ABSTRACT

Misunderstanding Medication Instructions: Assessment of a Picture-Based Intervention in Rural Western Kenya

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Health care providers, particularly English-speaking professionals participating in the delivery of short-term medical care in developing countries, face the challenge of delivering crucial information in a culturally competent way to people who may rarely or never have encountered the complex and important details of written medication instructions. Taking into account language, education, and literacy barriers, this study tested the effectiveness of a picture-based medication instruction sheet with bilingual labels during the operation of a temporary clinic in rural western Kenya. The goal was that medical treatment would be more effective and dangerous errors avoided if the patients could demonstrate effective patient recall of medication instructions immediately after they were given.

In the sample of 248 patients, the pictograph was able to decrease the proportion of patients with multiple errors ($p = 0.019$). However, 35.8% of the sample still had one or more error. There was an unexpected lack of overlap in this sample among literacy, level of education, and ability to speak English. The pictograph was most successful in decreasing errors among uneducated patients ($p=0.026$), and the intervention had more of an impact among females ($p=0.002$) than among males. Future research will build on these findings to develop other interventions that can address these potentially life-threatening mistakes that occur even among educated, literate, and English-speaking patients. Future work will also further explore the social context that would cause males to do worse than females.

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MISUNDERSTANDING MEDICATION INSTRUCTIONS: ASSESSMENT OF A PICTURE-BASED INTERVENTION IN RURAL WESTERN KENYA

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Onwards.

CHAPTER ONE

Introduction

Sub-Saharan Africa stands out as one of the greatest challenges to public health. Much of this region of the world is rural, impoverished, and impaired by high rates of debilitating and infectious disease.

Providing healthcare is not the complete answer to health challenges in Sub-Saharan Africa. Since much treatment is in the hands of the patient or the patient's family, attention must be paid to how physicians' treatment recommendations are received by the patients and caregivers. The instructions given by a doctor must be credible and understandable to a patient in order to have the greatest chance that the patient will follow through with the treatment.

Treatment adherence is a significant problem in the United States and other developed countries, and this problem is compounded in the context of a developing country because of several factors, including the populations' tendency to be less educated and have less experience with prescription medication and the precise directions that go with it. This problem is even more exaggerated when healthcare providers from other countries go to Africa for short-term healthcare aid and relief, since language and cultural barriers further harm chances that treatment instructions will be successfully understood and followed by patients. Finding new, culturally competent ways to deliver clear and simple communication of treatment instructions is crucial to gain the best outcome and to avoid potentially life-threatening errors in such circumstances.

CHAPTER TWO

Literature Review

The Challenge of Adherence

A large proportion of medical treatment is in the patients' hands, including recommendations for daily life and prescriptions that must be filled and administered by the patient or a family member. For this reason, the effectiveness of medical treatment often relies on the patient's adherence to a treatment regimen. The World Health Organization defines adherence as "the extent to which a person's behaviour – taking medication, following a diet, and/or executing lifestyle changes, corresponds with agreed recommendations from a health care provider" (World Health Organization, 2003). There is a large worldwide challenge with patients' adherence to treatments. In spite of the wealth, education, and experience with complex healthcare systems that is present in developed countries, 30-50% of U.S. adults are not adherent to long-term medication regimens (Haynes, McDonald, Garg, & Montague, 2002; Osterberg & Blaschke, 2005).

Figure 1 depicts the conceptual framework for adverse events related to medications. Medication errors may occur in a variety of areas (listed on the left in the figure), which could lead to adverse drug reactions, therapeutic failures, or even adverse drug withdrawal effects. All of the steps listed in the figure are critical for successful treatment, and this thesis focuses on "order communication", i.e. the communication of instructions, with the assumption that patients who cannot accurately recall their medication instructions will not adhere to them.

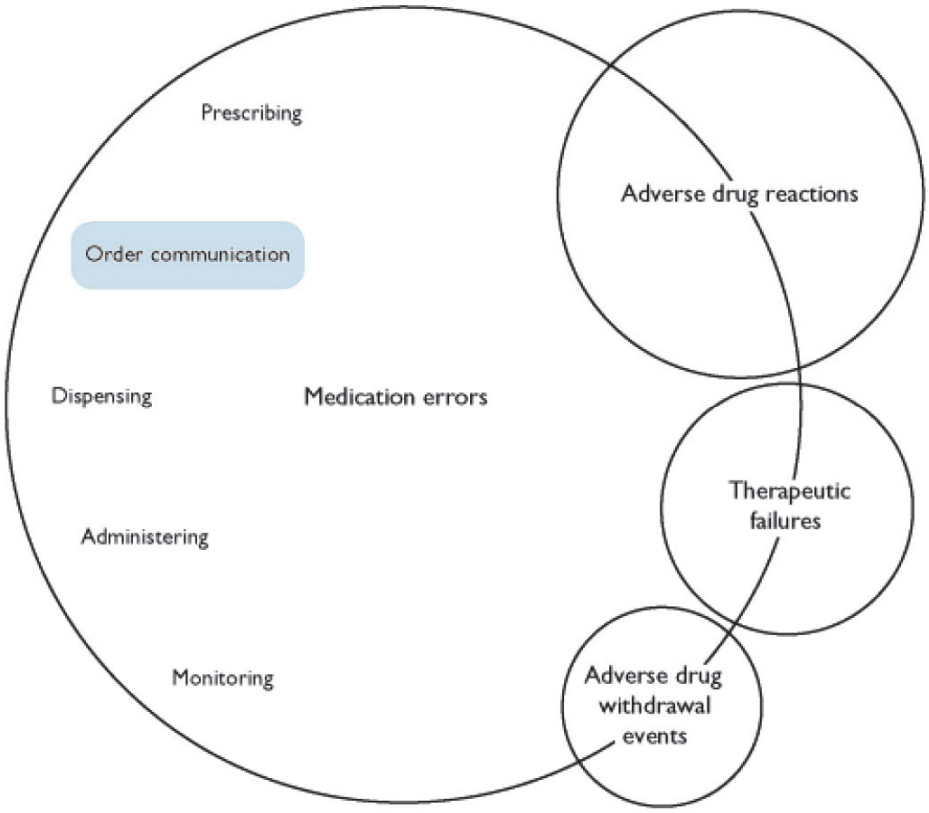

Figure 1. Conceptual Framework for Medication-Related Adverse Events (Handler, Wright, Ruby, & Hanlon, 2006)

Responsibility for Treatment Regimens. It is important to note the difference between "adherence" and "compliance", as well as to consider which party is held responsible for challenges in these areas: the patients or the healthcare providers (or both). "Compliance" has a connotation of placing the patient in a position of subordination, placing blame on the patient if he or she does not "obey" the physician. The term "adherence" refers to how closely a patient follows medication instructions given by a doctor, but is not meant to place the blame of a failed self-medication program on the patient (Petryna, Lakoff, & Kleinman, 2006).

This concept is discussed in Paul Farmer's book *Pathologies of Power*, in which he defines the "cognivist- personalistic pole" as the view that the individual agency of the patient (such as beliefs, personality, cultural norms, etc.) is the cause of deviation from adherence to medication plans (Farmer, 2004). This perspective is contrasted with the "structural pole" which places the blame on barriers outside of the patient's control that take away the opportunity for patients to be compliant. Farmer argues that noncompliance comes as a result of structural barriers. This argument is supported in a study he performed (Farmer, 2004), exploring the effect of tuberculosis treatment regimens for impoverished Haitians. He concludes that "the outcomes were related to the quality of the program rather than the quality of the patients' ideas about the disease."

The current study does not focus on adherence as a measure of how much the patients of a particular culture or background want to follow directions, but how able they are to understand and recall the duration, frequency, and timing prescribed for taking their medications. The factors considered in this study that affect this view of adherence are not how "difficult" or "obedient" a patient is, but rather whether the instructions were given in a clear and understandable form.

The Challenge of Cross-Cultural Communication in Healthcare

In recent years, the world has witnessed a phenomenon known as the "globalization of health," i.e. the sharing of ideas, strategies, values, and efforts internationally to solve some of the greatest health challenges facing the world today (Collins, 2003). It is an attempt to collaborate between nations to work toward a common cause of improving public health. Globalization's impact on health has had many positive and negative consequences, and one challenge that arises is the issue of

cultural and linguistic barriers between collaborators, and also between physicians and patients (Collins, 2003). This study focuses on the communication barriers between doctors and patients of different cultures. It focuses on the challenges and strategies associated with the goal of an effective and respectful cross-cultural patient-physician relationship by using particular interventions to enhance communication.

There are various opportunities for healthcare providers and patients from a myriad of cultures to come into contact in a healthcare setting. Either the patient or the physician may play the part of the outsider in a local culture. This thesis focuses on the scenario of the physician traveling to a new country to provide healthcare, although many applicable examples are taken from literature that studies the interactions between native doctors and migrant patients, such as the interaction of doctors with the large and growing Spanish-speaking population in the United States.

As a result of the very common interaction among cultures within the context of healthcare, there is a great need for culturally competent healthcare providers. "Cultural competence" in healthcare refers to "a set of congruent behaviors, attitudes, and policies that come together in a system, agency, or among professionals and enable effective work in cross-cultural situations" (Anderson, Scrimshaw, Fullilove, Fielding, & Normand, 2003; Office of Minority Health: U.S. Department of Human Services, 2002). This is the ability of a system to enable health care providers to effectively recognize and navigate cultural and linguistic barriers to address the health needs of a population. Cultural competence has both the potential to improve efficacy of care by helping a doctor and patient understand each other and thereby cooperate together, and it also has the potential to improve the efficiency of care by cutting down on unneeded diagnostic testing by

improving the quality of information available to a doctor to make a diagnosis (Anderson et al., 2003).

The Challenge of Prescription Medication Communication Between Physicians and Patients

One of the most crucial and challenging aspects of communication barriers between doctors and patients is the communication of prescription instructions from doctor to patient. Physician communication is cited as one of the greatest factors in adherence (Rosenow, 2005). The doctor can give the patient only a certain amount of direct medical care, and most of a patient's care comes in the form of self-medication per instructions from a doctor (vanderGeest, Whyte, & Hardon, 1996). Cultural competency relates directly to the safety of a patient because miscommunication about the patient's treatment regimen may result in treatment errors (Office of Minority Health: U.S. Department of Human Services, 2002). A patient's understanding of instructions and trust in the caregiver's competency relates directly to the patient's adherence to a treatment plan.

A comprehensive framework for cultural competence framework in healthcare delivery that was developed by Anderson and colleagues (see Figure 2). As seen in this framework, basic efforts toward cultural competency, such as clearly communicating with patients, giving patients culturally appropriate education materials, and remaining familiar with and respectful of the patient's culture, correlate with the outcomes of more efficient, effective health systems and better quality of care across diverse populations. Some of the variables potentially associated with adherence that are examined in this study are language barriers, illiteracy, and cultural appropriateness. The portions of the

Anderson framework that are relevant to this study are highlighted, and they indicate that appropriate use of interpreters and educational materials enhances the communication across cultural and linguistic barriers, thereby improving adherence to medication plans, satisfaction of patients, and overall health outcomes.

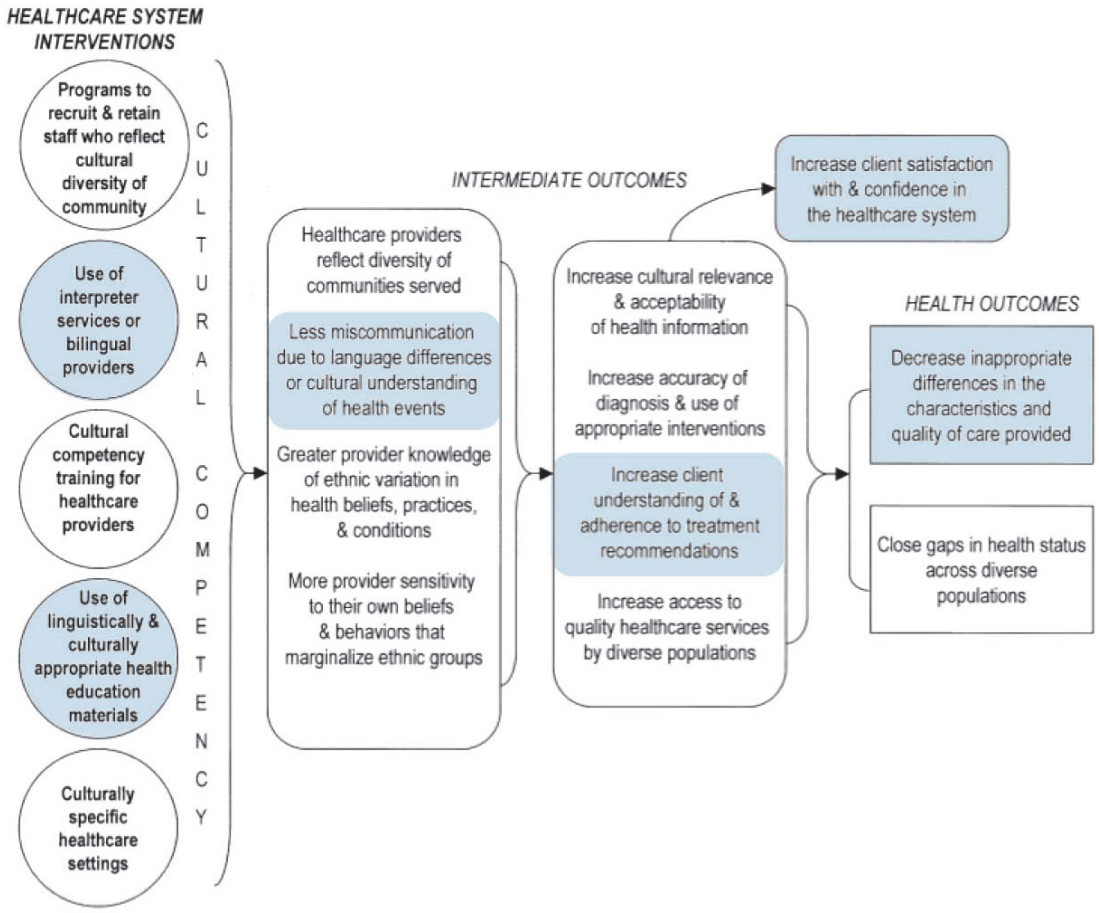

Figure 2. Cultural Competency Framework (highlights added) (Anderson et al., 2003)

Language Barriers

One of the most basic interventions to improve communication with patients is to improve the accuracy of the translation or interpretation of information from one party to the other. The inability of a patient simply to communicate or receive an accurate message to or from her physician triggers many problems, such as undermining trust in

the doctor-patient relationship and opening the door for misunderstandings and mistakes (Anderson et al., 2003). Patients who do not speak the same language as their doctor are less likely to understand their medication instructions, and more likely to make mistakes or deviate from the proper treatment plan (Deumert, 2010).

For circumstances when a doctor and patient speak different languages, a medical interpreter may be used. The word "translator" is often interchanged with the word "interpreter," although there is a distinction between the two. A translator rephrases words and sentences from one language to another, focusing only on written or verbal words, but an interpreter both translates sentences and adjusts them so that they are meaningful to all parties. A translator's job deals mostly with literal words, but an interpreter's job encompasses linguistic and cultural elements, as well as idiosyncrasies and nonverbal movement (Dysart-Gale, 2005; Hsieh, 2008; Searight & Searight, 2009; Zoraster, 2011).

Language Interpretation

Methods of interpretation. There are three major methods of interpretation (Brooks, 1992; Grasska & Mcfarland, 1982). The first is simultaneous interpretation, in which the interpreter translates and speaks the material as the speaker talks, with no pauses. This approach may be more time-efficient, but also distracting because two people talk at the same time (Searight & Searight, 2009). The second is line-by-line, or "sequential" interpretation, during which the speaker talks in short sentences or phrases, pausing in between each one so that the interpreter can repeat, word-for-word, what was said in the listener's language (Searight & Searight, 2009). The third, and least accurate

method, is summarization. This occurs when the speaker relates an entire thought, paragraph, or story, and then the interpreter summarizes what was said to the listener. During this method of interpretation, the interpreter is very likely to add, delete, or modify details about what was said. This is the method most often used by the interpreters in the clinic, in which this study was done.

Individuals who serve as interpreters. There are several types of people who fill the role of the interpreter, each resulting in varying levels of interpretation quality (Phelan & Parkman, 1995). The first, and by far the ideal type, is simply a bilingual healthcare provider. The bilingual doctor can speak with his or her patient directly, and there is no need for a third party who may distort information. Patients are most comfortable confiding in someone with whom they can speak directly because the doctor appears more credible and able to understand.

The next tier is a trained, or professional, interpreter. These interpreters are well aware of the challenges that may appear and are trained to maintain strict confidentiality. They are experienced in both maintaining content and preserving the "sense and intent" of what was said.

Although bilingual doctors and professional interpreters are the best options, they are sometimes unavailable. In this situation, a bilingual friend or family member may be called upon to interpret for the patient. These are known as "ad hoc" interpreters (Glenn Flores, Abreu, Barone, Bachur, & Lin, 2012). This method may be somewhat advantageous because the friend or family member may provide reassurance to the patient, be familiar already with the patient's illness, and be available nearby; however, important disadvantages and ethical challenges accompany this method as well. One of

the most obvious is the question of confidentiality. For example, a patient may hesitate to disclose sensitive or embarrassing information to a physician when the interpreter is the patient's child (Phelan & Parkman, 1995). Also, the interpreter may try to hide or twist information in an attempt to hide abuse or other family problems (Zoraster, 2011). The interpreter may have a certain opinion about the patient's infirmity, which affects the information transferred, or the interpreter may keep information from the patient in an attempt to shield him or her from bad news.

The last option is an untrained volunteer who does not know the patient. This may include any type of worker at the hospital who is available and knows both of the languages. Patients may not be as comfortable with this person, but this is preferable to someone the patient knows (Phelan & Parkman, 1995; Putsch, 1985).

There is a common misconception that anyone who is bilingual can automatically serve as an interpreter (Díaz-Duque & Diaz-Duque, 1982; Grasska & Mcfarland, 1982). Ad hoc interpreters have been found to be more likely to commit significant errors, fail to mention potential side effects, and ignore or omit embarrassing or sensitive information (Glenn Flores, 2005). In a study done by Flores et al., untrained interpreters were significantly more likely than trained interpreters to make errors of potential clinical consequence (77% vs. 53%, $p < 0.0001$) (Glenn Flores et al., 2003). "Potential clinical consequence," in this study, meant the error potentially altered the past medical history, history of present illness, diagnosis or therapy, understanding of condition, or follow-up plans.

Concerning trained and untrained interpreters, Grasska and Mcfarland (1982) draw attention to extrinsic and intrinsic errors. Intrinsic errors are present in every

interpreter-assisted interview and extrinsic errors have to do with lack of training of the clinician or interpreter.

Errors in interpretation. Research has been conducted to investigate the frequency and types of interpreter errors and whether these errors are of clinical significance. These errors fall into five general categories:

1. Omission. This is by far the most frequently committed error. This error occurs when the interpreter leaves out words or phrases spoken by the clinician or patient.
2. Substitution. The interpreter substitutes a different word or phrase than the one said by the speaker.
3. Addition. The interpreter adds an extra word or phrase that was not said by the speaker.
4. Editorialization. Instead of directly interpreting what was spoken, the interpreter inserts his or her own personal views.
5. False Fluency. The interpreter uses the wrong word or phrase, or a word or phrase that does not exist in the language.

(Glenn Flores et al., 2003, 2012)

A study by Flores et al. (2003) evaluated the frequency and type of errors committed by interpreters in 13 observed and recorded clinical encounters. In this study, interpreters made a mean number of 30.5 ± 3.6 errors per clinical encounter. Sixty three percent of these errors had potential clinical consequence. According to two separate studies by Flores et al. (2003, 2012), the relative frequencies of each error category were:

Table 1. Relative Frequencies of Interpretation Errors in Flores Studies

Type of Interpretation Error	Flores Et al., 2003	Flores Et al., 2012
Omission	52%	47%
Substitution	13%	9%
Addition	8%	10%
Editorialization	10%	9%
False Fluency	16%	26%

A subsequent study by Flores et al. (2012) also found that errors of potential clinical consequence were significantly less likely among professional interpreters vs. ad hoc interpreters. This study recommends a minimum of 100 hours of training interpreters in order to significantly reduce errors of potential clinical consequence.

Correct use of interpreters. There is a large amount of literature with guidelines of how to use interpreters to yield the best result (Brislin, 1970; Office of Minority Health: U.S. Department of Human Services, 2002; Paasche-Orlow, Schillinger, Greene, & Wagner, 2006; Samuels-Kalow, Stack, & Porter, 2012). These sources were used to compile the following guidelines for the physician in using an interpreter:

1. Meet with the interpreter before the meeting with the patient to discuss how long the meeting is expected to take and the basic subject that will be covered. This is a good time to learn from the interpreter whether any issues to be discussed are culturally sensitive and how to navigate them respectfully (Phelan & Parkman, 1995).
2. Clearly explain the role of the interpreter to the patient before the consultation starts (Phelan & Parkman, 1995).
3. Address the patient in the second person, talk directly to the patient, nod and maintain eye contact to communicate attentiveness (G. Flores, 2000; Phelan & Parkman, 1995; Searight & Searight, 2009; Zoraster, 2011). However, understand that the patient may not retain eye contact with you, as it is considered disrespectful in some cultures on the part of the patient (Misra-Hebert, 2003). Kinesics (the relationship between body movements and communication) may have a strong placebo effect of reassurance (Brooks, 1992).

4. Arrange the patient, doctor, and interpreter in a triangle (G. Flores, 2000).
5. Pause frequently so the interpreter may translate smaller amounts of information at once (Misra-Hebert, 2003; Phelan & Parkman, 1995). An overload of complex information given by the doctor is a significant challenge to interpreting. A study by Abbe et al. (2006) surveyed oncologists, interpreters, and parents of children who were patients about thwo perceived challenges of interpreting. The challenge reported most by the doctors was "complexity of information" (reported by 51.5% of the doctors) and the greatest challenge as reported by interpreters (41.6%) was the length of the physician's sentences.
6. Use simple words and avoid jargon or technical terms that may not have a translatable equivalent in the target language (Díaz-Duque & Diaz-Duque, 1982; Misra-Hebert, 2003; Putsch, 1985; Squires, 2009; Zoraster, 2011). For example "prophylactic," "condom," and "rubber" are, respectively, the technical term, the common term, and slang that refer to the same thing (Grasska & Mcfarland, 1982). Interpreters and clinicians should be aware of the use of technical terms and slang, and use their words appropriately.
7. Conversely, try to learn some key terms and vocabulary in the target language (Díaz-Duque & Diaz-Duque, 1982; Putsch, 1985; Zoraster, 2011).
8. Appear attentive when the patient talks to you to reassure the patient to reassure the patient and make use of communication through body language. Pay attention and respond to nonverbal gestures (Phelan & Parkman, 1995; Zoraster, 2011). However, keep in mind that gestures are not universal and that certain body movements may be misinterpreted in a new culture (Misra-Hebert, 2003).

9. Check the patient's understanding routinely by asking the patient to repeat back instructions, correcting when necessary (Misra-Hebert, 2003; Paasche-Orlow et al., 2006; Phelan & Parkman, 1995; Putsch, 1985; Zoraster, 2011). Back-translation has also been used in several studies to assess how well ideas are being communicated (Baird, 2011; Brislin, 1970).
10. Emphasize by repetition. If you suspect mistranslation or misunderstanding, return to the subject again, rewording your idea in order to get the correct point across (G. Flores, 2000).
11. While the patient is in the room, only talk with the interpreter about issues of communication; do not talk about the patient (Phelan & Parkman, 1995). Discuss disagreements with your interpreter in private (Grasska & Mcfarland, 1982).
12. Try to use the same interpreter for consecutive consultations. Get to know your interpreter and establish a relationship. This will increase trust and cooperation, and an interpreter and doctor can improve their communication as they gain more experience as a team. Talk to the interpreter outside of consultations to learn about any cultural missteps or things to do differently in the future (Phelan & Parkman, 1995; Putsch, 1985; Zoraster, 2011).
13. Ask the interpreter about some words or sentences that were not translated. This encourages attention to details (Putsch, 1985).

Following these guidelines may enhance the conversation between the doctor and patient, building trust through the connection of clearer communication and greater understanding of one another.

The relationship of the physician and the interpreter. One more area to focus on is the trust between the doctor and the interpreter. The doctor is dependent upon the interpreter, and this power held by the interpreter has the potential to be abused. Potential abuses presented by Zoraster et al. (2011) include editing information to favor ethnic subgroups, influence how money is spent, or otherwise fail to report information that may reflect badly on the interpreter. Hsieh (2010) stresses that the dimensions of interpreter competence, shared goals, professional boundaries, and established patterns of collaboration are the important dimensions that can strengthen or compromise the trust between providers and interpreters. An important way to improve this trust is for doctors to recognize the value of interpreters and to be open to their valuable insights. One of the doctors surveyed in this study commented: "I hope [interpreters] don't feel like they are lower on the totem pole, because I can't do my job and take care of a patient without them. So, I value them as an equal colleague. Because despite the fact that they don't have the MD behind their name, I couldn't be an MD without their assistance" (Hsieh, Ju, & Kong, 2010).

Cultural Competence

Finally, in order to interact with a patient appropriately and respectfully, it is important to connect culturally as well as linguistically. Even if a doctor and patient speak the same language, a cultural "disconnect" may exist, which can create misunderstandings, decrease a patient's trust in the doctor's competency, and otherwise create obstacles in the relationship between a doctor and patient. Cultural competency includes not only awareness of the patient's cultural beliefs, but also the beliefs of the physician.

One challenge in cultural competency is the tendency toward ethnocentricity, the feeling that one's own culture is best. Realizing this, and being aware of one's own cultural values and bias is an important primary step of cultural competence.

As a reference, some of the main ideas of U.S. culture include the idea of individual accomplishment as a measure of a person's worth rather than family or gender, as is emphasized in many other cultures. U.S. culture holds a strong belief of a person controlling their own destiny, while other cultures subscribe to fatalism, or attribute the events of a person's life to an external source. Modesty and shame are less prominent in U.S. culture than in others, and in U.S. medicine, good and bad news are always given. In many other cultures, bad news is often withheld (Misra-Hebert, 2003).

One of the greatest barriers that stand between a doctor and a patient of different cultures is their differing worldviews. Differing worldviews are grounds for different interpretation of a situation, which means a person may not understand the actions of others who interpret a situation differently. This is also true within the context of medicine. Doctors may not understand why their patients do not follow their treatment plans because they do not know the cultural lens through which a patient views the illness and which led the patient to choose a different course of action as the best one.

In many cases, the doctor comes from a Western worldview that focuses on scientific and biologic processes as explanations for and solutions to diseases. In many cultures, however, the Western view is only one component of a range of explanations for disease. Strong spiritual or metaphysical elements may strongly influence a patient's attitude toward disease and create a complex interaction between Western and traditional treatment. A culturally competent doctor should have awareness of other health beliefs in

the culture in which he or she is working, an open attitude toward the patient's beliefs, knowledge as to what those beliefs are, and the skill to design a treatment plan that is culturally acceptable to the patient. As a note, the medical culture within most clinics and hospitals is referred to as "modern," "Western," or "scientific," while alternative sources are called "traditional medicine."

It is important for a doctor to understand patient's health beliefs so that a treatment plan may be devised that is effective according to the doctor's beliefs and acceptable according to the patient's culture and prior medical beliefs. Systematic tools are available to help doctors keep an open mind and gain a grasp of how the patient perceives the illness and treatment. The following checklist of items to complete and questions to ask is a Culture and Health-belief Assessment Tool taken from Rosen et al (2004). Following these guidelines help both the patient and doctor understand each other's perception of the illness and treatment.

Culture and Health-Belief Assessment Tool (CHAT) (Rosen, 2004)

1. When appropriate, I have discussed the role of the interpreter with both the interpreter and the patient.
2. What do you think caused your illness?
3. Why do you think your illness started when it did?
4. What does your illness do to you? How does your illness work?
5. How bad (severe) do you think your illness is? Do you think it will last a long time, or will it be better soon, in your opinion?
6. What do you fear most about your illness?
7. What are the chief problems that your illness has caused for you?
8. When you have a problem, to whom do you turn for help?
9. For your future care, who would you like to be involved?
10. What have you done to treat your illness?
11. What kind of treatment do you think you should receive?
12. What are the most important results that you hope to receive from treatment?
13. Is there anything that might conflict with your treatment regimen?
14. Are you feeling uncomfortable or uncertain about what we have decided?

All of these questions have implications as to how the patient perceives and accepts treatment plans given by the doctor. The doctor should keep these attitudes in mind when negotiating a treatment plan with the patient. This awareness includes knowledge of important folk illnesses in the area in which the doctor is working. Folk illnesses are defined as "culturally constructed diagnostic categories commonly recognized by an ethnic group, often in conflict with biomedical paradigms" (Rosen, 2004). A doctor in a new culture may find himself treating diseases he does not believe exist but which are important to his patients. A doctor's approach to these illnesses is important to the doctor's credibility in a community.

A useful framework for conducting interactions with a patient of a different culture is the LEARN model: (Berlin & Fowkes, 1983)

LEARN Model

- *Listen* with sympathy and understanding to the patient's perception of the problem
- *Explain* your perceptions of the problem
- *Acknowledge* and discuss the differences and similarities
- *Recommend* treatment
- *Negotiate* agreement

The idea of negotiating a treatment plan with a patient is a very important step in patient-physician interaction. According to Berlin & Fowkes (1983), the patient and physician are partners in deciding the treatment plan. Negotiation, rather than merely telling the patient what treatment plan to follow, results in a more patient-centered approach to reach a mutually acceptable agreement (Carillo & Green, 1999).

An important resource for insight into the patient's culture is the interpreter. A physician's possible lack of cultural competency is a challenge that may be more

apparent to the interpreter than to the physician, since the interpreter needs to mediate culturally as well as linguistically. In a previously mentioned study that surveyed physicians, interpreters, and child patients' parents, 82.4% of the interpreters reported that the physicians had "very little" to "no understanding" of cultural differences that can affect communication with the patient's family (Abbe et al., 2006). All of the interpreters in the survey either "agreed" (68.7%) or "strongly agreed" (31.2%) that they should have more opportunity to share insights into the patient's culture.

Medical Culture of Rural Western Kenya

The present study focuses on a community of the Luo tribe in the Nyanza province of rural western Kenya. In order to understand the dynamics of how the medication instructions given by non-native workers in a temporary clinic are received, it is essential to investigate the medical culture of this area in particular.

The Luo people recognize two forms of intelligence, academic and practical, which develop separately from one another (Sternberg et al., 2001). The Western concept of academic intelligence is seen as only a component of intelligence by Luo standards, just as modern medicine comprises only a component of medical care (Grigorenko et al., 2001). Medical care in Kenya stems from a range of sources, including private and government clinics, shops selling medicines, "traditional healers," and herbalists. Of these, clinical treatment is only a part of the sources of medical care, and patients are very likely to seek treatment from more than one source of care (Gm Mwabu, 1986). This concept of choosing from a combination of systems for health care is known as medical pluralism, which is common in Kenya (Beckerleg, 1994). The following studies illustrate this point.

A study by Ruebush et al. examined the sources of treatment for 138 cases of malaria in rural western Kenya: 60% were treated at home with herbal remedies or medicines from local shops and 18% sought treatment at a clinic or hospital (Ruebush, Kern, Campbell, & Oloo, 1995). A study by Liefgoogh and colleagues (1997) examined attitudes of treatment of tuberculosis in northwestern Kenya and found that the subjects considered traditional treatment as a valid, equally effective, and much shorter alternative to modern medicine. Usually, modern health sources were not consulted until the illness was very advanced. Amin et al. (2003) studied the curative sources for childhood fevers in Kenya, with 38.8% of cases treated formally (clinics, hospitals, and community health workers); 26.1% from retail stores, drug shops and pharmacies; 7.0% from treatment within home (self treatment with drugs, traditional healers, and homemade remedies); and 28.1% left untreated.

Income level of an individual also likely makes a difference in the chosen source of medical treatment among Luo people. A study by Mwabu et al. in eastern Kenya found that growth in income shifts medical demand from the informal sector to the modern sector (Mwabu, Ainsworth, & Nyamete, 1993).

Luo schoolchildren in rural western Kenya have great autonomy, with an estimate of only one-quarter of illnesses reported to adults. Self-treatment is common and knowledge is often acquired informally. These practices pose a high risk of misuse of pharmaceuticals, as shown by the high rate of drug poisoning from chloroquine, a common malaria medication (Geissler et al., 2000). Community health education involving children has the potential to be very influential (Geissler et al., 2001).

Much of traditional medical knowledge in the Luo culture comes from within the family. An important source of medical knowledge in a Luo child's life is his or her grandmother (Prince & Geissler, 2001). Learning "how to heal" in Luo culture has strong moral and emotional elements to it, and the relationship between a grandmother and her grandchild is the ideal for this type of learning, since it is often free from the disciplinary restraints of the parent-child relationship and the school scenario. When a child lives with his or her own parents, the relationship between grandparent and grandchild can be one of openness, equality, love and respect, rather than discipline and obedience. Knowledge and wisdom learned from the grandmother is highly valued and is seen as different than education gained in schools.

This grandmother-grandchild relationship is the context in which traditional medicine is passed down. Herbal medicine is also known as "Luo medicine," or *yadh nyaluo* in Dholuo, the native language or the area. A Luo herbalist is known as a *jathieth* (pl. *jothieth*), which literally means "one who treats" (Prince & Geissler, 2001). A woman gains credibility as an herbalist if her treatments are successful and if she possesses enough charm and charisma, in which case others outside of her family will come to her for help, paying her often with food or chickens. Most of a woman's power as a healer comes from her status as a trusted member of the community, so she needs to show the community that she respects and cares for her patients. The healer's treatment comes as a mixture of passed-down, traditional remedies and exotic, foreign, and novel medicines (which are often associated with power). A grandmother teaches her herbal remedies to a grandchild to whom she is particularly close, and whom she perceives as a pure and moral person. Medical knowledge is shared in a relationship of love and trust,

and according to the Luo culture, "having a pure heart, respect, and compassion for people are moral qualities that are necessary for healing" (Prince & Geissler, 2001).

Shops are also an important source of medical care. Studies have shown that training shopkeepers is a feasible and effective way to increase the community's knowledge of the appropriate use of pharmaceuticals (Marsh et al., 1999).

In the end, a great deal of frequent and effective use of clinics by people in developing countries depends largely on the peoples' view of modern healthcare. These views have the opportunity to be informed largely by public education and quality of healthcare provided (Haddad & Fournier, 1995; Machila et al., 2007). Patients' attitude toward this quality depends largely on how well physicians' skill and respect for patients can penetrate cultural barriers that exist in this relationship.

Literacy Barriers

The role of illiteracy in patient-physician communication. Patient illiteracy is an important concern in healthcare, as poor reading skills of patients may lead to medication errors and dangerous health effects (Kefalides, 1999). One method to address this challenge is to use illustrations instead of written instructions to communicate medical information to illiterate patients.

The role of illiteracy in patient-physician communication in Kenya. Literacy in Kenya is described in the Kenya Demographic and Health Survey (2008). Literacy rates vary widely according to gender, age, socioeconomic status, and province within Kenya. Literacy is highest in the youngest age group surveyed, (ages 15-19) and declines in each older age group. The literacy rate among 15-19 year-olds is 92.0% and 94.8% for

females and males, respectively, and 62.2% and 85.3% for women and men ages 45-49. Among rural populations in Kenya, the literacy rates are 82.3% for women and 89.6% for men. The lowest quintile of wealth has rates of 58.9% for women and 79.7% for men, and the highest quintile has 95.4% for women and 96.7% among men. Finally, literacy rates in the Nyanza province, (where this study takes place), are 89.8% for women and 91.8% for men. This statistic, however, includes the population of Kisumu, the third largest city in Kenya, which is quite different from the rural Nyakach plateau where this study takes place. The literacy rates in this extremely poor area are more likely to reflect the effects of both the rural context and poverty. Therefore the literacy rates for the present study sample are likely to be even lower than the rates noted above.

Pictograph Interventions for Medication Prescriptions

A pictograph is a sheet given to a patient that uses illustrations to communicate instructions about how to administer the treatment.

Each pictograph has its advantages and disadvantages and is usually designed specifically for the type of instructions and audience for whom it is meant. Designers of pictographs should guard against making them too complicated, or else they become a "photo-novel" that could provide too many distracting details (Choi, 2011). Also, while accompanying text usually guides the interpretation of pictures, patients with low-literacy skills may skip past the text and try to guess the meaning of the illustrations (Choi, 2011).

When designing pictographs, it is important to get input from those who will use the pictograph (Ngoh & Shepherd, 1997). Patients may not understand certain elements of pictures that designers may find apparent. For example, in one study, Kenyans were able to recognize a picture of a human head without a body, although less than 70% could

recognize a hand, and less than 50% could identify a foot (Moynihan & Mukherjee, 1981). A study by Kim et al. concluded that patients recognized a pictograph designed with the participation of nurses and consumers much more than a pictograph developed outside of the clinic (Kim, Nakamura, & Zeng-Treitler, 2009). Ngoh and Shepherd detailed the design phases of the pictograph they produced to communicate prescription drug instructions to illiterate patients in rural Cameroon (see Figure 2), and an important step in the process was the revision of the pictograph after receiving input from a local artist in order to make it more culturally acceptable (Ngoh & Shepherd, 1997).

Examples of Pictographs. Figures 3-5 depict examples of pictographs used in past studies. Figures 3 and 4 show simple combinations of English letters and numbers with simple pictures to communicate treatment. Since cultures may have different concepts of time, universal symbols are popular, such as the rising and setting of the sun.

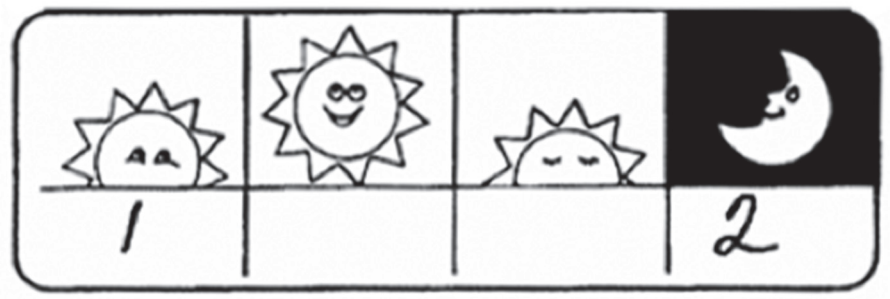

Figure 3: Pictograph indicating instructions to take one tablet in the morning and two at bedtime (Katz, Kripalani, & Weiss, 2006)

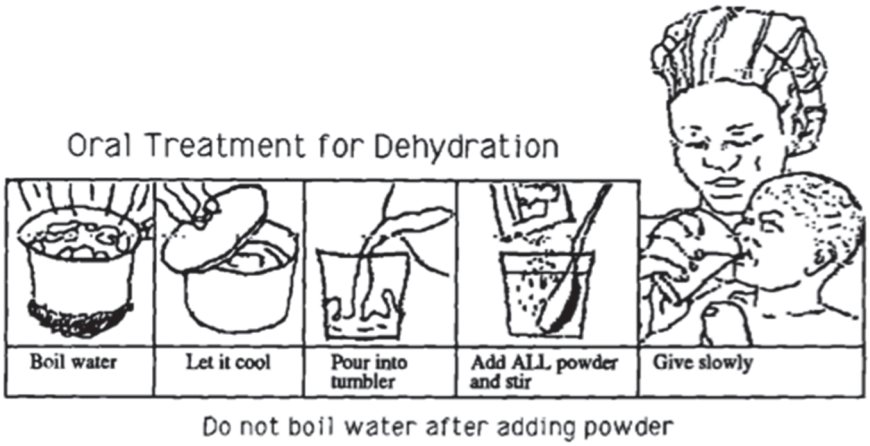

Figure 4. Pictograph Communicating an Oral Dehydration Treatment in Rural Kenya (Patel, Eisemon, & Arocha, 1990)

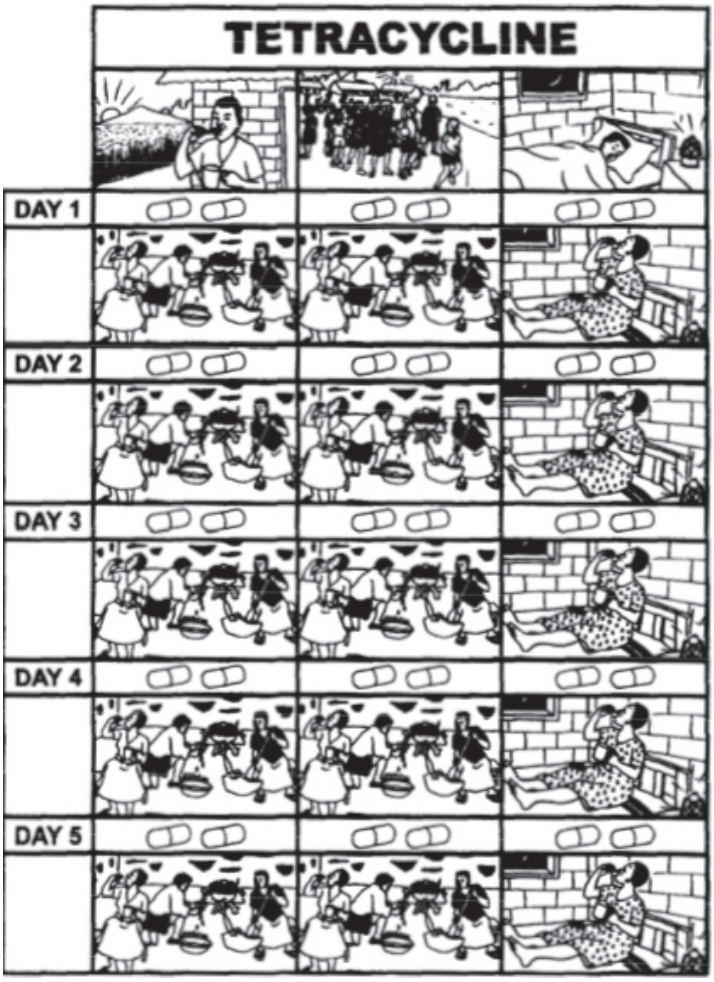

Figure 5: Tetracycline Pictograph in Rural Cameroon indicating that Tetracycline is to be taken three times a day on an empty stomach for five days (Ngoh & Shepherd, 1997)

Figure 5 shows instructions for patients to take tetracycline in rural Cameroon. This pictograph was developed with careful cultural details, although other studies tend to emphasize the importance of simplicity (Kefalides, 1999; Ley, Jain, & Skilbeck, 1976; Samuels-Kalow et al., 2012).

Pictographs not only are used in medication instructions, but also in prevention and general health education, such as the pictograph below to help people become aware of when they should suspect that they have HIV or AIDS (Figure 6).

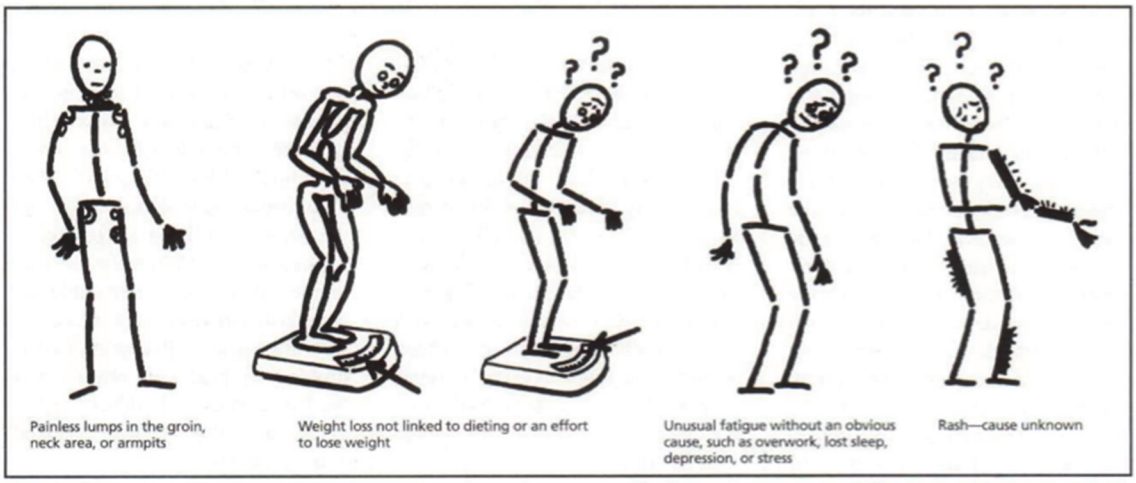

Figure 6. Pictograph communicating HIV/AIDS awareness (Kefalides, 1999)

Assessment of Effectiveness of Pictographs.

There is conflicting data about the effectiveness of pictographs. Some studies support the use of pictographs to enhance patients' understanding and recall of prescription instructions, especially illustrations used in conjunction with written and oral instructions (Samuels-Kalow et al., 2012). Pictographs have been effective especially for communicating with patients of low literacy, but they enhance recall for literate patients as well. For example, a study in the Kajiado district of south-central Kenya compared mothers' knowledge of how to administer oral rehydration treatment to their children

after being given standard written instructions compared with instructions accompanied by pictures (see Figure 4) (Ngoh & Shepherd, 1997). The mothers were divided into groups based on their amount of education. For the text-based instructions, less educated mothers recalled 30% of the instructions while more educated mothers recalled 55% of the instructions. For the instruction with both pictures and written instructions, less educated and more educated mothers recalled 72% and 75% of the instructions, respectively.

Pictograph-based instructions have also been found to reduce dosing errors and improve adherence in patients of low socioeconomic status (Yin et al., 2008), and there is evidence of a positive effect in enhancing patient recall of spoken medical instructions. A study by Houts et al. (1998) resulted in a mean correct recall of 81% for patients who were given a pictograph, versus 14% in those who were not ($p<0.0001$). A subsequent study by the same author also concluded that pictographs help maintain patient recall of medical information over long periods of time (P. S. Houts, Witmer, Egeth, Loscalzo, & Zabora, 2001).

The efficacy of a pictograph ultimately depends on the situation, as some studies have found no significant difference in recall of instructions (Watson & McKinstry, 2009).

The Gap

The setting for this study combines many of the most powerful barriers for communicating directions about medical treatment. The stakes are high in this area, as it is a circumstance in which mistakes can be life-threatening if errors are made. There are

no studies that have assessed the effectiveness of various means of communicating in a setting with this many challenges.

In the temporary, annual clinic on the Nyakach plateau where these data were collected, medications are communicated through multiple, minimally trained interpreters to a patient population that contains all possible combinations of people who have no education, do not speak English, and/or cannot read. These economically destitute patients live in a remote area with little access to transportation, so many of them have had little or no experience with a formal healthcare system and the practice of receiving prescription medicines with their precise instructions.

In addition, patients are prescribed more medications than they would be in a permanent clinic, because physicians attempt to treat patients during a single visit for multiple acute and chronic problems. Furthermore, all patients are given a prescription for vitamins. Because the clinic is held only once a year, parents often bring all of their children to see the physician, seeking help for chronic problems such as skin rashes, asthma, worm infections, tooth abscesses, and other conditions that are often seen in the context of HIV/AIDS and malnutrition. The average number of children in a family is six (Damoiseaux, 2013), so a parent may have a very large number of medications for which to be responsible, and the treatments are likely to be different for each child.

To add to these challenges, there is no long-term relationship between these patients and the physicians, pharmacy workers, or local people in their role as interpreter. There are more than the usual opportunities for cultural misunderstandings, as many of the physicians and clinic workers have never worked in a developing country where they do not speak the local language, let alone know the local culture. The non-native

healthcare workers are often treating diseases that are unfamiliar to them, such as malaria or helminthic infections, and they may be prescribing medications that they do not normally use.

This study combines several aspects of prior research to gain new insight into the practical use of pictographs to enhance physician-patient communication. The intervention designed for this patient population was a simple pictograph design that could be quickly filled out in order that instructions could be clear to the patients and also practical for a temporary clinic staff that sees 100+ patients a day with multiple medications. In addition, the short, bilingual labels were designed for multiple types of individuals that the clinic encounters: not only illiterate, uneducated patients, but also patients who may be bilingual. The attempt was made to create a tool that would be helpful to as many people as possible, given a wide range of characteristics.

The evaluation of the intervention also goes further than previous research, taking into account certain realistic and specific cultural factors that could affect a patient's understanding of medication instructions, such as the gender, age, and number of prescriptions for which the patient is responsible. Attention is paid to three similar, but distinct, factors related to verbal ability that may provide an advantage for a patient in the accuracy of recall of medication instructions. In addition to examining the independent effect of all of these variables on error rate, this study analyzes the data in such a way as to test the modifying and confounding effects of these variables as they shape the impact of the pictograph intervention.

Finally, this study is part of a larger community-based research program that is gathering data to direct and evaluate the comprehensive development project of the non-

profit organization, Straw to Bread, in its work on the Nyakach plateau. As such, the generalizability of the findings of the study are important in and of themselves, but also in addition to the usefulness of the results for this particular project.

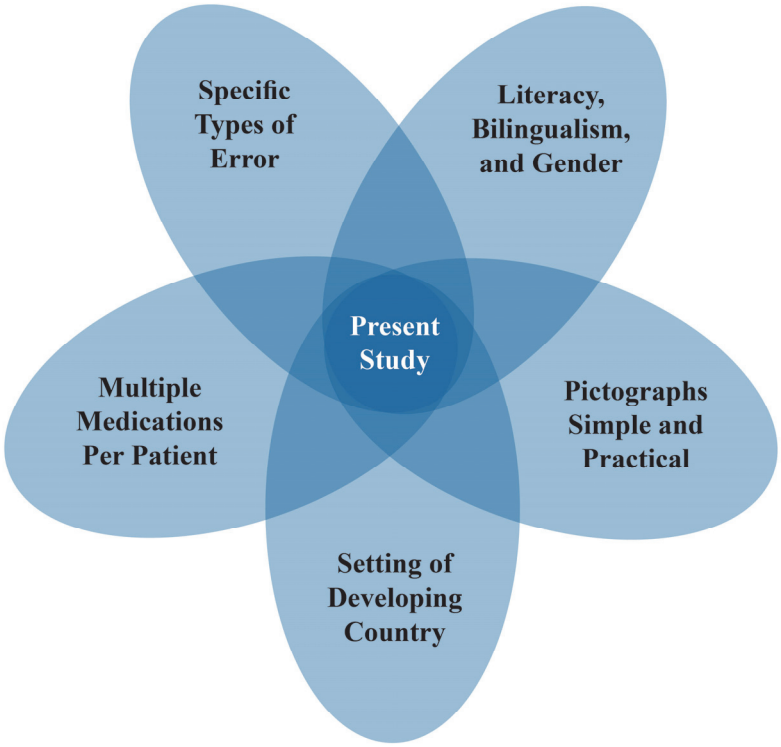

Figure 7. Illustration of the way that the present study combines aspects of previous studies to fit the specific needs of the community.

CHAPTER THREE

Hypothesis

Within the general context of improving communication between healthcare providers and patients, this study examines the increased challenges posed by temporary, non-native healthcare workers in developing countries. Results from this community-based intervention are of particular interest for a comprehensive development project among the Luo tribe on the Nyakach plateau in Kenya.

Research Question

What is the best method for communicating medication instructions to the patients of the Nyakach plateau that results in the most accurate patient recall?

Hypothesis 1: Using the pictograph will decrease the error rate when patients recall their prescription instructions.

Hypothesis 1_0: Using the pictograph will have no effect on the error rate when patients recall their prescription instructions.

Hypothesis 2: Using the pictograph will cause a greater decrease in rate of frequency errors (how often to take the medicine) than the rate of dose size errors.

Hypothesis 2_0: Using the pictograph will have no effect on the difference in the rate of frequency errors vs. the rate of dose size errors.

Hypothesis 3: Using the pictograph will increase the rate of duration errors.

Hypothesis 3_0: Using the pictograph will have no effect on the rate of duration errors (how long to take the medicine).

Description

A trial using pictographs versus controls was performed in a temporary clinic that is carried out annually by the non-profit organization, Straw to Bread, on the Nyakach plateau in western rural Kenya. The researchers carried out the study as patients were given instructions for their prescribed medicines through interpreters. The outcome was measured by surveying the patients as they left the clinic to determine the accuracy of their recall of the instructions.

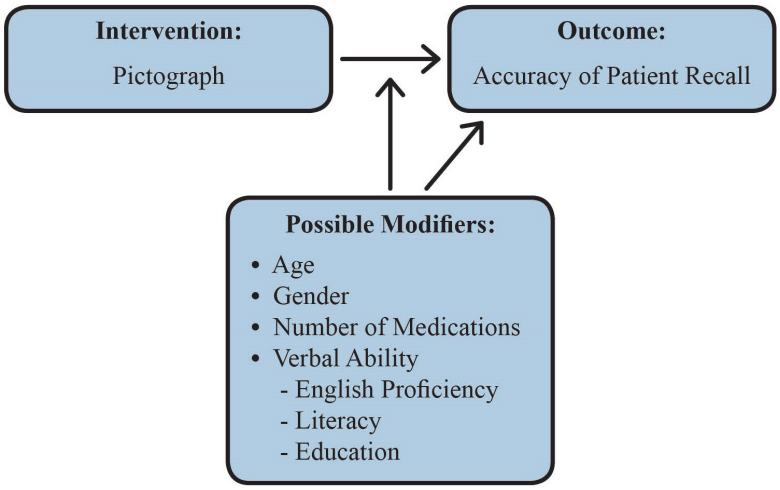

Figure 8. Basic Study Design

CHAPTER FOUR

Methods

Setting

This study was carried out in a rural community of subsistence farming on the Nyakach plateau in the Nyanza province of western Kenya. Residents of this area are virtually all from the Luo tribe, and Dholuo is their native language. The few paying jobs on the plateau are largely limited to teaching, making bricks, working in small shops, and breaking rocks into gravel. There is a government-sponsored health center with no physician that serves approximately 60,000 people. Families have an average of six children (Allen, 2013), and HIV/AIDS continues to have a devastating effect on the population (Guidangen, 2013).

Data collection took place at an annual two-week clinic held by volunteer physicians and other healthcare workers from the United States during the period of May 22 through May 28, 2013. Straw to Bread, a U.S.-based non-profit organization, sponsors an American team of volunteer medical professionals and college students that travels to Kenya for two weeks each year to work with this community (www.strawtobread.com). The medical care is part of the organization's comprehensive development projects and research in this community that encompass healthcare, sustainable agriculture, safe water sources, education, and small business development.

Sample

Inclusion Criteria

The subjects for this study were a convenience sample of the adult patients who had been prescribed medication by a physician at the clinic and received it there at the temporary pharmacy. A patient, or a family of patients, was selected every 2-5 minutes as they left the clinic, which was approximately the length of time required to complete one survey.

Exclusion Criteria

Patients excluded from the study included those under the age of 16, patients who were not given medication, and 5 patients who declined to participate in the study.

Study Design

The design of the study was an experiment in which the intervention (pictograph) was given to patients at the temporary clinic pharmacy after they had received verbal medication instructions from a healthcare worker via a translator just before the patient left the clinic.

Assignment to Intervention or Control Group

Patients were assigned to the intervention group or to the control group based on which day they came to the clinic. In order to control for the time of day when a patient was asked to recall instructions, all of the eligible patients who came on 2 designated days were given the intervention. Three other days were designated for patients in the control group who received verbal medication instructions by a pharmacy worker through

an interpreter. In order to control for a practice effect, the investigator alternated days when the pictograph was used in the pharmacy, and the remaining patients received the normal standard of care, which consisted of a series of numbers indicating the prescription instructions written on the plastic bag that contained the medication. For example, the worker in the pharmacy would write 2x3x5 to indicate that the patient should take two pills, three times per day, for five days.

Procedure

Pictograph intervention. The pictograph was presented to the patient in the pharmacy, before the patient arrived at the researcher waiting to interview the patient at the exit of the clinic. Each pictograph was placed in the clear plastic bag containing the medication for which it communicated instructions, and the worker and interpreter in the pharmacy explained the instructions for each medication to the patient.

Coaching intervention. A second "coaching" intervention was planned in which the translator and pharmacy worker giving the medication instructions would ask the patient to repeat back the instructions until he or she got them all correct. The coaching method was attempted briefly, and was found to be too difficult for the clinic to try at that point, primarily because it is a time-intensive intervention and there were not enough workers in the pharmacy to provide this extra time for the high patient volume. The sample size for this group was too small (n=10, 4% of total sample) for meaningful analytic statistics. However, data from the coached group are included in descriptive statistics of the sample as a whole.

Outcome Measurement

The researcher carried out the assessment as patients exited the clinic. Patients were invited by the investigator to participate in the study, the study was explained, and if the patient gave informed consent, the information was collected. The researcher was not blinded as to which group (intervention vs. control) the patient belonged.

Patients were asked the questions listed in the survey in Appendix A. Patients reported their age, level of education completed, and whether or not they could read (literacy). The researcher answered question 4 (English proficiency) based on her perception of the patient's ability to understand English throughout the conversation.

After these social and demographic questions were answered, the researcher recorded on the data collection sheet the correct information about each of the patient's medications based on what was written on the bag of medicine. Then the researcher asked the patient about each medication (the questions in italics in Appendix A), recording the patient's answers for each question. The patient's answers were compared to the original prescription information to determine the accuracy of the patient's recall of the medication instructions, and errors were recorded.

Although only some patients received the intervention of the pictograph before the assessment, after the interview the researcher offered the intervention to every patient, to assure that all patients with originally no pictograph were equally well informed. Also, if a patient answered a question incorrectly, the researcher informed the patient at the end of the interview of the correct medication instructions until the patient could repeat them correctly. The researcher checked the box labeled "Patient repeats instructions accurately before leaving the clinic" for each medication after the patient did so.

The outcome variable for this study was the patients' understanding of their medication instructions. The main predictor variable was the method of communicating the prescription instructions to the patients. These were: a group with no pictographs or coaching, a small sample of patients who were given extra coaching, and a group of patients who were given pictographs. Variables to adjust for included the patient's age, gender, English proficiency, literacy, education level, how many medications the patient needed to keep track of, and the time of day.

At the end of the interview, the patient was asked whether he or she had any other questions about his or her medications or suggestions about how their clinic experience could be improved in the future. The researchers recorded these concerns and addressed them to the best of their abilities. The patient was thanked for participating in the study.

Data Analysis

The data were double-entered into Microsoft Excel and then imported into SAS 9.3, the statistical program that was used for data analysis. Frequencies, percent and cumulative percent, mean and standard deviation (when applicable), and range were reported for each variable. Variables were stratified across education status, literacy, English proficiency, age, gender, and number of medications.

Multivariate analysis was used to assess interaction effects and the relative contribution of each predictor variable to the outcome variable. In some cases, data were stratified and contingency table analysis was done to assess the modification of the relationship between the predictor and the outcome variables.

The hypotheses were tested by calculating error rates for each patient based on the portion of errors in his or her recall of the medication instructions.

The Baylor University Institutional Review Board approved this study before data collection began. All data from human subjects was anonymous. Informed consent was obtained before a subject provided data for the study.

Figures 9 and 10 show the pictographs designed for this study. These pictographs were designed by the principle investigator using Adobe InDesign, with the help of a native contact in Kenya, Habil Ogola. The elements in blue are examples of the parts filled out by hand in the pharmacy, for each specific prescription.

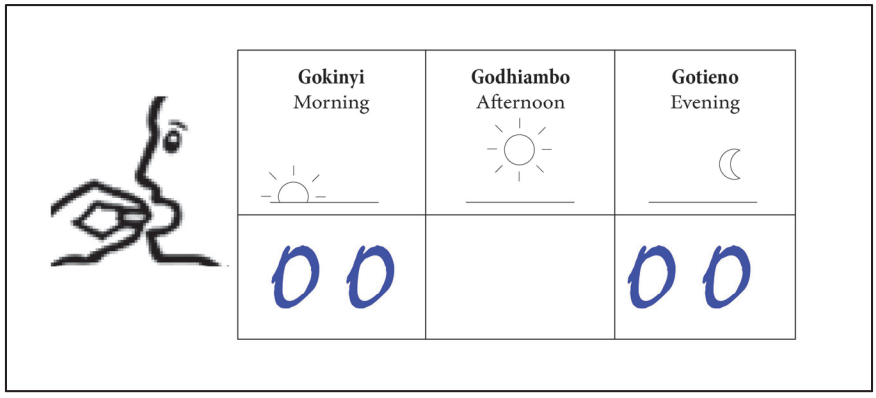

Figure 9. Pictograph indicating to a patient to take two pills in the morning and two in the evening.

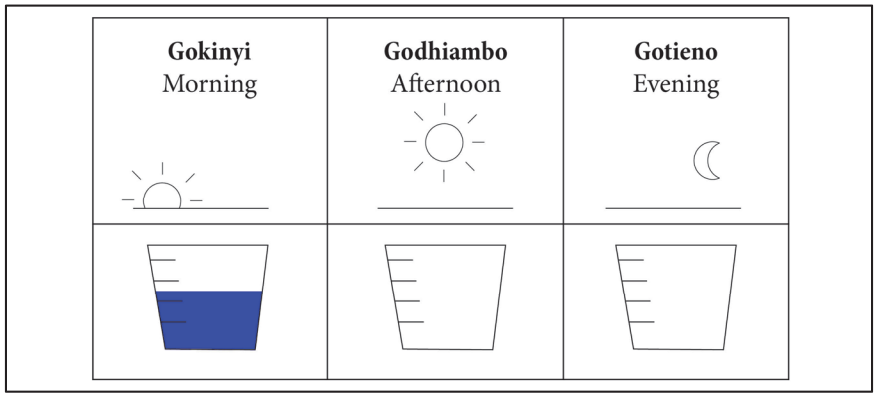

Figure 10. Pictograph indicating to a patient to take half of a measuring cup (provided with the medication) of liquid medication each morning.

CHAPTER FIVE

Results

Descriptive Statistics

Predictor Variables

Demographic data. Two hundred and forty-eight patients participated in the study and had an average age of 47 years, with a wide range of 16-105 years. The sample had 69 males (27.9%) and 178 females (72.1%).

Variables related to verbal ability. Table 2 contains information about three other characteristics of the sample that relate to a patient's verbal abilities: education, literacy, and proficiency in English. The who patients had a "verbal advantage" had at least some education, the ability to read, and some proficiency in English. The patients had completed varying levels of education, but for the analysis of this study, they were grouped together to create a dichotomous variable: those who had not had any education at all, and those who had at least at least some education, whether it was primary, secondary, trade school, or higher. The same was done for the English-speaking variable. Subjects who knew "some English, but needed help from a translator" and those "fluent in English" were grouped together in the "Some English" category.

Table 2. Variables Related to Verbal Ability

Variable	Category	n	Percent
Education n = 248	None Primary or higher	47 201	18.95% 82.05%
Literacy n = 245 (3 missing)	Illiterate Literate	82 163	33.5% 66.5%
English n = 243 (5 missing)	No English Some English	117 126	48.15% 51.85%

Literacy was measured by self-report. This value may not reflect the true literacy of the patients in the study, and the estimate is most likely an underrepresentation of literacy. The translator offered the interpretation that, when asked if they could read, some of the patients may have responded "no" to the question because they had limited ability and thought that they would be inadequate if asked to read a sample. For the purposes of this study, patients who were not confident enough to declare themselves able to read were considered illiterate.

Number of medications per patient. Most patients received multiple medications to manage. The frequencies are reported in Table 3, as well as the frequencies of the number of medications prescribed for the patient's own use and those prescribed for others who were dependent on the patient (for example, children or elderly parents).

Table 3. Number of Medications Per Patient (n=248 patients)

Variable	Range	$\overline{x}$	SD
Total Medicines	1-11	2.71	1.46
For Self	0-4	2.12	0.94
For Others	0-9	0.60	1.28

Outcome Variables

Frequencies and types of error rate. The error rate was measured in several ways, and the frequencies of each type are displayed in Tables 4 and 5. The Overall Error Rate is defined as the number of medications that were recalled by the patient with one or more mistakes per the number of medications prescribed. A patient with an error rate of 0 recalled all of his or her medication instructions correctly, and a patient with an error rate of 1 had a mistake on every medication. These error rates are further split into different types of errors: size, frequency, and duration. A size error means that the patient got the dose size wrong, or did not know the dose size. For example, she thought she was instructed to take two pills each time instead of one. A frequency error means that the patient misunderstood, or did not know, the number of times each day that she should take the medicine. A duration error means that the patient misunderstood, or did not know, how long to take the medicine. The usual instructions for duration given in the clinic are "until the medicine runs out." This was the most common type of error, with a mean of 0.13 for the sample.

Errors were also recorded in the form of absolute numbers. "Medications with >0 Errors" is the number of medications for which a patient had a mistake. "Total Number of Errors" is the total number of errors a patient had across all her medications. The overall error number may be higher than the incorrect medications because a patient may have made more than one mistake for a single medication. As shown in the data, the mean error number is higher than the mean number of incorrect medications (0.65 vs. 0.56).

Table 4. Frequencies and Types of Continuous Error Rates

	n = 248		
Type of Rate	Range	$\overline{x}$	SD
Rates			
Overall Error Rate	0-1	0.21	0.31
Size Rate	0-0.67	0.018	0.086
Frequency Rate	0-1	0.097	0.22
Duration Rate	0-1	0.13	0.26
Absolute Number of Errors			
Number of Medications with >0 errors	0-5	0.56	0.85
Total Number of Errors	0-5	0.65	1.05

Another useful measure would be to compare the number of errors with the total number of potential errors. Since there are 3 potential errors for any single medication (size, duration, frequency), then the number of potential errors would be the number of medications multiplied by 3. This analysis was not done for this study but could be completed in the future.

Table 5. Frequencies and Types of Dichotomous Error Rates

		n = 248	
Type of Rate	Categories	n	Percent
Any Error	No Errors	154	62.1%
	1+ Error	94	37.9%
Size	No Errors	236	95.2%
	1+ Error	12	4.8%
Frequency	No Errors	194	78.2%)
	1+ Error	54	21.8%
Duration	No Errors	189	76.2%
	1+ Error	59	62.1%
Multiple Errors	Low	154	62.1%
	High	26	10.5%

For data analysis, the errors were grouped into dichotomous categories (Table 5). Each type of error had two groups: no errors vs. one or more errors (referred to by the variable name "Any Error"). In order to identify more specifically the patients who may have had trouble understanding as well as remembering all the aspects of medication instructions, the variable "Multiple Errors" was created. "Low" in this category refers to patients who had no errors for any of their medications. "High" refers to patients who had one or more errors in *two* or more of the error categories (size, duration, rate). This more stringent grouping excluded patients who had only one *type* of error, regardless of how many errors they made in an effort to identify patients who were more confused, making multiple types of errors. This strategy revealed that 10.5% of the sample had made some errors of at least two types. 62.1% of the sample had no errors, regardless of the number of medications they were given.

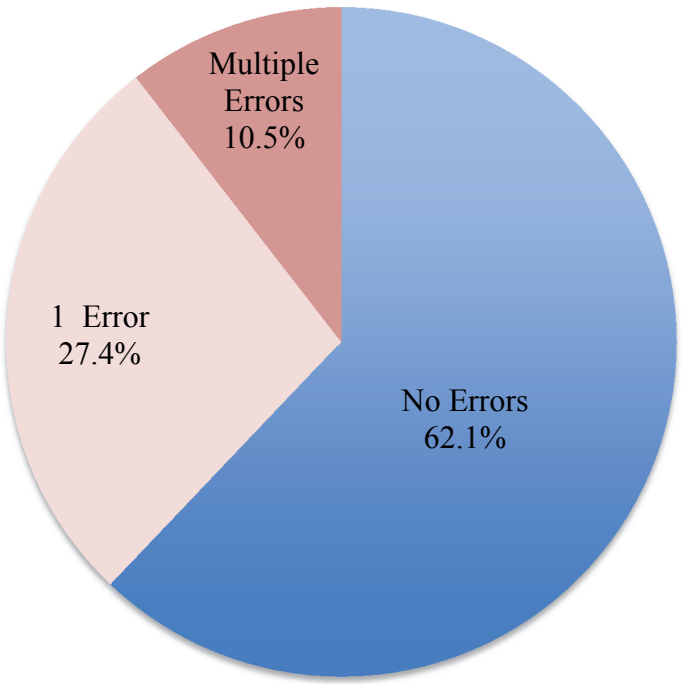

Figure 11. Proportions of Errors

The Any Error proportion and the Multiple Errors proportion were the two main measurements used as outcome variables when analyzing the effects of variables on patients' understanding of medication instructions.

Control and Intervention Groups

The two primary groups in this study were 1) the group with no intervention who received the usual standard of care before being interviewed, and 2) the group that received the pictograph in the pharmacy before being interviewed.

Table 6. Intervention Groups

Group	n	Percent
No Intervention	115	46.4%
Pictograph	123	49.6%
Coaching*	10	4.0%
Total	248	100%

**Included in descriptive statistics for total sample.*

Analytic Statistics

Distribution of Modifying Variables within Intervention Groups

The average age and gender distributions in each group were not statistically significantly different (p=0.90 and p=0.62, respectively), nor was there a significant difference between the groups in the number of medications for self (p=0.68) or others (p=0.77).

Table 7 shows the distribution of the variables related to verbal ability within each of the intervention groups. The column on the right shows that none of the other variables differed significantly from one group to the other. The no-intervention group

had a slightly larger percentage of illiterate and non-English-speaking patients than the pictograph group, though these differences were not statistically significant.

Table 7. Variables Related to Verbal Ability Across Intervention Groups

		Frequencies				χ^2	p
		No Intervention		Pictograph			
Variable	Category	n	Percent	n (%)	Percent		
Education	None	23	20.0%	22	17.9%	0.17	0.68
	Some	92	80.0%	101	82.1%		
Literacy	Illiterate	45	39.5%	34	28.1%	3.4	0.07
	Literate	69	60.5%	87	71.9%		
English	None	61	54.0%	50	41.7%	3.5	0.06
	Some	52	46.0%	70	58.3%		

Effect of Modifying Variables on Outcome

Table 8 consists of of eight contingency tables comparing the number of patients with each error proportion, for each category of the demographic and verbal advantage variables.

Table 8. Frequencies of Patients within Gender Demographic and Verbal Ability Categories: Overall Sample

		n patients (proportion within demographic category)			
		Any Errors		Multiple Errors	
Variable	Category	Errors	No Error	High	No Error
Gender	Male	27 (0.39)	42 (0.61)	9 (0.18)	42 (0.82)
	Female	67 (0.38)	111 (0.62)	17 (0.13)	111 (0.87)
Education	None	25 (0.53)	22 (0.47)	12 (0.35)	22 (0.65)
	Some	69 (0.34)	132 (0.66)	14 (0.10)	132 (0.90)
Literacy	Illiterate	41 (0.50)	41 (0.50)	15 (0.27)	41 (0.73)
	Literate	53 (0.33)	110 (0.67)	11 (0.09)	110 (0.91)
English	None	54 (0.42)	63 (0.58)	16 (0.20)	63 (0.80)
	Some	39 (0.31)	87 (0.69)	10 (0.10)	87 (0.90)

Demographic variables. Age had a significant impact on the Multiple Errors proportion (t= 2.07, p = 0.04), showing that older patients made more mistakes. There was no significant difference between the error rates of males and females (p=0.83 and 0.45 for Any Error and Multiple Errors, respectively).

Verbal ability. Table 9 shows the results for the effects of each of these variables on the Any Error proportion and the Multiple Errors proportion. χ^2 tests were run on the dichotomous variables. Significant results are highlighted in blue.

Education and literacy significantly impacted both types of error rate. English proficiency had a significant impact on the Any Errors proportion. Tables 8 and 9 show that education, literacy, and English proficiency have a protective effect against errors in medication instruction recall. Of these, education had the strongest magnitude of effect, since educated patients were 0.27 times less likely to have two or more types of mistakes in their recall of instructions.

Table 9. Relationship Between Verbal Ability and Error Rates for Overall Sample

	Effect on Error Rate in Overall Sample					
Variable	Any Error			Multiple Errors		
	RR	χ^2	p	RR	χ^2	p
Education	0.64	5.76	0.02	0.28	14.75	0.0001
Literacy	0.66	7.05	0.008	0.33	9.57	0.002
English	0.74	5.93	0.01	0.50	3.42	0.06

Number of medications. Table 10 shows that patients who were responsible for more medications (either for themselves or for family members) had significantly more errors (p=0.004 and p=0.02 for Any Errors and Multiple Errors, respectively).

Table 10. Relationship Between Number of Medications Per Patient and Error Rate in Overall Sample

	Effect on Error Rate in Overall Sample			
Variable	Any Errors		Multiple Errors	
	t	p	t	p
Total Medicines	2.87	0.004	2.41	0.02
For Self	2.10	0.04	1.87	0.06
For Others	1.69	0.09	1.40	0.16

Hypotheses

Hypothesis 1: Using the pictograph will decrease the error rate when patients recall their prescription instructions.

Effect of intervention on entire sample. Table 11 (page 53) displays the effects of the intervention on the specific types of error rates. The intervention decreased the error rate among all types of errors, and the statistically significant finding emerged using the measurement of Multiple Errors. Patients with the pictograph were 0.39 times less likely to have a high error rate using the Multiple Errors construct (p=0.019). So, the pictograph was found to decrease the error rate, thereby confirming Hypothesis 1 when patients with no errors were compared with patients who made at least one error in at least two categories. The null hypothesis was rejected in this case.

Effect of intervention, stratified by demographic variables. The values in table 12 were calculated from the data contained within Table 13. These tables show the effect of the intervention across the Any Errors proportion and Multiple Error proportion, while stratifying across the dichotomous modifying variables.

The pictograph had no statistically significant effect on the Multiple Error proportion among males, although the trend was, surprisingly, in the opposite direction than the hypothesized one (Table 12). On the other hand, females with the pictograph were 0.15 times less likely to have multiple errors than females without the pictograph.

Table 11. Effect of Intervention on Error Rates (Dichotomous Rates)

		Frequencies		RR	χ^2	p
		No Intervention	Pictograph			
Type of Rate	Categories	n (%)	n (%)			
Any Error	No Errors	69 (60.00%)	79 (64.23%)	0.89	0.45	0.50
	1+ Error	46 (40.00%)	44 (35.77%)			
Size	No Errors	107 (93.04%)	120 (97.56%)	0.35	2.75	0.10
	1+ Error	8 (6.96%)	3 (2.44%)			
Frequency	No Errors	85 (73.91%)	100 (81.30%)	0.72	1.87	0.17
	1+ Error	30 (26.09%)	23 (18.70%)			
Duration	No Errors	86 (74.78%)	97 (78.86%)	0.84	0.56	0.46
	1+ Error	29 (25.22%)	26 (21.14%)			
Multiple Errors	Low	69 (79.31%)	79 (91.86%)	0.39	5.51	0.019
	High	18 (20.69%)	7 (8.14%)			

Table 12. Effect of Intervention on Error Rate, Stratified by Modifying Variables

		Differences					
Variable	Stratifications	Any Errors (n=248)			Multiple Errors (n=170)*		
		RR	χ^2	p	RR	χ^2	p
Gender	Male	1.05	0.02	0.88	1.06	0.01	0.92
	Female	0.83	0.95	0.33	0.15	9.48	0.002
Education	None	0.67	1.79	0.18	0.27	4.95	0.003
	Some	1.00	0.0004	0.99	0.54	1.40	0.23
Literacy	Illiterate	0.83	0.66	0.42	0.26	4.81	0.03
	Literate	1.05	0.04	0.85	0.70	0.38	0.54
English	None	0.85	0.57	0.45	0.23	6.06	0.01
	Some	1.02	0.006	0.94	0.77	0.19	0.67

*Less than 248 because Multiple Errors compares patients with more than one type of error to patients with no errors (See Figure 12 p. 49).

Table 13. Error Proportions for Intervention Within Each Category of Modifying Variables

Variable	Stratifications	n patients (relative frequency within demographic and intervention category)							
		Any Errors				Multiple Errors			
		Pictograph		No Intervention		Pictograph		No Intervention	
		1+ Error	No Error	High	No Error	1+ Error	No Error	High	Low
Gender	Male	15 (0.41)	22 (0.59)	12 (0.39)	19 (0.61)	5 (0.19)	22 (0.81)	4 (0.17)	19 (0.83)
	Female	29 (0.34)	57 (0.66)	34 (0.41)	49 (0.59)	2 (0.03)	57 (0.97)	14 (0.22)	49 (0.78)
Education	None	9 (0.41)	13 (0.59)	14 (0.61)	9 (0.39)	2 (0.13)	13 (0.87)	9 (0.50)	9 (0.50)
	Some	35 (0.35)	66 (0.65)	32 (0.35)	60 (0.65)	5 (0.07)	66 (0.93)	9 (0.13)	60 (0.87)
Literacy	Illiterate	15 (0.44)	19 (0.56)	24 (0.53)	21 (0.47)	2 (0.10)	19 (0.90)	12 (0.36)	21 (0.64)
	Literate	29 (0.33)	58 (0.67)	22 (0.32)	47 (0.68)	5 (0.08)	58 (0.92)	6 (0.11)	47 (0.89)
English	None	21 (0.42)	29 (0.58)	30 (0.49)	31 (0.51)	2 (0.06)	29 (0.94)	13 (0.30)	31 (0.70)
	Some	22 (0.31)	48 (0.69)	16 (0.31)	36 (0.69)	5 (0.09)	48 (0.91)	5 (0.12)	36 (0.88)

Education, literacy, and English proficiency also had significant protective effects against high error rates within the Multiple Errors proportion construct, with magnitudes of effect of 0.27, 0.26, and 0.23, respectively (Table 12).

Hypothesis 2: Using the pictograph will cause a greater decrease in rate of frequency errors than the rate of dose size errors.

The pictograph was associated with a significant decrease in the rate of frequency errors for the total sample (see Table 14), with a decrease in the mean error rate from 0.13 to 0.072 (p=0.042). The size error rate has a smaller, nonsignificant decrease in mean error rate from 0.027 to 0.0088. These findings did not confirm Hypothesis 2, and the null hypothesis was not rejected.

Table 14. Effect of Intervention on Continuous Error Rates

	Frequencies						t	p
	No Intervention (n=115)			Pictograph (n=123)				
Type of Rate	Range	$\overline{x}$	SD	Range	$\overline{x}$	SD		
Rates								
Overall Error Rate	0-1	0.23	0.33	0-1	0.19	0.29	-1.03	0.31
Size Rate	0-0.67	0.027	0.11	0-0.5	0.0088	0.058	-1.61	0.11
Frequency Rate	0-1	0.13	0.26	0-1	0.072	0.17	-2.05	0.042
Duration Rate	0-1	0.12	0.25	0-1	0.12	0.27	-0.07	0.94
Absolute Numbers								
Incorrect Medications	0-4	0.62	0.88	0-5	0.5	0.82	-0.67	0.50
Overall Error Number	0-5	0.76	1.17	0-5	0.54	0.88	-1.64	0.10

Hypothesis 3: Using the pictograph will increase the rate of duration errors.

The mean duration error rate remained unchanged at 0.12 errors per patient, with and without the pictograph (Table 14). The study did not show a significant difference in rate of duration errors between the two groups, and the null hypothesis was not rejected.

CHAPTER SIX

Discussion

In this sample of 248 Luo adults coming to a temporary clinic in a rural area of western Kenya, 37.9% of all of the patients had at least one or more error in their recall of medication instructions. Forty percent of the patients who were given the usual standard of care had one or more error. This is a very high error rate that may affect patient adherence and calls for improvement in the clinic's method of communicating medication instructions.

Demographic Effects on Error Rate

Demographics. Out of all the demographic variables, education had the strongest effect on decreasing the error rate. This could be because education affects whether a patient is literate or has English proficiency, so it is the strongest determinant of how well a patient can correctly recall medication instructions.

Number of medications. As was shown in Table 10, a larger number of medications strongly and significantly correlated with a high error rate. This result is expected for two reasons: one, because a larger number of medications is harder to learn and keep track of, and two, patients may have a certain probability of making a mistake on a medication. The more medications a patient has, the greater chance that one of those medications will have a mistake, and the patient will no longer have an error rate of 0.

Although the error rate increased as patients had more medications for others, this result was not significant.

Hypotheses

Hypothesis 1: Using the pictograph will decrease the error rate when patients recall their prescription instructions.

As Figure 12 illustrates, the pictograph intervention had a significant, positive effect on accuracy of medication recall when the proportions of patients with multiple types of errors were compared with one another (Table 11). Patients given the pictograph were 0.39 times less likely to have a high combination of mistakes in their recall (p=0.019). This estimate of effect became stronger for certain social and demographic groups.

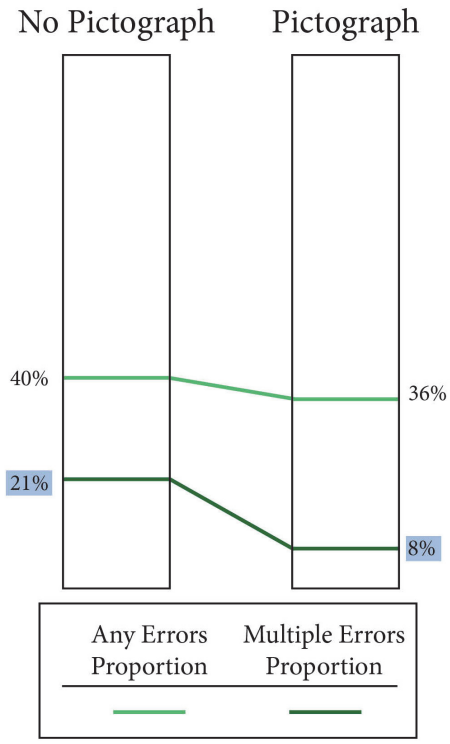

Figure 12. Comparison of Error Rates for Overall Sample

The impact of gender. Figure 13 illustrates the effect of the pictograph when stratified by males and females. The light lines represent the proportion of patients with any errors (whether a patient made no mistakes versus one or more mistakes), and the dark lines represent the proportion that had multiple errors. This figure is adapted from Tables 12 and 13. The significantly different result is highlighted in blue.

The pictograph caused a decreased the error rate for females when either metric was used. One surprising result is a small (although nonsignificant) increase in the error

rate among males when the pictograph was used. The strongest effect was that of the pictograph among the Multiple Errors proportion for females. Females with the pictograph had a relative risk of 0.15 for making more than two types of errors, as compared with females who were not given the pictograph. The success of the pictograph among females is apparent, although its helpfulness among males is not. Two hypotheses to explain this phenomenon are that the pictograph was created in a format that does not help males understand the medication instructions better, or that understanding the communication of instructions is not a factor in how well males recall the instructions. Improvements to find ways to make the pictograph more effective among males (or find a better method than a pictograph) will be sought.

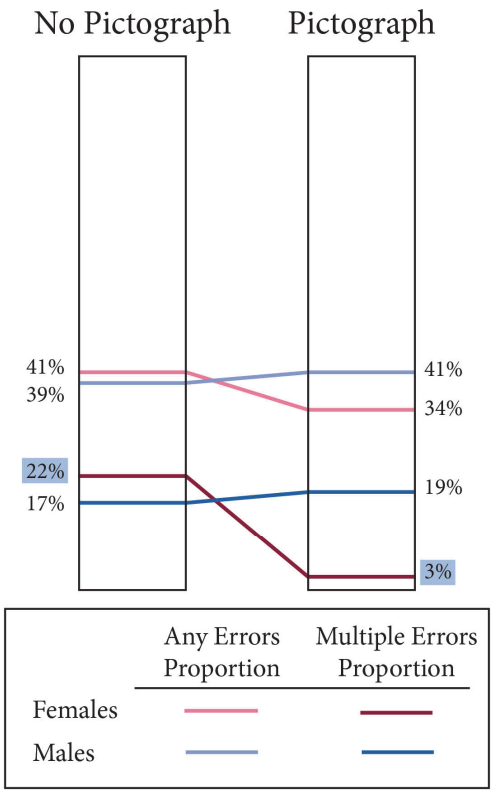

Figure 13. Comparison of Error Rates of Males and Females Without and With Pictograph

The impact of verbal ability. The effect of the pictograph was also stratified by whether or not the patient spoke English proficiency, whether or not the patient had any education, and whether the patient was literate. The results are recorded in Tables 12 and 13, and illustrated in Figures 14 and 15.

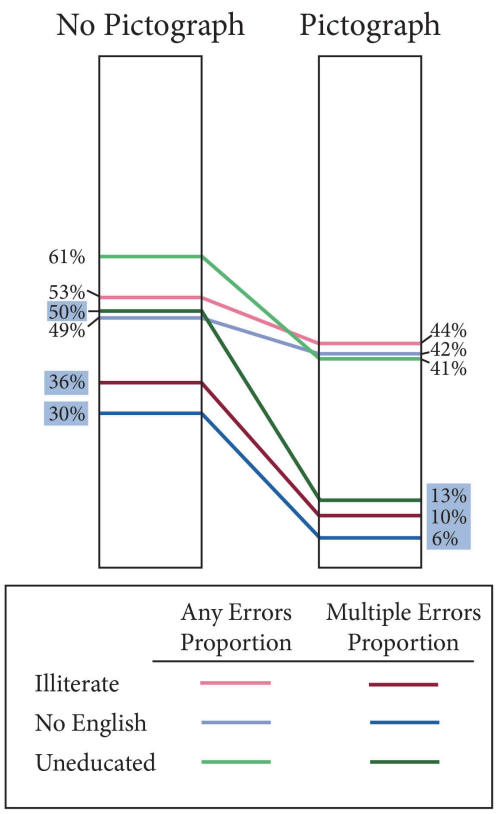

Figure 14. Comparison of Error Rates of Disadvantaged Verbal Abilities Without and With Pictograph

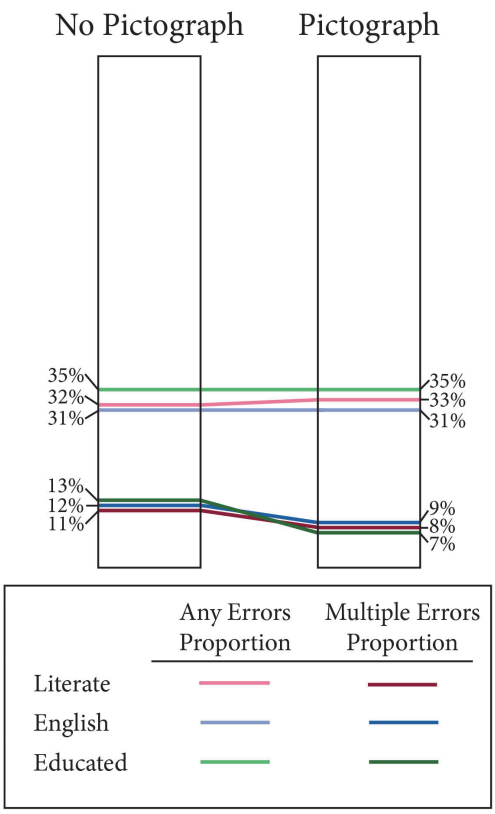

Figure 15. Comparison of Error Rates of Advantaged Verbal Abilities Without and With Pictograph

Once again, the significant differences are highlighted in blue. From these figures it is apparent that the pictograph decreased the error rate among illiterate, non-English-speaking, and uneducated patients. In each case, the estimate of effect was greater than that for the entire sample (Tables 11 and 12). However, the pictograph did not help literate, English-speaking, or educated patients.

The pictograph helps to even out disparities between those with advantaged and disadvantaged verbal abilities. In fact, verbally disadvantaged patients with the pictograph performed as well or better than verbally advantaged patients without the pictograph. Although this effect is helpful for illiterate, uneducated, and non-English-

speaking patients, changes to the pictograph to improve its effectiveness among patients of advantaged verbal abilities will be pursued.

Hypothesis 2: Using the pictograph will cause a greater decrease in rate of frequency errors than the rate of dose size errors.

As Figure 16 shows, the significant result for the decrease in mean rate of errors per patient was in the frequency category. Although the mean dose size error rate decreased by a greater portion of its original value, the frequency mean had a greater impact, especially since it started out with the greatest value. This is an important result, since frequency errors were the strongest contributor to the error rate among patients without the pictograph.

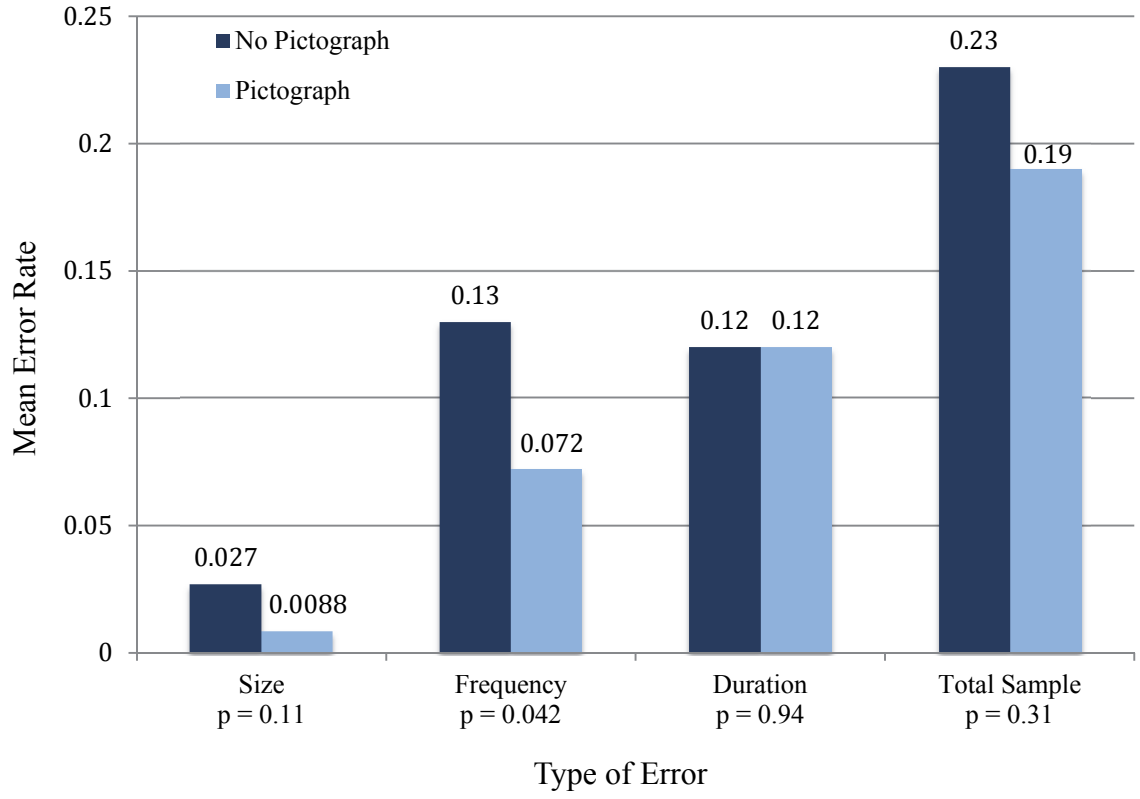

Figure 16. Comparison of Mean Error Rates With and Without Pictograph.

Hypothesis 3: Using the pictograph will increase the rate of duration errors.

This hypothesis was not supported by the data (see Figure 17), which show that there was no difference in the mean error rate of duration between the two groups. The pictograph was expected to increase the rate of duration errors because the patients without the pictograph were given an indication of the number of days to take the medicine, written on the plastic bag (for example 1x2x3, indicating to take the medication for three days), while the patients with the pictograph were only told out loud to take the medication "until the medicine runs out." In the future, the clinic will indicate the duration to take medications on the pictograph, in English and Luo, in order to communicate duration clearly to at least the literate patients.

Effect of Pictograph Improvements On This Population

The pictograph has been shown to be successful for decreasing the errors among verbally disadvantaged patients. The three variables of language, education, and literacy are not mutually exclusive. Figure 17 illustrates the distribution of overlap among these three variables.

31.5% of the sample had a combination of two or more Verbal Disadvantages, and 18.1% had all three. The pictograph would be expected to have an especially strong impact on these patients. Almost half (47.6%) of the sample had at least some education, spoke at least minimal English, and could read. However, even these groups still had an alarmingly high error rate. Future research should pursue a method of communication that will help patients of advantaged verbal abilities.

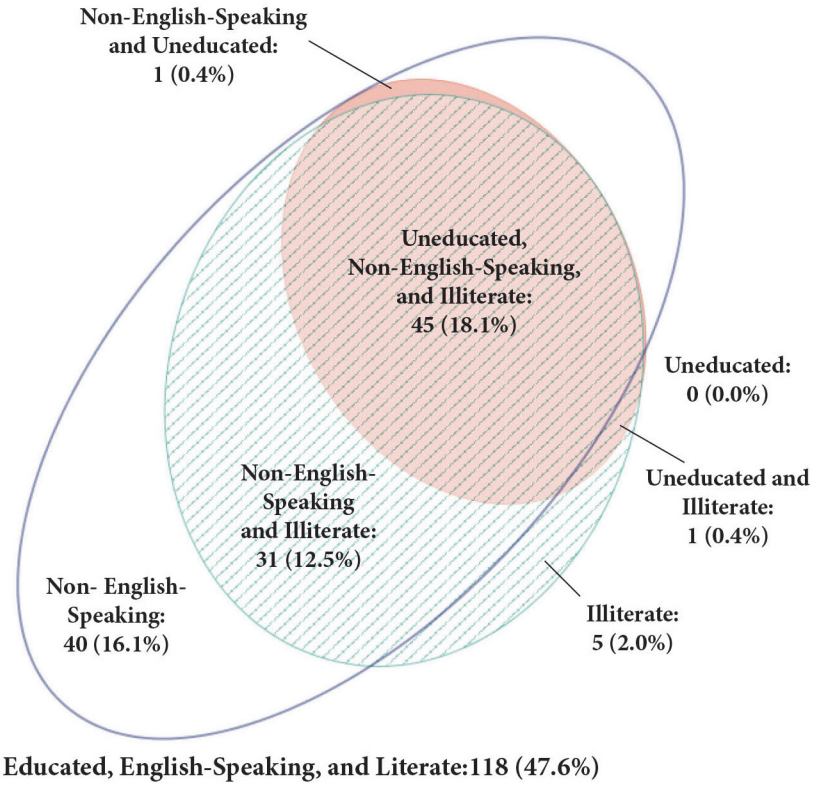

Figure 17. Venn Diagram of Overlapping Verbal Skills of Patients.

Limitations of Study

Generalizability

This study is limited because it deals with a very specific sample. The study occurred in a rural setting and the results may not be applicable to urban areas. The study took place in a traditional, impoverished setting, where the patients generally have no regular healthcare. The results of the study may not apply to populations with different amounts of exposure to Western medicine.

One other distinguishing factor of the study that could limit generalizability is the fact that it took place in a busy, temporary clinic that sees patients only once per year.

The practice effect could change the outcome for clinics that remain continuously open, because those clinics could learn which patients need more help and spend more time ensuring that those patients understood the medication instructions well. Also, patients who received medication more frequently would presumably get more familiar with treatment regimens and make fewer mistakes.

Random Error

Although this study avoided a majority of random error by performing statistical testing, randomness is still always a threat. The sample size was relatively small, which kept from adjusting for multiple variables.

Systematic Error

There is a possibility that factors that were not measured in the study could be affecting the outcome. For example, the fact that the patients and the physicians and researchers come from different continents may harbor an unseen cultural disconnect that could be decreasing the understanding of medication instructions. The experience of being questioned as part of a research study may have been sufficiently intimidating to have affected recall.

Future Research

This study leaves several possibilities for future research.

First of all, the pictograph itself could certainly be improved, such as finding a better way to communicate duration of treatment. There is also room for further research into finding the best ways to continue to improve accuracy of medication recall of the

patients whom the pictograph did not help very much, such as the verbally advantaged patients and males.

Future research could also compare these results to those of a local, permanent clinic. Analyzing the differences in results in a study of the same population could add insight into whether aspects such as the clinic being small, busy, temporary, noisy, or run by foreign physicians has any impact on results.

Follow-up research could also continue with a study varying translators, to assess whether variation of translators holds much of an effect in patients' understanding.

Conclusion

The pictograph decreased the rate of multiple errors in females as well as verbally disadvantaged patients. Future work will continue to make an effort to improve this pictograph and communication with patients in the Straw to Bread clinic, and also to find ways to improve the error rate of males and the verbally advantaged patients, since their error rates were still very high. This may include improvements outside of the pictograph, such as those illustrated in the Cultural Competency Framework in Figure 2. In the future, the Straw to Bread clinic could pursue interventions such as recruiting and retaining more staff who are more culturally representative of the population on the Nyakach plateau, improving the training and use of interpreter services, and making sure the healthcare providers are aware of cultural differences. The Straw to Bread clinic could also pursue a method of education for patients outside of the instructions given in the pharmacy, to make the patients more familiar with medication instructions.

All these interventions have the common goal of improving patients' understanding and acceptance of medication instructions. The clinic intends to achieve as

high a rate of understanding as possible among its patients, in order to increase patient adherence and thereby the effectiveness of treatment. These improvements in the healthcare delivered by this clinic endeavor to alleviate the burden of disease in this impoverished community within Sub-Saharan Africa.

APPENDIX

APPENDIX A

Medication Survey

1) Patient ID _____

Medication Sheet

2) Date 05/_____/2013

3) Time: _____ a.m. p.m.

4) English Proficiency: ___ Knows no English (1)
___ Knows some but needs translator's help (2)
___ Fluent in English (3)

5) Literate: ___No (0) ___Yes (1)

5) Birth Date: ___/___/_____ *(mo/dy/yy)*

6) How much school completed: ___ No education (0) ___Primary (1) ___Secondary or trade school (2)
___ University (3)

7) Gender ___Male (0) ___Female (1)
8) Form of instructions: ___ Normal (1) ___ Coaching (2) ___ Coaching and Pictograph (3)

Medication 1	**Medication 2**
10) Description _____	**19) Description** _____
11) For: ___Self (0) _____Other (Pt. ID)	**20) For:** ___Self (0) _____Other (Pt. ID)
12) Actual Instructions: a)___Quantity b)____Times per day c)____Duration d) Other:_____	**21) Actual Instructions:** a)___Quantity b)____Times per day c)____Duration d) Other:_____
13) Form of Medicine: ___ Pill (1) ___Liquid (2) ___ Topical (3)	**22) Form of Medicine:** ___ Pill (1) ___Liquid (2) ___ Topical (3)
14) ***What do you do with this medicine?*** _____	**23)** ***What do you do with this medicine?*** _____
15) ***How many times during the day do you take/use it?*** a) Number _____ b)___Use when necessary(88) c)___Don't know(99)	**24)** ***How many times during the day do you take/use it?*** a) Number _____ b)___Use when necessary(88) c)___Don't know(99)
16) ***What times during the day do you take it? What quantity do you take/use at that time?**** a)___ Morning b)___ Midday c)___ Evening d)___ Don't Know	**25)** ***What times during the day do you take it? What quantity do you take/use at that time?**** a)___ Morning b)___ Midday c)___ Evening d)___ Don't Know
17) ***How long do you take the medicine for?*** a)_____ Days b)___ Keep and use as needed c)___ Until the medicine runs out d)___ Don't know e)___ Until the symptom leaves	**26)** ***How long do you take the medicine for?*** a)_____ Days b)___ Keep and use as needed c)___ Until the medicine runs out d)___ Don't know e)___ Until the symptom leaves
18) Patient repeats instructions accurately the first time ___No (0) ___Yes (1)	**27)** Patient repeats instructions accurately the first time ___No (0) ___Yes (1)
☐Patient repeats instructions accurately before leaving the clinic	☐Patient repeats instructions accurately before leaving the clinic

*Write the quantity if the patient knows the dose of medicine each time, X if the patient knows he/she takes medicine at that time of day but does not know quantity.

Examples:

Patient: "I take 2 pills in the morning and 2 pills in the evening."
a)_2__ Morning b)___ Midday c)__2_ Evening d)___ Don't Know

Patient: "I take it twice a day." OR "I take it in the morning and evening."
a)_X__ Morning b)___ Midday c)__X_ Evening d)___ Don't Know

Patient: "I take one pill a day."
a)_1__ Morning b)___ Midday c)___ Evening d)___ Don't Know

Patient: "I don't know how much I take per day."
a)___ Morning b)___ Midday c)___ Evening d)_X__ Don't Know

ALSO: If answer to 15 ("How many times per day do you take it?") is b ("Use when necessary"), SKIP #16.

1) Patient ID _____

Medication 3	**Medication 4**
28) Description _____	**37) Description** _____
29) For: ___Self (0) _____Other (Pt. ID)	**38) For:** ___Self (0) _____Other (Pt. ID)
30) Actual Instructions: a)___Quantity b)____Times per day c)____Duration d) Other:_____	**39) Actual Instructions:** a)___Quantity b)____Times per day c)____Duration d) Other:_____
31) Form of Medicine: ___ Pill (1) ___Liquid (2) ___ Topical (3)	**40) Form of Medicine:** ___ Pill (1) ___Liquid (2) ___ Topical (3)
32) ***What do you do with this medicine?*** _____	**41)** ***What do you do with this medicine?*** _____
33) ***How many times during the day do you take/use it?*** a) Number _____ b)___Use when necessary(88) c)___Don't know(99)	**42)** ***How many times during the day do you take/use it?*** a) Number _____ b)___Use when necessary(88) c)___Don't know(99)
34) ***What times during the day do you take it?*** ***What quantity do you take/use at that time?**** a)___ Morning b)___ Midday c)___ Evening d)___ Don't Know	**43)** ***What times during the day do you take it?*** ***What quantity do you take/use at that time*?*** a)___ Morning b)___ Midday c)___ Evening d)___ Don't Know
35) ***How long do you take the medicine for?*** a)_____ Days b)___ Keep and use as needed c)___ Until the medicine runs out c)___ Don't know e)___ Until the symptom leaves	**44)** ***How long do you take the medicine for?*** a)_____ Days b)___ Keep and use as needed c)___ Until the medicine runs out c)___ Don't know e)___ Until the symptom leaves
36) Patient repeats instructions accurately the first time ___No (0) ___Yes (1) ☐ Patient repeats instructions accurately before leaving the clinic	**45)** Patient repeats instructions accurately the first time ___No (0) ___Yes (1) ☐ Patient repeats instructions accurately before leaving the clinic

46) What else would you like to know about your medication?

47) What should we change about our clinic that would make your visit better next time?

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