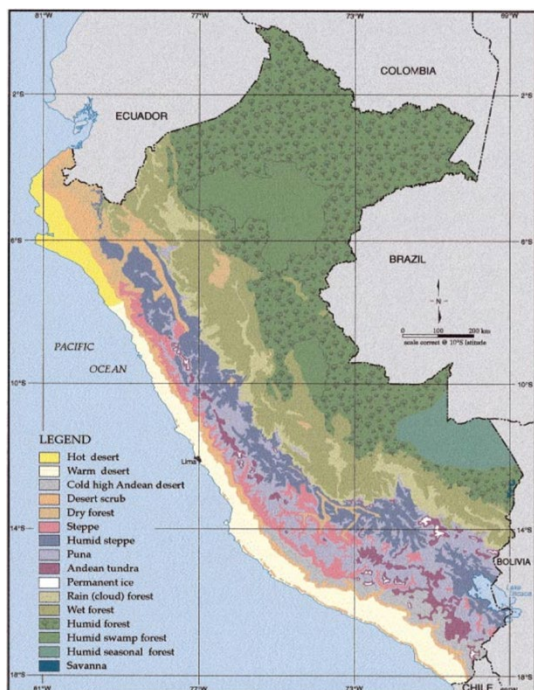


Figure 1: This picture depicts the variety of the ecosystem occupying Peru (Rodriguez & Young, 2000).

Brazil, Bolivia, and Chile with the Southern Pacific Ocean to its west border. Peru has a variety of different ecosystems that each come with their own challenges. The three major ecosystems of Peru include the desert in the west, temperate forests in the Peruvian Andes mountains, and the flood-prone rainforest in the east, otherwise known as the Peruvian Amazon, seen in Figure 1 (Rodriguez & Young, 2000). The western border of Peru, located along the Pacific Coast, is a dry desert ecosystem that occupies a thin portion of the

country (Central Intelligence Agency, 2018). The warm desert ecosystem accounts for only seven percent of Peru's landscape (Rodriguez & Young, 2000). Though the desert ecosystem is a small portion of Peru, the land surrounding the desert ecosystem contains a plethora of fertile soil as it is surrounded by silt-filled rivers that flow into the Southern Pacific Ocean (Davies, Moore, Burr, Pulgar-Vidal & Kus, 2019). Along with the desert portion of Peru being hot, this strip of land is very dry with seldom rainfall averaging two to four inches annually ("Climate - Peru," n.d.). The terrain then gradually climbs upward from sea level and transitions from the dry climate to a more temperate ecosystem. As the landscape climbs the foothills of the Andes mountains that lay adjacent to the coast, temperatures vary secondary to altitude ("Climate - Peru," n.d.). Here, the soil continues to be fertile in the highlands, but suffers in the valleys due to wind (Davies et al., 2019).

The Andes experience a wet season from September to May and from June to August the weather is much dryer and is considered Peru's dry season ("Climate - Peru," n.d.). For example, the city of Cusco has an average rainfall of 28 inches per year with only 0.7 inches of rainfall in the dry season ("Climate - Peru," n.d.). The rough terrain of the Andes mountain range separates the desert ecosystem on the coast from the wet rainforest in the eastern portion of Peru (Central Intelligence Agency, 2018). As seen in Figure 1, the humid rainforest within the Peruvian Amazon is the largest ecosystem occupying 32% of the country (Rodriguez & Young, 2000). Wet forests make up the second largest ecosystem and occupy 13% of Peru (Rodriguez & Young, 2000). The largest ecosystem consists of wet, humid rainforest, that makes up approximately half of the land.

The rainforest is thick and dense with different foliage making the soil less fertile which forces people to move to the highlands for better soil (Davies et al., 2019). In addition to the heat and humidity, an average annual rainfall of 111.8 inches is recorded in Iquitos, which is located in the northern Peruvian Amazon (“Climate - Peru,” n.d.). One commonality of the three different ecosystems in Peru is that there are many rivers flowing throughout all of them. The rivers originate from the Andes mountains and empty into one of three larger bodies of water: the Pacific Ocean, the Amazon River, or Lake Titicaca (Sawe, 2017). Some of the major rivers include the



Figure 2: This map labels the major rivers of Peru (Central Intelligence Agency, 2018).

Amazon River, the Ucayali river, Marañón, Purús, Jurua, and Huallaga (Sawe, 2017). These rivers provide freshwater, rich biodiversity, electricity, and transportation throughout Peru (Sawe, 2017). The rivers also contain silt which fertilizes the soil in Western Peru (Sawe, 2017). The Ucayali River is the longest river contained entirely within the country of Peru. The river flows north and empties into the Amazon river (Sawe, 2017). As seen in Figure 2, the Ucayali river runs directly through the western portion of the Peruvian Amazon, making it an essential location for the communities living along the river, including Pucallpa (Sawe, 2017).

Peru Population

As of July 2018, the country of Peru is home to around 31 million people with about ten million people, or one-third of Peru’s population, crowded into the nation’s urban capital, Lima

(Central Intelligence Agency, 2018). Pucallpa is located in the Ucayali region and has a population of 310,750 people which greatly contrasts Lima (“Where is Pucallpa, Peru?” 2015). Roughly half of the population is made up of Quechua Indians, while another 32% of Peruvians are mestizos, a mix of European and Indian descent. Lastly, Europeans make up the remaining 12% of Peru’s population (Davies et al., 2019).

The mixture of Indian, mestizo, and European cultures is partly a product of the Spanish invasion. Peru was ruled by Spain from 1533-1824 which is a large part of Peru’s history (Central Intelligence Agency, 2018). The Spaniards left a lasting impact that is still present in Peru today as seen with the national language and religion; Spanish is the national language of Peru and Roman Catholicism is practiced by about 81% of Peruvians (Davies et al., 2019). The Spaniards also founded Lima as the capital of Peru in 1535 which is still the nation’s capital (Davies et al., 2019). Lima is located in the central western portion of the country on the Pacific Coast seen in Figure 2 (Central Intelligence Agency, 2018).

Outside of Lima, half of Peru’s population lives in the Andes highlands, which means roughly one-sixth of the population lives in the Peruvian Amazon (Central Intelligence Agency, 2018). The western, tropical region of Peru was somewhat isolated from the urbanized, capital of Lima and eastern Peru until a main road was created in 1945 (The Editors of Encyclopaedia Britannica, 2008). The road connects the city of Pucallpa to Lima, connecting the eastern part of Peru to the western portion of the country (The Editors of Encyclopaedia Britannica, 2008). Since the road was built, Peru has been moving towards urbanization (Davies et al., 2019). Now about two thirds of the entire population live in urban cities (Davies et al., 2019). Though many have immigrated to urban cities, many indigenous people still choose to live off of the land scattered throughout the Peruvian Amazon.

History of Peru

Peru is now a democratic nation organized into 25 regions. However, historically, Peru was a land of many indigenous people. Peru's history provides insight into the many challenges their country continues to face today (Central Intelligence Agency, 2018). The Inca Empire reigned in Peru beginning in 1438 and lasting until Francisco Pizarro, a Spaniard leader, claimed Peru for Spain in 1533 (Central Intelligence Agency, 2018). Two years after defeating the Inca empire, the Spanish conquerors founded Lima as the nation's capital ("Peru History and Timeline"). After 1563, Peru became rich and more developed as silver caused an economic boom (Davies et. al., 2019). During this economic boom and throughout the 16th and 17th century, Peru remained under indirect Spanish rule by a viceroy, someone who ruled on behalf of Spain (Davies et. al., 2019).

In 1821, the indigenous people of Peru declared its independence from Spain and after three years of war, they were free from Spanish rule (Central Intelligence Agency, 2018). However, it was not until 1980, after the war with Chile, multiple corrupt governments, and many years of military rule, that Peru became a democratic nation based on a newly written constitution (Central Intelligence Agency, 2018). Peru faced challenges as a new democracy including unfulfilled promises of presidents, drug trafficking, and terrorism led by a group called The Shining Path. The terrorist group threatened human rights and negatively affected a near collapsing economy (Davies et al., 2019). Government instability is seen throughout Peru's history and has contributed to the lack of control over the illegal drug trafficking and terrorism.

An example of recent government instability was seen in 2006, when García Pérez was elected president for a second term after falling short in his first presidency from 1985-1990 (Davies et al., 2019). In 2008, Pérez created a law that provided an open-door policy for foreign

companies to enter the Peruvian Amazon and extract the abundant natural resources (Davies et al., 2019). Neither Pérez nor the laws he created, which allowed big companies to extract Peru's natural resources for their own profit, were well-liked by the people living in the Peruvian Amazon. The Amazonian Indians violently fought against law enforcement until these laws were retracted in June of 2009. Due to the laws created by President Pérez, his popularity declined, and he had no chance at reelection (Davies et al., 2019).

After Pérez, Ollanta Humala became the new president in 2011. Although Peru's economy was growing under Humala's leadership, he was discredited by political scandals and disliked by environmentalists for his interest in mining (Davies et al., 2019). Humala was not allowed to run for reelection in 2016, which opened up the opportunity for the presidential candidate, Pedro Pablo Kuczynski, to claim the presidency (Davies et al., 2019). However, Kuczynski only lasted two short years and he resigned after multiple scandals that discredited his presidency (Davies et al., 2019).

After Kuczynski's presidency, Martin Vizcarra took over and is currently recognized as Peru's President (Davies et al., 2019). Recent news paints the picture of a shaky future for the current president. Vizcarra recently dissolved all of congress and begged the public for re-elections with hope of passing a bill, aimed at ending embedded corruption, that has been untouched by congress for over a year ("Peru's Vizcarra to swear..." 2019). The result of Vizcarra's presidential rule remains unclear to the present day ("Peru's Vizcarra to swear..." 2019). Peru's history of unstable and rapid turnover of leadership has cultivated government distrust, lack of law enforcement, and lack of unity which has resulted in the growth of violence and illegal activities. The unstable leadership in Peru has been present since before the democracy first began in 1980 (Central Intelligence Agency, 2018).

The Region of Ucayali

With the nation's landscape, climate, and history in mind, the focus of this section is to discuss the culture specific to Ucayali, one of Peru's 25 regions, and Pucallpa, its capital.



Figure 3: This map shows the Ucayali region and its capital, Pucallpa (Herrera, 2015).

Ucayali is located in the eastern region of Peru with a central location inside the Peruvian Amazon as seen in Figure 3 (Herrera, 2015). About 490,000 people are currently living in Ucayali (Porro et al., 2014). Ucayali's capital, Pucallpa, is one of the larger cities located within the Amazon and as of 2015, roughly 310,750 people live in the city of Pucallpa ("Where is Pucallpa, Peru?" 2015).

Despite the road connecting Pucallpa to Lima, Pucallpa is still considered rural and isolated (The Editors of Encyclopaedia Britannica, 2008). Pucallpa has experienced economic prosperity at times with the increase in export of timber and rubber, however, these resources have been exploited in order to benefit Peru's government rather than the people living in the Ucayali region (Murray & Gallopin, 1997).

Around the same time as the road was built in 1945, the Ucayali region was overrun by the Shining Path terrorist group who used violence to obtain cocaine for illicit drug trafficking (Murray & Gallopin, 1997). The violence forced many families to flee their indigenous lands in the Amazon forests and move to the city of Pucallpa for safety (Tali, 2016).

One Peruvian man recalls that his family was forced out of the forest not only due to the violence from illegal drug trafficking, but also the presence of illegal loggers which resulted in deforestation (Tali, 2016). The terrorist group, the Shining Path, was present from 1970 to 1990 taking the lives of an estimated 70,000 people (Tali, 2016).

Though, the Shining Path has declined, the region still faces illegal logging leading to problems of deforestation (Tali, 2016). Pucallpa also faces the exploitation of its natural resources by large oil companies (Tali, 2016). Besides logging, fishing and driving mototaxis are other available jobs for Peruvians (Lezak, Cole Jr., Schroder, & Cole, 2019). Agriculture, forestry, and livestock account for about 20% of the revenue from the Ucayali region (Porro et al., 2014). Peru's major crops include coca, rice, maize, beans, and cotton (Porro et al., 2014).

Despite the wide variety of jobs that people work, Peru's unemployment rate remains relatively. According to the CIA, Peru's unemployment rate is about 30% in urban areas and 55% in rural areas. Furthermore, up to one third of kids ranging from ages six to fourteen work instead of attending school in order to help support their family (Central Intelligence Agency, 2018). Specifically, in the region of Ucayali the poverty rate is about 20% (Porro et al., 2014). However, the poverty rate in rural areas of Peru remains at 44% (Arboccó, 2018). A person who works in the forest is at the top end of the spectrum earning \$480 per paycheck followed by agriculture farmers who earn \$310, livestock owners and fishermen who earn around \$125, and businessmen who earn an average of \$84 per paycheck (Porro et al., 2014).

Daily Life in Peru: Family, Housing, Diet

The road connecting Pucallpa and Lima, as well as the violence from the illegal logging, has forced many families and indigenous tribes out of the forest and into the urban city to seek protection and jobs (Tali, 2016). Any migration or change in culture leads to the decision of

assimilation versus preservation of culture from generation to generation (Espinosa, 2012). Indigenous people living in the Peruvian Amazon used to be considered adults once they had the ability to reproduce and support their future family (Espinosa, 2012). However, schooling and cultural changes that come with urbanization have led to the new concept of “youth” and people are adapting more western cultural practices (Espinosa, 2012). Basic schooling for ages six to fifteen is both required and free, though school attendance is not well recorded (Davies et al., 2019). Often children of families who have enough money will be sent to private schools and some even to school for higher education in the more developed cities of Peru (Davies et al., 2019). Cultural changes have led to a shift in the dreams that parents have for their children; parents now want more for their children’s future than working a physical, manual labor job (Espinosa, 2012). New and old cultures are rapidly blending; though the old culture believes that being of reproductive age along with the ability to provide for a family makes someone an adult, current Peruvian culture does not agree. (Davies et al., 2019).

Despite cultures blending, tradition remains that once a couple has been married, they must find a place to live. Variations in housing range from informal settlements, made of cardboard found on the outskirts of urban cities, to single family homes or apartments made of brick and concrete (Davies et al., 2019). A shortage of affordable housing exists in urban areas forcing people to live in informal settlements just outside of the urban cities (Davies et al., 2019). Many people in Pucallpa work two or three jobs in order to put food on the table for their families (Davies et al. 2019). The typical diet for most Peruvians is animal based, most commonly poultry (Vaazquez-Rowe et al., 2017). Besides poultry, other staple foods include cereals such as rice, wheat, barley, and oats, as well as tubers, vegetables, fish, a variety of fruits, red meat, and legumes (Vaazquez-Rowe et al., 2017).

Despite the multitude of available food options, including animals and staple foods from farming, a study completed by Vaazquez-Rowe et al. found that people throughout Peru are not getting the nutrition they require (Vaazquez-Rowe et al., 2017). Overall, 29.8% of Peruvians are reported to have stunted growth, with a large range of 6.7% to 69.1% depending on the region in which they live (Lutter, Chaparro, & Muniz, 2010).

Challenges of the Ucayali Environment

The region in which a Peruvian resides can have a large effect on their lifestyle due to the region's land, climate, urbanization, and available resources. Specifically, the Ucayali region is located within the Amazon rainforest (Herrera, 2015). The land is full of natural resources, but the soil is not extremely fertile until the foothills of the Andes in the western region of Ucayali (Davies et al., 2019). The region of Ucayali receives an average of 111.8 inches of rainfall per year ("Climate - Peru," n.d.). The rainfall, mostly occurring during the wet season, leads to flooding of up to 30 feet of the Ucayali river (Cole, 2018). Not only are the conditions of the Ucayali region challenging, but the region is also isolated from a majority of the population which presents further challenges (The Editors of Encyclopaedia Britannica, 2008).

One major road spans 526 miles and connects Pucallpa to Lima (The Editors of Encyclopaedia Britannica, 2008). Given that the Ucayali region is surrounded by rainforest and has only one road connecting it to the rest of the country, it remains secluded. Further, Pucallpa lacks street lighting and paved roads leading to motor vehicle accidents which is among the top reasons for death in this region (Lezak et al., 2019). Healthcare is always a concern in secluded areas as well due to lack of medical availability. Peru recognizes the need for better medical knowledge and facilities available to those outside of Lima due to the volume of trauma and

infectious diseases, however there is a need for more doctors, nurses, and healthcare facilities in the rural areas (Davies et al., 2019).

Injuries and Violence

In the urban areas of Peru, major roads are crowded with cars, taxis, and bikes. Most injuries in these areas result from road traffic accidents and interpersonal violence (Cook & Zumula, 2003). Traffic accidents are a result of overcrowded, unpaved roads and poor traffic laws (Cook & Zumula, 2003). Some accidents are fatal and for every death due to trauma another three to eight people are disabled from a traumatic accident (Beveridge & Howard, 2004). Disability is a hardship not only for the individual, but also for their family, and to society as a whole. Along with traffic accidents, rural areas within the Peruvian Amazon also face violence. Homicide rates have been increasing recently (Sousa, Xavier, Rican, Pascoal de Matos, & Barcellos, 2015). Some of the causes of increased homicide rates include drug trafficking, interpersonal conflicts, and disagreements involving land ownership (Sousa, 2015). The illegal logging and drug trafficking that occurs in the Amazon causes conflict in individuals, that may result in violence. Given the high rates of road traffic accidents and interpersonal violence, along with limited access to healthcare and challenging environmental conditions, Peruvians are at high risk for injuries that can lead to amputations.

The Consequences of an Amputated Limb

Amputations have major risks and repercussions for the patient. Some consequences include reductions in physical ability, self-esteem, confidence, and the perceived reduction in physical appearance. Depression and anxiety often accompany amputations, which results in an overall decreased quality of life satisfaction (Gallagher & Maclachlan, 2001).

Gallagher and Maclachlan performed a study in 2001 to gather information on how patients responded to an amputation. The initial reaction to amputation was often devastation and distress (Gallagher & Maclachlan, 2001). A quote from one of their participants states that “when I saw the prosthesis for the first time, I cried and cried” (Gallagher et al., 2001, p.89). Another common theme was the desire to appear normal again. Most amputees have decreased self-image because they believe that others judge their appearance or think negatively of them (Gallagher et al., 2001). Amputees may also find social interactions to be somewhat awkward due to people's reactions to an amputated limb. Responses to amputation range from shock and complete avoidance to inappropriate jokes and comments (Gallagher et al., 2001).

Patients often state that the effects of amputation are harder on friends and family than on themselves. In some situations, family members have to make the difficult decision of amputation, which can result in guilt (Gallagher et al., 2001). Therefore, relationships can suffer due to resentment surrounding the choice to amputate. However, not all reactions to amputations are negative. Some patients are able to gain a positive perspective after a period of acceptance. Patients learn to accept the amputation and remember that their situation could be worse; they could be deceased, or have even less physical ability (Gallagher et al., 2001). Generally, acceptance comes with time and support from family and peers.

The vital need for social support was expressed by most patients. Some stated that without their friends and family, adjusting to the amputation would have been much more difficult (Gallagher et al., 2001). Along with the support of family and friends, counseling was expressed as another necessary component of rehabilitation; counseling is best via a psychotherapist, support from peers going through the same process, and a mentor who can provide advice and support through the adjustment period (Gallagher et al., 2001). The mentor is

capable of explaining the long road of recovery, but also demonstrating that life without a limb is possible.

Prevalence of Amputations

In general, more amputations are due to traumatic events in developing countries than in developed countries (Staats, 1996). The rapid shift from rural to urban living in developing countries leads to more traffic accidents which often has severe consequences, such as amputations and death. (Staats, 1996). Approximately 4.5 million people die from injuries in developing countries, and one million of those are due to traffic related accidents (Zirkle, 2008). Another three to eight times more people are permanently disabled for each traffic related death (Zirkle, 2008).

Traffic accidents are not as common in the United States because of the country's well-developed transportation laws and roadway system. When accidents occur, people have greater access to medical care and therefore a decreased chance of requiring an amputation. According to a study performed in 2005 by Graham and colleagues, 1.6 million individuals in the United States reported having at least one amputation (Ziegler-Graham, MacKenzie, Ephraim, Trivison, & Brookmeyer, 2008). Of the 1.6 million amputees, 50,000 individuals have an upper extremity amputation (Ziegler-Graham et al., 2008). In general, amputees in the United States have a more positive outlook following an amputation because they are less likely to be permanently disabled. Disability is less common because of the variety of jobs not requiring manual labor in the United States.

Physical Effects of Amputations

Amputation of a limb leads to a decrease in functional abilities. Unfortunately, in developing countries, most amputees can no longer work as they did before the traumatic event.

Most end up on the streets begging for food and money for survival (Rotabi, 2008).

Unemployment leads to a cascade of consequences like financial instability, ostracization from the community, and decreased self-worth (Rotabi, 2008).

Amputations can also be challenging for health and everyday comfort levels. A study in 2010 performed by Desmond and MacLachlan, found that 64% of upper limb amputees experience phantom limb pain and 55% experienced residual limb pain. Most patients described the pain as discomforting or distressing, but a few described the pain as excruciating (Desmond & MacLachlan, 2010). Desmond and MacLachlan described phantom limb pain as “pain in the amputated limb that is no longer there” (Desmond & MacLachlan, 2010, p. 1). Amputees can also experience pain or discomfort in the portion of the limb that is still intact, which is known as residual limb pain (Desmond & MacLachlan, 2010).

Social Effects of Amputation

Not only do individuals with amputations suffer from physical ailments, but also social and psychological effects. A study performed in 2011 by Østle and colleagues, found that amputees have a significantly lower life satisfaction than their average peer. Lower life satisfaction is mostly due to changes in occupation and complications of the amputation like pain and overuse injuries (Østle, Magnus, Skjeldal, Garfelt, & Tambs, 2011). In a study that was conducted in 2007, Desmond found that amputees had three times the number of depressive symptoms than their control matched peers (Desmond, 2007). Depressive feelings originate from the fact that their lives will no longer be the same. The concept of their unknown future also provokes feelings of anxiety.

A study performed by Moskau and colleagues in 2009, found that amputees have a higher risk for anxiety symptoms than other orthopedic patients. Levels of anxiety were correlated with

marital status, level of education, and age (Mosaku, Akinyoola, Fatoye, & Adegbehingbe, 2009). Younger patients had higher levels of anxiety due to alterations in life goals and expectations. Marriage and higher levels of education were protective in developing anxiety (Mosaku et al., 2009). Most factors relating to the development of anxiety depend on the amount of social support the patient receives. Young adult amputee patients often experience a negative self-image. A negative self-image can worsen anxiety and depressive symptoms, therefore, decreasing life satisfaction because the amputees believe that others will perceive them negatively (Mosaku et al., 2009)

A researcher named Rotabi collected data on real life examples of amputation narratives. One example was a woman from South America who had double lower limb amputations (Rotabi, 2008). The woman was ostracized from her family after her traumatic accident since she could no longer take over the family farm. Another interview performed by Rotabi was with a man who lost his hand in a factory accident (Rotabi, 2008). The new amputee was immediately fired from his job because he could no longer do the required work. Losing a job places huge financial burdens on families and it is a frequent consequence of amputations. If amputees are no longer able to work, they are viewed to be less valuable and are more likely to be ostracized from society (Rotabi, 2008).

Traumatic Amputation Protocol in the United States

The majority of traumatic amputations in developed countries occur to those in the armed forces (Smurr, Gulick, Yancosek, & Ganz, 2008). Therefore, the Army has created two medical centers that implement an excellent amputation rehabilitation protocol. Three main steps to recovery include; wound healing and acute management, prosthetic training, and discharge planning (Smurr et al., 2008). Rehabilitation training is very individualized to the patient, but the

main goal is to master the use of the prosthetic limb and to reintegrate physically, socially, and psychologically back into everyday life (Smurr et al., 2008).

Wound healing and acute management, which is step one of recovery, are both initiated upon injury and continue throughout the healing process (Smurr et al., 2008). The first step on the road to recovery is evaluation. A comprehensive evaluation of the patient is taken to include their physical and mental status (Smurr et al., 2008). Background information is given to demonstrate what life was like before the amputation and used to set goals of functionality to meet before discharge (Smurr et al., 2008). Physical status is important to create a baseline motor function so progress can be tracked. Evaluation is done to measure the range of motion, strength, size of the scar, and sensation in both the affected and contralateral limbs (Smurr et al., 2008). Mental status, living status, family support, and environmental limitations are equally important to evaluate (Smurr et al., 2008). These factors guide the treatment plan, by changing the types of rehabilitation the patient may need.

After the evaluation, the main focus is on healing the wound. Since most amputations occur as a result of trauma, there is substantial debris so wounds must be left open for irrigation to reduce the risk of infection (Smurr et al., 2008). In developed countries, there are numerous techniques used to reduce the risk of infection. Once the wound is closed and clear of infection, edema must be resolved before fitting of a prosthetic can take place (Smurr et al., 2008). Next, desensitization techniques, like massage and compression, are used to decrease the hypersensitivity of the affected limb. These techniques are important for being able to tolerate the new prosthetic limb (Smurr et al., 2008). Early exposure training on self-feeding, toileting, and hygiene are also important, but controlling the pain is a main priority of the acute management phase. After amputation, individuals can experience phantom limb pain or pain in

the residual limb (Smurr et al., 2008). Multiple pharmacological agents are given to suppress pain, but ice, heat, and massage are also used (Smurr et al., 2008). Psychological support spans all phases of rehabilitation. The focus is on education, self-acceptance, reassurance, and social support from family and peers (Smurr et al., 2008).

Step two or subacute management, takes place in the outpatient setting and focuses on training the patient to use their prosthetic limb (Smurr et al., 2008). Throughout step two, it is very important to continue psychological support from counseling, family, and peers, since the first exposure to a prosthesis can be challenging (Smurr et al., 2008). Physical therapy is a huge component in step two. Patients not only need to be exercising range of motion in the affected limb but also strengthening the lower body and trunk. An emphasis on posture is placed in order to avoid overuse injuries that can lead to incorrect postures (Smurr et al., 2008). Physical therapy also focuses on retraining the performance of activities of daily living (ADLs) such as showering, laundry, and meal prep (Smurr et al., 2008). Patients learn to perform ADLs with and without the prosthesis. Patients also learn fine motor skills such as penmanship, twisting and tweezing. Some may need to undergo change of hand dominance training as well (Smurr et al., 2008).

Patients undergo extensive prosthetic training to learn how to master the prosthetic (Smurr et al., 2008). They begin with simple tasks like taking the prosthetic on and off, and finish with performing complex ADLs. Simple maintenance and cleaning of the prosthetic are also learned (Smurr et al., 2008). First time prosthetic limb use can be irritating to the limb, so initial wear times should be limited to thirty minutes daily. After removal, the wound site should be inspected for signs of breakdown (Smurr et al., 2008). Time wearing the prosthesis can slowly

be increased in 30-minute increments and worn more frequently throughout the day, with the ultimate goal of wearing the prosthesis for a continuous eight hours (Smurr et al., 2008).

Step three or long-term discharge planning is executed by the patients interprofessional healthcare team (Smurr et al., 2008). Technically, this phase spans the entire rehabilitation process because discharge is based on initial evaluations and long-term goals set by the patient. Decision to discharge the patient depends on many factors such as pre and post injury status, psychological and social support, community reintegration and resources available to the patient (Smurr et al., 2008).

Rehabilitation After Amputation in Developing Countries

In stark contrast to high availability of amputee rehabilitation programs in the US, amputee rehabilitation options are limited for people living in developing countries. Most countries do not have the finances to fund rehabilitation centers (Staats, 1996). The government does not fund amputee clinics until the burden is so large that the government has no choice but to fund a clinic in order to aid this population (Staats, 1996). Geographical limitations exist for amputees attempting to receive rehabilitation (Staats, 1996). If patients live in a rural setting, a clinic may not be within a travelable distance. Living far from medical care may have been a factor in amputation as well. Prosthetics and rehabilitation also place financial hardship on the amputee. Most amputees have lost their job due to their disability and therefore have minimal income to afford a prosthetic (Staats, 1996).

A few different types of rehabilitation programs exist in developing countries. First, they have government run programs. These programs are started and installed by the government in hospitals or separate rehabilitation centers. However, these programs are often funded with the assistance of foreign aid (Staats, 1996). A second type of rehabilitation center is a non-

governmental organization, funded by donors and large organizations, such as the International Committee of the Red Cross (Staats, 1996). A third type of rehabilitation center is led by private volunteer or religious organizations, such as Catholic Relief Services. Scalpel at the Cross also fits this category of rehabilitation center.

Benefits of Physical Therapy

Traumatic amputations inevitably result in physical changes; however, amputations also result in changes to the cardiovascular, respiratory, and nervous systems (Herasymenko, Mukhin, Pityn, & Kozibroda, 2016). Impaired recovery of one's motor function, also slows down the recovery of the other systems involved (Herasymenko et al, 2016). As the physiological and functional changes associated with amputation occur, the body goes through a process of compensation (Herasymenko et al, 2016). Compensation is considered complete once the body establishes a new, stable, functional state (Herasymenko et al, 2016). One of the most powerful ways to enact physiological and structural changes in the body is through physical activity (Herasymenko et al, 2016). Physical therapists are able to predict how the body will respond to different injuries, then actively influence these processes through physical exercises to help the body adapt to a new functional state (Herasymenko et al, 2016). Physical therapy is especially necessary for individuals who undergo amputations as a result of their injuries, as they experience more compensatory changes than those with injuries that do not require amputations.

For individuals requiring prosthesis, effective rehabilitation not only requires a high-quality prosthesis, correct prosthesis application, and a user guide, but also an adjustment of basic biological processes via functional recovery (Herasymenko et al, 2016). Without proper physical rehabilitation, which can be accomplished by means of physical therapy, an individual has a much higher chance of developing phantom limb pain which is a debilitating, long-lasting

condition with serious physical, mental, and socioeconomic consequences (Herasymenko et al, 2016).

Consequences of Immobilization

Some degree of immobilization is necessary for adequate recovery from a traumatic injury or orthopedic surgery. However, adverse and sometimes detrimental effects occur when muscles are immobilized for extended periods of time. Reduction of muscle mass is one of the biggest risks of immobilization, and it may occur as early as 48 hours after immobilization (Donatelli & Wooden, 2010). One study showed a 21% decrease in muscle mass of the quadriceps femoris after wearing a cast for four weeks (Donatelli & Wooden, 2010).

Loss of muscle force is another risk of immobilization. Interestingly enough, loss of muscle force directly correlates with the length of immobilization rather than with loss of muscle mass (Donatelli & Wooden, 2010). A study revealed that increased cortisol levels during immobilization may also contribute to loss of muscle force (Donatelli & Wooden, 2010). Another study showed that eight weeks of cast immobilization after ankle surgery resulted in a 50% decreased force production (Donatelli & Wooden, 2010). In summary, immobilization leads to a lack of functional muscle ability. Therefore, clinicians must focus on restoring functional deficits following injuries and surgeries. One way to prevent muscle atrophy is by exercising surrounding joints and muscles as much as possible (Donatelli & Wooden, 2010).

Similar to muscle immobilization, bones are immobilized for various reasons, such as fracture repair or healing of other musculoskeletal injuries (Donatelli & Wooden, 2010). The rate of bone resorption and formation is regulated by weight bearing and muscular contraction. Therefore, while immobilization may be necessary for proper healing, it has negative effects on bone. One negative effect is increased bone resorption within 24 hours of immobilization

(Donatelli & Wooden, 2010). Increased bone resorption inevitably results in decreased bone mineral content as well. Increased bone absorption in conjunction with decreased mineral content leads to a steady decrease in bone hardness. Bone hardness has been found to be reduced by approximately 60% after twelve weeks of immobilization (Donatelli & Wooden, 2010). Unfortunately, these physiological responses leave individuals much more susceptible to bone fractures. While immobilization is required for a period of time, remobilization should be initiated as soon as possible to prevent further bone loss.

Remobilization

Regaining full muscle functionality is very difficult due to the slow healing process and formation of scar tissue. However, one of the goals of remobilizing muscles is to prevent excessive scar tissue buildup, which can result in decreased mobility and increased susceptibility to muscle strains (Donatelli & Wooden, 2010). Proper physical training reverses many of the factors affected by immobilization, including muscle mass and force. For example, a study by Shaffer and colleagues, showed that 70% of muscle force in plantar flexors returned to baseline five weeks after a lower limb cast was removed (Schaffer et al, 2000).

On the other hand, studies have shown that the process of bone loss does not stop immediately after resuming normal weight bearing activities. In fact, one study in particular showed that after two weeks of immobilization, bone density did not return to normal following four weeks of normal activity (Donatelli & Wooden, 2010). Despite the slow recovery process, a stepwise approach to mechanical loading can start the recovery process earlier, bringing a quicker return to full function. Physical therapy helps determine how much mechanical loading is safe for a patient depending on their injury and where they are at in the recovery process.

Mechanical loading is the “force per unit area that measures the intensity of internal forces acting within the body as a reaction to external applied force” (Donatelli & Wooden, 2010, p. 7). Mechanical loading is essential for bodily health due to its role in tissue repair and the adaptability of connective tissue, muscle, nerve, and bone. Although bone does not adapt quickly when it is stressed, it is able to functionally adapt to mechanical loading through bone remodeling. Additionally, bone density increases with mechanical stress, which results from the pull of skeletal muscle on bone during weight-bearing activities (Donatelli & Wooden, 2010). Since weight-bearing activities are the main way to increase bone density, thus increasing bone health, the exercises in a patient’s recovery process must be carefully constructed to maximize bone health.

In order to increase bone health, exercise should “(1) be dynamic, not static; (2) exceed a threshold intensity; (3) exceed a threshold strain frequency; (4) be relatively brief but intermittent; (5) impose on bones an unusual loading pattern; (6) be supported by unlimited nutrient energy; and (7) be supported by adequate intake of calcium and cholecalciferol (vitamin D₃)” (Donatelli & Wooden, 2010, p. 11). Evidently, optimal recovery of bone and muscle following immobilization is extremely complex. Given the negative side effects of immobilization and the importance of remobilization for the health and functionality of muscle and bone, physical therapy is imperative. Physical therapy helps guide patients through their recovery process after suffering traumatic injuries and undergoing orthopedic surgeries.

Additionally, without guidance through the recovery process, individuals are more susceptible to forming scar tissue, which impairs normal muscle function and range of motion. The first step in the healing process is inflammation which begins almost immediately after an injury occurs. Typically, the inflammation stage lasts about one week and is followed by muscle

regeneration, which peaks 14 days after the injury. The final stage of healing, known as the fibrosis stage, consists of scar tissue formation and continues until about four weeks post injury. However, scar remodeling continues for months after an injury and can continue to grow (Donatelli & Wooden, 2010). Given that scar remodeling continues long after an injury, it is important for patients to gain knowledge from a trained physical therapist about how to minimize scar tissue formation for the months following their injury.

Conclusion

Developing countries have limited access to resources compared to developed countries. Obtaining adequate medical care for traumatic injuries is difficult in developing countries, so the traumatic injury protocol is very different compared to developed countries. Even if the patient is able to obtain proper orthopedic amputation surgery, many obstacles still need to be overcome. Some of the most common obstacles include risk for infection, reintegration back into society, and rehabilitation of the amputated limb to regain functional capacity. SATC not only provides orthopedic surgeries to patients, but also provides physical therapy and is now in the process of creating a physical therapy clinic necessary for optimal patient recovery. The next chapter will discuss the methodology of the research project as well as the contents of the informational packet that will be created.

Chapter 3: Methodology

Introduction

This chapter documented the methodology of conducting a community service project for the organization, Scalpel at the Cross (SATC), which consisted of creating an informational packet. The overall goal of this community service project was to advance the work that SATC is currently conducting in Pucallpa, Peru. The project accomplished this by creating an informational packet to educate potential donors about SATC's mission and motivate them to donate in order to help raise funds for a new physical therapy clinic.

Throughout this chapter, the rationale behind the community service project and how the community service project was implemented will be described. Further, this chapter discussed who SATC is as an organization, the people they serve, and how the community service project helped to enhance the organization's work. Finally, the project tool, which is an informational packet, was explored in depth along with the potential barriers and solutions to the barriers.

Project Rationale

Scalpel at the Cross serves the people of Pucallpa, Peru by providing necessary orthopedic surgeries as well as sharing Christianity. Peruvians often drive over an hour in order to meet the SATC team with the hope that a free surgery will provide them with a better outcome and thus an improved quality of life ("Scalpel At The Cross...", 2015).

Over the years, SATC enhanced the training of a local physical therapist named Isaac Mendoza to aid and monitor patients following their orthopedic surgeries ("Scalpel At The Cross...", 2015). Isaac works alongside patients during their journey of healing, as well as guiding patients spiritually on a journey with Christ.

SATC serves the people of Pucallpa by providing orthopedic surgery following traumatic injuries from occupational hazards, motor vehicle accidents, and violent interpersonal conflict (Cook & Zumula, 2003). SATC performs surgeries as well as rehabilitation which provide individuals the opportunity to heal and transition back into their normal daily lives.

To better serve the people of Pucallpa, SATC's goal is to build a new physical therapy clinic. A new physical therapy clinic will require about \$500,000 over the next five years ("Scalpel At The Cross...", 2015). This money will secure the land, build a wall around the property, construct and furnish the new facility, and contribute to staff compensation. In order to help consistently raise funds throughout the next five years, SATC needs a compelling informational packet to explain the challenges of living in the Peruvian Amazon, complications of amputation and the benefits of physical therapy. This informational packet will serve to raise funds allowing SATC to enhance the care they provide for the many people of Pucallpa who sustain life altering injuries.

SATC contributed stories of patients they have helped in Pucallpa, but they needed specific research compiled on the effects of amputation and benefits of physical therapy to strengthen their case for building the new physical therapy clinic. SATC asked that an informational packet be created to use at their fundraising events over the next five years. The informational packet contains key points that express the importance of physical therapy following orthopedic surgery. By addressing the many benefits of physical therapy, a strong case was made for the need of additional funds in order to begin construction and fulfill SATC's mission.

The predicted outcome of this community service project is that the informational packet will educate potential donors about SATC's mission, the population SATC serves, the effects of

amputation, and the benefits of physical therapy. The hope is that the information will be well received by donors any they will contribute funds towards the new physical therapy clinic. Likely, once the funds for the physical therapy clinic have been raised, the informational packet can be adjusted and reused by SATC to continue raising funds and better serve the population of Pucallpa.

SATC has continued to grow since beginning their mission in 2004 and the organization's current goal is to construct a new physical therapy clinic. The physical therapy clinic will greatly improve Isaac's working conditions, but more importantly it will benefit the patient's ability to heal following orthopedic surgery. An average of one million people living in developing countries, such as Peru, are killed in traffic related accidents, while even more individuals are left with a physical disability (Zirkle, 2008). SATC is serving the people of Pucallpa and in doing so, decreasing the high number of people who might have otherwise died as a result of complications following a traumatic accident. This community service project greatly benefited SATC by helping them raise funds, as well as the people they serve who will be utilizing the new physical therapy clinic in which they can heal physically and grow spiritually.

Population

Scapel at the Cross, the organization this community service project is serving, is a medical mission that provides orthopedic surgery and medical care to the residents of Pucallpa, Peru. Since Pucallpa is located within the Peruvian Amazon it is secluded from the rest of the country (The Editors of Encyclopaedia Britannica, 2008). This provides challenges such as healthcare accessibility. Therefore, SATC plays a vital role in providing orthopedic care and follow up to the people of Pucallpa.

The residents of Pucallpa, Peru are hardworking, family-orientated individuals. The poverty rate is approximately 20 percent, and weekly wages range from 24-480 US dollars (Porro et al., 2014). Some individuals have to work two to three jobs in order to provide for their family (Davies et al. 2019). Common jobs include farming, fishing, and logging (Porro et al., 2014).

These individuals often need orthopedic surgery due to the dangerous nature of the occupations, and the high volume of motor vehicle accidents and interpersonal violence (Cook & Zumula, 2003). Therefore, when injuries occur it is vital that the individuals who need care receive orthopedic surgery and rehabilitation so they can return to their daily jobs. If the individual is unable to return to work, their family is now in financial trouble and the injured person could be ostracized due to their inability to contribute to society (Rotabi, 2008). After the orthopedic surgeries are performed, the patients are cared for by SATC's local physical therapist Isaac Mendez, who helps patients with their rehabilitation.

Project Plan and Implementation

The informational packet was made using Canva®, a graphic design platform, utilizing SATC's project chair, who has marketing experience. Next, the informational packet was submitted to SATC's Board of Directors for feedback. The researchers did not identify any ethical implications of the informational packet, and SATC did not identify any ethical implications either upon review of the informational packet. However, SATC did provide suggested edits on page layout, color schemes, content, and wording. After the finalizations were made based on their feedback, the informational packet was given to SATC for their use at fundraising events. To ensure that they are able to use the informational packet for the next five years, the Canva® login information was given to them to make edits as needed.

Project Tools

The informational packet (Appendix A) created by this community service project discussed SATC mission and background, challenges of living in Pucallpa, the effects of amputations, the benefits and necessity of physical therapy following orthopedic surgery, the logistics of the physical therapy clinic, and information on how to donate to SATC. The information included in the packet was compiled from research conducted and reported in the literature review. Next, the contents of each section of the informational packet will be discussed in further detail. In order to enhance empathy and understanding of SATC's mission, patient testimonies were included in the informational packet as well.

The informational packet has a colorful cover titled, "Scalpel At The Cross" in big lettering. The mission statement and the SATC logo are located below the title. The attractive cover is intended to capture readers attention to help compel potential donors to read and learn more about SATC.

The first section inside the informational packet introduces SATC. This section discusses who SATC is as an organization, how they began, and the population they serve. It reads as follows:

SATC is a medical mission, founded by the Cole family in 2004, that provides orthopedic surgery to the people of Pucallpa, Peru. Peter and Nancy Cole have brought together a dynamic team that works tirelessly in order to fulfil SATC's mission to provide "much needed aid to an area with a long history of poverty, medical neglect, and suffering."

Along with the Board of Directors, the SATC team consists of Kara Rodriguez, the Mission Director, Esteban Cardona, the Director of Development,

Communications and Patient care, Michael and Tiffany Simmons, the Cashibo Campus Oversight, and Isaac Mendoza, the Peruvian Medical Coordinator.

SATC is not solely interested in providing orthopedic surgeries for those in need; instead, they are passionate about offering complete care for patients who seek their help. Complete care of individuals includes follow up care after the surgery such as physical therapy and integration back into daily life. Complete care also includes the opportunity to learn about God and His love for all people.

The next section inside the informational packet discusses the challenges of living in Pucallpa, Peru, including the climate, isolation from adequate health care, and violence. It reads as follows:

Peru is located on the west coast of South America and contains three different ecosystems: the desert on the west coast, temperate forests covering the mountains in the central region, and tropical rainforests in the east. Pucallpa is located in the Ucayali region which is within the tropical rainforest ecosystem and according to the weather report, Climates to travel, this region receives roughly 111.8 inches of rain each year. A majority of this rain falls during the rainy season, dumping large volumes of water in a short period of time which results in flooding each rainy season.

Despite a main road that was built between Lima and Pucallpa, the Central Intelligence Agency reports there are roughly 310,750 people living in the Peruvian Amazon region who remain isolated from 10 million Peruvians who live in the nation's capital, Lima. Aside from the main road, Pucallpa's congested streets with limited enforcement of traffic laws results in many motor vehicle

accidents; according to Lezak and his colleagues, motor vehicle accidents are one of the top causes of death in the Ucayali region. Beveridge and Howard's research indicates that though many traffic accidents result in death, there are three to eight times more injuries that result from traffic related accidents. Aside from injuries suffered in traffic accidents, drug trafficking, interpersonal conflicts, and disagreements involving land ownership have increased homicide rates in Pucallpa. The high volume of trauma and infectious disease pleas for more doctors, nurses and medical facilities in the rural areas of Peru.

The challenges of Pucallpa's climate, prevalence of injuries, trauma and infectious disease along with their isolation from Lima pleas for more doctors, nurses and medical facilities in the rural areas of Peru. Scalpel at the Cross has stepped up to the rural, isolated, and varied terrain of Pucallpa to become a beacon of hope by providing medical care and spreading God's love.

Next, the effects of amputations are discussed. This section briefly explores the various physical, social, and psychological effects that occur following an amputation and reads as follows:

The following list contains the psychological effects of amputations: Reductions in physical ability, self-esteem, and confidence, lower life satisfaction, and higher rates of depression and anxiety. The physical effects include phantom limb pain and residual limb pain. Lastly, the social effects include ostracization and job loss or financial instability.

Physical therapy is important to counteract the negative effects of amputations; So, the benefits of physical therapy are discussed in the next section.

When someone undergoes an amputation, they undoubtedly face physical changes to their body. However, according to Herasymenko and colleagues, amputations also result in physiological changes to their cardiovascular, respiratory, and nervous systems, which slow down the recovery process. Therefore, recovery following an amputation is crucial to one's overall health. Physical therapists help patients recover by creating a plan that is customized to every unique patient.

While some degree of immobilization is necessary for adequate recovery from a traumatic or orthopedic injury, adverse effects occur when muscles are immobilized for extended periods of time. Some adverse effects include loss of muscle mass, loss of muscle force, and decreased bone mineral density. Without guidance through the recovery process, individuals are much more likely to prolong the immobilization period following an injury, thus decreasing their muscle functionality and increasing their risk of fractures and muscle strains.

Schaffer and colleagues state that proper physical training reverses many of the factors affected by immobilization, including muscle mass and force. A stepwise approach to physical training can start the restoration process earlier, bringing a quicker return to full function. Physical therapy helps determine how much physical training is safe for a patient depending on their injury and where they are at in the recovery process.

In order to increase bone health, Donatelli & Wooden recommend that exercise should “(1) be dynamic, not static; (2) exceed a threshold intensity; (3) exceed a threshold strain frequency; (4) be relatively brief but intermittent; (5)

impose on bones an unusual loading pattern; (6) be supported by unlimited nutrient energy; and (7) be supported by adequate intake of calcium and cholecalciferol (vitamin D₃).” Evidently, optimal recovery of bone and muscle following immobilization is extremely complex. Given the negative side effects of immobilization and the importance of remobilization for the health and functionality of muscle and bone, physical therapy is imperative. Physical therapy helps guide patients through their recovery process after suffering traumatic injuries and undergoing orthopedic surgeries.

The logistics of the physical therapy clinic are discussed next. This section outlines what the raised funds will be used to purchase.

The fundraising goal is \$500,000 over the span of the next five years. First, they will use the money to build a wall around the property. This is necessary because in Pucallpa it is common for people of the community to attempt to build their own structures on purchased property in order to steal the land while construction is in progress. They will then use this money to construct and furnish the clinic with necessary medical equipment. Finally, the rest of the money will be used for staff compensation.

The final section of the packet includes various ways to support SATC’s mission of spreading God’s love. A link to SATC’s home website was included so that potential donors can gain more information about SATC visions and goals. The website also includes information about upcoming medical mission trips as another way to get involved. The final way to help is by donating. Information on who to make a check payable to, and an online donation link to SATC was included as well. Lastly, this section concludes with words of gratitude and appreciation.

Potential Project Barriers

A lack of the researcher's firsthand experience in Pucallpa, Peru was one barrier to the implementation of the project. In order to effectively communicate the need for a new physical therapy clinic to potential donors, it was important to provide compelling testimonies and information in the informational packet. The methods accounted for this barrier by utilizing the firsthand experiences of Dr. Peter Cole and Nancy Cole, who are the founders of SATC.

In addition to a lack of firsthand experience, a limited number of professional connections made the implementation of the project difficult as well. The goal was to reach as many potential donors as possible, however with minimal professional experience by the researchers, this was a challenge. One way to overcome the lack of connections was to utilize the connections of the committee chair of the project, Greg Ekbohm, who has over 30 years of surgical experience and has also been part of a prosthetic clinic in Africa.

Besides limited professional connections, another difficulty was creating an effective informational packet without backgrounds in marketing or sales. The goal of the informational packet was to compel individuals to donate to the cause. Therefore, it was important to create a packet that is both visually appealing and engaging. In order to overcome this barrier and accomplish this, SATC's marketing chair was consulted.

Another important aspect of creating an effective informational packet was clear communication. Since potential donors will be from all different professional backgrounds, the language used in the informational packet must be comprehended by all, not just those in the medical community. This barrier was overcome by intentionally choosing the language used to avoid confusion.

Conclusion

This chapter discussed the project rationale, population, project plan and implementation, project tool, and project barriers, all of which has been carefully considered in order to provide SATC with a valuable resource to help them successfully fund a new physical therapy clinic. The next chapter discusses the final outcome of the informational packet.

Chapter IV: Discussion

Introduction

This community service project partnered with Scalpel at the Cross (SATC) to create an informational packet to demonstrate the need to raise funds for a new physical therapy clinic for the population of Pucallpa, Peru. This chapter will discuss the final results of the informational packet, including the project outcomes. The limitations of this project will be addressed, as well as the potential for project expansion. Lastly, the conclusion of the community service project will be discussed.

Summary of Results

The idea for this community service project arose after having a conversation with SATC about the need for a new physical therapy clinic in Pucallpa, Peru. A new physical therapy clinic would extend the scope and services of the SATC mission, by improving patient outcomes and facilitating reintegration back into their daily lives following orthopedic surgery. However, the problem is that SATC does not have adequate funds to build a new physical therapy clinic, hence the need for this community service project. This project will produce an informational packet explaining the need for and benefits of physical therapy in the culture of Peru. This packet will be provided to SATC for their use over the next five years to help facilitate the building of a new physical therapy clinic.

This project was necessary because SATC expressed the need for a new physical therapy clinic in Pucallpa, Peru. SATC is in the early stages of building this clinic, as they recently acquired the land, and are now in need of funds. They asked our group to compile an informational packet to help spread their message and persuade people to donate. After the

informational packet was created, it was sent to the SATC board for suggestions and feedback. The necessary edits were made and then the packet as well as the login information for Canva®, the graphic design program used to create the packet, was given to SATC for further manipulation and implementation. This packet was originally going to be utilized in fundraisers or sent out as a newsletter to potential donors. However, since a large scale in person fundraiser is not possible and SATC has shifted their focus to COVID-19 relief during this time, the packet implementation is currently on hold.

The final informational packet included both quick facts and more in-depth answers of the main questions that donors may have regarding the new physical therapy clinic. The packet highlights the most significant information found in the literature review to support the need for the clinic. The main sections include information on the challenges Pucallpa residents face on a daily basis, the complications that accompany debilitating injuries like amputations, and the ways physical therapy improves patient recovery following orthopedic surgery.

Describing Pucallpa is important so that donors are aware of the unpredictable climate, unstable government, and the underdeveloped infrastructure. The challenging environment in Pucallpa highlights the desperate need for the light and hope that SATC provides the community. Research has established that receiving physical therapy after a traumatic injury greatly improves patient outcomes (Herasymenko et. Al, 2016). Therefore, the consequences of traumatic injuries and benefits of physical therapy were highlighted in the packet to increase knowledge about the seriousness of these injuries and the need for high quality rehabilitation. The packet also includes two patient testimonies to provide personal examples of how the vital work SATC does positively impacts lives.

After completion of the packet, SATC provided valuable feedback to improve the packet.

Members of the SATC board suggested edits on aspects of the packet such as page layout, color schemes, content, and wording. (N. Cole, personal communication, May 27, 2020). Using SATC's feedback, edits were made, and the informational packet was given to SATC. The login information to Canva® was provided to SATC so they can continuously make edits as needed over the next five years. The final outcomes of this project cannot be fully discussed since the packet was not able to be implemented at a fundraiser due to the COVID-19 pandemic.

Limitations

The packet was originally intended for SATC to use at upcoming fundraisers. However, due to the COVID-19 pandemic, SATC is “shifting their efforts from a developmental model to a relief model” in order to combat the pandemic (N. Cole, personal communications, May 27, 2020). Nancy also stated that “two of the three government hospitals in the area have closed due to staff being too sick to carry on. There is a temporary tent hospital set up in a local parking lot...They have built mass graves and bury 100-200 people at a time.” (N. Cole, personal communications, May 27, 2020). Pucallpa is being hit extremely hard by the pandemic so SATC is currently focused on helping provide basic human needs rather than providing orthopedic surgery and physical therapy. Since they are not conducting in-person fundraisers at this time, the packet is not able to be used as originally intended for the time being.

Initially, the plan was to hold a fundraiser of our own. Unfortunately, time constraints from PA school made it difficult for us to plan our own fundraiser. Instead, we decided to attend a SATC fundraiser to discuss the research used to make the informational packet. Soon after the decision was made, the pandemic set in. Once social distancing guidelines were established, we accepted that in person fundraisers may not occur until 2021. With these uncertainties, a decision was made to halt implementation. We still hope to attend a future SATC fundraiser to discuss

and help implement the informational packet.

Although this project had its limitations it still adequately serves the community of Pucallpa, Peru. As previously stated, Pucallpa is an isolated region with limited access to resources. SATC is able to provide free medical care to the residents of Pucallpa. The current buildings and location that medical care is provided is lacking. SATC helps care for an increasing number of patients and therefore needs to expand the physical therapy clinic to better serve the people. This informational packet is helping educate the general population about the city of Pucallpa as well as demonstrating the need for expanded physical therapy.

Future Projects

This project focused on explaining who SATC was as an organization, challenges that come with living in Pucallpa, complications of amputations, as well as the benefits of physical therapy. These topics were the focus of the project in order to demonstrate the need for the new physical therapy clinic to donors. However, another need SATC has is to provide education regarding wound care following injuries or surgical procedures with the goal of preventing future amputations, and other complications that occur following infections.

Further, there is an isolated island near Pucallpa that faces similar daily challenges. A future project could be done by researching this island, and connecting with the mission group that serves the population on the isolated Peruvian Island to identify any needs they may have. However, this project chose to focus on the new physical therapy clinic for SATC because they will serve anyone in the surrounding regions who are in need of medical services, including the residents of the island. The physical therapy clinic will be able to meet the needs of many more individuals, which is why it was chosen as the goal of this project.

The hope is that this project will inspire future students to work with Scalpel at the Cross to provide further aid in the opening of the new physical therapy clinic. SATC is eager to continue their relationship with Bethel University and their health professional students. The new physical therapy clinic will be a foundation to build upon to expand SATC's mission. Therefore, potential future projects that may be needed include training programs for future medical assistants demonstrating the use of crutches, and prosthetics, as well as wound care informational packets.

Future projects could also connect with SATC to hold a supplies drive to collect donations of necessary equipment for the physical therapy clinic, as well as holding a fundraiser to help raise funds necessary to ship the materials to Peru. Once the clinic is built, a project that focuses on prosthetics could travel with SATC to Pucallpa and hold a "prosthetics day" to fit and equip people with free prosthetics, similar to what Dr. Ekbom has done in the past. Finally, another future project could focus on increasing public health awareness in Pucallpa, Peru. This could involve creating informational brochures for SATC patients and the entire population of Pucallpa. Brochures regarding sanitation, infectious diseases, and wound care would help reduce complications following injuries or surgeries.

Conclusion

The primary goal for this project is to demonstrate the need for physical therapy following traumatic injuries or orthopedic surgeries in order to help SATC reach their fundraising goal. This will ultimately help SATC better serve the people of Pucallpa. Compiling the research necessary to construct the informational packet produced by this project was a time-consuming process, so the hope is that this project will lighten the burden on SATC so they can continue to focus on patient care. That said, the informational packet is intended to speak to

people on an intellectual, spiritual, and emotional level. When people read the information and engage in the patient stories, the hope is that they will want to share SATC’s mission “to be a lighthouse for Christ through a medical ministry” and their hearts will be open and willing to donate funds towards building the new physical therapy clinic (Scalpel At The Cross Medical Ministry to Peru, n.d.).

The opportunity to work with SATC throughout this project has been a joy and a privilege. Working directly with Dr. Peter and Nancy Cole for this project allowed us to share in their passion and determination to make a difference in the population of Pucallpa. On the surface one may think that making an informational packet does not seem very significant, but the informational packet produced by this project has the potential to have an immense impact on thousands of patients in the years to come. Not only does SATC impact patients on a physical level by providing free surgical care, but they impact patients on a spiritual level as well. For example, the story of Fernando that was featured in the informational packet, talks about how he developed a burning passion to serve the Lord after experiencing God’s mercy in the form of free surgical care provided by SATC. Through this project, we get to share in those patient stories, and so do all of the potential donors who will read the informational packet.

Furthermore, the significance of this project is clear when thinking about the positive impact a new physical therapy clinic will have on the population in Pucallpa. Physical therapy is crucial when it comes to patient recovery following orthopedic surgery, so of course a new physical therapy clinic will be extremely beneficial to physical recovery. However, a new physical therapy clinic represents so much more than a nice building where patient rehabilitation can take place. A new physical therapy clinic also represents the fact that those living in Pucallpa matter and they are worth the time, money, and energy put into building a new clinic. Given the

high rates of poverty in Pucallpa, we feel that it is important for them to know that they deserve high quality care regardless of their socioeconomic status. The hope is that the new physical therapy clinic will be one more way that SATC spreads the good news of the Gospel to those who may not hear it otherwise.

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APPENDIX A:
Informational Packet

SCALPEL AT THE CROSS

A gift of light, hope and surgery to Peru

Background of Scalpel at the Cross

Scalpel at the Cross (SATC) is a medical mission, founded by the Cole family in 2004, that provides orthopedic surgery to the people of Pucallpa, Peru. Dr. Peter Cole and Nancy Cole have brought together a dynamic team that works tirelessly in order to provide "much needed aid to an area with a long history of poverty, medical neglect, and suffering".

Along with the Board of Directors, the SATC team consists of Kara Rodriguez, the Mission Director, Esteban Cardona, the Director of Development, Communications and Patient care, Michael and Tiffany Simmons, the Cashibo Campus Oversight, and Isaac Mendoza, the Peruvian Medical Coordinator.

SATC is not solely interested in providing orthopedic surgeries for those in need; instead, they are passionate about offering complete care for patients who seek their help. Complete care of individuals includes follow up care after the surgery such as physical therapy and integration back into daily life. Complete care also includes the opportunity to learn about God and His love for all people.

INSIDE THIS PACKET

Background of Scalpel at the Cross

Why Pucallpa, Peru?

Consequences of Amputations

Benefits of Physical Therapy

Vision for a New Physical Therapy Clinic



Why Pucallpa, Peru?

The city of Pucallpa faces many challenges due to its location within the Peruvian Amazon. Some challenges include:

- Tropical Rainforest
- Hot & Humid
- Annual Flooding
 - Rains 111.8" annually → majority during the wet season
- Isolated from Lima, the capital of Peru
 - Rural location far from major hospitals
- Pucallpa has a developing infrastructure with limited traffic enforcement
 - 5 million deaths due to traffic related accidents
 - 15-40 million more traffic related injuries
- Violence and Interpersonal Conflict
 - Drug trafficking
 - Land ownership disputes
 - Increasing homicide rates



Peru is located on the west coast of South America and contains three different ecosystems: desert, temperate forests, and tropical rainforests. Pucallpa is found within the tropical rainforests of the Ucayali region and receives 111.8 inches annual rainfall. This results in flooding each rainy season and contributes to poor sanitation.

The people living in the Peruvian Amazon remain isolated from the nation's capital, Lima, its medical resources, and the majority of Peru's population. Pucallpa's congested streets with limited enforcement of traffic laws results in many motor vehicle accidents, which is one of the top causes of death in Pucallpa. Though many traffic accidents result in death, there are three to eight times more injuries that result from traffic related accidents.

The challenges of Pucallpa's climate, prevalence of injuries, trauma and infectious disease along with their isolation from Lima pleas for more doctors, nurses and medical facilities in the rural areas of Peru. Scalpel at the Cross has stepped into the rural, isolated, and varied terrain of Pucallpa to become a beacon of hope by providing medical care and spreading God's love.

Meet Francisco



In February of 2019 Francisco had a major accident while working. When he was admitted to the hospital the doctors informed him, they would have to amputate his hand. SATC was in the middle of a surgical campaign and the team was miraculously present at Hospital Amazonico when Francisco arrived. After much deliberation, the surgical team decided they would operate and reconstruct his wrist to avoid amputation. As of October 2019, Francisco only has mild pain in his wrist and his wound has healed well, free of infection.



Consequences of Amputations

Physical effects:

Reductions in physical ability
Phantom limb pain
Residual limb pain

Psychological effects:

Increased risk of depression
Increased risk of anxiety
Reduced self-esteem

Social Effects:

Job loss or financial instability
Lower life satisfaction
Ostracization

The negative effects of amputations can be detrimental to one's life. Scalpel at the Cross helps to decrease these consequences by providing prompt surgical intervention, and physical therapy.

Benefits of Physical Therapy

Physical therapists help counteract the negative effects of amputations by creating rehabilitation plans that are customized to each unique individual. Without guidance through the recovery process, individuals are much more likely to prolong the immobilization period following an injury. While some degree of immobilization is necessary for adequate recovery from a traumatic or orthopedic injury, adverse effects occur when muscles are immobilized for extended periods of time, including:

- Loss of muscle mass
- Loss of muscle force
- Loss of bone mineral density

In order to increase bone health, exercise should:

- be dynamic, not static
- exceed a threshold intensity
- exceed a threshold strain frequency
- be relatively brief but intermittent
- impose on bones an unusual loading pattern
- be supported by unlimited nutrient energy
- be supported by adequate intake of calcium and vitamin D3

Evidence shows that optimal recovery of bone and muscle following immobilization is extremely complex. Proper physical training helps reverse the adverse effects, and starts the restoration process earlier, bringing a quicker return to full function. Physical therapy also helps determine how much physical training is safe for a patient depending on their injury and where they are at in the recovery process.

Fernando's Story



Fernando was on his way to work on his motorcycle when a drunk driver hit him and sent him flying. Due to the jarring impact, he sustained a major injury to his left leg. He had to use his life savings to receive surgical care in Pucallpa. In addition, due to the recovery time he was unable to work and lost his job. Despite receiving medical care by local surgeons, he developed an infection in his bone and required more surgery. Without the necessary funds for a second surgery, he was hopeless.

However, Isaac Mendoza referred him to Scalpel at the Cross and their October 2019 campaign where he was elected as a surgical candidate. After a successful operation in October of 2019, he is now on his way to recovery. Although he will never forget the horrible accident, he is forever impacted by God's mercy in providing free surgical care. Fernando now has a burning passion to serve the Lord.

Vision for the Physical Therapy Clinic

The goal is to raise \$500,000 over the next five years. This money is needed to purchase the following:

- Wall surrounding property (previously purchased)
- Construction of clinic: building, electricity, plumbing
- Clinic equipment: X-ray machine, crutches, resistance bands, exercise equipment, etc.
- Furnishing the clinic
- Staff compensation

The wall is necessary to prevent any efforts of attempting to build on or steal the land while construction is in progress as Peru has different laws regarding land ownership.

Please join our efforts in spreading God's love

Scalpel at the Cross: A New Physical Therapy Clinic

HOW TO CONTRIBUTE TO SCALPEL AT THE CROSS

Learn about who SATC is, how far they've come and what else they dream to achieve at <https://scalpelatthecross.org>

- Join a medical mission trip to see the Peruvian Amazon first hand.
- Spread the word about SATC's mission and all they are doing in Pucallpa, Peru.
- Pray for God's continued guidance as we raise funds for the physical therapy clinic as well as God's hand in the work SATC conducts in Pucallpa, Peru.



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