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Implementation of a Helicobacter Pylori Test and Treat Program in Rural Nepal Facilitated by a Nurse Practitioner Doctor of Nursing Practice Comprehensive Project Report

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Doctor of Nursing Practice Final Project: Implementation of a Helicobacter Pylori Test and Treat Program in Rural Nepal Facilitated by a Nurse Practitioner

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Abstract

There are 30 million people in Nepal, 85% live in rural areas and have access to 15% of health care resources. This deficit in health care resources is supplemented by services provided by non-governmental organizations who organize short-term medical missions. At a rural Nepalese health post 45% of the patients complained of abdominal discomfort. As the prevalence of helicobacter pylori is 50-90% in Southeast Asia, the patients believed that they had helicobacter pylori.

In resource-poor communities, there is a gap between best practices and the care delivered. To decrease the gap in one rural Nepalese health post, a Nurse Practitioner implemented a Helicobacter pylori *test and treat* program at a health clinic. This project was designed to identify the causes of abdominal discomfort and provide disease-specific treatment. Among those tested 25% were Helicobacter pylori positive and received antibiotics. The other 75% were treated using evidence-based protocols according to the characteristics of their symptoms, lifestyle, and diet.

The aim of this project was to improve health care quality by decreasing the prevalence of abdominal complaints at a Nepalese health post. This paper delineates a process to implement a quality improvement program in short-term medical missions. The role of the Nurse Practitioner employing the Doctor Nursing Practice core measures facilitates improvement in health care processes to close the quality chasm in resource-poor communities.

Keywords: Doctor of Nursing Practice, Helicobacter pylori, Medical mission

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Introduction

Background Knowledge

This quality improvement project was implemented during a short-term medical mission (STMM) by myself, a Nurse Practitioner (NP) who is completing the Doctor of Nursing Practice (DNP) in Health Care Systems Leadership. The program provides the NP with evidence-based approaches to design, implement, and evaluate models of patient care and health care systems (Waxman, 2014). Prior certification as a Family Nurse Practitioner gave the NP clinical skills to diagnose and treat medical problems. Licensure in Washington State affords the NP independent practice to provide medical care, (DOL, 2012). The NP is also licensed in the state of California. In STMMs, medical personnel work within the confines of their licensure.

This project was implemented at a remote health post in Okhaldhunga, which is located in the foothills of the Himalayas. The Okhaldhunga health post serves a Sherpa community with close to 400 homes. The health post is a two-story brick building. The clinic is divided between the two floors. The bottom floor is dirt and is the location of the primary care clinic. Upstairs is the location of the dyspepsia clinic and a room where *point of care* testing (POCT) takes place. POCT is medical diagnostic testing that is done outside the clinical laboratory.

Most Sherpa work as farmers or as porters for climbers in the Himalayan Mountains. There are no roads to this community, Katmandu travelers must take a plane that lands on a dirt runway, and walk for two to three days before arriving at the health post. The Sherpa practice Buddhism and are very gracious for the services STMMs bring to their health post and community.

The STMM is organized by two groups, the Mount Everest Foundation for Sustainable Development in Tibet and Nepal (MEF), which is a non-profit non-governmental organization (NGO) and Parivar, which is a for profit Nepalese organization. The MEF organizes activities at the health post and is referred to as the *Foundation leader* in this paper, while Parivar organizes the logistics of the trek and is referred to as the *Nepali leader*.

Extreme scarcity of health resources leads to an increased need for STMMs in Nepal. Of the 30 million people in Nepal, 15% live in urban centers and use 85% of healthcare resources (World Health Organization, 2010). Therefore, 85% of Nepalese live in rural areas and have access to 15% of available health care resources. More specifically, over four-fifths of the population has access to less than one-fifth of health care resources (see Appendix B1). This deficit in health care resources is supplemented by services provided by NGOs. Each year one in seven Nepalese citizens interface with a NGO for health care services.

Both quantity and quality of health care professionals are lacking in the most needy areas of Nepal. Despite increases in medical school enrollment, only 13% of physicians intend to practice in rural Nepal (Huntington, Shrestha, Reich, & Hagoplan, 2011). When qualified health providers are not available, local villagers run the health posts. Many rural health post workers have received no formal training (Kneval, 2010). NGO volunteers work with local villagers during STMMs.

Evaluation of STMMs. Langowski, (2011) describes that STMM volunteers may not be organized in their health delivery efforts and may be working outside the parameters of their licensure. An understanding of the health care quality delivered by volunteers on STMMs is not always known (Langowsky & Iltis, 2011). In the United States heath care outcomes show medical errors cause many deaths (Institute of Medicine, 2001). The literature suggests the same is true in STMM activities (Langowski & Iltis, 2011). A need exists to measure and monitor health care activities during STMMs. This project is an example of how to measure outcomes during STMMs.

STMMs rely on a group of medical and non-medical members who form impromptu teams to treat immediate health needs of the community. Rarely do volunteers return to a STMM clinic setting. There is no continuity in care and the health care delivered is not evaluated. Evaluating clinic activities requires advanced planning. Building a system to improve health care quality requires the involvement of a health care team leader or director who can assess the quality of medical care and create systems to measure and improve outcomes.

This role is ideally suited for a NP. NPs serve in the role of health care team leader or director by collaborating with community leaders to identify and alleviate local health care deficiencies. The NP is licensed to diagnose and treat chronic diseases and with DNP training, the NP can use knowledge of health system models to direct the clinic activities to meet community health care needs. The NP works with patients and communities to identify problems, problem-solve, and close gaps in health care delivery through such activities as project management, scholarly discussions, presentations, projects, and advocacy for policy. These activities are constitutive of the DNP role (Chism, 2013).

In rural Nepal, diagnosing Helicobacter pylori (H. pylori) is difficult due to the lack of diagnostic laboratories, diagnostic tests and electricity. When not immediately used, diagnostic testing and specimens must be kept at 36.5 – 46.4 degrees Fahrenheit. There is no refrigeration in the village. So, a feasible test to diagnose H. pylori in this environment must not require electricity and must accurately diagnose the presence of disease within a few hours. For this project, the specimens were immediately placed in a cooler and kept there until processing time. To avoid over and under treatment in this rural, resource-limited village, the best diagnostic test should have a sensitivity and specificity close to 100%. Health post workers do not use diagnostic testing prior to offering a treatment. Treatment options are based on the patient's symptoms. It is possible that some patients are being treated incorrectly as different disease entities have the same symptomology. Ideally treatment will start on the same day during the same visit. Offering a treatment on the same day makes it easier for the patients as they must travel on foot to get to the health clinic. The community boundaries spread over several mountain ridges and patients may take three to four hours to get to the health post.

The significant question is, Does diagnostic testing need to be done since the expected prevalence of H. pylori is so high? The answer is *yes*. In Mapel (2013), the Rome criteria are described and include recommendations for a *test and treat* program to screen for H. pylori in all cases of dyspepsia. The Rome criteria came about as an international effort to improve the diagnoses and treatment of functional gastrointestinal disorders, which includes dyspepsia (Stanghellini & Cogliandro, 2014). The Rome process is a system that defines functional gastrointestinal disorders and answers specific questions in the management of these disorders using cost effective analysis techniques (Mapel, 2013).

The project employed POCT to better diagnose the causes of dyspepsia in patients in this rural village and provided cause-specific treatment. Appropriate diagnosing and individualized education of treatment options for all types of dyspepsia, specifically H. pylori can bring down the rates of dyspepsia and lessen the need for invasive procedures such as gastrectomies.

There were two types of POCT testing. There are antigen and antibody tests. The literature review below recommends antigen testing. Antigen testing supplies are not available in Nepal. In Nepal, only H. pylori antibody tests are available. Antibody testing does not differentiate between a new onset of disease from a previous disease exposures. After treatment for H. pylori the antibody test will remain positive. An antigen test will be positive only if an active infection exists. Stool antigen test kits have a high sensitivity and specificity in diagnosing H. pylori infections (Salih & Karakas, 2013). Results are not affected by previous infection or proton pump inhibitor use. Accurate diagnostic testing leads to accurate antibiotic use. Increased potential for infections with resistant organisms develop with improper antibiotic use (De Francesco, 2010).

This lack of antigen test kits was corroborated by two local physicians, Dr. Gupta (personal communication, November 18, 2013), the medical director of Helping Hands Hospital and a physician, Dr. T. Sherpa (personal communication, December 3, 2013) who has published studies on H. pylori in Nepal stated that only antibody testing was available in Nepal. A sales representative stated that within Nepal biomedical companies do not find it lucrative to supply antigen testing for H. pylori (A. Bentley, personal communication, February 15, 2014). Antibody tests cost $1. Antigen tests cost $120. Annual Per capita income is $730 in Nepal (World Bank, 2014). Accurate diagnostic testing is important to decrease the prevalence of H. pylori. Without proper diagnosis, treatment is not specific for the disease.

The lack of diagnostic testing is not unique to this STMM. In a survey of 25 STTMs, all services lacked diagnostic testing capabilities, resulting in the inability to treat conditions in all services (Naujokas, 2013). Services included emergency surgical treatment, non-emergent surgical treatment, infectious diseases, obstetrics, gynecology, and psychiatry. The only diagnostic test adequately available was one for detecting human immunodeficiency virus (Naujokas, 2013).

Local Problem

The prevalence of H. pylori is 50% worldwide and depending on the source, 50 to 90% in Southeast Asia (Sherpa et al., 2012). Nepal is no exception to these statistics. In urban Nepal, 76.3% of patients who presented with dyspepsia had H. pylori infections. H. pylori was found in 71.68% of gastritis cases, 97% of duodenal ulcer, 64% of gastric ulcer and 100% of gastric adenoma cases (Pathak, Y.P. Deo, P. Deo, & Kadel, 2008). H. pylori is a bacteria. Untreated symptoms often progress to serious illness including gastric cancer (MAPS, 2012). In the Solokhumbu, Sherpa et al. (2012) found the H. pylori prevalence to be 70%. Gastric cancer, associated with H. pylori is 260% higher than in the Sherpa population compared to the general Nepali population (Sherpa et al., 2012).

At the heath post there was no way to test for H. pylori, consequently patients were diagnosed with gastritis or dyspepsia and given omeprazole or bismuth. These medications provide the patient temporary relief of symptoms. Most patients in the village had previously taken omeprazole, a proton pump inhibitor, with temporary results. These medicines do not cure H. pylori, they only temporarily decrease the symptom. Discussions with Sherpa, Foundation, and Nepali leaders revealed, however, that many patients needed partial gastrectomies for

abdominal discomfort that was caused by H. pylori. In these cases, The H. pylori had led to peptic ulcer disease or gastric cancer.

In November 2012, at the Okhaldunga health post, baseline data of chief complaints, treatments, and final diagnosis was collected. A register of final diagnoses revealed the extent of *abdominal complaints* (see Figure 1). All patients with musculoskeletal complaints also had abdominal complaints. In this paper the term abdominal complaints will be replaced with the word *dyspepsia*, which is defined as a condition of impaired digestion. This is a symptom of H. pylori as well as other abdominal disease entities (Stanghellini & Cogliandro, 2014).

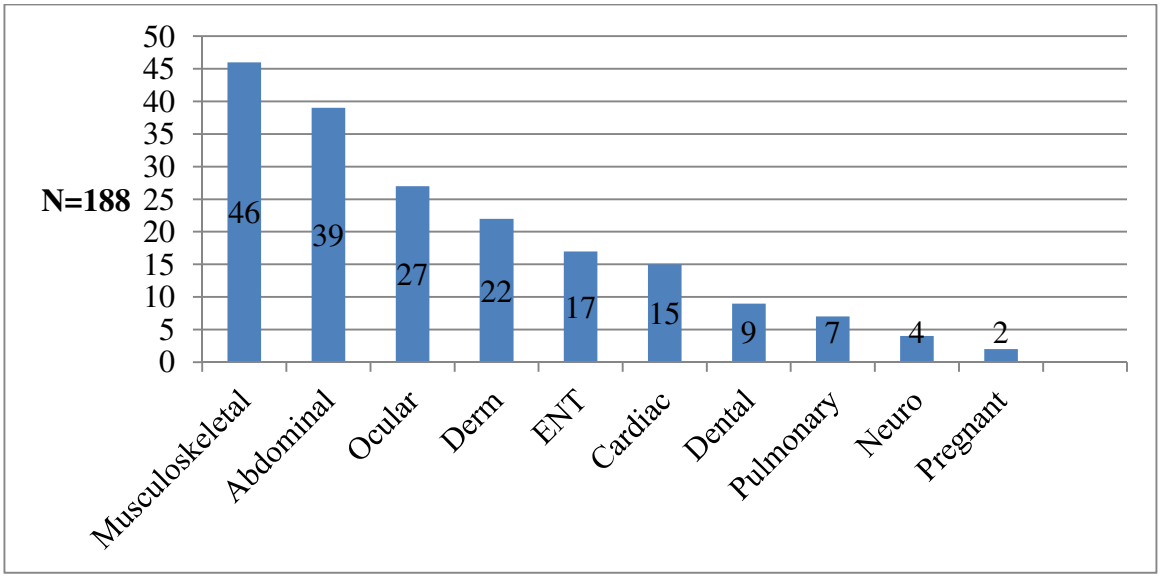


Figure 1. Prevalence of Disease Entities at Okhaldhunga Health post – November 2012

The local problem is improper treatment of abdominal discomfort or dyspepsia due to the inability to make a proper diagnosis. Baseline data validates that 45% of patients have abdominal discomfort that is temporarily relieved by medications that do not cure H. pylori. Villagers assume but are not sure if the abdominal discomfort is due to H. pylori. A feasible diagnostic test is needed.

Intended Improvement/Purpose of Change

The numerous patient complaints of dyspepsia indicated a community health problem. Discussions with the Sherpa, Foundation, and Nepali leaders revealed that they wanted the treatment for H. pylori brought to the health post. The intended improvement was to accurately diagnosis H. pylori from dyspepsia and to provide the appropriate treatment. The treatment for H. pylori is antibiotics combined with Omeprazole, which is the treatment for dyspepsia. Under treating H. pylori by not prescribing antibiotics leads to increased incidence of peptic ulcer disease and gastric cancer. If the NP assumes all dyspepsia is H. pylori and prescribes accordingly, overtreatment occurs and leads to antibiotic resistance (De Francesco et al., 2010; Venkateshwari et al., 2011).

Since resource-limited settings deserve quality care, the leaders of this project, therefore, designed a method of accurately diagnosing and correctly treating the cause of dyspepsia The objective of this project was to have a NP implement a program to decrease the incidence of dyspepsia by 50% compared to baseline data, at a rural Nepalese health post, by implementing point-of-care diagnostic testing for H. pylori and providing instruction to health post staff on the guidelines for treatment of all types of dyspepsia. The aim was to complete the project by June 27, 2014.

Review of the Evidence

To facilitate the literature search on feasible diagnostic tests, a PICOT question helped frame the review. PICOT stands for the *population* being studied, *intervention* itself, *comparison* intervention, *outcome* desired, and the *time* period. This acronym provides a method to find the answer to a researchable question. The following paragraphs explain the search process whereby the most feasible and accurate diagnostic test was identified.

PICOT question. What is the most accurate and feasible POCT to be used during a three-day medical mission to diagnose H. pylori in adult Nepalese who live in an isolated rural village? The literature search found research articles that compared different POCT. *Feasibility* describes a test that is non-invasive and easy to administer in an isolated environment. *Accuracy* describes a test with high sensitivity and specificity for diagnosing H. pylori. POCT is a test that can be done in the clinic in a short period of time.

Sources of search process. An initial literature search in Fusion produced 1050 articles. To refine the literature research, a review of guidelines, indicating, the best POCT or in-office test for H. pylori included the following sources: Dynemed, UpToDate, World Gastroenterology Organizational Global Guidelines, and Maastricht IV Consensus Report. Evaluation of the guidelines was done by the AGREE instrument. AGREE stands for Appraisal of Guidelines for Research and Evaluation. The AGREE instrument assesses the quality of guidelines (Cluzeau et al, 2003). The guidelines are assessed within six domains. A numerical value is given based on the answers to 23 questions (see Appendix C for details). Table 1 shows Dynemed and the Maastricht IV Consensus Report were found to have highest rigor in the development of their guidelines and application to the clinical practice.

Table 1

Agree Instrument Results

	Scope and Purpose	Stakeholder Involvement	Rigor of Develop-ment	Clarity of Presenta-tion	Applica-bility	Editorial Dependence	Total Score	Overall Assessment	
Dynemed	**12**	**?**	**25**	**16**	**11**	**5**	**59**	**Thorough**	**YES**
UpToDate	**11**	**?**	**24**	**15**	**11**	**3**	**54**	**Doesn't cover aspects population**	**MAYBE**
Maastricht IV	**12**	**?**	**25**	**15**	**11**	**5**	**58**	**Concrete Organized**	**YES**
World Gastro-enterology Organization	**12**	**?**	**13**	**8**	**4**	**2**	**39**	**No references explanations**	**NO. Informa ied**

Endoscopy, serology, urea breath test, and stool antigen test are the four ways to diagnose H. pylori (Dynemed, 2014). The guidelines affirm that POCT monoclonal antibody antigen tests have the highest sensitivity and specificity to diagnose H. pylori. A literature search in Fusion, CINAHL, Cochrane, and PubMed on POCT using the search terms *H. pylori, rapid tests, point-of-care test* and monoclonal antibody test was done. Twenty articles were found and the six most rigorous articles were chosen for this systematic review (see Appendix D for definitions of levels of evidence). Rigor was determined by evaluating internal and external validity, reliability, and applicability to the program needs (see Table E). Inclusion criteria included tests that are

noninvasive, easy-to-use, and had high sensitivity and specificity. Exclusion criteria included a test that was invasive, unable to use in rural setting, and had a low sensitivity and specificity.

Only stool antigen testing is accurate, easy to use, and does not require the use of laboratory equipment and electricity. Six quasi-experimental, level III, studies met the inclusion and exclusion criteria and were included in the literature review (Table 2).

Table 2

Literature Review – Point-of-Care H. pylori Stool Antigen Diagnostic Test

Six Articles Evaluated	**Level/Grade Type of Article**	**In-Office Test**	**Sensitivity & Specificity**	**Interpretation**
Calvert et al., (2010) Pre n = 185	III / High Quasi-experimental	RAPID Hp StAR	91% - 80% 92% and 76%	More Sensitive
		ImmunoCard STAT!	69% - 90% 74% and 89%	More Specific
Calvert et al., (2010) Post n = 88	III / High Quasi-experimental	RAPID HP StAR	100% - 92.3% 100% - 93.6%	Useful
		ImmunoCard STAT!	90% - 90% 90% - 94.9%	Useful
Jerkarl et al., (2013) Pre n = 266	III / Moderate Quasi-experimental	ASAN Easy Test H. pylori	84.5% - 96.2% (gastritis & metaplasia) 90.5% - 100% (ulcers)	More useful in detecting H pylori in pts w/ulcers
Sato et al., (2012) n = 111	III / High Quasi-experimental	Rapid TPAg	100% - 99.6%	Useful
Shimoyama et al., (2011) Post n = 102	III / High Quasi-experimental	Rapid TPAg	98% -	94% agreement with gold standard
Korkmaz et al., (2013) Pre n = 198	III / Low Quasi-experimental	ImmunoCard STAT!	68.9% - 92.6%	Not useful
		One Step HpSA test	86.7% - 88.9%	Not useful
		Premier Platinum PLUS HpSA EIA	**92.2% -94.4%**	**Useful**
		H. Pylori fecal antigen test	78.9% - 87%	Not Useful

Critical appraisal of the evidence. All six studies are level III quasi-experimental studies (see Appendix D) using the criteria in Melnyk and Fineout-Overholt (2011). Each study

is appraised separately. The study design, method, sample size, setting, major variables studied, outcome measurements, analysis of data, findings, limitations, and worth to practice of all the articles is compared. All studies compare a POCT to at least one gold standard for diagnosing H. pylori (see Appendix E). Table 2 shows a summary of the deciding factors in choosing a diagnostic test. The results are drawn from the evidence-based review of the literature (see Appendix E).

Summary of conclusions. Every study had a different gold standard. All gold standards had high sensitivity and specificity in diagnosing H. pylori (Dynemed, 2014). The consensus of these studies in Table 2 is that the Rapid TPAg was compared to the gold standard and is shown to have accurate diagnostic value in diagnosing H. pylori. The RAPID StAR and Premium Platinum PLUS HpSA were also found to have high sensitivity and specificity in diagnosing H. pylori. The latter test was used, as it was the only diagnostic test commercially available. The other tests were researched but were not placed on the market for sale.

Conceptual /Theoretical Framework

The Humanbecoming Theory

This project is guided by Rosemary Parse's nursing theory of *Humanbecoming*. This theory guided the interactions of the NP with everyone involved in the project. Six different leadership groups including the Nepalese trekking team, the nonprofit Foundation, the Sherpa leaders, the village leaders, and the NP were involved in organizing this project. This is explained in more detail in the methods section. Assimilating each group's goals was necessary to complete the project. Each group had different goals, which could sound contradictory, but can be understood to be part of a paradox within which one works to solve a problem. The goal is to decrease the incidence of H. pylori in the Okhaldhunga community. An example of the

paradoxes present includes: working with profit and nonprofit groups; and the giving and receiving of health care. These are considered paradoxical situations because opposite actions are performed among two groups or two people during a working relationship. A mutual goal can be reached by exploring the relationship between the two groups or people. This theory is about solving problems by exploring and working within relationships that have conflicting interests in life.

Humanbecoming is a term that explains the process of people becoming, this word symbolizes the evolution people transforming themselves or their lives into new *realities*. There are three main principles of this theory: find meaning by working through paradoxes, find patterns of rhythmicity, and create new person-specific solutions. The word *humanbecoming* reflects theses main principles of this theory (Sitzman & Eichelberger, 2012). People, ideas, and communications evolve over time by living within paradoxes (Parse, 1999). Combining two words, often actions or feelings, that contradict each other but together describe a possible truth is called a *paradox*. Examples of such words include: unknown-known, following-leading, and desire-do not want. Combining self-contradictory or word-combinations into a single word creates the vocabulary in the humanbecoming theory. The words describe the paradox of the situation (Bunkers, 2012). The NP examines the paradoxes of working through barriers to bring the project to fruition. The paradox lies within the situation of being in one state and needing to be in another state. For example, the NP may need to lead the team to reorganize clinic practices but does not have the authority till she is recognized as the leader.

A symbol of Parse's humanbecoming theory provides a visual representation to guide the application of its concepts (see Appendix F). It is comprised of a circle of intertwining ribbons that represent the human and the universe relating to each other. The black and white colors

represent the paradoxes found in living life and the green color represents hope. The ribbons join in the middle to represent the mutual process in creating or *cocreating* a relationship between the nurse and the patient. The ends of the ribbons are near each other but do not touch. This reflects the exploration that takes place in communication and working with each other. Among the ribbons, there is a rhythmical pattern leading to the formation of the circle, which reflecting the exploration of life and learning through experience (Sitzman & Eichelberger, 2012). This symbol sets the tone for the understanding and application of the theory.

In this project, the NP interacts with patients to recognize patterns of illness-health and to cocreate a healthier personalized lifestyle. This theory is appropriate for this project because it explores boundaries and promotes creativity. Creativity is important in finding solutions to problems and the theory provides a framework to understand and work within changing-resisting relationships. The framework directs the nurse to look for meaning in the paradoxes of life, look for patterns to create relationships, and transcend with these patterns into a possible solution. The final solution is created by the nurse and patient relationship. Important characteristics of both groups emerge to cocreate a mutual solution to a mutual goal (Bunkers, 2012).

This framework is also used to direct other relationships. The humanbecoming theory serves as a leadership guide for the NP (Parse, 2008). For example, in designing this project, the NP is following-leading. The NP follows the advice of Sherpa, Nepalese, and Foundation leaders while leading the STMM and health post team in the implementation of the project. Working within paradoxes creates flexibility in thinking and acting. This flexibility facilitates the progression of solving problems and overcoming barriers to implementing projects. For example the NP assesses the best way to implement a project by realizing what is known and unknown. The humanbecoming theory creates the word known-unknown to represent this.

Humanbecoming is a practice theory. In clinical leadership practice, the theory of humanbecoming is a model of leading-following (Morrow et al., 2011). Individualized and successful outcomes evolve when NPs use the paradox leading-following to discover rhythms of change-resistance (Parse, 2008). This means it is useful to the practice of nursing and guides the nurse, in this case a NP, in caring for patients. The medical model promotes preventing harm to patients by working up a symptom, creating a differential, and making an accurate diagnosis. The NP adds humanbecoming nursing theory to the practice of accurately diagnosing a patient's problem by bringing the patient's universe to create a patient-specific final plan of care.

The application of the humanbecoming theory directs NPs to envision the future, accomplish comprehensive projects, and work successfully with patients and others. NPs committed to a vision intentionally intervene as meanings unfold in leading-following (Doucet & Maillard-Struby, 2014). Humanbecoming theory guides NPs and patients to communicate what is known-unknown, cocreate rhythmical patterns of the possible, and cotranscend to a previously inconceivable solution (Parse, 2008). Application of this theory provides guidance when a solution is not apparent.

Methods

Ethical Issues

Medical ethics of beneficence, non-maleficence, distributive justice, and autonomy guide patient care during STMMs. These four principles of ethics guide STMM activities (Seager, 2013). The NP discovered violations of the above principles of medical ethics and implemented interventions to correct the situations. The violations and interventions are described in the following paragraphs.

Beneficence. Beneficence is providing treatment to the sick with quality health care while remembering the best interests of the patient. The first problem the NP observed was the situation where registered nurses and paramedics were diagnosing problems without creating a differential from the patient's symptomology. Their training does not prepare them to diagnose disease entities. The NP solicited a discussion about the ability to diagnose problems. Some comments that were shared included that there were no resources and that volunteers felt compelled to do whatever they could. When STMM volunteers work outside their license, they are not thinking they will harm the patient. One volunteer voiced, "What the group is trying to do is better than nothing." The STMM ate dinner together and discussed this medical dilemma and agreed that it is better to do nothing than harm a patient by possibly advising the wrong intervention. At mealtime, the STMM volunteers often held informal discussions about the events of the day. The volunteers discussed successes, problems, and solutions.

Non-maleficence. Non-maleficence is consciously avoiding harm to the patient. For example, the volunteers wanted to avoid situations where they could cause harm to the patients. The solution was in the organization of the clinic. A triage system was developed. The triage system ensured volunteers worked within the scope of their license.

Safety issues. Safety concerns were discussed at dinner including witnessed mistakes. For example, all children were given the same dose, one cap three times per day of antibiotics by health post workers. They did not know to weight the children and dose them based on kilos. When healthcare workers were at the health post, the NP stayed and instructed them on safer ways to do things. *Lewin's Theory of Change* was

used as a framework to introduce new ideas into the health post practices. More detains of the use of this theory are described later in the paper.

Distributive justice. Distributive justice promotes optimal care to all people (Seager, 2013). Every patient was offered the same care for each disease entity. But often, the ability to provide the appropriate standard was lacking. To ensure patients received care from properly trained health care workers specialty teams were created. The NP diagnosed conditions and then sent patients to a specialty team. Specialty teams were formulated for the primary disease entities presenting at the health post. A team was created to instruct patients on how to decrease non-H. pylori symptoms. By having teams demonstrate and instruct patients on interventions to improve their diagnosis, the NP had more time to diagnose and order treatments for patients.

Lack of diagnostic testing. Another example of the lack of distributive justice is the lack of diagnostic testing. This was an ethical issue because many patients complained of dyspepsia. The STMM was presented with the dilemma of how to treat these patients. It was assumed, but without diagnostic testing, there was no certainty that the patients had H. pylori. The treatment for H. pylori is antibiotics. Based on the principle of beneficence, the NP decided not to give antibiotics without just cause.

Autonomy. Autonomy refers to allowing the patient to make his or her own informed decisions. Patients came to the clinic of there own volition. They paid the equivalent of 25 cents for an office visit. If they do not want the health care, they do not pay. If they wanted healthcare but did not have the money, charity care was offered.

Patient protection and privacy. Patient charts are kept locked in the clinic and patient specimens were coded with numbers for privacy. All materials are burned after data is collected.

Institutional review board. IRB exemption was granted by University of San Francisco since this was a quality improvement project and not a research project (see Appendix A).

Setting

The STMM takes place at a rural Sherpa health post at Patale in Okhaldhunga, Nepal. The health post is located in the foothills of the Himalayas. The Sherpa are descendants of Tibetans. They are famous for helping tourists climb in the Himalayas. The STMM volunteers, usually on vacation, come from all over the world to experience the Sherpa culture and trek in Nepal. The health post is far enough from Mount Everest that tourists do not routinely visit this region. There is a mutual curiosity between volunteers, trekkers, and local villagers.

No medical background is required and participation in the clinic activities is not required. It cost $1450 to trek to the health post. This money pays for trekking logistics and supplies for the clinic. The health post is a one-hour plane ride followed by a 3-day trek from Katmandu.

The health post is very important to the village. From he health post, it is a 2-day walk to the closest community hospital. Family members carry the sick to the hospital on their back. There are no roads, only footpaths. There is no electricity in the community. This means that diagnostic tests must include POCT and not require electricity to evaluate the presence or absence of disease.

The health post clinic has an informal atmosphere. The health post leaders desire a more formal structure. When the NP teaches the health post workers about H. pylori and other disease entities, the health post workers respond by helping the NP to set up the project. The NP uses quality improvement practices to ensure the patients receive safe and proper care during the STMM. The clinic will receive organized care from properly trained volunteers and health post workers.

Planning the Intervention

The intervention to implement a H. pylori *test and treat* program at the health post was discussed with all the leaders including the health post workers. Dyspepsia is a prevalent diagnosis in the health post-patient population (see Figure 2). All patients with musculoskeletal problems were screened for dyspepsia and found to be positive.

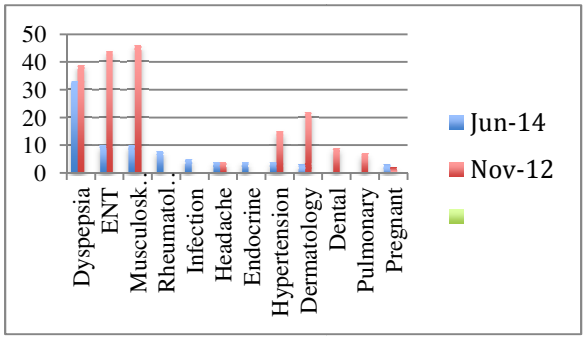


Figure 2. Comparison of Prevalence of Diagnoses at the Health Post

Planning for the project started with learning as much as possible about the Sherpa community and the Nepalese health system. The NP did an internship at the Helping Hands Hospital in Katmandu and also visited the Community Mission Hospital in Eastern Okhaldhunga. The latter hospital is a 2-day walk from the health post. The physicians, nurses, and administration were open and cordial with the NP. The NP sought advice and strategized with them on logistical problems particular to Nepal.

Proposed solution and description of the new program. During a short-term medical mission, the NP, other healthcare providers, health post staff, and trek service volunteers proposed to offer a H. pylori *test and treat* program to patients with dyspepsia. The NP would be using skills learned in the DNP Program to organize the improvement process to close the gap in H. pylori identification and treatment. The curriculum for this program provides education and training in project management, evidence-based practice, translation of research, cost-benefit analysis, and quality improvement processes. All of the components of the DNP curriculum were to be used to implement the H. pylori *test and treat* program to improve health care quality at the health post.

Treatment options were to focus on each patient's individual symptoms. An evidence-based algorithm for treatment of dyspepsia created by American Family Physicians and used by Nyaya Hospital, in western Nepal, directs appropriate treatment (see Appendix O). A monoclonal stool antigen test with high sensitivity and specificity was to be used to detect the presence or absence of H. pylori. The Platinum Plus SAT EIA was found to be the most accurate of the available tests with a sensitivity and specificity of 92.2% and 94.4% respectively (Kormatz, Kesli, Karabagli, & Terzi, 2013).

Organizational vision. The Mount Everest Foundation for Sustainable Development in Nepal and Tibet sponsors the short-term medical mission. The organization supports community-based sustainability projects in Nepal and Tibet. The Mount Everest Foundation works with local community agencies and partnerships to alleviate severe poverty in Nepal. Through sustainable community-based initiatives, the Foundation has built schools, staffed clinics, restored dilapidated cultural centers and invested in Nepal's most valuable resource, its people. This

project aligns with the vision of the Mount Everest Foundation and support for the project has been approved by the foundation.

Provider analysis. The roles and relationships described here pertain to providing services at the health post clinic. The quality improvement process is dependent on the efficacy of the project planning. The NP is the lead primary care provider and pivotal in the implementation of the project. The NP connects the planning process to the implementation process, works with the Foundation leader to ensure adequate resources are available, and works with the health post team to ensure the delivery of safe healthcare. The Foundation leader allows the NP to make all clinical decisions.

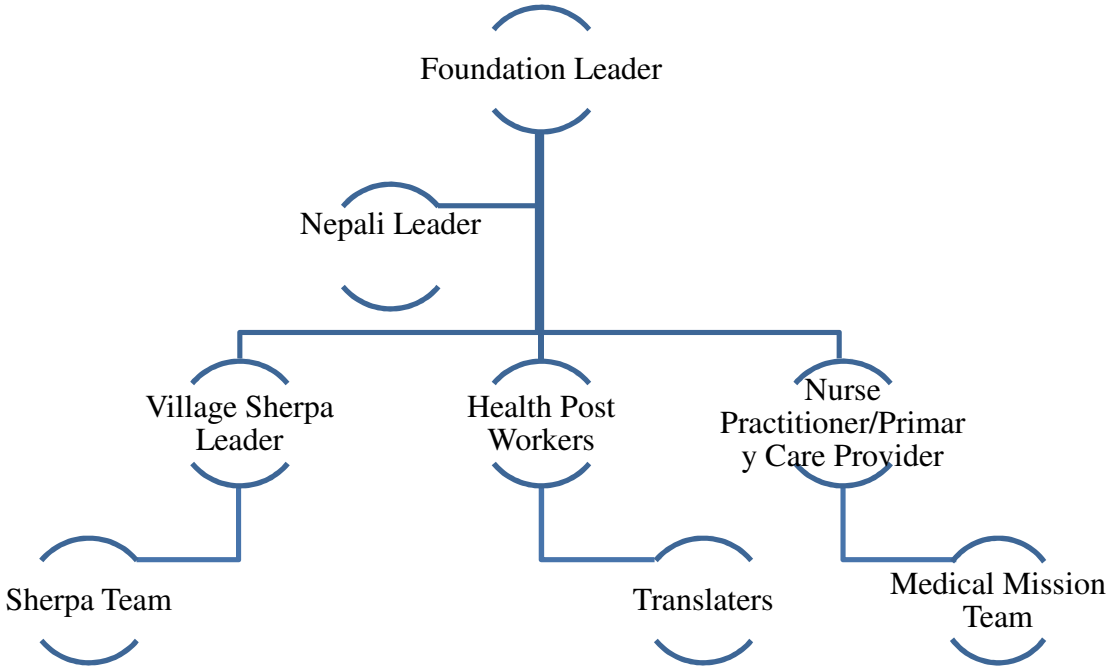


Figure 3. Medical Mission Organizational Chart

Organizational chart. The organizational chart (see Figure 3) describes the relationships of health post staff, medical mission volunteers, and medical mission leaders. The Foundation leader oversees all acvities on the trek and at the health post. The Nepalese leader overseas the

logistics of the trek, the Sherpa team, the health post workers, and the primary care clinic leader who is a NP. The quality improvement process is dependent on the efficacy of the project planning. The NP is pivotal in the implementation of the project. The NP organizes the planning, implementation, and evaluation processes (see Appendix J for the responsibility matrix).

Stakeholder analysis. The major internal stakeholders are the patients receiving care for their injuries or diseases. They benefit directly from the medical mission. Health post workers, as well as organization and local leaders also benefit directly and indirectly. They receive income from the Mount Everest Foundation and provide services to the health post patients. The local leaders gain influence and the Foundation leader gains access to local residents for employment as porters on his climbing expeditions. Volunteers, providers, and donors provide services to help the villagers. Every member of the medical mission benefits from the services provided to the health post patients. Table 3 illustrates how the benefits are distributed among stakeholders.

Table 3

Benefits to Stakeholders

Stakeholder	**Type of Stakeholder**	**Money**	**Benefits**	**Involved in Organizing Events**
Patients	Internal	Pay for services	Directly	Attend Events, Show Appreciation
Volunteer Primary Care Provider Leader	External	Pay for trek	Indirectly	Organize clinic, provide services, bring supplies, monitor quality
Foundation Leader	Both	Pays salaries	Both	Organize logistics of trek, recruit volunteers, and donors
Sherpa Leaders	Both	Receive salaries. Share culture	Both	Support trek and organizational leader
Health Post Workers	Both	Receive salary. Share culture	Both	Support volunteers
Donors	External	Pay	Indirectly	Support health post services

				and patients

Information flow requirements. Understanding the patterns and flow of the trek and health system facilitates solving problems by communicating to the proper people, at the proper time (see Appendix I for a communication matrix). The NP communicates horizontally with the Sherpa leader and health post workers and vertically with the trek and NGO leader. Thinking through matrices facilitates trust among trek members and will avert communication problems with health post workers and trekkers.

The Institute of Healthcare Improvement's (IHI) Failure Mode Effects Analysis (FMEA) planning tool is useful in identifying and averting patient safety problems (IHI, 2004). A FMEA applied to health post systems shows that patients are at risk to be diagnosed and treated incorrectly by untrained providers (see Appendix K). The untrained providers include uneducated health post workers and untrained altruistic volunteers. The NP monitors provider credentials to protect patient safety. The NP records and reviews the chief complaints, diagnoses, and treatments of all patients. This information is used to ensure adequate supplies are at the health post. Adequate supplies are needed to provide the correct treatments. For example, the lack of supplies and knowledge has limited the identification and treatment of H. pylori and other gastric entities.

Application of the 5 Ps. Managing the five Ps helps manage a project successfully. Inattention to them can sabotage a project. The five Ps are *purpose*, *population*, *professionals*, *processes*, and *patterns*.

The *purpose* of the medical mission is to provide quality, culturally sensitive healthcare at a health post in rural Nepal. The medical mission offers short-term health care to a health care resource-poor community.

There are many different *populations* at the health post. Patients of all ages and socioeconomic status come to the clinic. Western health care workers only come to the health post two times per year.

Professionals at the clinic include health post workers, medical mission organizers, translators, village leaders, and medical volunteers. Local village builders also visit the health post. They will build a laboratory and a patient exam room.

The NP monitors *processes* including: answering the door, assigning patients, documenting in charts, orientation of patients, orientation of volunteers, education of patients, education of health post workers, preventive measures, assessments, chronic disease management, and evaluation of processes. Altering the processes affects the quality of patient care. The NP involves the professionals to change processes to improve the quality of patient care.

Patterns are predictable events and include the following: everyone going to the primary care leader for answers, the lead provider gets the best translator, the volunteers practice within their license boundaries, the lead provider goes to the organizer with questions, water is boiled on an open pit by the lead porter, and the governor guards the door to ensure privacy. These patterns need to be considered when taking action to change a system. The NP monitors the Five Ps and facilitates positive change in the function of the clinic.

SWOT analysis of medical mission system. The risks and benefits lay within the strengths, weaknesses, opportunities, and threats to our medical mission system (see Appendix M). Planning to avoid the weaknesses and threats will minimize problems on the trip. The STMM volunteer team members are on vacation and will leave the organization of activities to program leaders.

Planning to avoid weaknesses and threats by focusing on the program strengths will minimize problems on the trip and during the health post clinical time. Health post workers and volunteers are benevolent and altruistic, yet in their efforts they may try to give medical care outside the scope of their medical license and knowledge base. An informal inquiry found that health post worker did not understand the difference between the signs and symptoms of H. pylori, dyspepsia and other gastrointestinal entities. Filling this knowledge gap was incorporated into the H. pylori *test and treat* program that focuses on the right treatment being prescribed for the right condition (see Appendix R).

GANTT chart timeline for project. The GANTT chart summarizes the expected deadlines of important aspects of the project (see Appendix G1). The GANNT project timeline is composed of nine deliverables. In Figure G2, there is an explanation of these deliverables with completion dates (see Appendix G2). All goals are measurable by delineating a date for completion. Each goal has several milestones. When determining the end dates, consideration of the chart is useful. Defining project goals help determine specifications, tasks, and responsibilities for the project. Planning of schedules, budgets, resources, risks, and staffing is ongoing and begins while the project goals are being defined. Similar overlapping of activities occurs with the execution and closing of the project. The timeline organizes the deliverables using the Project Life Cycle model (see Appendix G) as a guide (Larson, 2011).

Description of projected resource requirements. Supplies needed for the project include diagnostic test cards, antiseptic wipes, gowns, goggles, gloves, masks, red bags, 25 test tubes, 25 micro containers, pipette with tips, distilled water, vortex mixer, timer, generator, fuel, ice chest, ice, privacy screens, medications, posters for explaining guidelines for diagnosing and treating the causes of gastritis, a tent latrine for diagnostic testing, hand washing basins and soap.

Supplies were purchased in the United Stated and brought over on the plane. Nepalese do not have a mail system. The tent, hand washing supplies, and privacy screen are available at the health post. The water in this region is collected from the river and is not treated before drinking. Water is boiled before drinking on an open fire pit.

For this project, the NP requested the Foundation build two rooms in the health post. One room was a patient exam room. At times, privacy was difficult to attain in the health post because the local population was curious about STMM activities. A Sherpa guarded STMM activities to protect the privacy of the patient. The other room was a laboratory or a place where POCT could be done. It is not a laboratory in the true sense. It is an area where body specimens, taken from patients can be tested for disease. The addition of a laboratory facilitated cleanliness in the clinic since patient specimens could be tested in a separate area. Currently health post workers did pregnancy tests in the same area where patients are examined. H. pylori testing needed to be in a laboratory to prevent contamination of the clinical setting. Once the diagnostic tests were procured, the foundation agreed to build the laboratory. The foundation understood a laboratory is needed to do H. pylori diagnostic testing.

Budget, time, cost, and performance constraints. As long as trekkers want to go to Nepal, the clinic has funding. Each trekker pays $1450 to explore the Himalayan foothills and participate in a short-term medical mission. Trekkers do not have to participate in clinic activities. The Foundation leader organizes the trek logistics. Part of this money goes to support the clinic and the rest supports the trek to and from the clinic. The Foundation leader manages the money collected. A list of needed supplies is given to the Foundation and they are purchased for the clinic. A clinical leader knows what the clinic needs based on prior data collected. The supplies for the H. pylori program are described in the budget (see Appendix N). The direct cost

for these supplies is $4700.00.

The return on investment is seen as long as the STMM is able to deliver health care resources to the community. Currently, the Foundation leader is developing the clinic based on community desires and needs. This brings health resources and jobs to the community. Patients also pay the equivalent of 25 cents to receive health care. These funds do not support the health post but go to the Mayor of the community. When someone has a serious medical problem, they can borrow the money to pay for care at the hospital. The clinic is not self-supporting. The return on investment comes in improving health care in the village.

Implementation of the project

The project was initiated 14, 2014. The implementation process started as soon as the NP arrived at the airport. The first step involved getting the diagnostic tests through customs.

A volunteer from an earlier STMM returned to Nepal to help with the implementation of this project. She became the NP's assistant. The NP and her assistant flew on the same flight from Los Angeles to Katmandu. The project details were reviewed. These project details will be described later in this report. The assistant was shown and reviewed the diagnostic test protocol and checklist, the treatment algorithm, the data collection sheet, and the evaluation process. Implementation and evaluation processes were described to the assistant in detail and questions were answered.

The implementation of the project was a community effort. Within two hours of arriving in Katmandu, Nepali and Sherpa leaders joined the NP at the hotel. At this meeting, Nepali leaders verified needed supplies. A checklist showed we needed patient charts, a generator with fuel for the vortex, a block of ice for the cooler, and antibiotics to treat the H. pylori. A vortex is a high-speed mixer used to spin or prepare the specimen for use in diagnostic testing. At the

meeting the details of the project were described to all the leaders. Everyone was excited about the project. While everyone gathered the supplies, the NP stayed at the hotel and was always available in the lobby.

The next morning the charts, ice, generator, fuel, and antibiotics arrived. All supplies were labeled and stacked together. The assistant double-checked all supplies and studied the laboratory process for running the diagnostic test. The organization of the gastritis clinic was discussed. Further questions and instructions were given during the actual walk to the health post. Patients arrived on Saturday to the health post clinic. The Sherpa leader organized porters to carry all the supplies. One of the health post workers accompanied the NP. She did not carry supplies but she was available if the NP had questions or problems. Her presence in Katmandu afforded the NP the time to explain and show the health post worker the project details. Once at the health post, the NP explained the project to everyone. Suggestions were discussed and implemented into the plan. The Sherpa men hooked up the vortex to the generator and a test run was successful.

The health post was remodeled before the team arrived. The Sherpa men built two rooms in the health post. One room was an enclosed exam room and the other was the new laboratory. This was very exciting. The NP had asked for both but was only promised a laboratory. Solar lights had also been installed.

The health post team assembled to receive instruction on the implementation of the H. pylori *test and treat* program. They reviewed all the forms. They examined all the diagnostic testing supplies. Medications to treat H. pylori were placed in a plastic freezer bag. Instructions in the Sherpa language were enclosed. For those who could not read circles were place on each medication pack, which delineated how many times the pills needed to be taken each day.

Patients came to the primary care clinic and those with dyspepsia were referred upstairs to the dyspepsia clinic. Each patient was interviewed and the patient's specific symptoms of dyspepsia were recorded using a data collection tool (see Appendix P). The Sherpa leader explained how to collect the specimen and the quantity of stool to place in the container. Twenty-four specimens were collected.

After the clinic closed, the laboratory was opened and diagnostic testing was performed on the specimens. The laboratory team included the assistants, the two health post workers, two future health post workers and the head schoolmaster. The Sherpa men stood by to start the generator. Checklists outlined the details of each step. The schoolmaster called out the steps and checked them off as each step was concluded (see Appendix Q). The NP monitored the implementation of each detail. Premade labels were available for specimen containers and test tubes. Each specimen was given a number to protect the identity of the patient. Everyone enforced strict isolation. Everyone wore gowns, gloves, goggles, and masks. After the diagnostic testing was finished, all the specimens and disposable equipment went into plastic red bags and was burned. At dinner the group discussed the events of the day. Everything went as planned.

The next morning the dyspeptic patients returned to the clinic for their test results. Six patients or 25% had positive H. pylori results. They were given medications and instructions. The other 18 patients who were H. pylori negative were given a plan based on the symptomology of their dyspepsia. Management of their symptoms was based on an algorithm (see Appendix R). They were to visit the health post if problems or questions arose. The health post worker planned to visit the patients the next day and then in three to five days. Follow up at the patient's homes in two weeks would ensure all medications had been taken. After one month the health post workers visited the patients for a final time to evaluate the status of previous abdominal

complaints.

The implementation of the project was organized before arriving in Katmandu to implement the project. The details of the projects evolved during many conversations via email and skype with the different leaders. The NP explained the implementation process to health post, Sherpa, Nepalese and Foundation leaders. The NP and the other leaders wanted to help the dyspeptic patients. It was everyone's combined effort to achieve one goal that facilitated the development of this project. Everyone was working from the heart to implement the H. pylori *test and treat* program. The team effort worked.

Leadership style. The project was successfully implemented due in part to the leadership style of the NP. The NP's leadership style employed a combination of strategic models. Effective leaders develop the team towards the goal (Kouzes & Posner, 2012). This leadership style is constructed from theoretical and practical knowledge. Leadership is created at the personal as well as at the organizational level. Inherent in success is having a plan and a goal. These leadership strategies were used to lead implement the project.

***Strengths*.** To be engaged a leader needs to find his or her strength zone at work. Effective leaders utilize their strengths to make change. Kouzes and Posner (2012), categorizes strengths into four themes including executing, influencing, relationship building, and strategic thinking.

The NP is an achiever with self-assurance and strong futuristic thinking. The NP is responsible, always looking ahead and always learning. Recognizing the strengths of team members produced superior results compared to isolated individual efforts (Posen & Kouzes, 2012). For example, the NP worked with different types of leaders in this project. Recognizing the strength of these leaders and allowing them to lead allowed the project to naturally develop.

During this project, the NP aligned herself with people who were interested in creating social bonds with the Sherpa. For example, the NP started a tradition where all the women got together and did manicures on each other. This spa time created friendly bonds and made hand washing more fun. Table 4 shows the categories where the NP has strengths.

Table 4

Leadership Strengths of the Advanced Practice Nurse

Executing	**Influencing**	**Relationship Building**	**Strategic Thinking**
Achiever	Self-Assurance		Futuristic
Responsibility			Learner

Systems theory. Having studied the individual and interrelated characteristics of the micro-systems, meso-systems and macro-systems, the NP leadership style appraised these systems and worked within them. The NP provided direction to the team while working within the system. The NP focused on listening, asking questions, and understanding each system separately as well as how they related to the whole or larger system.

Organizational Theory. NP leadership activities are directed by the five practices outlined in *Leadership Challenge,* (Kouzes & Posner, 2012). The five practices are: model the way, inspire a shared vision, challenge the process, enable others to act, and encourage the heart. These practices guided the NP's thinking processes and leadership activities. They also guided communication and actions to develop authentic leadership.

Organizational leadership involves looking ahead to keep the organization evolving. Skills to create positive change are essential to guide an organization. When a gap in positive organizational processes was discovered, the NP used Kurt Lewin's *Change Model* to facilitate a

change in the structure of activities. Lewin's model has a concrete framework to guide the introduction of new interventions to improve a process. In this model, the NP leader focused on unfreezing, freezing, and solidifying a process within the organization. The leader *unfreezes* by setting new organizational goals and providing information that support attaining these goals. The leader *freezes* by implementing the new processes. The leader *solidifies* the organization on new processes by supporting employees and adjusting processes to meld into the organization's unique style (Borkowski, 2009). The following interventions detail the change process used in the application of Lewin's theory to this project.

Unfreeze. For this project, there were specific activities that would decrease forces opposed to change and increase forces promoting change. These activities included: establishing a sense of urgency by sharing the data with the local leaders on the prevalence of H. pylori, asking people on all levels if they would like change, identifying resistance to change, and creating a powerful coalition. The NP involved people on all levels to bring the H. pylori project to the health post by sharing the vision on how the prevalence of H. pylori can be decreased by using evidence-based information. This gave credence to the project. The vision and strategy of the H. pylori program was incorporated into the team orientation process.

Change. Team members were encouraged to ask questions and work with the group to change the systems to achieve the vision. Each evening a debriefing session occurred. From the debriefing discussion changes in process occurred. The Institute of Healthcare Improvement's model with PDSA cycle was used as a format to structure and measure change process outcomes. Each day a recap of positive activities was recognized. The results of the H. pylori *test and treat* program was shared. These short-term wins fostered credibility in the changes occurring. While change was being accepted the leader looked for other chances to further improve health care at

the clinic. For example, the NP asked for the clinic to be remodeled once she realized there was strong support for the H. pylori program.

Refreeze. Repeating the interventions reinforced improvements. The use of check-off sheets facilitated remembering the process. The use of the improvement process to identify and solve other health problems reinforces the changes.

In summary, the leadership system employed in this project was comprised of looking ahead while enjoying the present. Problems were not ignored. Information was continually gathered and a backup plan was always ready for implementation. Using leadership strengths and change frameworks facilitated the cocreation of positive change. The Institute of Healthcare Improvement's model with PDSA cycle was used to evaluate change processes and outcomes. These outcomes led to the creation of new interventions to improve processes. In the manner described above, guiding the decision process in implementing evidence-based leadership practices was Parse's (2008) nursing theory of Humanbecoming.

Planning the Study of the Intervention

To study the intervention an evaluation tool, the Institute of Healthcare Improvement's Model of Improvement with PDSA cycle, was employed. The plan to assess the effectiveness of the implementation of the project involved: measuring process and patient outcomes, collecting data on symptoms, and calculating the daily proportion of dyspeptic patients. The data has been plotted on a running chart. Below is a detailed description of the process of evaluating this project using the Model of Improvement with PDSA cycle.

Model of improvement with PDSA. The Institute of Healthcare Improvement's Model of Improvement using the PDSA cycle was the quality improvement design

chosen to set up the project evaluation process (see Appendix L). The model provided a format to setup an improvement process. It measured processes and outcomes and evaluated the effects of the intervention used to improve the problem. The information from these measurements was analyzed with the steps of the PDSA cycle. The analysis provided information to improve the process. Questions associated with each step of the process are answered. The questions are always the same. Each question is answered in the Model for Improvement. The following paragraphs go over each step of the Model of Improvement using the PDSA cycle to generate continued improvement.

Aim Statement. The model asks the health care leader to set up an improvement process based on the *aim statement*. To evaluate the *aim statement,* the model asks a series of questions and the answers provide structure to evaluate the aim statement. The model starts by asking, what is the group trying to accomplish? In the case of this project, the incidence of H. pylori in the patient population at the health post needs to be identified. The second question is how will the group know that a change is an improvement? The group will learn if a patient has H. pylori. Patients will receive proper treatment for their symptoms based on their H. pylori status. An improvement will be achieved as the incidence of dyspepsia decreases over time. The third question is, what changes can the group make that will result in improvement? The NP will facilitate the implementation of a diagnostic test that has a high sensitivity and specificity in diagnosing H. pylori.

Plan. Once the project has an aim, a plan is created that can be measured. An improvement process must be measurable to know if there is an improvement. The NP knows the prevalence of dyspepsia in the clinic population but does not know how many of these cases are

due to H. pylori infections. The literature supports the probability that many of these patients have undiagnosed H. pylori and is consequently at risk for peptic ulcer disease and gastric cancer (Pathak et al., 2010; Sherpa et al., 2012).

A method to detect H. pylori will be determined by completing a systematic review of feasible diagnostic tests. A plan for change is formulated. After reviewing the literature, a diagnostic method with high sensitivity and specificity was found suitable to be used in the rural clinic. The plan for collection of data is to implement a *test and treat* H. pylori program. In this way, each patient's dyspepsia will be correctly treated based on cause of the symptoms. This information will be gathered during the short-term medical mission.

Do. Diagnostic tests will be brought to the health post and patient specimens will be analyzed. The health post staff will partake in the laboratory testing.

***Study*.** After completing analysis of data, a summary of what is learned by plotting data on a running chart will demonstrate trends of H. pylori incidence and prevalence (see Appendix T for an example of a running chart).

Act. All measured outcomes will be evaluated. After analyzing trends and outcomes, a decision must be made. The change may need to be reevaluated. If so, a new PDSA cycle will be implemented to improve patient or process outcomes.

This quality improvement project aims to determine the cause of dyspepsia in the patient population at the Okhaldhunga health post and offer appropriate treatment. The aim of the project is to decrease the incidence of dyspepsia by implementing a *test and treat* program for H. pylori. If patients have H. pylori and do not receive antibiotics, they may develop peptic ulcer disease or gastric cancer. If a patient does not have H. pylori and receives needless antibiotics, resistance to these antibiotics or superinfections may

develop (De Francesco et al., 2010). If patients have dyspepsia due to other causes, they need proper treatment for those causes (see Appendix R for treatment algorithm for dyspepsia; see Appendix P for the dyspepsia symptom and lifestyle datasheet). Post treatment testing for cure will also be done. Trends in the prevalence of dyspepsia will be studied and visually displayed on a running chart.

In another Sherpa village, patients had 70% prevalence of H. pylori (Sherpa et al., 2012). Based on that study it would be expected that a similar prevalence would be present at the Okhaldhunga health post. Patients with H. pylori would receive antibiotics plus proton pump inhibitors (PPI) and those without H. pylori would receive PPIs and information on how to control their symptoms. Diagnostic testing with high sensitivity and specificity is used to detect the presence of H. pylori. The completed questionnaire using the Model of Improvement provides a format to measure process and patient outcomes (see Appendix L).

After the implementation of the *test and treat* program, the questions within the Model of Improvement with PDSA cycle, are again answered and the responses are compared with the previous cycle. The new answers facilitate increased improvement in reducing the incidence of dyspepsia. The new answers are used to formulate a new intervention to improve the H. pylori *test and treat* program.

Implementation Tools and Processes

Data collection sheet. This is the form used to collect information about patient symptoms and lifestyle. The information on this form guides patient education once H. pylori status is determined (see Appendix Q).

Treatment algorithm for dyspepsia. This sheet was used in determining the

cause of dyspepsia if H. pylori status is negative. It is an evidence-based algorithm created by the American Academy of Family Practice (Meurer & Bower, 2002). It is also used by Nyala Hospital in Western Nepal (see Appendix R).

Internal and external validity. A checklist was used to maximize internal validity (see Appendix Q). By following the checklist consistent processes were followed. Keeping open lines of communication between the NP, STMM volunteers, and health post workers involved in the implementation of the project maximized external validity. Backup plans were also in place to ensure everything ran smoothly. The cooler was tested before the trip to ensure the diagnostic tests would remain at the correct temperature. The efficacy of the diagnostic tests was evaluated using sample specimen from the company. Both H. pylori positive and negative sample specimens were used to validate the sensitivity and specificity of the diagnostic tests. The pipette was calibrated and the vortex machine was tested.

Gap analysis. This project focused on decreasing the incidence of H. pylori among the patients who came to the health post. The incidence of chief complaints was collected (see Appendix B2). This data will continue to be collected in the future. The incidence of dyspepsia should decrease as more patients achieve control of their symptoms. In addition, the results from the diagnostic tests were tabulated and taken into consideration when developing a plan to treat the patient's dyspepsia.

GANTT chart. The timeline was adjusted during the planning of the project. The original GANTT did not plan for the extended evaluation period or the dissemination of results. Each visit to the health post provided information that was incorporated into the implementation strategy of the project. Communication between visits shaped the plan

(see Appendix G for details about completion of milestones based on the GANTT chart).

Methods of Evaluation

Prevalence of dyspepsia. Prevalence data is the proportion of people in a population (the health post) who have a particular disease or symptom including old and new cases. The prevalence of dyspeptic patients who came into the health post was expressed as a percentage of all health post patients. Taking the number of dyspeptic patients and dividing that number by the total number of patients who came into the clinic during each medical mission enables the evaluation and comparison of trends in the prevalence of dyspeptic patients. For example, if there are 15 dyspeptic patients and 30 patients came into the clinic, 50% of the patients had dyspepsia. A different number of patients came into the clinic during each medical mission. Computing percentages or proportions of the dyspeptic patients to the total number of patients that day facilitated depicting the data on a running chart (see Appendix T).

Checklists. A checklist was created to monitor the process of diagnostic testing (see Appendix Q). The NP used checklists to organize supplies, implement testing, and teach patients. The checklists were self-explanatory. Instruction on the contents occurred with health post workers. Carbon copies were given to them. When checklists are not used, people do not always complete necessary steps, even if they remember (Gawande, 2009).

Skype and email. Weekly skype calls to Katmandu were made after the implementation of the intervention. This was necessary because the NP wanted to ensure there were no problems in the follow-up schedule with the H. pylori positive patients. She also wanted to be sure the patients were symptom-free.

SWOT analysis. The NP monitored for potential problems as outlined in the SWOT

analysis (see Appendix M). No problems were encountered. Everyone was focused on implementing the H. pylori *test and treat* program. The NP's assistant gathered prevalence data. One health post worker saw primary care patients and the other one stayed with me to learn about treatment for H. pylori and dyspepsia.

Return on investment. To be an effective advocates for using the H. pylori *test and treat* program one needs to know the incremental program costs, number of lives that will be saved, and articulate the usefulness of the program using cost-benefit analysis. The return on investment is derived from doing a cost/benefit analysis. It is important to know the financial effect of the program on the community. To be of value, a program must save lives and be affordable (Lansdorp-Vogelaar & Sharp, 2013).

Assessment of dysfunction/failure. Processes were evaluated by the checklist and outcomes by prevalence data. Trends in the incidence of H. pylori were monitored. The PDSA cycle focused on interventions to improve trends. Consistency in all steps of the program was monitored.

Analysis

Cost-Benefit Analysis. To determine the value of a medical intervention the NP, who is also the program director, must know the cost of implementing and sustaining the program as well as the number of lives saved (The National Center for Early Defibrillation, 2014).

The annual cost of implementing the program is shown in the budgetary numbers (see Appendix N). To evaluate the cost of sustaining the program the five-year plan is included in the budget (see Appendix N). Only the incremental costs were included in the analysis. The H. pylori *test and treat* program does not interfere with the rest of the clinic.

To calculate the number of lives saved data from a comparable project was used. The

data was collected from a nearby Sherpa village. It provided data that reflects the same demographic characteristics as this Sherpa village (Sherpa et al., 2012). There is a 70% prevalence of H. pylori in the Solukumbu village (Sherpa et al., 2012). The Okhaldunga village has a similar Sherpa ethnic population as the Solukumbu village.

During a 2-day STMM 188 people came to the Okhaldhunga clinic. The incidence of dyspepsia is 85 people among the188 that visited the clinic. Table 4 summarizes the prevalence of H. pylori and gastric cancer at the Okhaldhunga health post. Data on gastric cancer shows that 73% of cases are found in H. pylori infected patients. From this data the lifetime probability of gastric cancer was calculated to be 0.4% in the 30-year-old general population (Lansdorp-Vogelaar & Sharp, 2013). The lifetime probability of developing stomach cancer in this community is 0.4% or 16 people. This expected incidence of gastric cancer is double compared to the general lifetime probability in non-Sherpa communities. According to Sherpa et al. (2012), in a Sherpa community, the cancer mortality rate is 269/100,000 per annum, which equals a 0.27% probability. The bar grafts (see Figures 4 and 5) depict the costs averted by preventing gastric cancer and dyspepsia (Leivo et al., 2004).

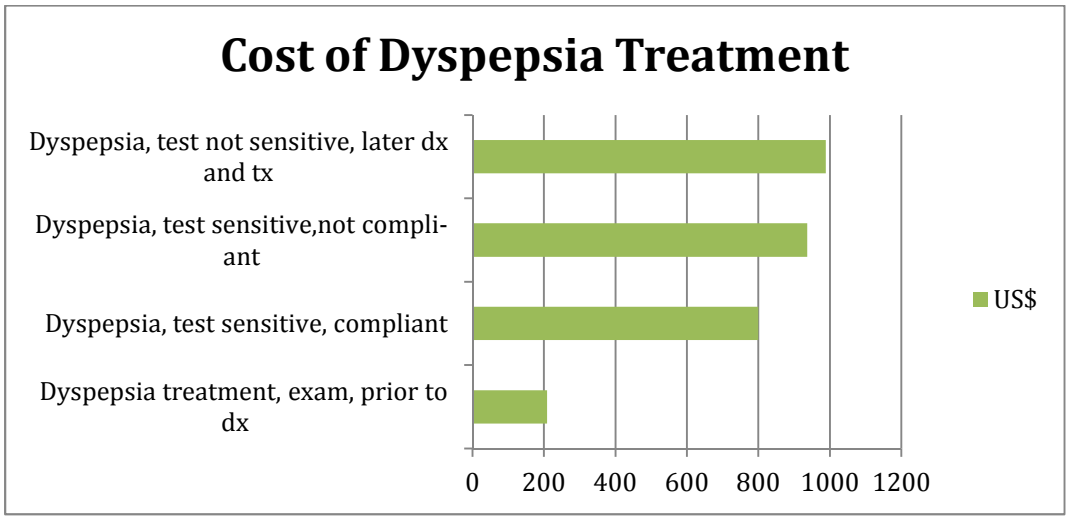


Figure 4. Cost of Dyspepsia Treatment. These are the costs averted by effectively treating dyspepsia.

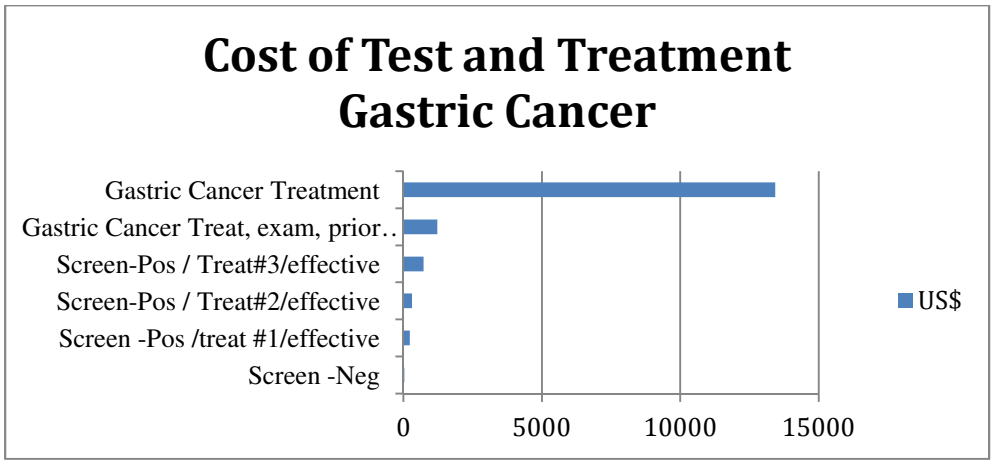


Figure 5. Costs of *Test and Treat* Gastric Cancer. These are the costs averted by effectively treating H. pylori and thus preventing gastric cancer.

To summarize, Table 5 shows 45% of patients who visited the clinic have dyspepsia, which is lower than the Solukumbu village.

Table 5

Expected Prevalence of H. pylori in Solukumbu versus Okhaldhunga

Residence of Sherpa	**Actual Prevalence of H.pylori**	**Expected Prevalence**	**Total Number of Clinic Patients**	**Actual Number of Dyspepsia Patients**	**Percent of Total patients have dyspepsia**	**Expected Number of Positive H.pylori (188x70%)**	**Expected Lifetime Incidence of Gastric Cancer**
Patale, Okhaldhunga	25% (See below for discussion)	70% (Expected to be the same as Solukumbu)	188	85	45%	131.6	16
Solukumbu	70%						

This H. pylori *test and treat* program cost $4700 to implement (see Appendix N). In 2004, it cost $13,000 to treat a gastric cancer patient and $800 to *test and treat* a compliant dyspeptic patient (see Appendix H). These figures adjusted for inflation are $16,000 and $1000 respectively. These calculations show that cancer prevention through appropriate management of

dyspepsia is cost-effective. The 5-year budget projection (see Appendix N) shows the costs of the *test and treat* program will remain stable. This low-cost program can be easily maintained by donations, grants, and fund-raising treks.

Quantitative methods. Gender, chief complaint, treatment, and final diagnosis were recorded on all patients. From this data prevalence of disease entities was measured and compared.

Prevalence data demonstrates if the project is improving the incidence of disease in the health post population and directs what supplies to bring to the health post. For example, the incidence of hypertension is on the rise. An increase in hypertensive medications was brought to the health post. Prevalence data also showed a decrease in the incidence of palpitations after Lasix was withdrawn from the medicine list and replaced with Lisinopril. In the same manner, data will show a decrease in the prevalence of dyspepsia if the H. pylori *test and treat* program is beneficial. Results of the H. pylori *test and treat* program is below.

Software. No software was used to analyze data.

Results

Program Evaluation/Outcomes

Prevalence of H. pylori. Twenty-four patients were tested. Six patients (25%) were positive for H. pylori (see Figure 6). These patients received antibiotics and follow-up from the health post workers.

Prevalence of Dyspepsia. Patients with dyspepsia were treated using the dyspepsia data collection tool (see Appendix P) and the dyspepsia and GERD algorithm (see Appendix R). Eighteen patients had symptoms of dyspepsia but were negative for H. pylori.

The data collection tools guided the NP to ask pertinent questions about the patient's

history. The pattern of the answers leads to the identification of the patient problem that is characterized by dyspepsia. The treatment selected for the patient is specific to the cause of the dyspepsia (see Appendix P for the detailed data collection tool).

The health post worker stayed at the NP's side and listened as every step of the diagnostic and treatment process was explained. By the time the group had worked up all 24 patients, the health post worker learned the patterns leading to specific treatments for specific disease entities. She understood the necessity to work up a symptom to find the correct diagnosis.

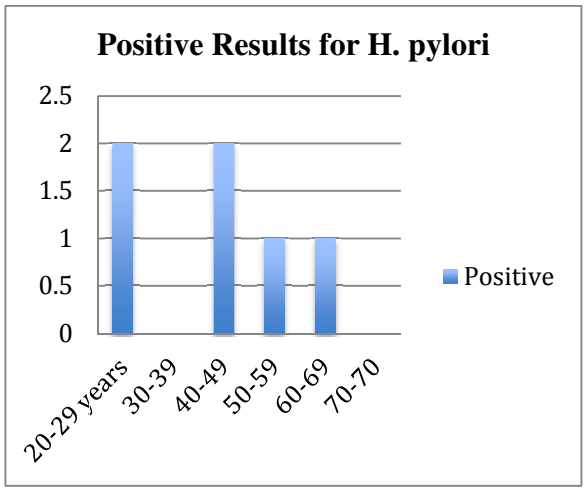


Figure 6. 25% of dyspeptic patients have H. pylori

The Y-axis represents the number of cases and the X-axis represents the age of the patients.

The predicted prevalence rate was 70% (see Table 5). In looking at Dr. Sherpa's data, he had randomized families before completing the diagnostic testing. At Okhaldhunga, only two of these patients came from the same family. The literature states that there may be increased incidence of H. pylori among family and close friends (Dynemed, 2014). The next Model of Improvement intervention is to evaluate the families of the H. pylori positive patients for H. pylori and dyspepsia.

The NP did not randomize the patients, as this project was not a research study, but a

quality improvement project. The aim was to improve the quality of health care at the health post by implementing a H. pylori *test and treat* program to decrease the incidence of peptic ulcer disease and gastric cancer. An improvement project finds evidence-based support in the medical and nursing literature for an intervention that will improve patient outcomes. By designing a quality improvement project using the model of improvement with the PDSA cycle, outcomes are measured and tracked overtime on a running chart (Floyd, 2014).

Avoidance of harm. Antibiotic resistance to H. pylori is high throughout the world (De Francesco et al, 2010). In this case, 18 (75%) patients did not receive needless antibiotics. The initial suggestion was to give everyone antibiotics. Administration of antibiotics to infection-free patients leads to resistance to these medications. Harm was avoided and the quality chasm at the health post narrowed (see Appendix O).

Nature of setting and improvement intervention. The setting is very rural. There was no running water, electricity or sanitation. The Sherpa community was very supporting and independently found solutions to many problems. For example, they brought a solar battery from Katmandu and set up lights in the laboratory. The women of the community brought food and snacks to the health post. They brought water for hand washing. The health post workers took notes, asked questions, and emulated what was taught and done.

Changes. The health post now has a patient exam room and a laboratory with doors. Water is placed at the entry to wash hands. Waste is incinerated. Charts are now completed on each patient. Health post workers learned to work up the symptom of dyspepsia into a differential diagnosis and provide disease-specific interventions to reduce symptomology.

Feedback from skype calls. It was difficult to get feedback on Skype. Nepal is 12 hours ahead of California. Nepali leaders and the NP often spoke at midnight or six in the morning. A

phone chain was established: Nepali leaders called Sherpa leaders who called health post workers to get information. Only one type of phone reaches the health post. This is the first year a call to the health post has been possible.

It would have been better to stay at the health post for two week and do continual evaluation of the effectiveness of the H. pylori treatment regime. However, in talking with leaders in Nepal, all patients took their medications and had relief from their symptoms.

Model of Improvement. After implementing the intervention, the NP went through the steps of the model again. This model provided a format to set up a projects that affected a change in practice that improved processes and patient outcomes. The results of each project were plotted onto a running chart, which provided a visual to easily compare results (see Appendix T).

. ***Aim Statement.*** Sometimes the results partly meet the objective of the aim statement. As the project adds additional interventions to meet the objective of the aim statement does not change. If the results completely satisfy the aim statement then the project is over. In this project the results partly met the objective. The diagnostic test identified a 25% incidence of H. pylori but the patient sample size was only 24 patients. This is only 6 % of the village population. To improve the H. pylori test and treat program, a change in the program was needed. To develop a new intervention, the NP used the PDSA cycle process. PDSA - cycle 2 of the H. pylori *test and treat* program was created and described below.

Plan. The plan is to implement the *test and treat* program a second time. The prevalence of H. pylori was lower than expected. The literature shows that H. pylori infection is often present in families or in overcrowded living situations (Eusebi, Zagari, & Bazzoli, 2014; Pearse, Campbell, Mann, Parker, & Thomas, 2013; Urita et al., 2012). Next time the NP will test all family members of H. pylori positive patients. Previously positive patients will also be tested for

cure of H. pylori.

Do. The same test will be brought to the health post. A second test will also be brought to validate the results.

Study. The results will be collected in the same manner as this project.

Act. All measured outcomes will be evaluated. After measuring trends and outcomes, a decision must be made. The intervention may need to be reevaluated. If so, a new PDSA cycle will be implemented to improve patient or process outcomes.

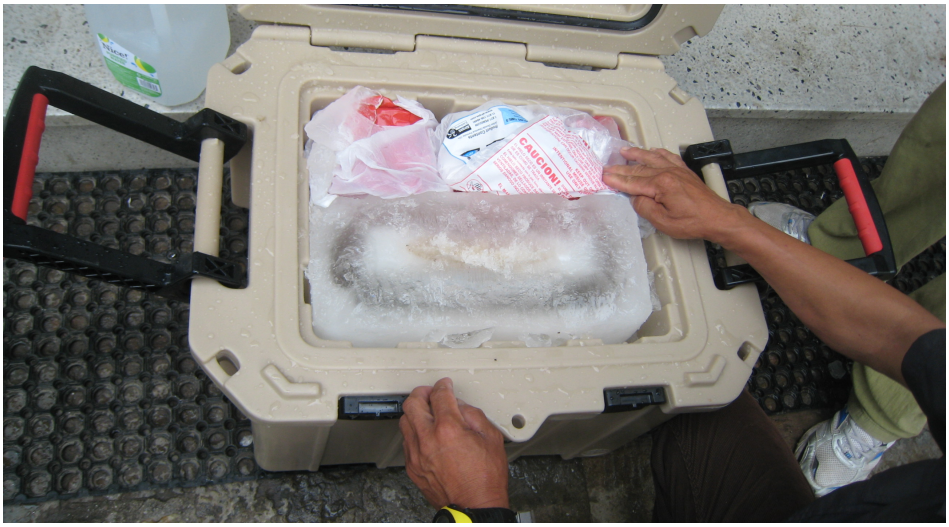
Discussion

Summary

Successes. The aim of this project was to correctly identify patients with H. pylori from the dyspeptic patients and to provide disease specific treatment to the patients. The diagnostic tests identified the H. pylori positive patients. These patients received antibiotics. To manage their symptoms, dyspeptic patients who were negative for H. pylori received education to manage their symptoms. Most importantly the health post workers are learning there is more to medical treatments than treating a symptom. The H. pylori *test and treat* program showed the health post workers how to work up a symptom to create a diagnosis. They took notes and understood the process.

Difficulties. The acquisition of the diagnostic test was the biggest obstacle. The review of the literature gave the name of a perfect test. Dr. Sherpa used the test in his studies with the neighboring Sherpa community. He tried to get the test for the NP without success. The NP went to the major Katmandu hospitals and everyone used serum antibody tests. The NP returned to the literature and found a test in the United States. Buying the test was easy; getting it to the health post was precarious.

The diagnostic tests needs to be kept cool. The NP did many experiments to find the perfect method to transport the test to the health post. A Pelican cooler with 2-inch insulation kept the diagnostic test cool for 10 days. Dry ice was used during the flight to Nepal. Before wrapping duct tape around the cooler, the NP summoned a TSA agent to inspect the container. The container made it to Nepal without being reopened.



Staff behavior. Leaders from Katmandu, the United States, and Okhaldhunga came together and had community support to make this project work. Local health post worker understand that a symptom can be different disease entities. Local health post workers are progressing in setting standards of care in their clinic. The health post workers are better able to care for their community.

Lessons learned from evolution of changes, outcomes achieved. The NP felt a more through evaluation would have been accomplished had she stayed two more weeks. That said, the health post workers did follow up with the patients and reported to Katmandu that the patients felt better.

Important lessons learned from sequence of changes that occurred. The STMM was able to help the community because the community and the STMM were working towards the same goal. The project was a success because the Sherpa held the project to be important to the community. In one study 65% of participants disagree that STMMs have a positive impact on the health situation for local people (Welch, 2012). Reasons include wasted time and resources, poor quality of medical work, no follow-up plan, malpractice, and illegal presence (Welch, 2012). Satisfaction of STMM volunteers is important, but understanding the impact the community feels should not be assumed to be positive.

Members of the STMM want to help make a positive difference. STMM volunteers rarely return to the same place twice. This needs to be studied. The more favorable the attitudes of the local community toward the STMM, the happier are the STMM volunteers (Welch, 2012).

Important lessons learned from the outcomes achieved. Remember first to do no harm. If antibiotics had been given to everyone 75% of the test patients would have received antibiotics needlessly. This could result in antibiotic resistant strains of bacteria to be introduced into the community.

What contributed most to the successful changes? Everyone worked together. There were no surprises in human behavior. Everyone wanted to help and everyone was heard. There were leaders on all levels and the communication was consistent.

Sustainability. Consistency in processes leads to solidifying a change. Lewin's theory supports taking the time to *freeze* a change. The STMM will conduct further H. pylori *test and treat* clinics. Each clinic will be improved using the Institute of Healthcare's Model of Improvement with the PDSA cycle.

Positive sustainability. There are new ideas and practices at the health post. These

include the practice of hand washing, offering patients privacy, completing diagnostic testing in a separate room, and working up a symptom to create a differential.

The health post workers want to be able to test dyspeptic patients for H. pylori. The daily ability to *test and treat* H. pylori does not exist and will not exist in the near future. The diagnostic testing can only be done if the STMM imports the test into Nepal. Testing and treating H. Pylori despite its prevalence is not a national priority. Drug companies do not find it financially rewarding to sell diagnostic antigen tests into Nepal. For this reason STMM missions need to have leadership to plan projects that will improve health care in the community they serve.

New possibilities. As the project progressed, new possibilities for other projects surfaced. Plans for the next H. pylori clinic include testing the previously positive patients for cure. The prevalence data will show trends. Addressing new trends early can prevent health problems from progressing to illness.

Implications for advanced nursing practice. Applying the core measures of theexpands the possibilities of the NP to help his or her patients. In this project, the NP directed the clinic operations and organized staff to improve the quality of patient care. Together with health post workers, and organizational leaders, the NP worked to implement the H. pylori *test and treat* program.

The leadership system used in this project includes the application of nursing theory and evidence–based leadership strategies. Foremost of all, nursing theory guides practice. It keeps NPs focused on the essence of their profession (Karnick, 2012). Difficult nursing problems and decisions require guidance. Nursing theory provides this guidance. Nursing theory provides vision in making decisions, as does the knowledge of evidenced-informed leadership strategies.

Leadership is created and so requires advanced planning. In developing leadership style, preparation is important on many different levels. These include the personal, interpersonal, organizational, inter-organizational, national, and international levels. By studying evidence-informed leadership strategies, nurses mindfully use a strategy to direct a group of people to create effective change for the greatest good. The processes of this project are applicable to nursing practice and demonstrate a method to achieve positive patient outcomes. This project shows nurses how to effect change.

Dissemination plan. Maru et al. (2012) describes a vision to promote quality health care delivery in resource-poor communities. In the process of providing health care to resource-limited areas, the quality chasm must be narrowed. The NP presented this project at the International Council of Nurses Nurse Practitioner Network. The NP will apply to other conferences and seek grant support for future projects. The NP is exploring medical mission quality improvement strategies with the Catholic Health Association of the United States and the NGO Possible, which was formerly known as Nyaya Health.

Relation to other evidence

The results of this project did not reflect the results of Dr. Sherpa's research. This project employed a diagnostic test with a high sensitivity and specificity. Meticulous detail was taken in using the diagnostic tests. Still maybe the test materials were faulty. Evaluating testing supplies with known positive specimen would rule out this possibility. This was not done. There is a need for further evaluation of these types of medical mission projects.

Barrier to Implementation/Limitations

In summary, the barriers included acquiring the diagnostic test, transportation of the test to the health post, lack of laboratory site, the language, and the lack of electricity. Limitations

included the necessity of relying on health post workers to do patient follow up. The NP will return to the heath post to do follow up in six months.

Interpretation

It is important to continue monitoring patient outcomes in the diagnosing of H. pylori. The results are not complete without further follow up of the patients and their families. Testing for cure is also recommended. The ability to test the specimen on two different diagnostic tests would also strengthen the results. The project has demonstrated a method to improve health care in the health post by identifying a diagnosis instead of treating symptoms.

The mechanisms of change or improvement worked well in this scenario. Everyone was on board to improve the health care at the health post. The community felt empowered to recreate the laboratory testing. Lewin's theory provided a methodical basis to implement a change. Parse's humanbecoming theory provided a framework to communicate and cocreate a new system.

The implication of these findings for the leadership of change is the confidence that develops in acting on a desire to improve a situation. The desire to create change does not create change without actions. These actions bring experience and confidence.

The desire to improve health care at the health post was present and the health post workers did not know what to do. The Doctorate of Nursing Practice program provided the NP with education and tools to work with the health post and Sherpa community to appropriately treat stomach ailments.

The predictability of cause and effect is best understood by seeing that when the team has a common vision, progress can be made towards that vision. The true effect of this project has yet to be determined. The consistency of implementing evidence-based practice needs to

evaluated. The effectiveness of the antibiotic and dyspepsia algorithms is yet to be determined. These evaluations are ongoing through Skype calls.

Competing commitments had to do with employment. The Nepali and Sherpa leaders are not available in the spring and fall months. During these times, they are working in the mountains. The reason the Nepali and Sherpa leaders had time to build the rooms at the health post was because Mount Everest was shut down to climbers due to avalanches. The backup system was to use tents.

The staff understands the need for continued education. Ideally the health post staff will receive certified training. The logistics for the health post to achieve more training is in progress.

Conclusions

This project is an example of the application of evidence-based practice. Literature reviews provide answers to clinical problems. Using the processes described in this paper of translating the research effectively to improve health care interventions will ameliorate health care in primary care clinics. As a NP, this is essential to providing health care to patients.

In the United States, people do not give technical support to their neighbors unless they feel qualified. In STTMs, patients may not know they are receiving substandard care from untrained volunteers. An uninformed villager does not have a choice when an incompetent medical mission volunteer offers help. When the villager has no hope, trust may be the only option.

STMM volunteers must offer hope that can be trusted. NPs have learned from the IOM (2001) report *Crossing The Quality Chasm: A New Health System For The 21st Century* that many lives are lost senselessly in U.S. hospitals due to poor safety conditions. The IOM report is applicable to all aspects of healthcare including volunteering. This paper is a call for evaluation

of effectiveness of medical mission trips in foreign, rural communities and to assess the thoughts and feelings of indigenous people regarding STMM activities in their community. Volunteering is not about the benefit received, it is about the benefit given.

Other Information

Funding

Funding was provided by several sources. The Mount Everest Foundation operates through a 501(c)(3) organization called The Mountain Fund. This allows donations and trekking fees to be tax deductible. Fundraising activities include presentations, speaking engagements, and providing treks. Medical mission members donate money to go on the trek to the health post. Additional monetary support was received from medical mission team members.

References

Ackerman, A.K. (2010). The ethics of short-term international health electives in developing countries. *Annals of Behavioral Science and Medical Education. 16*(2), 40-43.

Borkowski, N. (2009). *Organizational behavior, theory, and design in healthcare.* Sudbury, MA: Jones and Bartlett Publishers.

Bunkers, S.S. (2012). The possibilities with paradexity. *Nursing Science Quarterly*, *25*(2), 126-131.

Chism, L. A. (2013). *The doctor of nursing practice: A guidebook for role development and professional issues*. Burlington, MA: Jones and Bartelett Learning.

Cluzeau F., Burgers J., Brouwers M., Grol R., Makela M., Littlejohns P.,…Hunt C. (2003). Development and validation of an international appraisal instrument for assessing the quality of clinical practice guidelines: the AGREE project. *Quality & Safety in Healthcare*, *12*(1), 18–23.

De Francesco, V., Georgio, F., Hassan, C., Zotti, M., Neri, M.,…Zullo, A. (2010). Worldwide H. pylori antibiotic resistance: A systematic review. *Journal of Gastrointestinal and Liver Disease, 19*(4), 409-414.

Department of licensing. (2012). ARNP: Scope of practice. *Washington State Department of Health*. Retrieved from www.doh.wa.gov/

Ducet, T.J. & Maillard-Struby, F. (2009). The humanbecoming leading-following model in practice. *Nursing Science Quarterly, 22*(333), 333-338. doi: 10.1177/0894318409344768

Eusevbl, L., Zagari, R.M., & Bazzoli, F. (2014). Epidemiology of helicobacter infection. *Helicobacter, 19*(Suppl.1), 1-5. doi: 10.1111/hel.12165

Flores-Luna, L., Camorlinga-Ponce, M., Hernandez-Suarez, G., Kasamatsu, E., Martínez, M.E., Murillo, R., Lazcano, E., & Torres, J. (2013). The utility of serological tests as biomarkers for helicobacter pylori-associated precancerous lesions and gastric cancer varies between Latin American countries. *Cancer Causes Control*, *24*, 241-248.

Gawande, A. (2009). *The checklist manifesto: How to get things done right.* New York, NY: Picador.

Ginsberg, G.M. (2013). Generalizability of cost-utility analyses across countries and setting. *Best Practice & Research Clinical Gastroenterology*, *27*, 845-852.

Green, T., Green, H., Scandlyn, J., & Kestler, A. (2009). Perceptions of short-term medical work: a qualitative study in Guatemala? *Globalization and Health*, *5*(4), 1-13. doi: 1186/1744-8603-5-4

Holmes, K.P., Fang, J.C., & Jackson, B.R. (2010). Cost-effectiveness of six strategies for helicobacter pylori diagnosis and management in uninvestigated dyspepsia assuming a high resource intensity pattern. *BMC Health Services Research*, *10*(344), 1-6.

Howard, A. (2011). Paradexity: The convergence of paradox and complexity. *Journal of Management Development, 29*(3), 1-18.

Huntington, I., Shrestha, S., Reich, N.G., & Hagoplan, A. (2011). Career intentions of medical students in the setting of Nepal's rapidly expanding private medical education system. *Health Policy and Planning*, ***27***(4), 417-428. doi:10.1093/heapol/czr052

Institute of Healthcare Improvement (2004). Failure, modes, and effects analysis. *Institute of Healthcare Improvement.* Retrieved from http://www.ihi.org/resources/Pages/Tools/FailureModesandEffectsAnalysisTool.aspx

Institute of Medicine. (2001). *Crossing the quality chasm: A new health system for the 21st century*. Washington D.C.: The National Academy press.

Karakus, C., & Salih, B. (2013). Comparison of the lateral flow immunoassays (LFIA) for the diagnosis of helicobacter pylori infection. *Journal of Immunological Method*, *396*(1-2), 8-15.

Karnick, P.M. (2012). Humanbecoming theory in practice: A case for theory-guided nurse practitioner education. *Nurse Science Quarterly, 25*(2), 147-148.

Knevel, R. (2010). Training rural women to improve access to oral health awareness programmes in remote villages in Nepal. *International Journal of Dental Hygiene*, *8*, 286-289. doi: 10.1111/j.1601-5037.2010.00481.x

Korkmatz, H., Kesli, R., Karabagli, P., & Terzi, Y. (2013). Comparison of diagnostic accuracy of five different stool antigen tests for the diagnosis of helicobacter pylori infection. *Helicobacter*. doi: 10 1111/hel.12053

Kouzes, J., & Posner, B. (2012). *The leadership challenge*. San Francisco, CA: Jossey-Bass.

Kruk, M., Porignon, D., Rockers, P., & Lerberghe, W., (2010). The contribution of primary care to health and health systems in low- and middle-income countries: A critical review of major primary care initiatives. *Social Science and Medicine 70*, 904-9011. doi: 10.1016/j.socscimed.2009.11.025

Langowski, M.K., & Iltis, A.S. (2011). Global health needs and the short-term medical volunteer: Ethical considerations. *HEC Forum*, *23*, 71-78.

Lansdorp-Vogelaar, & Sharp, L. (2013). Cost-effectiveness of screening and treating helicobacter pylori or gastric cancer prevention. *Best Practice & Research Clinical Gastroenterology*, *27*, 933-947.

Larson, E.W. (2011). *Project management: The management process* (5th ed.). New York, NY: McGraw-Hill.

Leivo, T., Salomaa, A., Kosunen, T.U., Tuominen, R., Farkkila, M., Linna, S., & Sintonen, H. (2004). Cost-benefit analysis of helicobacter pylori screening. *Health Policy*, *70*, 85-96.

Lloyd, R. (2014). Model of improvement. *Institute of Healthcare Improvement.* Retrieved from www.IHI.org

MAPS. (2012). Guideline From European Society Of Gastrointestinal Endoscopy, European Helicobacter Group, European Society Of Pathology, And The Sociedade Portuguesa De Endoscopia Digestive. *Virchows Archives*, *460*, 19-46. doi: 10.1007/s00428-011-1177-8

Mapel, D.W. (2013). Functional disorders of the gastrointestinal tract: Cost effective review. *Best Practice and Research Clinical Gastroenterology*, 24, 914-931.

Maru, D.S. Andrews, J., Scharz, D., Schwarz, R., Acharya, B., Ramalya, A.,…Mate, K. (2012). Crossing the quality chasm in resource-limited settings. *Globalization and Health, 8*(41), 1-5.

Melnyk, B.M., & Fineout-Overholt, E. (2011). *Evidenced-based practice in nursing and healthcare* (2ed). New York, NY: Lippincott, Williams, & Wilkins.

Meuer, L.N. & Bower, D.J. (2002). Management of helicobacter pylori infection. *American Family Physician*, 6597), 1327-1336.

Morrow, M., Yancey, N., Karnick, P., Carroll, K., & Wang, C. (2011). Leading-following within nursing education advancing nursing practice: Glimpsing the emerging now. *The Illuminations, 5*(20), 1-3.

Naujokas, A. (2013). Raising the quality of care during medical missions. *Archives of Pathological Laboratory Medicine*, *137,* 637-641.

Pathak, J.L., Deo, Y.P., Deo, P., & Kadel, R. (2010). Association of Helicobacter pylori infection with gastrointestinal diseases in Nepal. *International Journal of Infectious Diseases*, *14*(sup 2), S52. doi: 10.1016/S1201-9712(10)60156-7

Parse, R. (1999). Nurse science: the transformation of practice. *Journal of Advanced Nursing, 30*(6), 1383-1387.

Parse, R.R. (2008). The humanbecoming leading-following model. *Nursing Science Quarterly, 21*(4), 369-375. doi: 10.1177/Q894318408323492

Pearce, M.S., Campbell, D.I., Mann, K.D., Parker, L., & Thomas, J.E. (2013). Deprivation, timing of preschool infections and H. Pylori seropositivity at age 49-51 years: The Newcastle thousand families birth cohort. *BMC Infectious Disease, 13*(422), 1-5.

Seager, G. (2012). *When helping hurts: An evidenced based practice guide for health practices in global health initiatives*. Bloomington, IN: Author House.

Sherpa, T.W., Sherpa K.T., Nixon G., Heydon J., Heydon E., & Dovey S. (2012). The prevalence of helicobacter pylori infection in sherpa residents in khumbu, an isolated community in eastern Nepal. *Journal of the New Zealand Medical Association, 125*(1365).

Shin, D.W., Yun, Y.H., Choi, I., Koh, E., & Park, S.M. (2009). Cost-effectiveness of eradication of helicobacter pylori in gastric cancer survivors after endoscopic resection of early gastric cancer. *Helicobacter, 14*, 536-544.

Sitzman, K.L., & Eichelberger, L.W. (2011). *Understanding the works of nurse theorists: A creative beginning* (2nd ed.). Sudbury, MA: Jones and Barlett Publishers.

Stanghellini, V., & Cogliandro, R. (2014). Review article: Adherence to Rome criteria in therapeutic trials in functional dyspepsia. *Alimentary Pharmacology and Therapeutics, 40*, 435-466.

Tepes, B., O'Connor, A., Gisbert, J.P., & O'Morain, C. (2012). Treatment of helicobacter pylori Infection. *Helicobacter, 17*(Sup.1), 36-42.

The National Center for Early Defibrillation (2014). Evaluate cost-effectiveness. *National Center for Early Defibrillation*. Retrieved from www.early-defib.org on 07/30/2014

Ureta, Y., Watanabe, T., Kawagoe, N., Takamoto, I., Tanaka, H., Kijima, S.,…Urita, C. (2012). Role of infected grandmothers in transmission of helicobacter pylori to children in a Japanese rural town. *Journal of Pediatrics and Child Health, 49*, 394-398. doi: 10.1111/jpc.12191

Venkateshwari, A., Krishnavent, D., Venugopal, S., Shashihikumar, P., Vidyasagar, A., & Jyothy, A. (2011). Helicobacter pylori infection in relation to gastric cancer progression. *Indian Journal of Cancer*. *48*(1), 94-98.

Waxman, K.T. (2014). Program objectives. *MSN to DNP/Healthcare Systems Leadership*. Retrieved from www.usfca.edu/nursing/msn_dnp_hcsl

Welch, K. (2012). Results of the PRISM survey: Patterns and responses in intercultural

medicine. *Global Mission Health Conference.* Retrieved April 25, 2014 from www.medicalmissions.com

World Health Organization. (2010). Nepal country health system profile. *WHO*. Retrieved from www.searo.who.int/EN/Section313/Section1523_6866.htm

Wundisch, T., Wilhelm, C., Neubauer, A., Dieckhoff, P., Greene, B., Thiede, C., & Stolte, M. (2012). Second cancers and residual disease in patients treated for gastric mucosa-associated lymphoid tissue lymphoma by helicobacter pylori eradication and followed for 10 years. *Gastroenterology*, *143*, 936-942.

Section VIII: Appendices

Appendix A: IRB or Non-Research Approval Documents

Appendix B: Gap Analysis

Appendix C: AGREE Instrument Questions

Appendix D: Level of Evidence

Appendix E: Review of Literature – H. pylori Point-of-Care Monoclonal Antigen Tests

Appendix F: Parse Humanbecoming Theory Symbol

Appendix G: GANTT Chart

Appendix H: Cost/Benefit Analysis

Appendix I: Communication Matrix

Appendix J: Responsibility Matrix

Appendix K: Failure Mode Effect Analysis

Appendix L: PDSA Plan #1

Appendix M: SWOT Analysis of Current State

Appendix N: Budget (Annual and Five Year Plan)

Appendix O: Return on Investment Plan

Appendix P: Data Collection Tool

Appendix Q: Checklist for Helicobacter pylori Diagnostic Test Protocol

Appendix R: Treatment Algorithm for GERD and dyspepsia

Appendix S: Itinerary of Project Implementation

Appendix T: Running Chart

Appendix A:

IRB or Non-Research Approval Documents

Shelley Bloom MSN, FNP-C

University of San Francisco
School of Nursing and Health Professions
DNP Department

DNP Project Approval: Human Subjects Protection

(Non-research Status Form)

Title of DNP Project:
Improved Health Care Delivery at a Short –Term Medical Mission in Rural Nepal facilitated by an Advanced Practice Nurse

Brief Description of Project:

This project was already determined to be a quality improvement project by the IRB, June 24, 2013.

The purpose of this project is to improve the health care delivery system provided by community workers and international volunteers affiliated with a non-governmental agency at a health-post in rural Nepal. In Nepal, 85% of the population lives in rural areas but only 15 % of Nepalese health care resources are available for rural villages (WHO, 2010). Non-governmental organizations finance and carry out medical missions to provide valuable healthcare services in rural Nepal. Despite increases in medical school enrollment, only 13% of physicians intend to practice in rural Nepal (Huntington, Shrestha, Reich, & Hagoplan, 2011). When qualified health providers are not available, health posts are run by local villagers. Many rural health post workers have received no formal training (Kneval, 20100. Non-governmental voluntary workers may not be organized in their health delivery efforts. An understanding of the healthcare quality delivered by volunteers on medical missions is not always known and is needed (Langowsky, 2011).

The gathering of baseline data depicts the health needs of patients visiting the health post (Pambos et al, 2012). Follow-up data provides process and outcome measurements which can be used to enhance the quality of care provided. Activities based on the outcomes measured show if the system and care delivered met the needs of patients who came into the clinic. The Institute of Healthcare Improvement's model of improvement will be used

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to measure outcomes and implement interventions to improve care. This model provides direction and a framework to improve processes and outcomes. It will provide a method to improve the delivery of care.

In summary, there is literature to support a lack of structure existing in the delivery of healthcare by medical missions. Improvement in mission planning, monitoring, and evaluation, by using the Institute of Healthcare's model of improvement, provides structure and transparency to ensure the quality of healthcare delivered at the health post (Martinuik et al, 2012). The improvement process described in the previous paragraph serves as a means to improve mission planning and evaluate the health care delivery system.

References

Huntington, I., Shrestha, S., Reich, N.G., Hagaoplan, A. (2011). Career intentions of medical students in the setting of Nepal's rapidly expanding private medical education system. *Health Policy and Planning*, 27(4), 417-428. doi:10.1093/heapol/czr052.

Institute of Healthcare Improvement. (2013). An overview of the model of improvement. *Online Learning: Quality Improvement*. Retrieved from app.ihi.org/Ims/onlearning.aspx.

Kneval, R. (2010). Training rural women to improve access to oral health awareness programmes in remote villages in Nepal. *International Journal of Dental Hygiene*, 8(), 286-289. doi: 10.1111/j.1601-5037.2010.00481.x.

Langowski, M.K., Iltis, A.S. (2011, July). Global health needs and the short-term medical volunteer: Ethical considerations. *HEC Forum*, 23(), 71-78.

Martinuik, A. LC., Manouchehrian, M., Negin, J.A., Zwi, A. (2012). Brain gains: A literature review of medical missions to low and middle-income countries. *BMC Health Services Research*. 12(134), 1472-6963. http://www.biomedcentral.com/1472-6963/12/134.

Pambos, M., Ng, J., Loukes, J., Matheson, J. Aryal, B., Adhikari, S., Kerry, S.,Reid, F., Oakeshott, P. (2012). Demographics and diagnosis at rural health camps in Nepal: Cross-sectional study. *Family Practice*. 29(), 528-533. doi: 10.1093/fampra/cms010.

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World Health Organization. (2010). Nepal country health system profile. Retrieved from www.searo.who.int/EN/Section313/Section1523_6866.htm.

To qualify as a QI/ Process Improvement Project, rather than a research project, the criteria outlined in federal guidelines will be used: (http://answers.hhs.gov/ohrp/categories/1569)

☑ This project meets the guidelines for a Quality Improvement Project as outlined in the Clinical Quality Improvement Checklist (attached) and can be submitted to the USF IRB Committee as QI.

☐ This project involves research with human subjects and must be submitted for full IRB approval.

Comments:

Signature of DNP Committee Chair _____ **(date)** 7/8/13

Signature of DNP Student Shelley Bloom 7/3/2013 **(date)**

Shelley Bloom MSN, FNP-C

CLINICAL QUALITY IMPROVEMENT CHECKLIST *

STUDENT NAME: Shelley Bloom **DATE:** 7/3/2013

DNP COMMITTEE CHAIR: Dr. Timothy Godfrey

Instructions: Answer YES or NO to each of the following statements about QI projects:

Project Title:	**YES**	**NO**
The aim of the project is to improve the process or delivery of care with established/ accepted quality standards, or to implement change according to the agency Quality Improvement programs. There is no intention of using the data for research purposes.	×	
The specific aim is to improve performance on a specific service or program and **is a part of usual care.** ALL participants will receive standard of care.	×	
The project is **NOT** designed to follow a research design, e.g., hypothesis testing or group comparison, randomization, control groups, prospective comparison groups, cross-sectional, case control). The project does **NOT** follow a protocol that overrides clinical decision-making.	×	
The project involves implementation of established and tested quality standards and/or systematic monitoring, assessment or evaluation of the organization to ensure that existing quality standards are being met. The project does **NOT** develop paradigms or untested methods or new untested standards.	×	
The project involves implementation of care practices and interventions that are consensus-based or evidence-based. The project does **NOT** seek to test an intervention that is beyond current science and experience.	×	
The project is conducted by staff where the project will take place and involves staff who are working at an agency that has an agreement with USF SONHP.	×	
The project has **NO** funding from federal agencies or research-focused organizations and is not receiving funding for implementation research.	×	
The agency or clinical practice unit agrees that this is a QI project that will be implemented to improve the process or delivery of care, i.e., **not** a personal research project that is dependent upon the voluntary participation of colleagues, students and/ or patients.	×	
If there is an intent to, or possibility of publishing your work, you and your DNP Committee and the agency oversight committee are comfortable with the following statement in your methods section: *"This project was undertaken as a Quality Improvement Initiative at X hospital or agency and as such was not formally supervised by the Institutional Review Board."*	×	

ANSWER KEY: If the answer to **ALL** of these items is yes, the project can be considered a Clinical Quality Improvement activity that does NOT meet the definition of research. **IRB review is not required. Keep a copy of this checklist in your files.** If the answer to ANY of these questions is **NO**, you must submit for IRB approval.

* Used with permission of Elizabeth L. Hohmann, MD, Director and Chair, Partners Human Research Committee, Partners Health System, Boston, MA.

4

Appendix B: Gap Analysis

Urban Nepalese make up 15% of total population and use 85% of resources. Rural Nepal gets 15% of the resources and has 85% of the total population

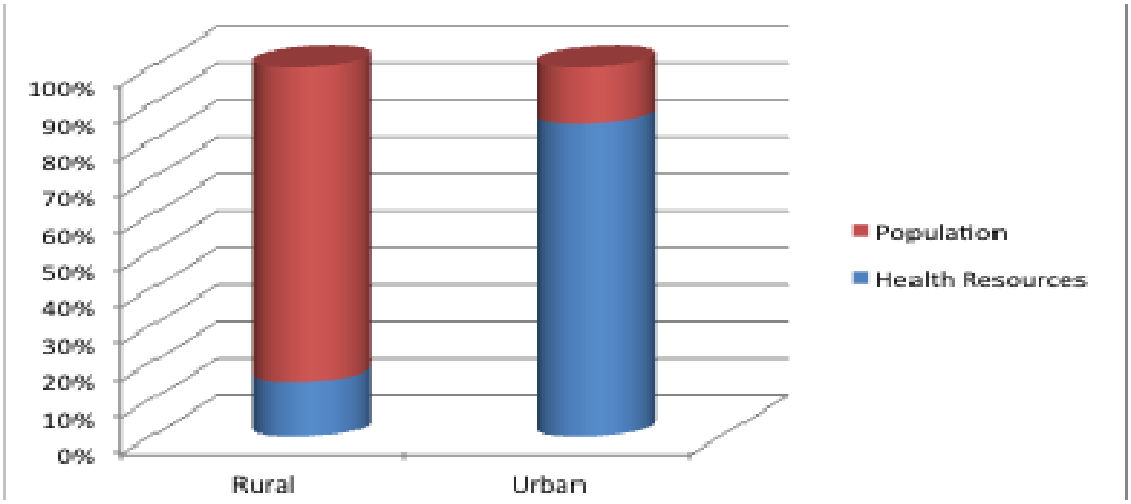


Figure 1. Current Health System: Limited Health Care Resources (WHO, 2010)

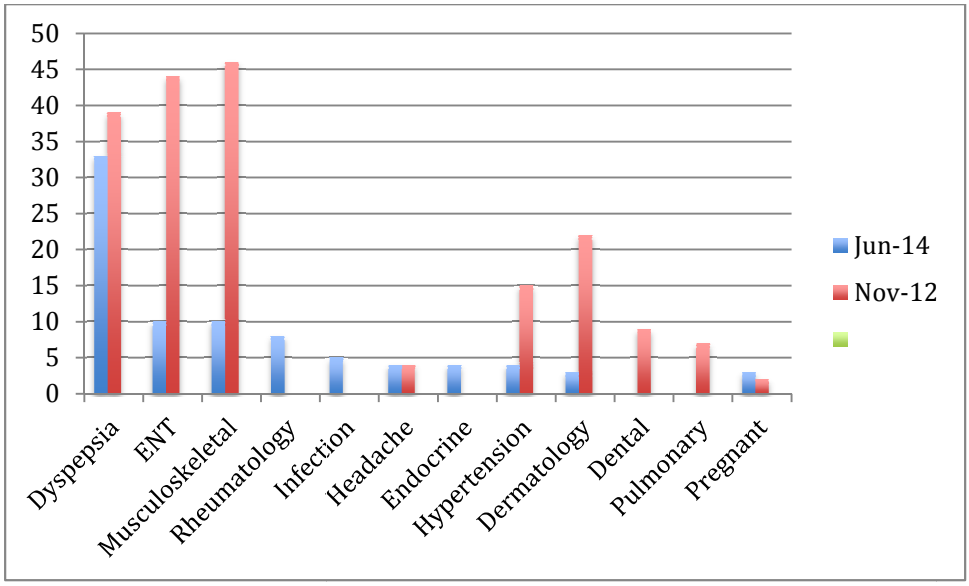


Figure 2. Comparison of Prevalence of Diagnoses at the Health Post

Appendix C: Agree Instrument Questions

AGREE Instrument
Domain 1. Scope and Purpose
1. The overall objective(s) of the guideline is (are) specifically described.
2. The clinical question(s) covered by the guideline is (are) specifically described.
3. The patients to whom the guideline is meant to apply are specifically described.
Domain 2. Stakeholder Involvement
4. The guideline development group includes individuals from all the relevant professional groups.
5. The patients' views and preferences have been sought.
6. The target users of the guideline are clearly defined.
7. The guideline has been piloted among end users.
Domain 3. Rigor of Development
8. Systematic methods were used to search for evidence.
9. The criteria for selecting the evidence are clearly described.
10. The methods for formulating the recommendations are clearly described.
11. The health benefits, side effects, and risks have been considered in formulating the recommendations.
12. There is an explicit link between the recommendations and the supporting evidence.
13.The guideline has been externally reviewed by experts prior to its publication.
14. A procedure for updating the guideline is provided.
Domain 4. Clarity of Presentation
15. The recommendations are specific and unambiguous.
16. The different options for management of the condition are clearly presented.
17. Key recommendations are easily identifiable.
Domain 5. Applicability
18. The guideline is supported with tools for application.
19. The potential organizational barriers in applying the recommendations have been discussed.
20. The potential cost implications of applying the recommendations have been considered.
21. The guideline presents key review criteria for monitoring and/ or audit purposes.
Domain 6. Editorial Independence
22. The guideline is editorially independent from the funding body.
23. Conflicts of interest of guideline development members have been recorded

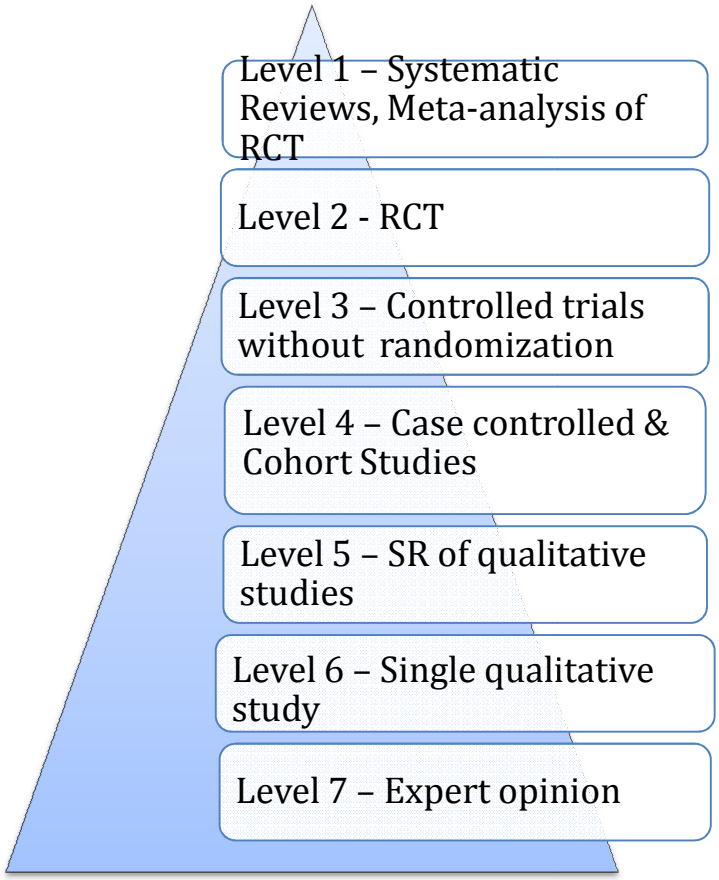
Each question is answered using a Liker scale 1 to 4. Scores in each domain are tallied and placed in a table for east comparison.

4	3	2	1

Strongly Agree Strongly Disagree

(www.agreetrust.org)

Appendix D: Levels of Evidence



(Melnyk & Fineout-Overholt, 2012)

Appendix E: Review of the Literature – Diagnostic Tools for H. pylori

	Calvert et al. (2010) pretreatment	Shimoyama et al. (2011) pretreatment	Jerkarl et al. (2013) pretreatment	Sato et al. (2012) pretreatment	Calvert et al. (2010) post treatment	Korkmaz et al. (2013) pretreatment
Study Type/ Level	Level III (Melnyk &Fineout-Overholt, 2011)	Level III (Melnyk &Fineout-Overholt, 2011)	Level III (Melnyk &Fineout-Overholt, 2011)	Level III (Melnyk & Fineout-Overholt, 2011)	Level III (Melnyk & Fineout-Overholt, 2011)	Level III (Melnyk & Fineout-Overholt, 2011)
Study Design/Method	Quasi-experimental/Patients with dyspepsia and scheduled for endoscopy were offered to participate in a comparison study of in-office stool antigen tests and endoscopy to identify the incidence of H. pylori and evaluate the sensitivity and specificity of each in-office test. Before the testing, no anti-secretory drugs for two weeks and no antibiotics for four weeks were taken. Readings of the tests were performed by two different observers. The gold standard was defined as the concordance of the rapid urease test, histopathology, and urea breath test. A positive test had two lines.	Quasi-experimental / Patients five to six weeks post treatment were given urea breath test to evaluate persistent H. pylori infection. Patients were asked to also submit to a second test, an in-office monoclonal stool antigen test. Comparisons were made between the results of the two tests. If results were inconclusive, endoscopy was recommended.	Quasi-experimental / Evaluation of H. pylori was done prior to treatment. Multiple tests, including the ASAN Easy Test H. pylori monoclonal stool antigen test, histology, PCR, and enzyme immunoassay were performed to diagnose H. pylori in various gastric disease entities. Sensitivity and specificity were calculated and compared for consistency with results in other studies. Two positive tests were needed to make a positive diagnosis for H. pylori.	Quasi-experimental / It is a comparison study of Rapid TPAg in-office test with TPAg EIA to determine if the Rapid TPAg is as effective in diagnosing H. pylori on different strains as the TPAg EIA. Each fecal sample was tested for H. pylori by both tests. Tests were run on negative fecal samples as well. The TPAg EIA is considered reliable. Comparing test results of the two tests will validate the Rapid TPAg if its results are in agreement.	Quasi-experimental / Eight weeks post H. pylori treatment evaluation of eradication of disease was evaluated using in office testing compared to gold standard	Quasi-experimental / Patient with dyspepsia received gastric biopsy with histopathology and rapid urease testing. Stool specimens for HpSA were also collected. Patients were considered H. pylori positive if two invasive tests were positive. Fecal antigen test results were compared with this gold standard
Sample/Setting	A convenience sample of 199 untreated consecutive patients with dyspeptic symptoms in an office setting. Ten subjects not included due to unavailable test results.	A consecutive convenience sample of 102 patients who received standard H. pylori treatment. A patient with watery diarrhea was excluded from the study.	A consecutive convenience sample of 266 adult patients undergoing a routine checkup with endoscopy and biopsy were included in the study. Exclusion criteria included children, patients with a history of proton pump or bismuth use in the last month, previous gastric	Fecal samples from 111 patients with gastrointestinal diseases were tested to confirm accuracy of the in-office tests and the TPAg EIA test; 75 patients had	Fecal samples from 88 patients eight weeks post treatment.	A consecutive sample of 198 patients with dyspeptic symptoms

			surgery, and history of gastric carcinoma.	gastric ulcers; 11 had duodenal ulcers; 6 had atrophic gastritis; 5 had non-ulcer dyspepsia; 4 had gastric MALT lymphoma; 3 had esophagitis; 2 had gastric cancer; 2 had gastric polyps; 2 had ulcerative colitis; 1 had chrons disease.		
Major Variables Studied and Their Definition	Independent variables include the three monoclonal stool tests: 2 rapid in-office tests, RAPIDHp StAR and an ImmunoCard STAT! HpSA, and an enzyme immunoassay test, Amplified IDEA Hp StAR. The dependent variable is the presence or absence of H. pylori in the results of all diagnostic tests.	Independent variables include in-office monoclonal antibody test called RapidTPAg, and two send out tests called enzyme immunoassay test and the urea breath test. The dependent variable is the presence or absence of H. pylori in the results of all diagnostic tests.	Independent variables include the new ASAN Easy Test H. pylori monoclonal stool antigen test, histology derived from endoscopy, PCR, and enzyme immunoassay. The dependent variable is the presence or absence of H. pylori in the results of all diagnostic tests.	Independent variables include the two tests. The TPAg EIA test requires the use of a spectrometer and the Rapid TPAg in-office test is done in 15 minutes. No other equipment is needed. The dependent variable is the presence or absence of H. pylori in the results of all diagnostic tests	Independent variables include RAPID Hp StAR, ImmunoCard STAT! and an EIA test Amplified IDEIA StAR	Independent variables include five different in-office fecal antigen tests. The dependent variable is the presence or absence of H. pylori in the results of all diagnostic tests
Outcome measurements	The incidence of H. pylori by each diagnostic test.	The incidence of H. pylori by each diagnostic test.	The incidence of H. pylori by each diagnostic test and the presence of H. pylori in different gastric disease entities.	The incidence of H. pylori by each diagnostic test and the presence of H. pylori in different	The incidence of H. pylori by each diagnostic test and the presence	The incidence of H. pylori by each diagnostic test and the presence of H. pylori in different gastric disease entities

				gastric disease entities.	of H. pylori in different gastric disease entities	
Data Analysis	Sensitivity, specificity, positive and negative predictive values, and 95% confidence intervals were calculated.	Enzyme immunoassays were done on the samples on the day of collection and after seven days of storage at room temperature. Room temperature was defined as -20 to 40 degrees Celsius. The antigenicity of stool specimens was found to be unaffected using ANOVA. Agreement of the calculations was calculated and the difference was examined by x^2. A p value less than 0.05 was considered statistically significant.	All statistical analysis was done using the R program. The Z test was used to compare proportions within the group. The sensitivity and specificity of each test result is reported. The stool specimens were thawed and refroze. There was no mention of an evaluation on the effect of this procedure on the specimen.	The TPAg EIA test was validated by comparing optical density values using paired t-test before and after storage. Positive correlation of catalase activity and the TPAg EIA absorbance value proved the test provided accurate results over time. Sensitivity and specificity was calculated on all samples.	Two observers analyzed all tests. No attempt was made to achieve consensus. Sensitivity, Specificity was calculated	Chi-square, CI, and p values were calculated. P<0.05 was considered significant.
Findings	According to the gold standard selected, 109 subjects were positive for H. pylori infection, 16 had two positive results, 93 had three positive results, and 14 had one positive result. All results were negative by 76 subjects. All percentages reflect sensitivity and specificity of H. pylori diagnostic tests. Amplified IDEIAHp StAR, a laboratory EIA monoclonal test, is the most reliable test with 90% and 89%. RAPID Hp StAR has 91% and 80% by observer one, while 92% and 76% by observer two. ImmunoCard STAT! HpSA has 69% and 90% by observer one and 74% and 89% by observer two. This shows the RAPID Hp StAR is more sensitive while the ImmunoCard STAT! HpSA is more specific.	In all 81 patients, with negative urea breath test results, Rapid TPAg results were also negative. In the 21 patients who tested positive with urea breath test, 14 tested positive by Rapid TPAg. Six patients who tested positive with urea breath test tested negative with Rapid TPAg. Five of these patients were retested after one month with both tests. Four of them tested negative with both tests. One patient continued to be positive with urea breath test and negative with Rapid TPAg testing. A subsequent histological exam results showed the patient to have a positive H. pylori culture. In 101 patients, results of irradiation therapy could be confirmed.	The ASAN Easy Test H. pylori monoclonal stool antigen test had sensitivity and specificity of 84.5% and 96.2% compared to Enzyme immunoassay of 91.6%-93.8% and 70.7%-100%, and polyclonal antibodies of 81.3%-89.4% and 80.5%-97.5%. The ASAN Easy Test H. pylori monoclonal stool antigen had 81-100% detection of H. pylori in atrophic gastritis, intestinal metaplasia, and chronic active gastritis. It showed 90.5% and 100% in patients with ulcers.	Both the TPAg EIA and Rapid TPAg tests had 99.9% sensitivity in identifying H. pylori from patients with known H. pylori. Therefore the Rapid TPAg is an accurate diagnostic tool for detecting H. pylori.	Sensitivity 100%, 100%, 94,9% and 94.9%, 92.3-93.6%, 94.9% for Amplified IDEIA, RAPID Hp StAR, and ImmunoCard STAT! respectively	The sensitivity and specificity were 92.2% and 94.4% for premium platinum HpSA Plus Test; 48.9% and 88.9% for HPAg test; 86.7% and 88.9% for ImmunoCard STAT! HpSA test; 78.9% and 87% for H. Pylori fecal antigen test,

		The agreement between Rapid TPAg and urea breath test was 94.1% (95/101).				
Limitations	Two lines indicated a positive test result. Trace lines caused discrepancy in readings between the two observers. Some tests were interpreted as positive by one observer and negative by another. There was a high rate of false positives from the urea breath test. The approach to correct this problem was not described in this study. The reader was referred to a previous study with the same problem.	False-negative results of Rapid TPAg may occur when insufficient stool sample is tested. False-positive results of urea breath test may occur when the standard deviation of near cut-off values and the results are similar values.	The study did not evaluate patients after treatment, pediatric patients were not studied, and there was no predetermined definition of a positive H. pylori culture. Sometimes sensitivities were expressed in wide ranges. There is no explanation of how these statistics were derived.	There were two specimens which tested negative which should have tested positive by the two tests. This suggests a mutation in the absorbing isotope. The test was not blinded.	There were discordant readings by the two observers with respect to the RAPIDHp StAR.	All tests had lower sensitivity and specificity than all the other five studies. This needs to be explored further.
Appraisal: Worth to Practice	Immunochromatographic tests are useful alternatives for in-office H. pylori diagnostic testing. Laboratory EIA monoclonal tests have higher sensitivity and specificity than in-office monoclonal testing.	Results of the cost-effective in-office Rapid TPAg test agreed 94.1% of the time with the expensive send-out urea breath test. This makes the Rapid TPAg test a viable solution for in-office testing. The study verified the stool sample storage process. This makes collection of samples easier.	The study described the use of a test in patients with active gastric disease entities.	TPAg EIA and Rapid TPAg accurately diagnose H. pylori in many disease states. Diagnosis performance was maintained in stored kits for up to a year. Rapid TPAg is suitable for out- patient use in situations where a laboratory is not present. Stool in the collection device can be accurately analyzed for up to seven days.	Despite varied reading of RAPID Hp StAR sensitivities and specificities were adequate for diagnosing the incidence of H. pylori	Not useful

Appendix F: Parse Humanbecoming Theory Symbol

Black and white colors stands for the paradoxes found in the nature of living. Green stands for hope. The joining in the center represents the coming together of the nurse and patient relationship. The intertwining of the black and green represents the human and the universe relating and cocreating a future universe together .

(http://currentnursing.com/nursing_theory/Rosemary_Pars_Human_Becoming_Theory.html)

Appendix G: GANTT Chart

The GANTT chart organizes the deliverables of the using the Project Life Cycle model as a guide. The Project Life Cycle has four phases that overlap with each other (Larsen, 2011). The project is divided into four quarters. The four phases are defining the project, which occurs during the first quarter; planning the project, which occurs in the first three quarters; executing, which occurs from start to finish; and delivering which occurs in the last quarter. The evaluation is an ongoing process.

Evaluate Health Care Delivery System									
Complete Needs Assessment/Define Problem									
Formulate Plan to Implement Change									
Align Plan With Health Post Vision									
Prepare to Execute the Plan									
Execute the Plan									
Have Evaluation Strategy in Place									
Share Results of the Project Evaluations									
Design Improvement Based on Evaluation									
Date	11/2012	6/2013	9/2013	11/2013	6/2014	8/2014	10/2014	11/2014	12/2014

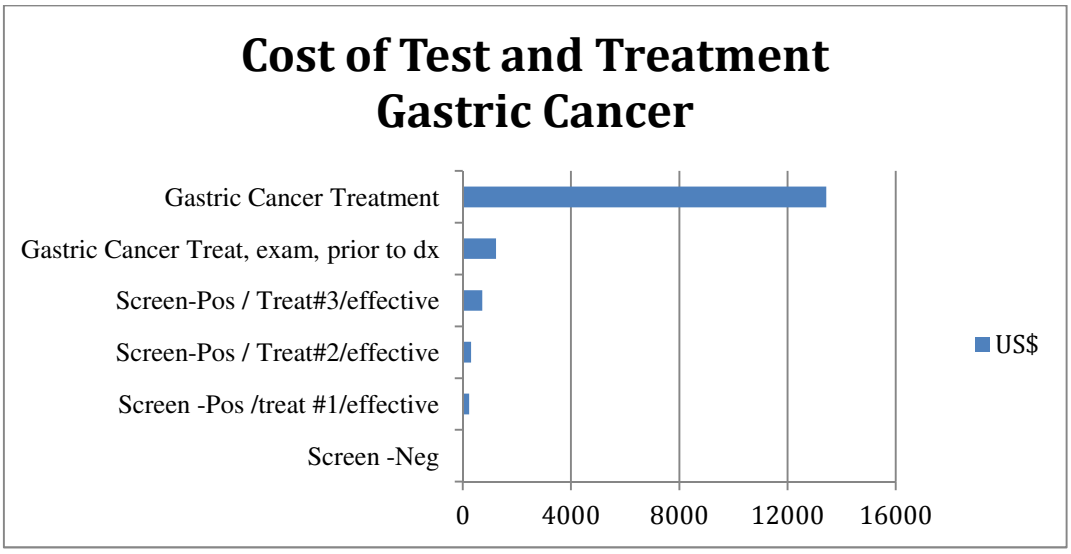
Figure 1. GANTT Project Timeline

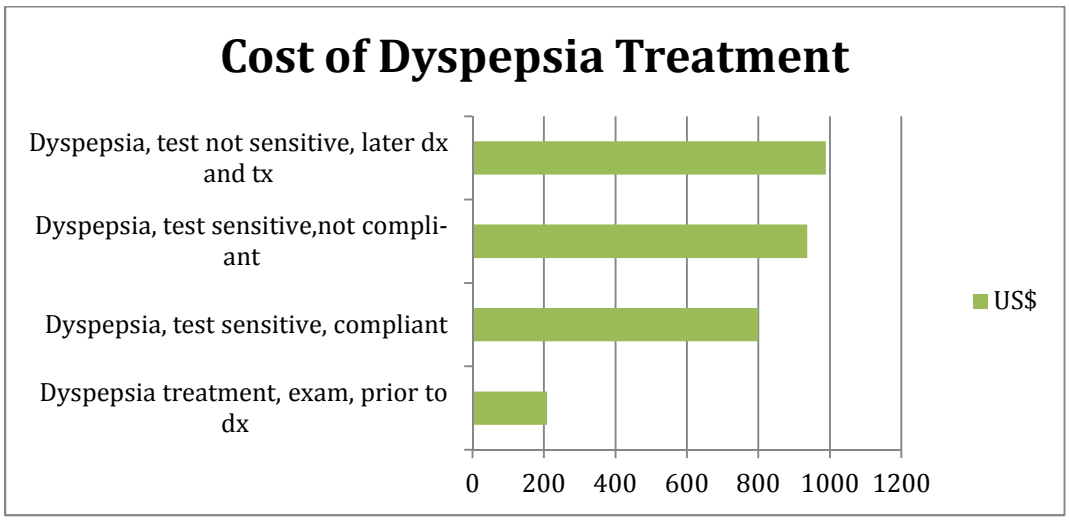
Evaluate Health Care Delivery System – This was accomplished by going to Nepal for a medical mission. I introduced the idea to the health post, Nepalese, and Foundation leaders. I used a poster created in Scholarly Communications to pitch the project. Completed 11/2012
Complete Needs Assessment/Define Problem – Prevalence data was collected and showed 45% of patients complained of dyspepsia. Grafts were created and shared with Nepalese and Foundation leaders who enthusiastically encouraged me to continue planning the project. Completed 6/2013.
Formulate Plan to Implement Change – During the courses in Project Management and Evidence-based Practice, a plan was formulated to improve the quality of health are by implementing a H. pylori *test and treat* program. Completed 9/2013.
Align Plan With Health Post Vision – Went to Nepal and worked the logistics with the health post, Sherpa, Nepalese, and Foundation leaders. Met with Dr. Gupta (Medical Director at Helping Hands Hospital) and Dr. Sherpa (Published research on H. pylori in a Sherpa community). They agreed to assist in the acquisition of a H. pylori diagnostic test) Completed 11/2013.
Prepare to Execute the Plan – I was packed and ready to implement the project Completed May 2014.
Execute the Plan – I went to Nepal and executed the project. Completed June 27, 2014
Have Evaluation Strategy in Place – Completed May 2014
Share Results of the Project Evaluations – Presented the project result and future plan at International Council of Nurses Nurse Practitioner Network in Finland. Completed August 2014.
Design Improvement Based on Evaluation – Completed October 2014.

Figure 2. Explanation of Deliverables from GANTT Project Timeline

Appendix H: Cost/Benefit Analysis

Averted Costs





(Leivo et al., 2004)

Appendix I: Communication Matrix

What Information	Target Audience	When?	Method of Communication	Provider
H. pylori eradication plan	Foundation and Nepali Leader	Every Month	Email, Skype	Nurse Practitioner
Health post organization	Trek Staff	Prior to leaving Katmandu	Verbally	Nurse Practitioner
H. pylori eradication plan	Trek Staff	Prior to leaving Katmandu	Verbally	Nurse Practitioner
H. pylori eradication plan	Health post staff Sherpa leader	On arrival to clinic and reinforce throughout clinic	Verbally, Posters	Nurse Practitioner, Translator
Cultural Considerations	Trek Staff	Prior to leaving Katmandu	Verbally	Nurse Practitioner
Treatment Plan	Patients	At the Health post	Verbally	Nurse Practitioner, Health post workers, Translator

Appendix J: Responsibility Matrix

What	Who
Meals	Foundation and Nepali Leader
Travel	Foundation and Nepali Leader
Sleeping Arrangements	Foundation and Nepali Leader
Navigation	Foundation and Nepali Leader
Emergency	Foundation and Nepali Leader

What	Who
Medicines	Nurse Practitioner
Treatments	Nurse Practitioner
Education of Staff	Nurse Practitioner
Clinic Organization	Nurse Practitioner
Gathering Documentation	Non-medical Personnel

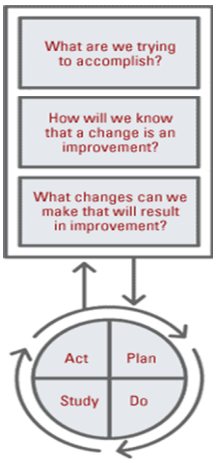
Appendix K: Failure Mode Effect Analysis

Steps in the Process	Failure Mode	Failure Causes	Failure Effects	Likelihood of Occurrence (1-10)	Likelihood of Detection (1-10)	Severity (1-10)	Risk Priority Number (RPN)	Action to Reduce Occurrence of Failure
1	Wrong Diagnosis	No Provider	Wrong Treatment	7	8	5	280	Only Providers Diagnose
2	Wrong Treatment	Un-educated provider	Patient Harm	5	5	5	125	Educate Health post Workers
3	Wrong Treatment	No Supplies	Patient Harm	5	5	5	125	Monitor Chief Complaints to Direct Supply Requisitions
							Total RPN = 530	

(www.IHI.org)

Appendix L: Plan Do Study Act Plan- Cycle1

Model For Improvement



What are we trying to accomplish?
Identify the incidence of Helicobacter pylori
How will we know that a change is an improvement?
We will know if a person has H. pylori and those without H. pylori will receive proper treatment for their symptoms
What changes can we make that will result in improvement?
☐ Implement the use of a diagnostic test that has a high sensitivity and specificity in diagnosing H. pylori.

PLAN: **Questions:** Knowing the prevalence of abdominal complaints, classified as dyspepsia, how many cases are attributed to H. pylori? **Predictions:** A method to detect Helicobacter pylori will be determined by completing a systematic review of feasible diagnostic tests. **Plan for change or test: who, what, when, where:** After reviewing the literature, a diagnostic method with high sensitivity and specificity was found suitable to be used in the rural clinic. **Plan for collection of data: who, what, when, where** A designated staff member will be taught to process and record the results of the lab tests. This information will be gathered during the short-term medical mission.
DO: carry out the change or test; collect data and begin analysis. Material will be brought into the clinic. Staff will be trained to collect and process patient samples.
STUDY: Complete analysis of data; summarize what is learned**.** Plot data on a running chart to evaluate trends of H. pylori incidence and prevalence.
ACT: Is the group ready to implement the change that was tested? Plan for the next cycle. All measured outcomes will be evaluated. Other diagnoses will be addressed in the same manner

(Retrieved from www.IHI.org)

Appendix M: SWOT Analysis of Current State

The medical mission volunteer team members are on vacation and will leave the organization of activities to program leaders. The risks and benefits of the program lie within the strengths, weaknesses, opportunities, and threats to the medical mission system. Planning to avoid the weaknesses and threats by focusing on the program strengths will minimize problems on the trip. The SWOT analysis delineates the strength and weakness of the team.

SWOT Analysis

S: STRENGTH	W: WEAKNESS
Benevolent and Altruistic Team Able to do more with less Helps villagers Supportive of each other Flexible team	May practice outside scope of license Poor understanding of Helicobacter pylori diagnosis and treatment May be ignorant of the culture
O: OPPORTUNITIES	**T: THREAT**
Villagers get treatment Health post workers get knowledge Health post workers facilitate NGO team actions	Financial need/budget Wrong Diagnosis/Treatment leads to harm Team member becomes ill Ability to travel at altitude may interfere with teammates health

Appendix N: Budget

Projected Annual Incremental Program Costs
Test (50) - $2000
Supplies - $1200
Treatment - $450
Delivery Costs - $750 (includes extra porters, flight fees)
Tips = $300
Total = $4700 (Cost of annual intermittent H. pylori program)
Only the additional (incremental) costs are considered for the cost-effectiveness analysis. This program adds a service to an existing clinic. Any educational needs are completed within the existing clinical time with existing personnel. Daily education of primary care topics is already included in the clinic routine.

5-Year Budget Overview for Helicobacter pylori *Test and Treat* Program
The budget is based on the incremental costs of the project.

Annual Budget Overview 2014 (Year 1)

Budget Totals	Estimated	Actual	Difference
Total Income	$20,500	$7,900	($12,600)
Total Expenses	$6,520	$5,234	$1,286
Difference	$13,980	$2,666	($11,314)

Annual Expense Report 2014 (Year 1)

Projected Annual Revenue	$20,500
Actual Annual Revenue	$7,900
Difference	($12,600)

Row Labels	Values Estimated Total	Actual Total	Variance Total
Operating	$6,520	$5,234	$320
Delivery Costs	$1,500	$1,030	($30)
Office supplies	$520	$300	$200
Supplies	$1,500	$1,200	($300)
Telephone	$200	$54	$150
Test Expenses	$2,500	$2,000	$500
Laboratory	$0		$0

Gifts	$0	$150	$0
Tips	$300	$500	($200)
(blank)			
(blank)			
Totals	**$6,520**	**$5,234**	**$320**

Annual Income Report 2014 (Year 1)

Projected Annual Revenue	$20,500
Actual Annual Revenue	$7,900
Difference	($12,600)

Row Labels	Values Estimated Total	Actual Total	Variance Total
Donations	$8,000	$7,900	($100)
Grants	$12,000	$0	($12,000)
Foundation	$500	$0	($500)
Totals	**$20,500**	**$7,900**	**($12,600)**

5-Year Estimated Revenues

Income	2014	2015	2016	2017	2018	
Donations	$8000	$4000	$1000	$1000	$1000	
Grants	$12000	$4000	$4000	$4000	$4000	
Foundation	$500	$500	$500	$500	$500	
Trekkers		$1450	$1450	$1450	$1450	
Totals	$13,980	$9950	$9950	$9950	$9950	

5-Year Estimated Operating Costs

Operating Costs	2014	2015	2016	2017	2018
Delivery Costs	$1500	$1200	$1200	$1200	$1200
Office / Lab Supplies	$520	$100	$100	$100	$100
Telephone	$200	$200	$200	$200	$200
Test Expenses	$2500	$4400	$4400	$4400	$4400
Laboratory Costs	$0	$0	$0	$0	$0
Gifts	$0	$150	$150	$150	$150
Tips	$300	$500	$500	$500	$500
Totals	**$6520**	$4150	$4150	$4150	$4150

The plan is to continue looking for a different Antigen test. I hope to find one that is easier to use and less expensive.

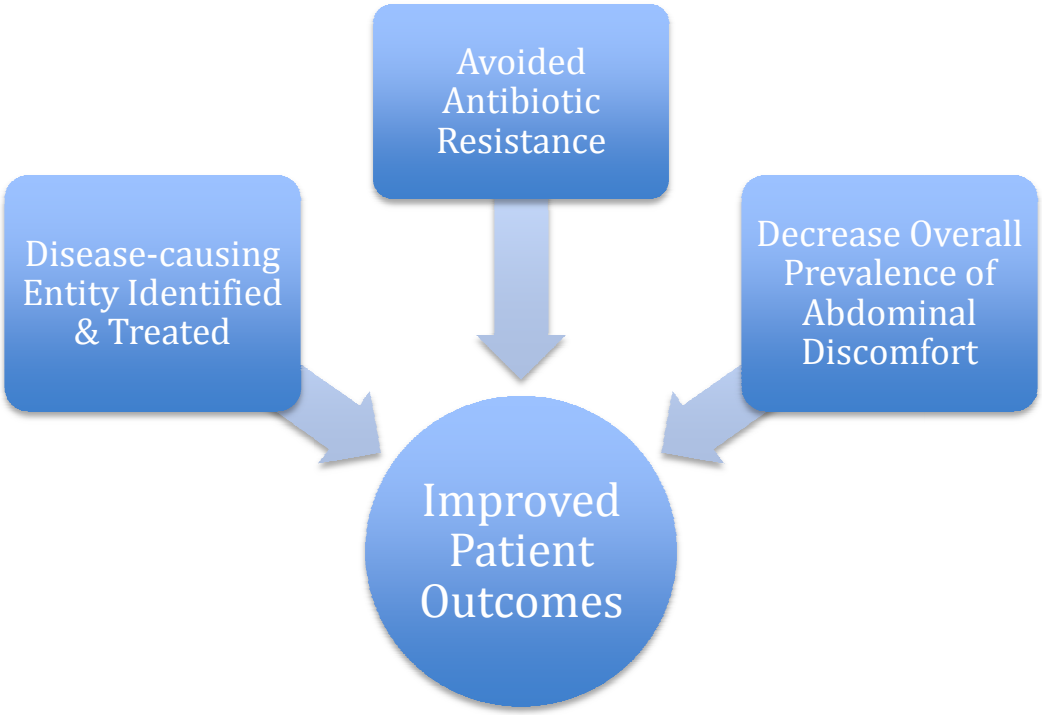
The current antigen test will double in price in the year 2015.
The foundation will cover the cost for improvements on the lab and clinic rooms.

5-Year Budget Overview

	2014	**2015**	**2016**	**2017**	**2018**
Income	$13980	$9950	$9950	$9950	$9950
Operations	$6520	$4150	$4150	$4150	$4150
Difference	$7460	$4800	$4800	$4800	$4800

Appendix O: Return on Investment Plan

Impact: 75% less antibiotics given to patients



Appendix P: Data Collection Tool

Helicobacter Pylori Program

IP Number	Name	Age	Gender	VDC	Ward No.

Date: ___/___ ___/___ ___/___

	Symptom	Duration	Immediate Post-Therapy	6-8 weeks Post-Therapy
SYMPTOMS	Pain or discomfort in upper abdomen		☐ Improved ☐ No change ☐ Worse	☐ Improved ☐ No change ☐ Worse
	GERD symptoms (rising sensation of burning, regurge)		☐ Improved ☐ No change ☐ Worse	☐ Improved ☐ No change ☐ Worse

Date: ___/___ ___/___

	Test	Result	Result
LABORATORY	H. pylori serology	☐ Positive ☐ Negative ☐ ND	☐ Positive ☐ Negative ☐ ND
	Hgb		
	MCV		
	Other		

	Medicine	Guideline	Dose Given	#Pills Dispensed	#Pills Taken
MEDICATIONS	Omeprazole	20 mg PO BID			
	Clarithromycin	500 mg PO BID			
	Amoxicillin	1 g PO BID			
	Tetracycline	500 mg PO BID if penicillin allergy			

Date: ___/___ ___/___ ___/___

	Question	Guideline	Intake	Immediate Post-Therapy	6-8 weeks Post-Therapy
COUNSELING	How often do you use tobacco products in a week?	Never			
	How many NSAID pills do you take a week?	Avoid NSAID use			
	How many cups of tea or coffee do you drink in a day?	0-1			
	If GERD symptoms: how soon after eating do you lie down?	At least 2-3 hours			

	Item	Result
FOLLOW-UP	CHW Name:	☐ Check if No CHW
	Number of home visits reported by CHW	

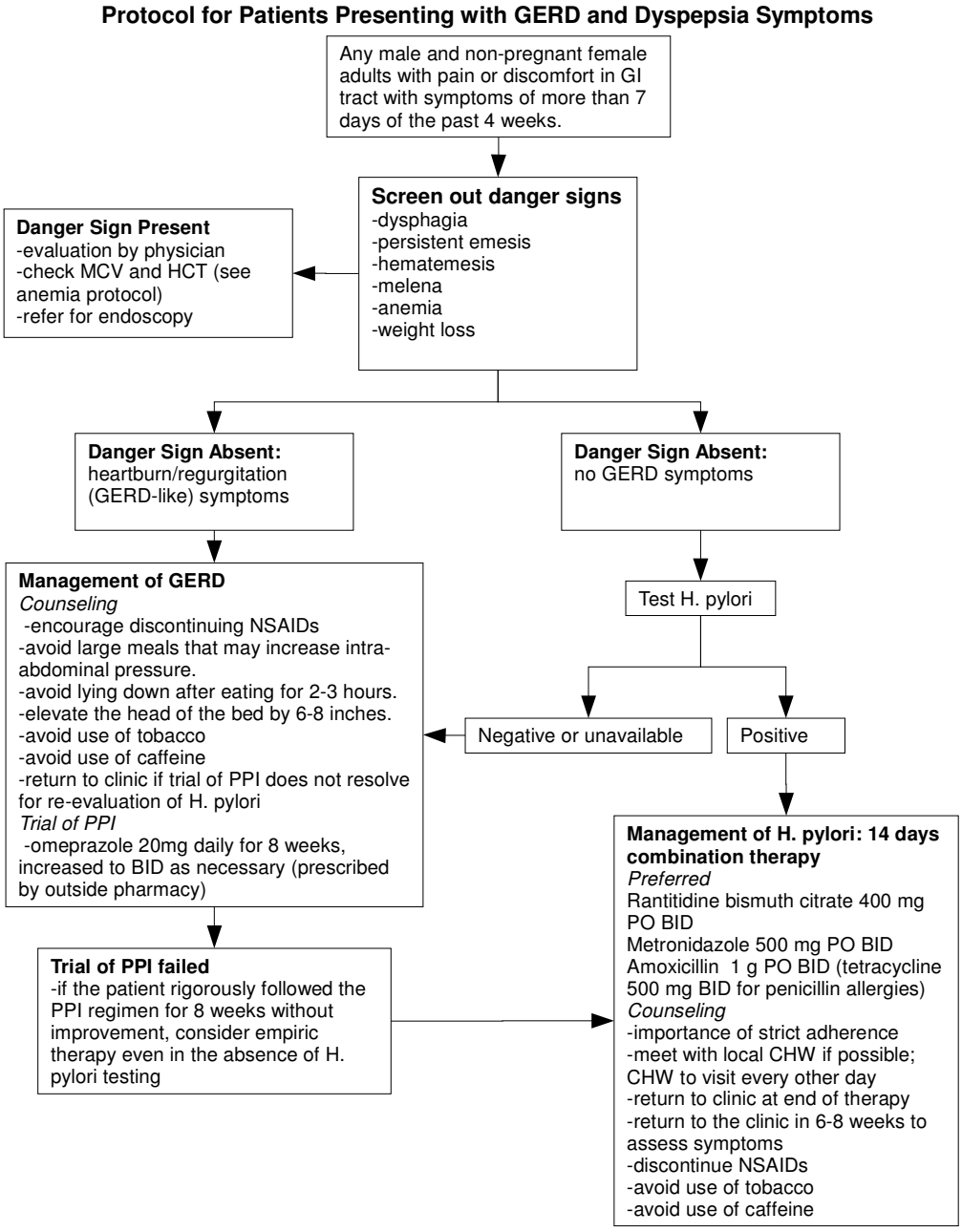
Appendix Q: Checklist for Helicobacter Diagnostic Testing Protocol

Helicobacter pylori Testing Protocol

Each step was called out before preforming it. When the step was completed a checkmark was made. Before starting all specimens, test tubes, and micro containers were labeled.

1. Materials and specimen at room temp □□
2. Add 500ml of sample diluent to clean labeled test tube □□
3. Mix specimen well □□
4. Add 100ml of specimen with transfer pipette (has bulb on end), second line = 100 microliter or 5-6 mm with stick □□
5. Vortex 15 seconds □□
6. Cut open foil packet along clotted line. □□
7. Break off number of wells needed and two for controls □□
8. Add 2 vertical drops of positive control to A1 (white lid – small) □□
9. Add 100 microliters of sample diluent to A2 which is a negative control □□
10. Transfer 100 microliters of specimen to appropriate wells – use the transfer pipette provided □□
11. Add each sample by running it down the side of the microwell □□
12. Add 1 drop of enzyme conjugate to all microwells □□
13. Shake the plate for 30 seconds being careful not to mix solutions □□
14. Cut a plate sealer □□
15. Incubate at room temp for 1 hour □□
16. After incubation dump in receptacle and bang on a paper towel □□
17. Do not aim at the bottom; wash each microwell by filling each with buffer solution. Direct a stream of wash down each microwell □□
18. 5 washes □□□□□□□□□□
19. 2 drops of substrate into each well and mix for 30 seconds □□
20. Blue color starts on positive microwell □□
21. Incubate 10 minutes at room temp □□
22. Stop reaction by adding 2 drops of stop solution □□
23. Mix 30 seconds □□
24. Negative reaction – faint yellow or colorless / Positive reaction – definite yellow □□

Appendix R: Treatment Algorithm for GERD and Dyspepsia



Adapted from Am Fam Physician 2002;65:1327-36,1339. Pubmed ID: 11996414

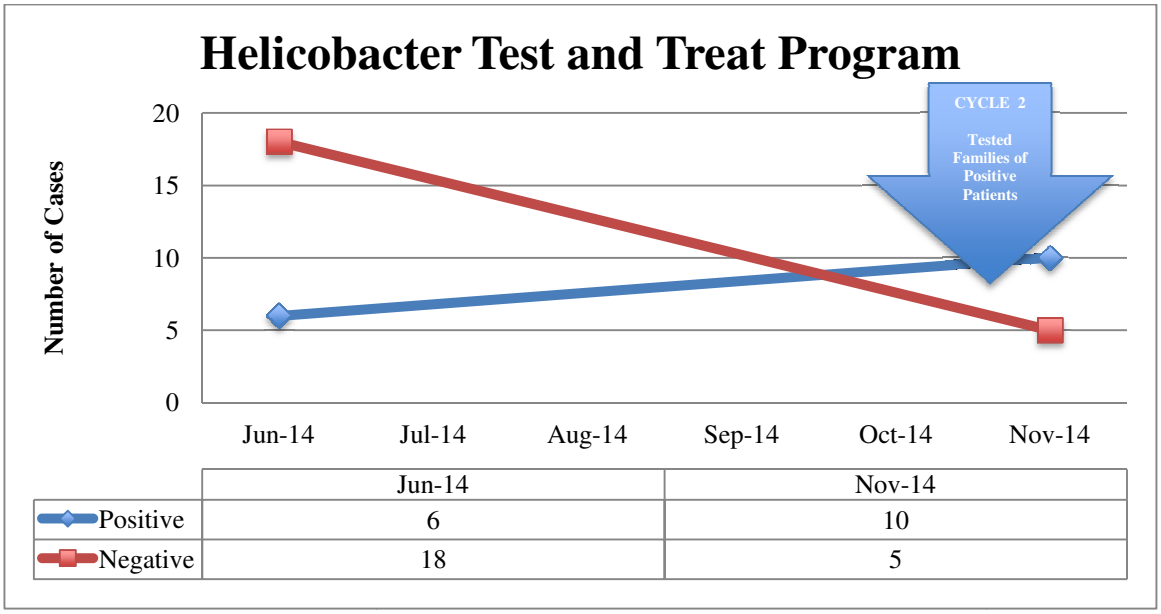
GERD stands for gastroesophageal reflux disease GERD causes dyspepsia but is not is a not caused by H. pylori. Symptoms are more likely to occur after eating, lying flat, and overeating.

Appendix S: Itinerary of Project Implementation

Day	Activities
Saturday	Left USA
Sunday	United with Program assistant in Los Angeles
Monday	Arrived Katmandu at noon. Organizational meeting at 3:pm
Tuesday	Supplies arrived. Generator function tested. Vortex function tested. Supplies double checked
Wednesday	Left at 4:00 am for health post
Thursday	Trekked. Project explained to all the Sherpa leaders and porters.
Friday	Arrived at health post. Set up gastritis lab
Saturday	After Puja, the gastritis clinic opened.
Sunday	All patients returned to the clinic for the results of their tests. Detailed instruction was given to patients on the management of their symptoms. The instructions were individualized to each according to their specific symptoms and life style. Planned patient follow-up by health post workers. Had Sherpa dance to celebrate.
Monday	Returned to Katmandu. Trekked. Project debrief with health post worker and assistant.
Tuesday	Trekked
Wednesday	Trekked
Thursday	Arrived Katmandu. Project report and debrief with Sherpa and Nepali leaders. Celebrated with everyone the completion of a successful project with pizza, beer, and a good night sleep
Friday	Returned to USA. Project report to Foundation leader.

Appendix T: Running Chart

The running chart shows trends in the quality improvement process. Patient outcomes are depicted as data points. The arrow shows the implementation of a new intervention. The trend of the data points reflects the implementation of the new intervention if internal and external validity are preserved. The November 14 data is projected data only to show how the running chart works to shows trends and the effect of new interventions.



	Jun-14	Nov-14
Positive	6	10
Negative	18	5