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Health Literacy and Medication Adherence

Seanny Minn
University of San Francisco, seannymin@msn.com

Putting Evidence into Practice: Creating Health Literacy and Medication Adherence Tool

Seanny Min, DNP©, FNP, CNS, PA-C, MSN

University of San Francisco

Doctorate of Nursing Practice Project

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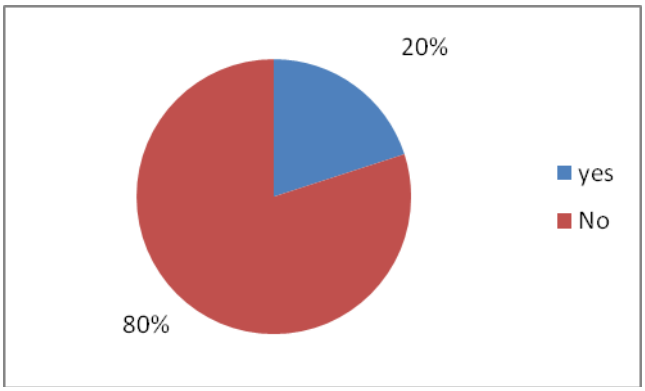
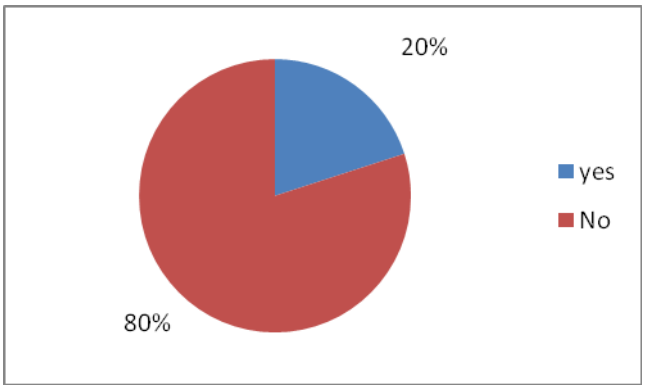
PRE-INTERVENTION SURVEY

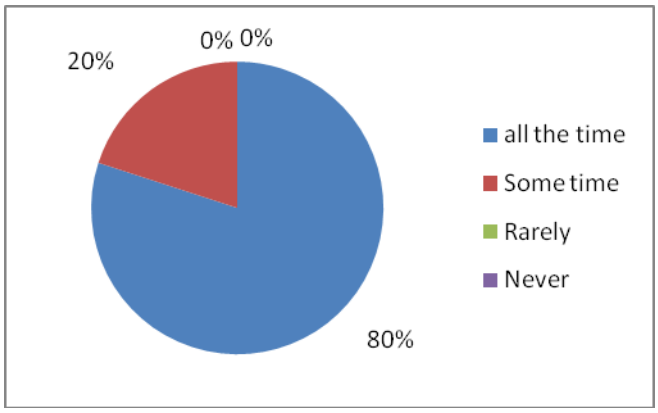
Can you read your medication instructions?



Do you understand your medication instructions?



How often do you need someone to help you take your medicine?



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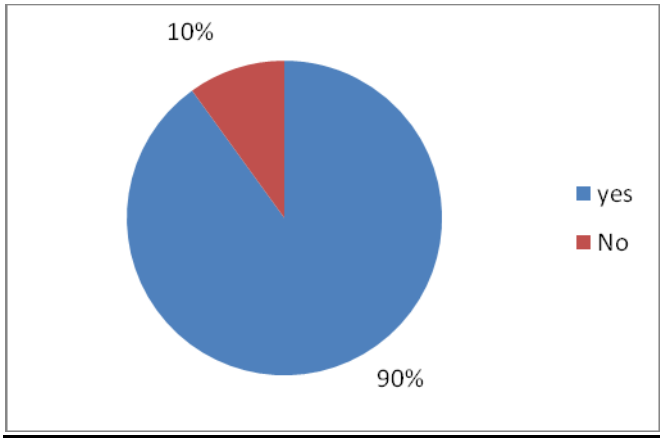

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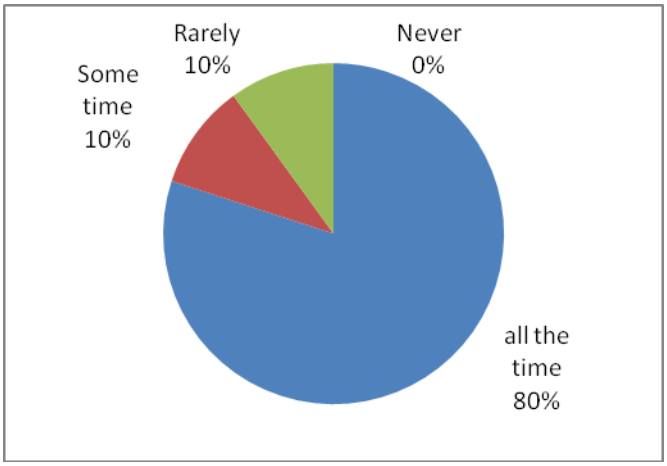
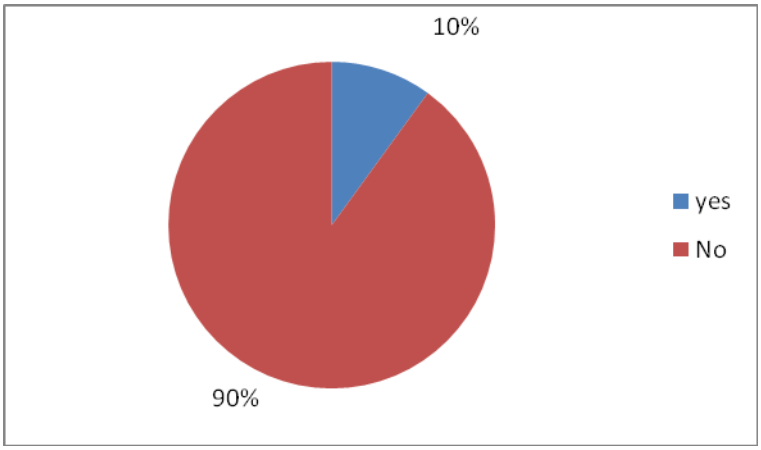


Were you able to tell what *this* medication is for?



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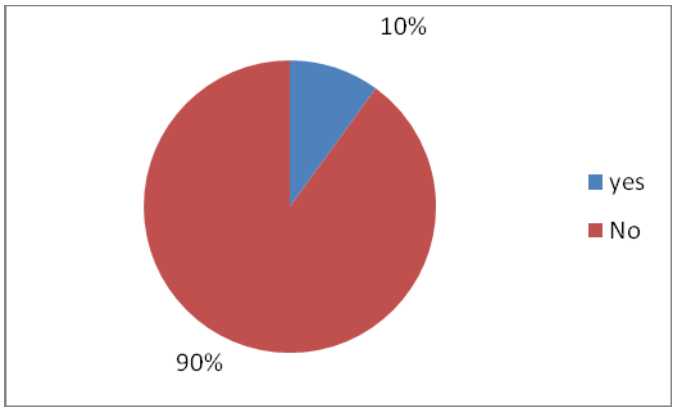
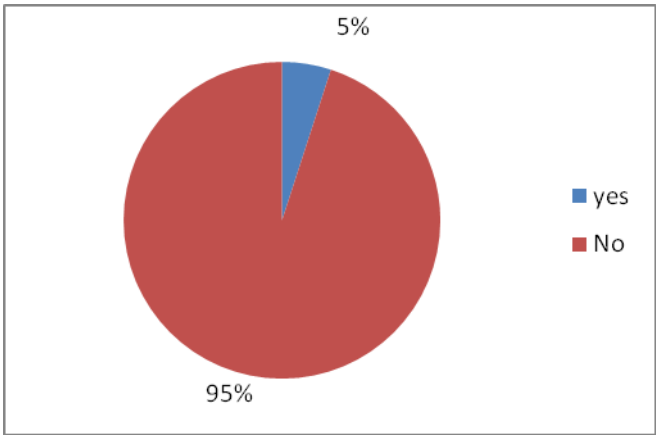
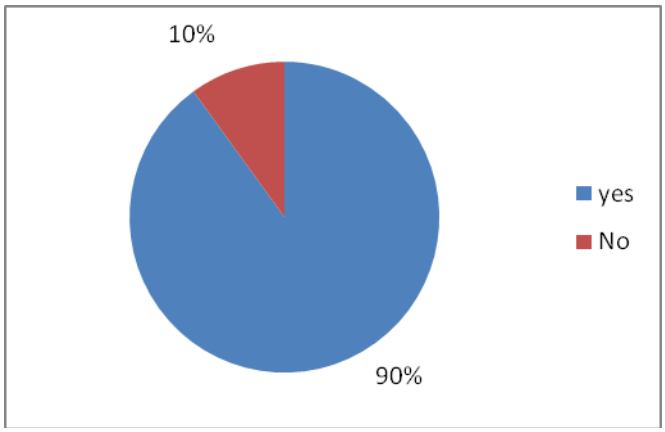


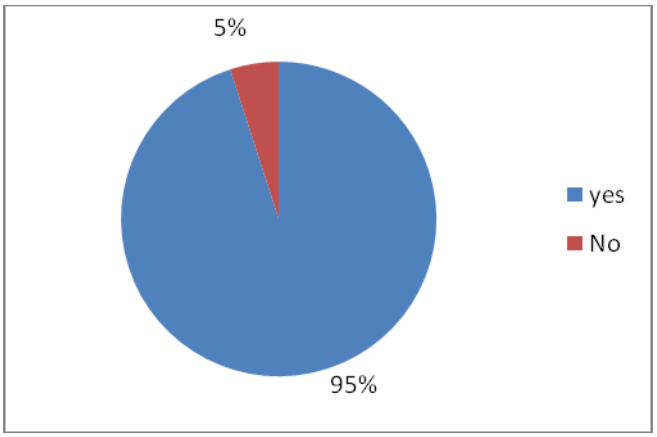
Are you able to describe what your doctor told you to expect from taking this medication?



When you feel better, do you sometimes stop taking your medicine?



Do you sometimes stop taking your medication if you begin to feel worse?



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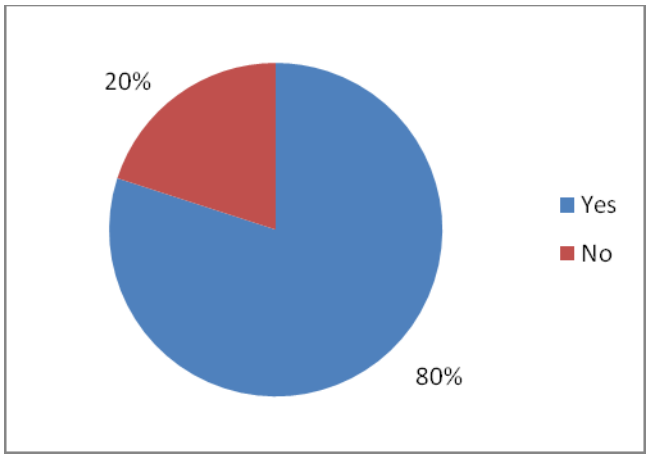
POST-INTERVENTION SURVEY

Do you understand your medication instructions?



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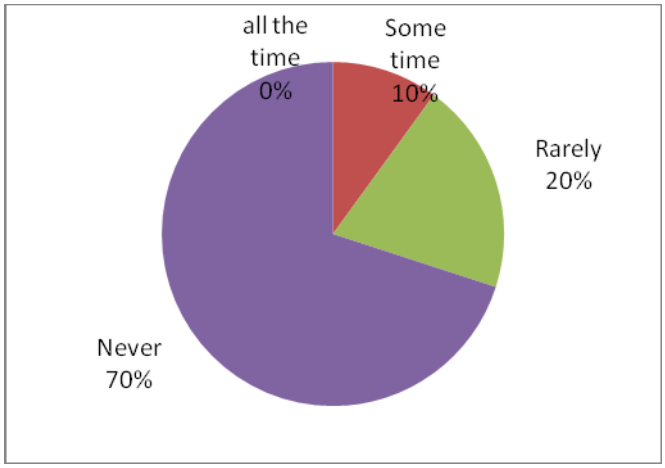

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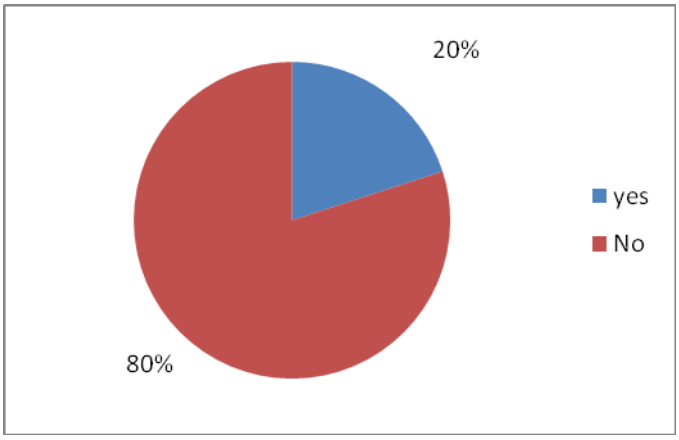

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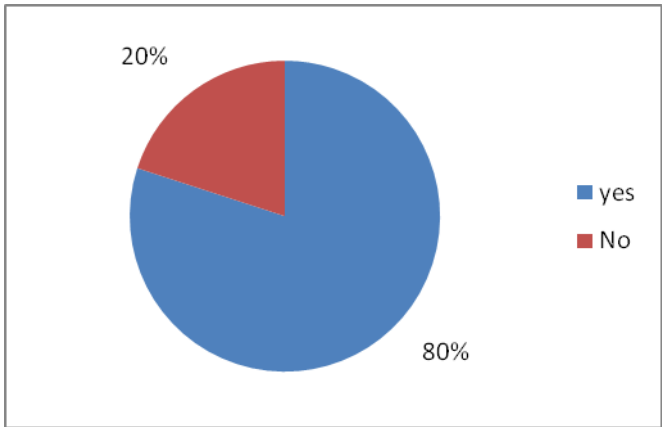

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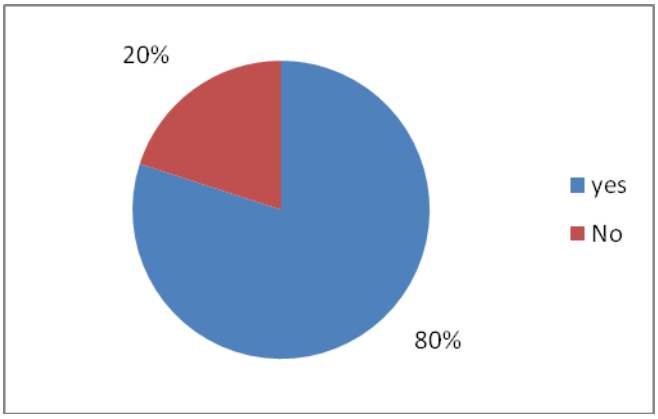

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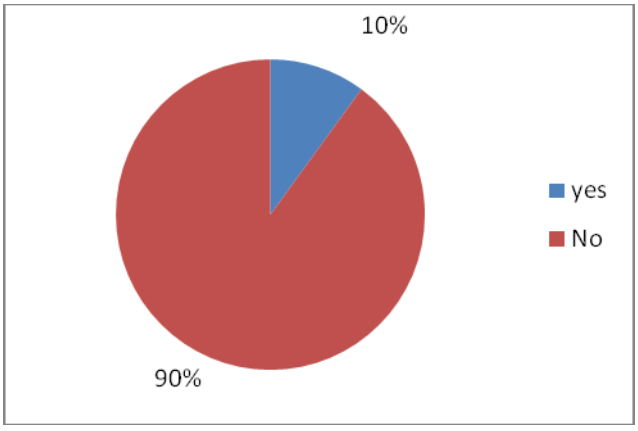

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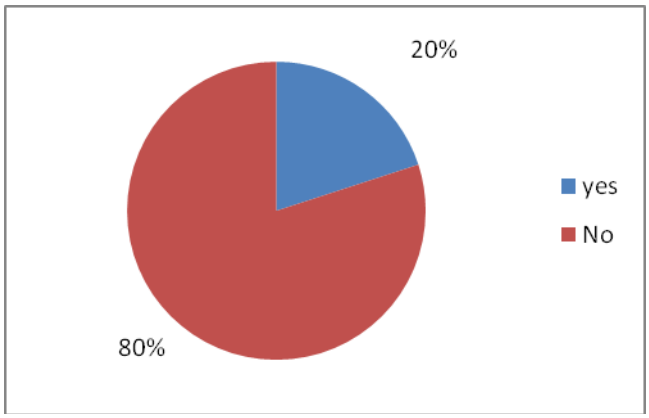

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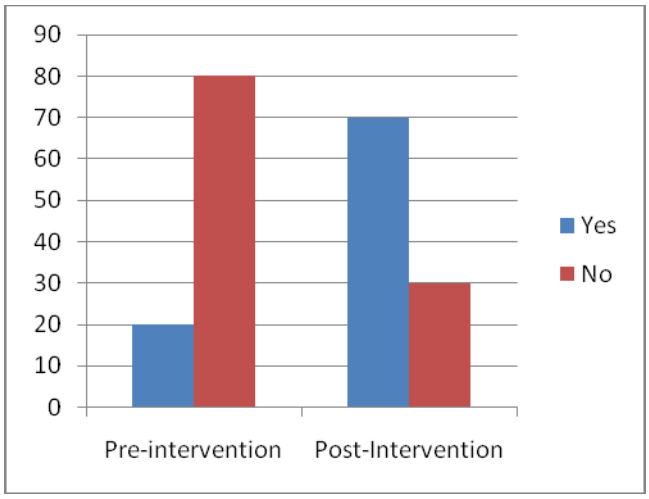
Comparing the Data

Do you understand your medication instruction?



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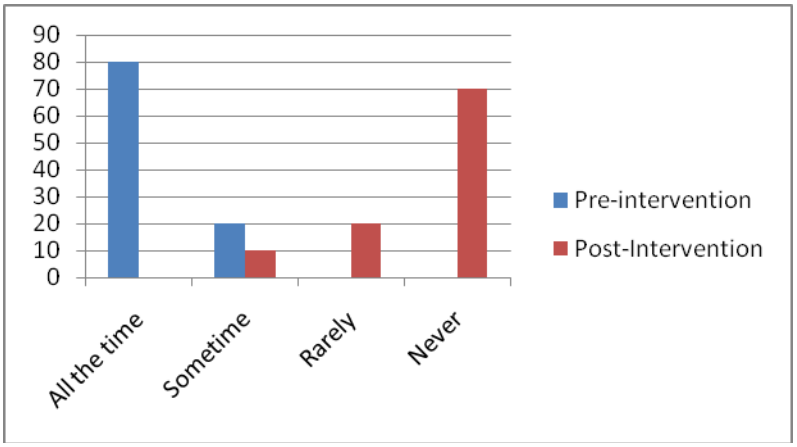

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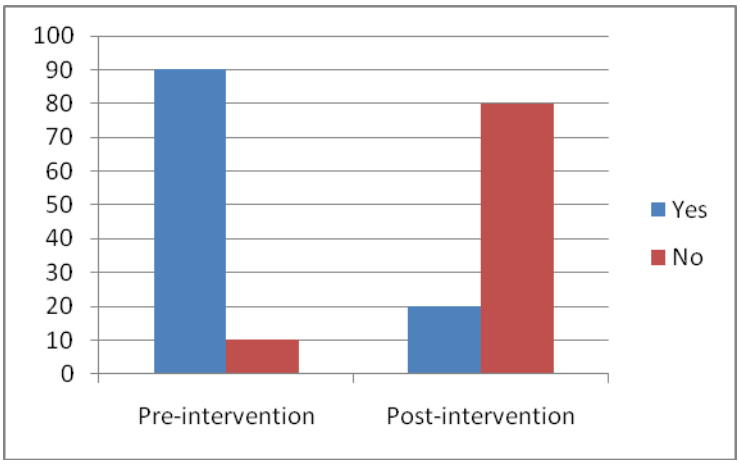

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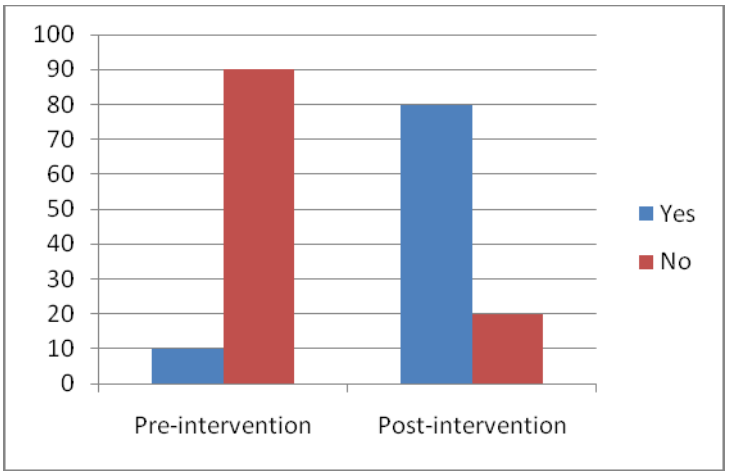

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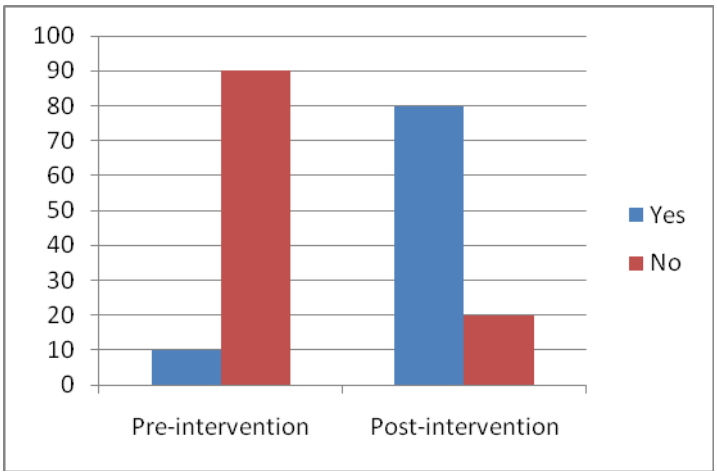

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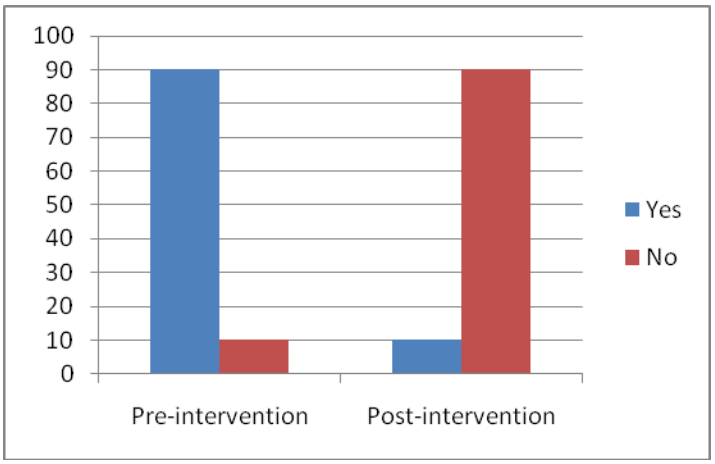

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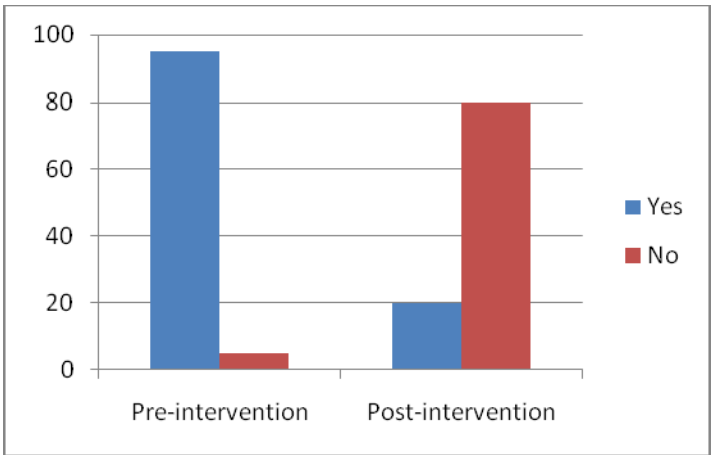

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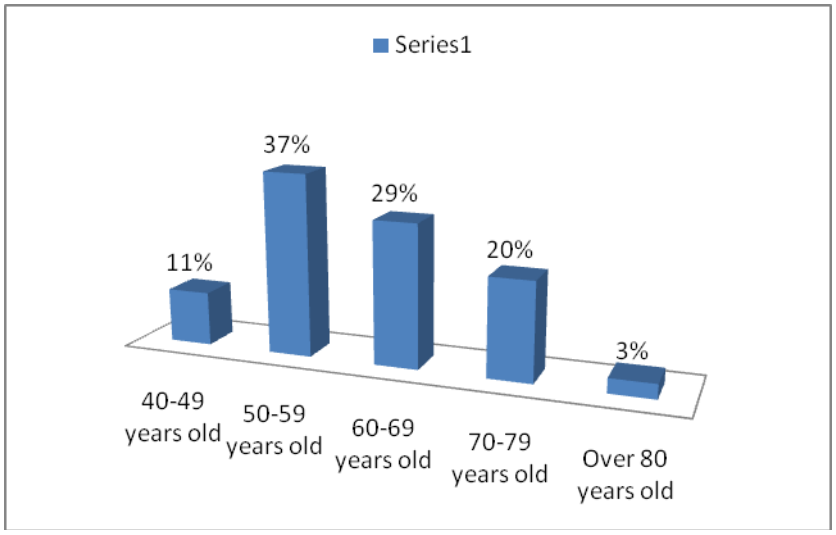
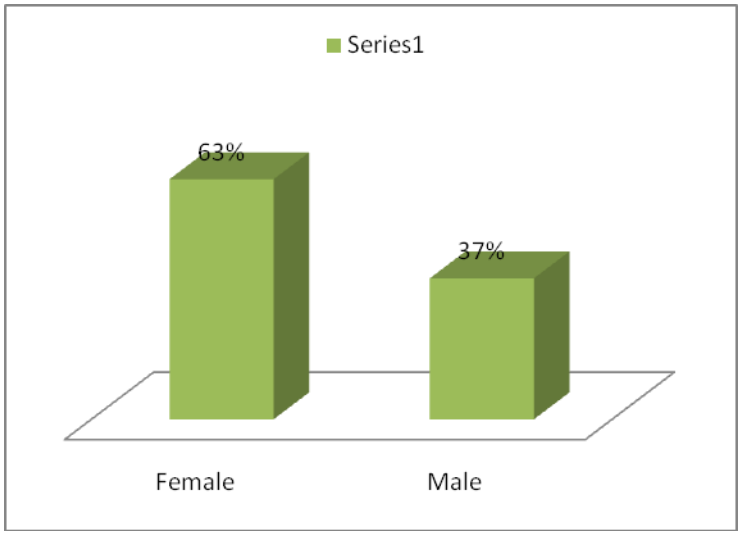
Demographic

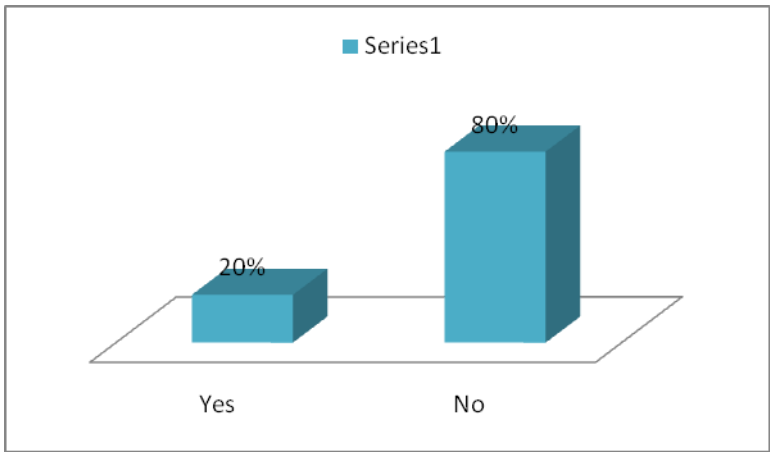
What is your age group?



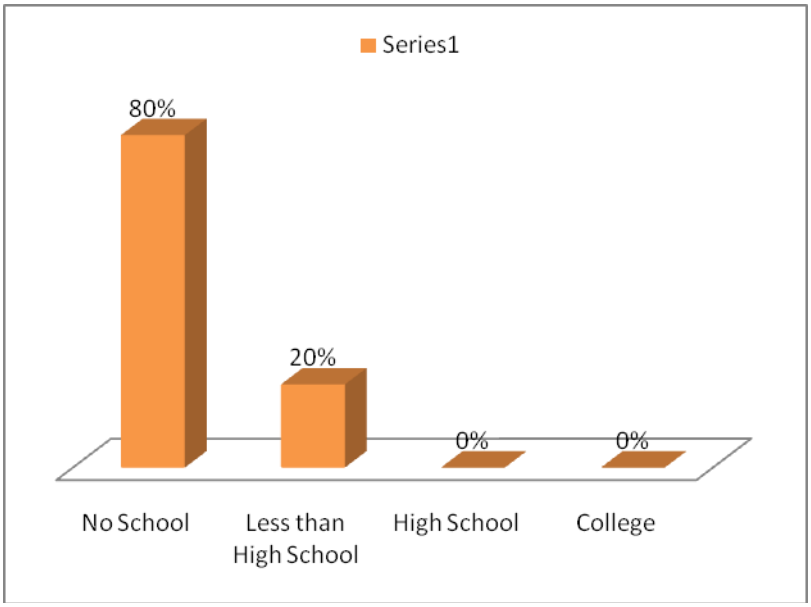
What is your gender?



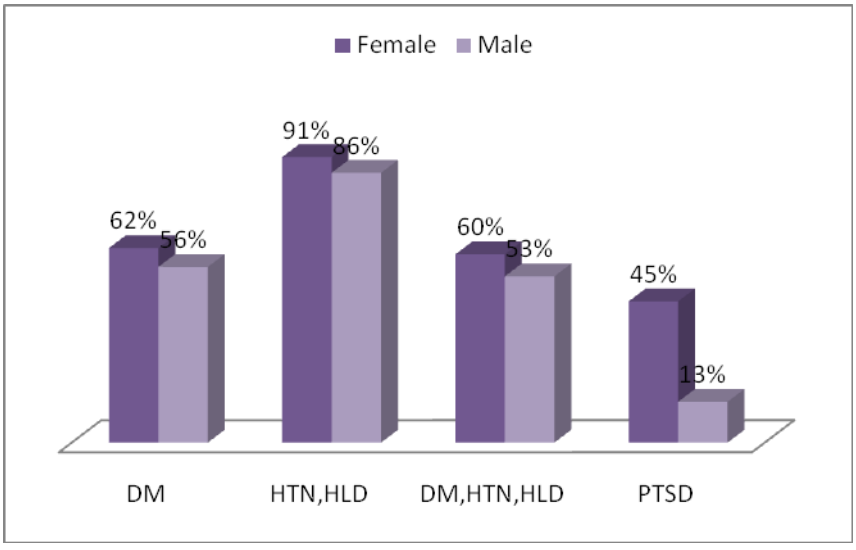
Have you ever attended school?



What is your educational background?



Disease Statistics



Section I: Introduction

Poor adherence to medical treatment is a national burden in the United States, and a major cause for poor adherence is low literacy and reading skills. Current available interventions and studies leave many important questions unanswered, and additional research on the effects of low literacy is essential.[1] Given the fact that barriers to medication adherence result from deficient health literacy, millions of Americans suffer from adverse health outcomes each year.[1] This DNP project will discuss the development of an effective pictorial, evidence-based medication tool for low literacy, illiterate and cognitively impaired patients to significantly improve quality of life, healthcare, clinical outcomes, understanding of medication instructions, patient safety related to medication adherence and the current and future U.S. financial burden.

Time for Change

Problems with properly adhering to medication are associated with many factors: health system issues, individual factors related to medical conditions, physical disability, socio-economic status, the complexity of the medication therapy and low health literacy.[2] While there are several non-adherence medication related factors, low health literacy has been widely recognized as a strong prediction of poor health outcomes and economic drain.

A key aspect of poor medication adherence is difficulty following medication instructions. Contributing to this aspect is a lack of health literacy, which is one of the most challenging factors to manipulate. Inadequate follow-through with treatment and medication plans results in a variety of adverse health outcomes, e.g. uncontrolled hypertension, diabetes, or hyperlipidemia, and a higher number of emergency services and hospital readmissions.

Researchers suggest that limited health literacy is associated with a greater number of instances of medication non-adherence in the ambulatory care setting.[2-3] It is critical for there to

be an effective exchange of information between patients and healthcare providers during emergency room discharge, as it affects healthcare costs and mortality rates.[2-3] While health literacy has been widely recognized as a strong predictor of medication adherence, the healthcare system continues to have significant gaps in the way health information is written and the patient's ability to understand and act on it. Addressing low health literacy can be expected to result in major financial savings in the healthcare industry.[4]

Section II: Examining the Clinical Relevance of the Problem

Clinically Relevant Problem

"Don't ask, don't tell."

A Case of Health Illiteracy, Not Noncompliance

A 65-year-old Asian woman, Mrs. S., visits her primary care provider for ongoing treatment of hypertension and type 2 diabetes mellitus. Neither her diabetes nor her hypertension have been well controlled in the past. Her hemoglobin A1c level (the percentage of glucose that binds to hemoglobin in red blood cells, HbA1c) [4-6] has been abnormally high, ranging from 9% to 12% (normal < 7%), and her home blood sugar levels have fluctuated from as low as 60mg/dl to as high as 400 mg/dl (normal < 109 mg/dl).[4-6] Mrs. S. frequents Asian Health Services with hypotensive or hypertensive symptoms, and hyperglycemic or hypoglycemic symptoms, regardless of adjustments to medications. Her primary provider notices that her medication bottles appear to differ at every visit; they are labeled with differing doses, and some are even one to two years old. When asked to describe how she takes her medications, she responds,

"I take one pill from every bottle once a day so that I can remember and easily understand taking them." Since she cannot read in English nor in her native language, her method seemed the easiest for her to remember and take multiple prescribed medications.

The aforementioned case is similar to the experiences of many other patients, who have been labeled *non-adherent*. However, the question remains: Is Mrs. S. really non-adherent, or does she have an undetected health illiteracy problem with cognitive or memory impairment?

All healthcare providers may come across patients like Mrs. S. has, yet the problem of health illiteracy and cognitive impairment are often ignored. The effects of health illiteracy and cognitive or memory impairment and medication non-adherence significantly affect the health burden and expenditures of the entire United States.

Health Literacy and Its Consequences

The Institute of Medicine (IOM) defines health literacy as "the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions."[7] Health literacy affects people's ability to navigate the healthcare system, including filling out complex forms, locating providers, sharing personal information with healthcare providers, understanding mathematical concepts, and engaging in self care and chronic disease management.[8-9] Patients with basic or below basic health literacy skills do not have the ability to perform even the simplest of those tasks, nor are they able to provide information as to why and when certain illnesses might need to have a specified test. Adherence-related outcomes are expected to worsen as the global prevalence of people experiencing chronic diseases grows.

In the United States and around the world, there is compelling evidence that patients are not taking their prescribed medications accurately, and they lack the knowledge to properly navigate medical management and the health system. *Health illiteracy*, which afflicts Mrs. S. and many others, is increasingly being viewed as a patient safety concern and a prime source of medication-related errors. The ramifications of improperly following prescribed medication

instructions and inappropriately navigating the health management system affect every aspect of healthcare. Non-adherent behaviors have been linked to significantly higher healthcare costs, emergency room readmissions and patient mortality rates.[10]

An important aspect of non-adherence is unfilled prescriptions, which account for about 140 million prescriptions in the United States, worth about $2.8 billion per year. Furthermore, non-adherence to medical treatments and medication-related errors are a source of approximately 125,000 deaths, $106 billion to $238 billion in healthcare costs, more than 10% of geriatric hospital admissions, nearly one quarter of nursing home admissions, and 20% of preventable adverse effects in the United States annually.[7-11] The estimated costs associated with low health literacy from the current lack of effective action are expected to range from $1.6 trillion to $3.6 trillion annually.[9] In fact, medication adherence and health literacy problems have become so prevalent in the United States, the problem could be considered a modern-day epidemic.

Section III: Review of the Literature and Evidence

In 2003, a national study based on the National Assessment of Adult Literacy (NAAL) reported that 36% of American adults possess basic or below basic literacy skills, with other studies claiming that number to be as high as 40% to 60%.[7, 12-14] Many patients may read at a fifth-grade level or below, which is classified as low literacy.[7] Low health literacy affects all populations, but when comparing population proportions, ethnic minorities like Mrs. S. are disproportionately affected by low health literacy.[13]

In addition, cultural and socioeconomic factors may contribute to low health literacy. People like Mrs. S. with poor English language proficiency, limited access to education, and of a low socioeconomic status are most likely to be illiterate. Poor health literacy is most pronounced among patients with chronic medical conditions, such as Mrs. S. with type 2 diabetes mellitus

and hypertension, which are commonly seen in geriatric populations.[7, 14] Schillinger et al.[12] compared health literacy levels in type 2 diabetic patients and found that nearly 80% of participants with a high school education or less developed poorly controlled diabetes and complications due to higher rates of non-adherence to medications, medical treatments and misunderstandings of lifestyle modifications.

Kripalani et al.[13] conducted a study and estimated that only 50% of American adults properly adhere to their medications. Many patients do not take prescription medications as directed by missing or changing doses, and up to 60% may even discontinue medication use three months after beginning the prescription. Patients with a sixth-grade reading level or below have the greatest difficulty understanding prescription medication instructions.[16] The greater the complexity of the medication regimen, which is affected by the number of medications prescribed and the number of daily doses for each medication, the greater the risk for misunderstanding instructions and not following them correctly. The case of Mrs. S. is a perfect example of how a complicated medication regimen can be difficult for an elderly minority patient suffering from chronic illnesses. Older patients like Mrs. S. may take five or more differing medications for their chronic medical conditions. In addition to having more complicated medication regimens, older adults commonly have problems resulting from impaired cognition, comprehension, recall of information on medications, and poor vision; it is estimated that as many as 55% of older patients fail to properly adhere to their medications.[14]

Researchers indicate that humans have a cognitive preference for picture-based rather than word-based information, which is referred to as the *pictorial superiority effect* (PSE).[16] PSE refers to concepts that people are much more likely to remember and recall when presented as pictures, rather than in words.[17] Cherry et al. conducted a study to examine memory span and

cognitive status for pictures and words in adults ranging from 45 to 97 years old to determine whether the oldest-old subjects (aged 90 to 97 years) were able to demonstrate PSE in retention and recall.[17] Researchers indicate that pictures can be shown dually in one's memory by visual and verbal codes, whereas words are primarily shown by verbal codes. Moreover, the sensory codes for pictures are richer than those for words; therefore, pictorial formats are much better remembered than verbal formats.[17] The damage of episodic memory in geriatric patients is considered a central aspect of mild Alzheimer's disease (AD) and amnestic-type mild cognitive impairment (MCI), found as a transitional state between normal aging and AD.[19] Researchers indicate that clinical observations suggest that pictures may improve memory in Alzheimer's disease, mild cognitive impairment, and mental retardation.[19] For instance, patients with AD do not appear to remember their family members with hearing or reading their names, but AD patients do recognize their family members when presented with photographs of them.[19]

Pictured-Based Effects

Although many patients rely on medication labels and instruction leaflets, these patient education materials are often difficult to understand. Medication labels and instruction leaflets are in small print size, making them hard to read, especially for geriatric patients. Due to the PSE, pictorial aids have played an important role in enhancing recall, comprehension and understanding of medication instructions.[16]

Research indicates that pictorial aids are superior to other interventions for improving medication adherence, medication recall and comprehension, especially when targeting patient populations with low health literacy and/or low socioeconomic status.[1, 16, 18] Kripalani et al. conducted a randomized control trial (RCT) to develop a low-literacy patient education tool by using a *pill card* intervention. The *pill card* intervention uses color photographs of each

prescribed medication for chronic illnesses to provide the medication's purpose and dosing instructions. Results showed that 94% of all patient groups reported that, regardless of literacy and cognition level, the pill card was easy to understand and was useful as a reminder for their daily medication schedule.[18]

Section IV: Implementation Plan

The expected outcomes and objective measurements are guided by Theoretical Adult Learning, a concept for creating and implementing the pictorial aids tool in reducing medication errors and improving patient safety. Advanced Nursing Practice roles include collaboration of healthcare professionals with community-based clinics while implementing effective plans that have an impact on patient care.

Theoretical Adult Learning Concept

Many geriatric patients struggle to understand and adhere to their medication schedules and instructions due to poor visual acuity and chronic medical conditions that require them to take multiple medications. This difficulty may be compounded by cognitive decline associated with such medical conditions.[16] Enhancing the accuracy of medication self-administration, improving patients' understanding of prescribed medications, and improving health literacy can ameliorate health outcomes. The expected result of adults properly adhering to medical treatments and management is a better identification and development of a solution that provides effective guidelines for pictorial aids labels. The theoretical Adult Learning Concept for improvement in medication compliance using a pictorial aids tool will be an amalgamation of: The Roy Adaptation Model in nursing practice, Knowles' Adult Learning Theory, Dual-Coding Theory and Mayer's Cognitive Theory of Multimedia Learning. These theoretical frameworks

explain the human processes in learning through different steps from a psychological perspective.

Roy

In 1976, Sister Callista Roy developed the *Adaptation Model* that provides the following four models: physiological, self-concept, role function and interdependence.[20] Roy's model emphasizes the person as "a biopsychosocial being in constant interaction with a changing environment."[20] The Roy Adaptation Model discusses people in an open, adaptive system that use coping skills to deal with stressors. The implementation process uses Roy's Adaptation Model to guide the nursing process in assessment of behavior, stimuli (stressors), nursing diagnosis, goal setting, intervention and evaluation. Roy suggests that people strive to live within their comforts and with individuals with whom they can effectively deal. To apply the Roy Adaptation Model to nursing practice, the pictorial aids tool focuses on promoting the patient's best adaptive strategies using all four adaptive models to successfully develop a qualified, effective medication adherence tool that will improve quality of life.

Knowles

Knowles is known to be a central figure of adult learning theories, known as andragogy, which is defined as "the art of science of helping adults learn". [21] Knowles's theory is also known as a "framework for thinking about what and how adults learn."[21] His key concepts are: (a) Self-concept, that one is being dependent to self-directed who can direct their own learning; (b) Life-experience, which is a rich resource for adult learning; (c) Readiness to learn, when a person is ready for the developmental tasks of a social role; (d) Orientation, as a person shifts form one learning subject to the center of another problem; and (e) Motivation, the internal perspective that is important in educational learning.[21] Knowles essentially says that adults

become more self-directed learners as they mature. Adult learners who rely heavily on their experience, what they learned best will motivate and increase their confidence and readiness to perceive new educational tools. Since they are motivated to get well and to be independent in self management and care, and the superiority effects that enhance memory deficit or cognitively impaired patients by pictures. The pictorial aids tool is essential to assist adults to learn in a way that increases their capability to promote recall and comprehension in following medication regimens.

Paivio

Paivio, of the University of Western Ontario, authored the first advanced Dual-Coding Theory on cognition that provides a framework for using visuals to improve literacy, idea generation, and designs for the development of educational materials.[21] In his Dual-Coding Theory, Paivio suggests that pictures can be dually represented in memory through visual and verbal codes, and sensory codes for pictures are richer than sensory codes for verbal information; pictures lead to greater benefits in enhancing information and interfere less with conceptual processing.[17] In addition, it is assumed that two codes provide superior information processing and organization than one code alone.[17] The Dual-Coding Theory suggests that pictorial aids have significant advantages for long-term retention, which provides a direction for the development of mnemonic aids that can improve everyday memory retention and recall in geriatrics and cognitive impairment.[17, 19, 22-23]

Mayer

Mayer's *Cognitive Theory of Multimedia Learning* says that people learn more deeply from *words* (auditory) and *pictures* (visual) than from words alone.[24] The concept of visual learning is based on three core assumptions: dual channel assumption, limited capacity

assumption and active processing assumption.[24] Like, Paivio, Mayer's cognitive theory says that humans process separate information through a dual channel, visual and auditory, which processes, filters, selects, organizes, and integrates information that is held in one's long-term memory. The limited capacity assumption is that humans are limited to the amount of information that can be processed in each channel at one time. For instance, people can only store a few images and a few sounds at a time in a working memory process, which is referred to as the *cognitive load theory*.[24] Finally, the active processing assumption says that humans actively engage in cognitive processing to filter, select, and organize information. For these reasons, the *pictorial aids tool* becomes essential in promoting adult learners in their recall and improving their comprehension to achieve proper adherence to medication regimens.

The Intervention

To gain a better understanding of factors that contribute to and influence adult learners using the pictorial aids labels, this project grounded the adaptation, self-concept, readiness, motivation, and dual-coding theories. Research indicates that pictorial aids are superior to other interventions for improving medication adherence, medication recall and comprehension, especially when targeting patient populations with low health literacy and/or low socioeconomic status and cognitively impaired adults. As predicted, the PSE lessens with age; however, it can be reestablished in adults in cognitive decline by using item presentation and instructing them to verbalize.[1, 16, 18] Kripalani et al. indicate that 83% (173) of a sample of 209 Medicare enrollees who used the *pill card* intervention reported that, regardless of literacy and cognition level, the pill card was easy to understand and was useful as a reminder for their daily medication schedule.[18]

This Doctorate of Nursing Practice (DNP) project examines patient responses to a pictorial aids label for medication instructions and their improvement of medication adherence in low income Cambodian adult patients in Oakland, California. The purpose of pictorial aids labels is to significantly improve patient understanding in medication instructions, taking medications as instructed, reducing medication errors, reducing poor health outcomes, and improving patient safety and quality of healthcare for those who are of a low socioeconomic status, as well as for underserved patients. The DNP-pictorial aids label project was conducted with the assistance of a Cambodian navigator and was under the supervision of a University of San Francisco DNP student who was appointed to be the primary researcher. A Cambodian navigator is a Cambodian individual employed at Asian Health Services (AHS) who is responsible for support services, answering questions, assisting and directing patients to appropriate services, interpreting, determining patient eligibility, patient and community health education, and conducting outreach/education activities on various health topics in the native language. During a normal clinic visit, the Cambodian navigator assisted with data collection by obtaining pre- and post-intervention screening. After pre-intervention screening was complete, the Cambodian navigator applied the customized pictorial aids labels on patients' prescribed medication bottles and provided them with a personalized pictorial calendar.

Method

During normal clinic activity at AHS, a Cambodian navigator and DNP student collected data on medication knowledge and adherence from 35 patients. The subject population consisted of 35 adult Cambodian patients at Asian Health Services in Oakland, California, who had chronic medical conditions, such as type 2 diabetes mellitus, hypertension or hyperlipidemia. Their ages ranged from 40 to 80 years old. Findings from this study project will contribute to the

knowledge base of today's healthcare system for outpatient settings currently facing adverse impacts from a lack of effective medication adherence tools.

Thirty-five adults aged 40 to 80 years with heart disease and/or diabetes were enrolled in the study protocol at AHS and underwent survey question screening and interventions with pictorial aids labels within AHS twice over a three-month period. During the study period, 65 adult patients were approached, and 42 agreed to participate (64%). Of the 42 participants, 35 patients (83%) received interventions of pictorial aids labels, a calendar in both English and Cambodian, and pre- and post-intervention survey question screening. The Morisky Scale is a nine-item survey used to assess a patient's understanding of the need for medications, how to take them, and the level of adherence with the prescribed protocol (Appendix D and E). Patients were rated on their perceived comprehension on a 10-point scale (non-adherence to adherence) at pre-intervention.

Upon completion of the pre-intervention screening, the pictorial aid labels were applied by the Cambodian navigator to the participant's medication bottles. In addition, participants were given a customized pictorial aids calendar in English and Cambodian for patients to bring home. The customized pictorial aids calendar consists of pictures that indicate their functions, e.g., a picture of candy represents diabetes, and a picture of fried, fatty food represents cholesterol. In addition, the customized pictorial aids calendar indicates when to take medications using pictures that symbolize morning, afternoon, evening and bed-time. Pill counts and refill records were also monitored.

This project's goal was to minimize potential risk. Researchers would not keep any information about individual participants. All participant responses were deleted. Researchers

kept study records as confidential as possible. No individual identities were used in any reports or publications resulting from this study project. Study information was kept in a locked file at all times. Only researchers had access to confidential information

Section V: Evaluation

Pre- and post-intervention surveys and assessments of patient behavior in taking medications and understanding medication instructions were analyzed to determine the efficacy of pictorial aids labels as guidelines in the improvement of medication adherence. The patient responses about the effectiveness of the pictorial aids tool were assessed and measured by using pre- and post-intervention survey screening every two weeks by the Cambodian navigator and primary investigator. After receiving the completed surveys and responses to the interventions (pictorial aids labels and customized calendar), the data analyst input the results into a study database for analysis by primary investigator. A full report of findings will be generated and submitted to AHS. Although the study project's duration was three months, the findings showed significant improvement in geriatric clients with low health literacy and in illiterate patients when given the pictorial aids labels and calendar. Up to 50% of patients with no education reported that their recall, comprehension of medication instructions and purpose, and times to take medications improved after their first visit to AHS; up to 70% improved after their second visit; and 17% with a few years of schooling improved by 90% after their first visit to AHS. Comparing data from the pre-intervention of the pictorial aids tool, geriatric patients, especially those who had never attended school, significantly improved their adherence to medication regimens and instructions by up to 80%. After receiving the completed surveys and responses to the interventions, the data analyst will input the results into a study database for analysis by the

primary investigator. A full report of findings will be generated and submitted to AHS, which may eventually lead to use of the pictorial aids labels and calendar by the U.S. healthcare industry.

Impact on Patient Outcomes

Who Is Affected by Low Health Literacy?

Many cultural and socioeconomic factors contribute to low health literacy. People like Mrs. S. with poor English language proficiency, limited access to education, and a low socioeconomic status are most likely to be illiterate. Moreover, poor health literacy is most pronounced among patients with chronic medical conditions, like Mrs. S. with type 2 diabetes mellitus and hypertension. The pictorial-based model demonstrates its efficacy in the management of illiterate, low health literacy and cognitively impaired patients. Mrs. S., illiterate and not noncompliant, could benefit from a picture-based model because while she cannot read instructions, she can recognize simple icons and pictures to guide her in properly taking her medications.[25-26] Many patients, regardless of their education level, are uncomfortable and embarrassed about admitting poor comprehension or misunderstanding instructions to their providers. Patients fear that their providers assume and expect them to understand instructions on prescribed medication labels, because medication labels and instructions seem to be simple and clear to providers. In that respect, millions of patients in the United States, especially older adults like Mrs. S., would benefit from the pictorial aids labels, as they can grow from dependent patients to self-directed; they would no longer need to wait for a family member or caretaker to assist them in taking their medications. With pictorial aids labels, low literacy patients would be able to understand the purpose of their medications and when to administer them, which would help them avert preventable adverse medication effects.

Economic Impact on Healthcare

Cost-Effectiveness

Failure to act carries high costs, including individual poor health outcomes, preventable permanent disabilities, deaths, increased healthcare spending, a financial burden on future generations and a burden on the economic wellbeing of the nation as a whole. Improvement in medication adherence can be a considerable financial bailout. The estimated costs associated with low health literacy range from $1.6 trillion to $3.6 trillion annually.[11] These costs could be eliminated with proper healthcare reform, whose savings could potentially provide healthcare to the estimated 47 million uninsured Americans.[4]

Lessons Learned

Throughout the process of conducting a DNP project, there are many lessoned to be learned, not the least of which is that to be involved with a project of this scope and magnitude in a six-month time period is challenging. As one begins the project, one thinks of more and more things that could be accomplished. As a result, the members of the pictorial aids tool project plan to continue with the project so as to collect long-term outcomes, including monitoring HbA1c levels for diabetics, lipid panels for hyperlipidemia-affected patients and blood pressure screening for hypertensive patients during their regular office visits at AHS. This research will be conducted after my studies are completed.

Another important lesson is to remain focused on the project. Researchers may find that there are not sufficient data, scholarly articles, evidence-based references or resources available to support the project. These factors may be frustrating and can stall the process. However, I would strongly recommend identifying a project about which one is truly passionate. My commitment to my patients and community saw me through the process.

Additionally, researchers must prepare for unexpected fallout from subjects. I recommend starting with a larger sample size than anticipated so as to account for possible dropouts and subjects who do not properly complete the procedure. It is also essential to have good collaboration, resources and support from school and clinical sites. Moreover, I worked closely with a supportive advisor and committee members. In every aspect and step of the project, researchers need good guidelines, effective communication lines and mentoring.

Dissemination Plan

Who Is Responsible and Why?

One of the advanced nursing practice roles is to collaborate and disseminate the findings of one's work with other health professionals in order to improve patient outcomes. Our work does not end when the patient leaves our office; we must have justifiable confidence that the prescribed treatment will be followed correctly. An accurate diagnosis and poorly adhered to treatment is as ineffective as an inaccurate diagnosis. The healthcare professional's responsibility is only finished when the disease is treated and resolved. Contributing to the United States' medication and medical treatment adherence problems are numerous studies of low health literacy, as well as behavioral, social, economic, medical and policy-related factors, which need to be addressed if positive changes can be made and can be made a part of healthcare reform.

The dissemination plan is to publicize the concept of effective pictorial aids tools in a scholarly journal, as well as in a foreign language journal, that would be available to all patient populations. The process of dissemination will continue to provide the pictorial aids tool at AHS after the DNP project is complete. The goal is not only to improve medication compliance, health outcomes and patient safety, but also to boost patients' self esteem and improve their self care. These outcomes will simultaneously reduce adverse effects and decrease the overall

financial burden within the healthcare system cause by low health literacy. The AHS will continue to utilize the pictorial aids tool, and the tool will also be implemented at St. Mary's outpatient clinic in San Francisco, where several underserved, minority patients are seen for primary care.

Conclusion

Research supports interventions that consist of a combination of pictograms with written and verbal communications to convey to the patient how to carry out medically related recommendations and improve health outcomes.[1, 25, 26] Overall, the results of the literature support the use of pictorial aids in combination with oral counseling and written materials in medication teaching and medical adherence management. Educational materials need to be written at or below a fifth-grade reading level, and oral counseling with healthcare professionals in conjunction with a pictorial-based program will improve medication adherence, navigation of the healthcare system and quality of life. If Mrs. S. had been properly informed of how to take her medications and had legible picture instructions, she would not have been labeled non-adherent and could have saved money on doctor visits, emergency room admissions, and led a healthier life overall. The new recommended guidelines (Table 1) provide the evidence-based tools for healthcare providers in the United States.

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Table 1: Recommended Guidelines for Putting Evidence into Clinical Practice to Improve Medication Adherence

Design and implement standardized and universal picture interventions (simple, explicit icons).	To reduce misinterpretation and improve adherence. Are useful to convey information, such as scheduling and drug indication. Picture aids have proven to enhance patient recall and comprehension in all ages, even those with a higher literacy level or illiterate populations.
Simplify patient education standardized materials; make medication instructions and/or consent form at a fifth-grade level or lower.	To improve written prescription information. Eliminate misunderstanding of medication instructions and medication errors. Patients are able to follow prescription medication instructions and are more likely to adhere to medications. Enhance patient safety and satisfaction.
Use plain and simple language and avoid jargon.	Use explicit instructions, be specific when giving instructions, for example, “Take at 9 a.m. and 9 p.m.,” instead of, “Take twice daily.”
Use the teach-back method.	To assess patient recall and comprehension. To clarify patient perceptions of their ability to perform the task.

Limit instructions to three or fewer important points at a time.	Many patients with chronic medical conditions are elderly with cognitive impairment.
Encourage patients to ask questions.	Many patients feel ashamed to admit poor comprehension or are not aware of the gaps in following prescribed medication instructions.
Make medication adherence a critical healthcare issue.	All stakeholders, healthcare policy makers and practitioners must recognize the impacts, costs and contributions to negative health outcomes resulting from poor medication and medical therapy adherence.
Make patient adherence a national health priority.	To motivate practitioners and patients to take steps to improve medication and therapy adherence.
Implement a multidisciplinary approach to medication management and adherence.	To change interactions between providers and patients and by having all team members collaborate throughout the continuum care.
Increase funding to implement professional training and education on patient medication adherence.	Current research findings can be applied into professional education through continuing education and lectures on patient adherent issues to support practitioners that need hands-on information about adherence management.

Appendix A: Demographics

What is your age group?		
Answer Options	Response Percent	Response Count
40—49 years old	11%	4
50-59 years old	37%	13
60-69 years old	29%	10
70-79 years old	20%	7
Over 80 years old	3%	1
	answered question	35
	skipped question	0

How long have you lived in the United States?		
Answer Options	Response Percent	Response Count
1-5 yrs	3%	1
6-10 yrs	9%	3
10-14 yrs	0.0%	0
15-19 yrs	0.0%	0
20-25yrs	54%	19
Over 25 yrs	34%	12
	answered question	35
	skipped question	0

What is your gender?		
Answer Options	Response Percent	Response Count
Female	63%	22
Male	37%	13
	answered question	35
	skipped question	0

Have you ever attended school?		
Answer Options	Response Percent	Response Count
Yes	20%	7
No	80%	28
If yes, please check one		
Answer Options	Response Percent	Response Count
No School	80%	28
Less than High School	20%	7
High School	0%	0
College	0%	
	answered question	35
	skipped question	0

Appendix B Disease Statistics

Disease statistics intervention group				
Gender	DM	HTN,HLD	DM,HTN HLD	PTSD
Female	62%	91%	60%	45%
Male	56%	86%	53%	13%
			answered question	35
			skipped question	0

Appendix C

Health Literacy and Medication Adherence Labels- Informed Consent Form

INFORMED CONSENT FORM

ASIAN HEALTH SERVICES

CONSENT TO BE A STUDY SUBJECT

Researcher/Doctoral Student: Seanny Min, FNP, CNS, MSN

STUDY PURPOSE AND BACKGROUND

Mrs. Seanny Min, FNP, CNS, MSN, is in the Doctorate of Nursing Practice program at the University of San Francisco and Mrs. Lotida Sot, Cambodian Navigator, of Asian Health Services, are conducting a project that leads to improvement s in the field of nursing. We are evaluating the efficacy of picture aids labels as guideline tools in the improvement of medication adherence within the Asian Health Services, which may eventually be offered to the health care industry. Part of this study is to conduct a survey using customized pictorial aids labels for medication instructions.

PROCEDURES

If you agree to be in this study, the following will happen:

You will talk with Mrs. Lotida Sot and complete the questionnaire about your level of understanding in taking prescribed medications twice over a period that can vary from one to two months.

You will ask to use pictorial aids labels for prescribed medication instructions.

Each interview may be up to 30 minutes.

RISKS/DISCOMFORTS

Participation in the study may involve a loss of privacy, but several precautions are taken to avoid loss of confidentiality. Study records will be kept as confidential as possible. Only primary investigator and research staff will have access to these files.

Some of questions may make you feel uncomfortable and you are free to decline to answer any questions that you do not wish to answer or to stop participations at any time.

COSTS/REIMBURSEMENT:

There will be no costs to you for being in the study.

There is no reimbursement for the interview(s).

QUESTIONS

This study has been explained to you by Mrs. Seanny Min and Mrs. Lotida Sot and your questions were answered. If you have any other questions or concerns relating to this study or surveys, you may contact Mrs. Seanny Min at 650.281.9108, or at sm809@me.com or Mrs. Letida Sot at 510.986.6868.

CONSENT

PARTICIPATION IN RESEARCH IS VOLUNTARY. You have the right to decline to participate or to withdraw at any point in this study. You decision as to whether or not to participate in this study will have no influence on your present or future care at Asian Health Services.

If you wish to participate, you should sign below.

_____ _____

Date Participant's Signature

_____ _____

Date Signature of Person Obtaining Consent (researcher)

ក្រដាសស្នាមអនុញ្ញាតឲ្យធ្វើការស្រាវជ្រាវអំពីបៀបប្រើថ្នាំពេទ្យ

សេចក្តីបញ្ជាក់លើការអនុញ្ញាត

មន្ទីពេទ្យអាស៊ីផ្នែកព្យាបាលសុខភាព (ASIAN HEALTH SERVICE)

ប្រធានបទដែលនឹងត្រូវអនុញ្ញាតឲ្យធ្វើការស្រាវជ្រាវ

<u>គោលបំណង និង ប្រវត្តិសង្ខេប:</u>

អ្នកស្រី មិន ស៊ាន *កំពុងបំពេញមុខវិជ្ជាជីវៈផ្នែកវេជ្ជបណ្ឌិត ហើយកម្មវិធីសិក្សាបានតម្រូវឲ្យមានការហ្វឹកហ្វឺនអំពីការងារលំអិតរបស់គិលានុបដ្ឋាយិកានៅសកលមហាវិទ្យាល័យសាន់-ហ្វ្រាន់ស៊ិស្កូ* **(USF)** *។កម្មវិធីសិក្សានេះបានតម្រូវឲ្យមានការស្រាវជ្រាវបន្ថែមអំពីការងាររបស់គិលានុបដ្ឋាយិកា ហើយបានជ្រើសរើសយកមន្ទីរពេទ្យអាស៊ីផ្នែកព្យាបាលខាងសុខភាព ដែល* **អ្នកស្រី ស៊ាន មិន** *ធ្លាប់មានការទំនាក់ទំនងយ៉ាងជិតស្និទ្ធិជាទីកន្លែងសម្រាប់សិក្សាស្រាវជ្រាវ និងដើម្បីបានជួយឲ្យអ្នកជំងឺចេះប្រើសម្ភារៈលេបថ្នាំពេទ្យឲ្យមានប្រសិទ្ធិភាពប្រសើរឡើង ។ ការសិក្សាស្រាវជ្រាវផ្នែកនេះ នឹងធ្វើឡើងដោយស្រងមតិ និងសម្ភាសន៍អ្នកជំងឺផ្ទាល់អំពីរបៀបប្រើថ្នាំពេទ្យឲ្យបានត្រឹមត្រូវ ។ លោកអ្នកនឹងត្រូវបានសួរសំនួរផ្សេងៗដែលទាក់ទងទៅនឹងការលេបថ្នាំពេទ្យរបស់លោកអ្នក តែអាស្រ័យទៅលើការចាប់អារម្មណ៍ និងការស្ម័គ្រចិត្តរបស់លោកអ្នកចំពោះការចូលរួមក្នុងកម្មវិធីស្រាវជ្រាវនេះ ។*

<u>របៀបការចូលរួមសម្ភាសន៍</u> :

ប្រសិនបើខ្ញុំយល់ព្រម ហើយបានចូលរួមតាមការសិក្សាស្រាវជ្រាវនេះ ខ្ញុំនឹងត្រូវប្រតិបត្តិតាមសំណើរខាងក្រោមនេះ ៖

១. ខ្ញុំនឹងផ្តល់ការសម្ភាសន៍ ហើយនឹងសុំអនុញ្ញាតឲ្យសួរទៅតាមការយល់ដឹងរបស់ខ្ញុំអំពីការលេបថ្នាំពេទ្យផ្សេង ។ ។

២. ខ្ញុំនឹងសួរអំពីសម្ភារៈដែលជាគ្រឿងជំនួយផ្សេង ។ ផ្នែកការលេបថ្នាំពេទ្យជាប្រចាំ ។

<u>សម្រាប់ថ្នាំពេទ្យខ្លះ នឹងអាចធ្វើឲ្យលោកអ្នកពិបាកនឹងឆ្លើយប្រាប់</u>

១. សំនួរខ្លះដែលនឹងត្រូវសួរស្រង់មតិនេះ អាចនឹងធ្វើឲ្យខ្ញុំតឹងចិត្តពិបាកនឹងឆ្លើយហើយខ្ញុំនឹងសុំចៀសវាង ឬនឹងឈប់ចូលរួមក្នុងកម្មវិធីនេះតែម្តង ។

២. អ្នកដែលបានចូលរួមក្នុងការស្រាវជ្រាវនេះ អាចនឹងមិនទុកចិត្តចំពោះការរក្សាទុកសំណុំរឿងផ្ទាល់ខ្លួន តែអ្នកទទួលការខុសត្រូវនៃកម្មវិធីសិក្សារបស់យើងនឹងបានរក្សាទុកឯកសារទាំងនោះជាសម្ងាត់បំផុត ។ ការសួរនាំនៃបទសម្ភាសន៍នេះមិនបានតម្រូវឲ្យយកអត្តសញ្ញាណប័ណរបស់លោកអ្នកទេ ។ ឯកសារទាំងអស់នោះនឹងត្រូវបានតម្កល់ទុកក្នុងទូសម្ងាត់ជាដរាប មានតែបុគ្គលិកធ្វើការស្រាវជ្រាវទេដែលអាចបើកមើលបាន ។

៣. ដោយហេតុថា ខ្ញុំមានពេលវេលាតិចតួចពេក ហើយខ្ញុំសុំចូលរួមតែ ៣០ នាទីតែប៉ុ-ណ្ណោះ ។ មួយវិញទៀត ពេលខ្លះខ្ញុំនឹងអាចមានការធុញទ្រាន់នឹងធ្វើយថ្ងៃប់ ហើយខ្ញុំនឹងសុំឈប់ការចូលរួមជាមួយការស្រាវជ្រាវនេះក៏មិនដឹង ។

ការចូលរួមសម្ភាសន៍នេះ និងអាចផ្តល់ផលប្រយោជន៍អំពីការចេះដឹងសម្រាប់ខ្លួនខ្ញុំផ្ទាល់ តែជំ-នួយជាបន្ថែមទៀតនោះ គឺនឹងជួយឲ្យខ្ញុំចេះចំណាំសញ្ញាលើដបថ្នាំពេទ្យ ហើយនឹងចេះប្រើឲ្យបានត្រឹមត្រូវទៀតផង ។

<u>ចំណាយថ្លៃឈ្នួលក្នុងការចូលរួម:</u>

លោកអ្នកដែលបានចូលរួមក្នុងកម្មវិធីសិក្សាស្រាវជ្រាវនេះ នឹងមិនត្រូវឲ្យបងថ្លៃអ្វីទេ ។

<u>ជំនួយលើកទឹកចិត្តក្នុងការចូលរួម:</u>

ប្រហែលជានឹងអាចមានជំនួយតិចតួចដល់លោកអ្នកដែលបានឆ្លៀតឱកាសចូលរួមសម្ភាសន៍ក្នុងកម្មវិធីនេះ ។

<u>សំនួរផ្សេង ៗ :</u>

ខ្ញុំបាននិយាយជាមួយ **អ្នកស្រី ស៊ាន ម៉ិន** ដែលទាក់ទងទៅនឹងកម្មវិធីនេះ តែប្រសិនបើខ្ញុំនៅមានចម្ងល់ថ្ងៃក្រោយទៀត ខ្ញុំនឹងទូរស័ព្ទជួប **អ្នកស្រី ស៊ាន ម៉ិន** ផ្ទាល់តាមរយៈលេខ (៦៥០) ២៨១-៩១០៨ ឬ (អ៊ីម៉ែល seannymin@msn.com) ។

បើខ្ញុំនៅមិនអស់ចម្ងល់ទេនោះ ខ្ញុំនឹងសុំជួបជាមួយក្រុមជំនុំផ្នែកការស្រាវជ្រាវផ្ទាល់ ។

<u>ច្បាប់ចម្លងនៃសេចក្តីអនុញ្ញាត:</u>

ខ្ញុំបានទទួលសេចក្តីអនុញ្ញាតនេះដើម្បីទុកជាឯកសារ ។

ការចូលរួមក្នុងកម្មវិធីស្រាវជ្រាវនេះ គឺជាការស្ម័គ្រចិត្តរបស់ខ្ញុំ ។ ខ្ញុំមានសិទ្ធិឈប់ចូលរួមក្នុងកម្មវិធីនេះនៅពេលណាក៏បានដែរ ។ សេចក្តីសម្រេចចិត្តណាមួយដែលខ្ញុំចូលរួមឬមិនចូលរួមនោះ គឺមិនបានបិតក្រោមឥទ្ធិពលរបស់មន្ទីពេទ្យបាលសុខភាពផ្នែកអាស៊ីក្នុងបច្ចុប្បន្ននេះទេ ។

ខ្ញុំបានយល់ព្រម ហើយបានចុះហត្ថលេខាខាងក្រោមនេះ ។

ហត្ថលេខា ខែ ថ្ងៃ ឆ្នាំ

ហត្ថលេខា បុគ្គលិកថែរក្សាឯកសារស្រាវជ្រាវ ខែ ថ្ងៃ ឆ្នាំ

Appendix D

Participant Survey Scale in English (Pre-intervention)

Date: _____

Name: _____ Date of Birth_____

Dx:_____

1. Can you read your medication instructions?
   Yes= 1 No= 0

2. Do you understand your medication instructions?
   Yes= 1 No= 0

3. How often do you need someone to help you take your medicine?

   All the time=0 Sometimes=0 Rarely=0 Never= 1

4. Do you need someone to read your medicine bottle for you when you take your medication?
   Yes= 0 No= 1

5. How often do you need help reading medication instructions when taking medicine?
   All the time=0 Sometimes=0 Rarely=0 Never=1

6. Were you able to tell what *this* medication is for?
   Yes= 1 No= 0

7. Are you able to describe how you should take this medication?
   Yes= 1 No= 0

8. Are you able to describe what your doctor told you to expect from taking this medication?
   Yes= 1 No= 0

9. When you feel better, do you sometimes stop taking your medicine?

   Yes= 0 No= 1

10. Do you sometimes stop taking your medication if you begin to feel worse?
    Yes= 0 No= 1
    Total Score: _____ **Highest**:**0** **Lowest**: **10**
    Ten is the *lowest* level of medication adherence, while *zero* is the *highes*t level.

Appendix E

Participant Survey Scale in English (Post-intervention)

Date: _____

Name: _____ Date of Birth_____

Dx:_____

1. Do you understand your medication instructions?
Yes= 1 No= 0

2. How often do you need someone to help you take your medicine?

All the time=0 Sometimes=1 Rarely=2 Never= 3

3. Do you need someone to read your medicine bottle for you when you take your medication?
Yes= 0 No= 1

4. Are you able to tell what *this* medication is for?
Yes= 1 No= 0

5. Are you able to describe how you should take this medication?
Yes= 1 No= 0

6. When you feel better, do you sometimes stop taking your medicine?

Yes= 0 No= 1

7. Do you sometimes stop taking your medication if you begin to feel worse?
Yes= 0 No= 1

Total Score: _____ **Highest**:**9** **Lowest**: **0**
Zero is the *lowest* level of medication adherence, while *Nine* is the *highes*t level.

ការចូលរួមសម្ភាសន៍ផ្តល់ពត៌មានផ្នែកការស្រាវជ្រាវជាភាសាខ្មែរ

ខែ_____ ថ្ងៃ _____ ឆ្នាំ_____

ឈ្មោះ _____ ថ្ងៃ ខែ ឆ្នាំ កំណើត _____

ឈ្មោះថ្នាំ _____

1. តើលោកអ្នកអាចអានសេចក្តីណែនាំឲ្យលេបថ្នាំ(លើដបថ្នាំ)បានឬទេ?
   បាន____ អត់បាន ____
2. តើលោកអ្នកយល់សេចក្តីណែនាំឲ្យលេបថ្នាំនេះឬទេ?
   យល់_____ អត់យល់ _____
3. តើលោកអ្នកត្រូវការឲ្យអ្នកណាមួយជួយពន្យល់ពីការលេបថ្នាំនេះឫទេ?
   ពេលខ្លះ___ គ្រប់ពេលទាំងអស់ ___ ឃ្យរៗ ម្តង___ អត់ត្រូវការទេ ___
4. តើលោអ្នកត្រូវការឲ្យអ្នកណាម្នាក់ជួយពន្យល់ដបថ្នាំដែលលេបប្រចាំឬទេ?
   ចាស/បាទ____ មិនបាច់ទេ ____
5. តើលោកអ្នកត្រូវការឲ្យអ្នកណាម្នាក់ជួយពន្យល់ដបថ្នាំសម្រាប់លេបឬទេ?
   ពេលខ្លះ___ គ្រប់ពេលទាំងអស់ ___ ឃ្យរៗ ម្តង___ អត់ត្រូវការទេ ___
6. តើវេជ្ជបណ្ឌិតបានប្រាប់ថាថ្នាំនេះលេបត្រូវនឹងជម្ងឺអ្វីទេ?
   ចាស/បាទ ____ អត់ទេ ____ អាចយល់បាន ____
7. តើវេជ្ជបណ្ឌិតចង់ឲ្យលោកអ្នកលេបថ្នាំនេះឬទេ?
   ចាស/បាទ ____ អត់ទេ ____ អាចយល់បាន ____
8. តើវេជ្ជបណ្ឌិតលោកអ្នកបានផ្តល់ក្តីសង្ឃឹមពីការលេបថ្នាំនេះយ៉ាងដូចម្តេចដែរ?
   ចាស/បាទ ____ អត់ទេ ____ អាចយល់បាន ____
9. ពេលដែលលោកអ្នកបានជាសះស្បើយហើយ តើនៅលេបថ្នាំតទៅទៀតឫទេ?
   ចាស/បាទ ____ អត់ទេ____
10. ជួនកាលលោកអ្នកវិតតែឈឺខ្លាំង តើនៅតែលេបថ្នាំតទៅទៀតឬយ៉ាងណា?
    ចាស/បាទ ____ អត់ទេ____

Appendix F

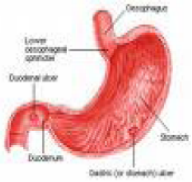
PICTURE TEMPLATE
PATIENT PICTORIAL AIDS CALENDAR
ប្រក្រតិទិនរូបភាពជំនួយដល់អ្នកជំងឺ

Date/ថ្ងៃទី: _____ **Name/ឈ្មោះ:** _____

Patient #/លេខប្រចាំខ្លួនអ្នកជម្ងឺ: _____

WHAT IT IS FOR? សំរាប់អ្វី?	 **Morning** ព្រឹក	 **Afternoon/ Lunch** រសៀល/ បាយថ្ងៃត្រង់	 **Evening** ពេលល្ងាច	 **Bed time** ពេលចូលដេក
 សម្ពាធឈាម				
 **Diabetes** រោគទឹកនោមផ្អែម				
 **Cholesterol** **សារធាតុខ្លាញ់**				
 បេះដូង				
 **Headaches** ឈឺក្បាល				

The Pictorial Aids (What it is for)
ប្រើរូបភាពជំនួយ (សំរាប់អ្វី)

 សម្ពាធឈាម	 Headache ឈឺក្បាល	 Allergy ប្រតិកម្ម	 Depression ក្រៀមក្រំក្នុងចិត្ត	 បេះដូង
 Diabetes រោគទឹកនោមផ្អែម	 Morning ព្រឹក	 រសៀល/ បាយថ្ងៃត្រង់	 Bed time ពេលចូលដេក	 Morning ព្រឹក
 Neck pain ឈឺក	 Dizzy វិលមុខ	 Stomach Ulcer ដំបៅក្រពះ	 Sleep ដេក	 Evening ពេលល្ងាច
 Goiter	 Goiter	 Constipation ទល់លាមក	 Diarrhea	 Medication ថ្នាំកែរោគ

Pictorial Aids Tool Calendar

Patient Name: _____

 **Diabetes**	 **Lower back pain**	 **Leg Pain**	 **Asthma**	 **Cholesterol**
 **Cholesterol**	 **Painful Hand**	 **Stomach pain**	 **Lower back pain**	 **Leg Pain**