

IMPLEMENTING AN EVIDENCE BASED PRACTICE GUIDELINE TO  
STANDARDIZE THE CARE OF ADULTS WITH TYPE 2 DIABETES

A DOCTOR OF NURSING PRACTICE PROJECT SUBMITTED TO THE OFFICE OF  
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## **ABSTRACT**

**PURPOSE:** The purpose of this quality improvement project was to explore the impact of implementing the Health TeamWorks practice guideline in standardizing the care for adults with type 2 diabetes. The goal was to improve patients' glycosylated hemoglobin A1c (HbA1c) levels to less than 8% and Low Density Lipoprotein (LDL) levels to less than 100mg/dL. The Implementation Model, adapted by Titler (2010) and built on Rogers Diffusion of Innovation Theory (Rogers, 2003), guided this project. Interventions used to promote the use of guideline included the use of opinion leaders, education classes, audit and feedback of performance during providers' meetings.

**METHODS:** A 'pre and post' implementation evaluation of patients' laboratory results was the design used to gather data. Patients with uncontrolled HbA1c levels were checked every three months and LDL levels once during the year of project.

**RESULTS:** The convenience sample of 11 providers included six medical doctors and five nurse practitioners employed at Kalihi Pālama Health Center. They were primary care providers of record for 88 patients with diabetes whose laboratory results were tracked for this project. Descriptive and trend analyses revealed the 3-months, 6-months, 9-months and 12-months checks results of 74%, 32%, 52% and 43% of patients with improved HbA1c levels, respectively. Of the 88 patients, 19% met the target of HbA1c level of less than 8% at least once during the project year. Forty three patients had their LDL levels rechecked in 2015 and 33% of them met the target goal of less 100 mg/dL.

**DISCUSSION.** The results revealed a decrease in HbA1c in the majority of patients; however, glycemic relapse was noted at the 6-months checkpoint. Despite the work of care coordinators, the patient 'no show' for appointments was a common occurrence due to a lack of insurance and

financial resources. Providers identified facilitators and barriers to using the guideline. It was difficult to establish adherence of providers' use of the guideline because of the multiple 'patient factors' identified that prevented consistent implementation and evaluation. However, working in a collaborative team made a difference in bridging the gaps in the care of diabetic patients.

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## LIST OF ABBREVIATIONS AND SYMBOLS

ADA	American Diabetes Association
AADE	American Association of Diabetes Educators
AACE	American Association of Clinical Endocrinologists
APRN	Advanced Practice Registered Nurse
CDC	Center for Disease Control and Prevention
CDE	Certified Diabetes Educator
COFA	Compact of Free Association
DNP	Doctor of Nursing Practice
HbA1c	Glycosylated Hemoglobin A1c
HTN	Hypertension
IT	Information Technology
KPHC	Kalihi Pālama Health Center
LDL	Low Density Lipoprotein
LVN	Licensed Vocational Nurse
MA	Medical Assistant
MD	Medical Doctor
PCP	Primary Care Provider
QI	Quality Improvement
RN	Registered Nurse
SD	Standard Deviation
SDM	Staged Diabetes Management

## LIST OF ABBREVIATIONS AND SYMBOLS

SW	Social Worker
USA	United States of America
vs	versus
mg	milligram
<i>n</i>	total number of patients
%	Percent
>	Greater than
<	Less than
#	Number of
±	plus or minus
✓	check

## **CHAPTER 1**

### **EXECUTIVE SUMMARY**

Type 2 diabetes is a complex, chronic illness requiring continuous medical care beyond controlling blood sugar. Health care providers play an important role in supporting patients in maintaining glycosylated hemoglobin A1c (HbA1c) and Low Density Lipoprotein (LDL) at optimal levels. Clinical practice guidelines help providers in making decisions about using effective treatments, and utilization of effective services for patients with diabetes. Practice guidelines also decrease variation in care and provide consistency in the standard of care.

Results of a recent retrospective chart review (Wang, Braginsky, & Leake, 2014) done in the Diabetes Clinic at Kalihi Pālama Health Center (KPHC) showed glycemic relapse after 6 months of successful treatment posed a challenge in the care of adults with type 2 diabetes at KPHC. This result motivated this Doctor of Nursing Practice (DNP) student to seek other ways to reach and maintain HbA1c and LDL at target levels. From informal inquiries, the DNP student found out that providers at KPHC used different guidelines for the care of patients with diabetes. Some of these practice guidelines are authored by American Diabetes Association (ADA), the American Association of Diabetes Educators (AADE), the Staged Diabetes Management (SDM) team, the American Association of Clinical Endocrinologists (AACE), and the Health TeamWorks organization. The Health TeamWorks guideline (Appendix A, p.1-2) for diabetes is a resource for providers at KPHC but only a few providers knew about how to access it online. The focus of this DNP project was to determine if engaging providers in making a practice change would facilitate improvement in their type 2 diabetic patients' HbA1c levels after six months of care and LDL levels during the year of the project.

## **Problem**

Diabetes and related complications accounted for \$245 billion in costs in 2012, of which \$176 billion were direct medical costs and \$69 billion was a result of reduced productivity of patients with diabetes (CDC, 2014). It is estimated that if there is a 10-50% reduction in the levels of HbA1c, hypertension, and lipids, between 48,000 to 239,000 potential complications could be avoided, amounting to a savings of \$39 billion to \$196 billion by the year 2031 (Fitch, Iwasaki, & Pyenson, 2010). Studies have shown that glycemic relapse can occur at anytime during the first year of care. The purpose of this project was to explore if standardizing providers' care of adults with type 2 diabetes using the Health TeamWorks guideline would improve HbA1c and LDL to targeted levels.

## **Conceptual Framework**

The Implementation Model, adapted by Titler (2010) and built on Rogers' Diffusion of Innovation Theory (Rogers, 2003) was used to guide the study. The rate and extent of the adoption of an innovation depends on the characteristics of the innovation, communication and support among stakeholders involved, and interventions to facilitate utilization of innovation by the users.

## **Literature Review & Synthesis**

High quality clinical practice guidelines identify decision points at which valid evidence should be integrated with providers' knowledge and experience in deciding on a course of treatment plan. The multiple interventions to promote the use of guidelines included the use of opinion leaders, education classes and audit and feedback of performance for providers. The best intervention for this project was the presentation of data and integrating information about the guideline during providers' meetings.

## **Innovation/Objectives**

Variation in care has risks in patient health outcomes. The innovation for this DNP project was the implementation of the evidence based Health TeamWorks guideline to standardize providers' care for the adults with type 2 diabetes at KPHC. The objective was to engage the providers in implementing a practice change for the period of one year. Adherence in using the guideline was reflected in the number of times the provider checked patients' HbA1c and LDL levels during the year of this project.

## **Methods**

### **Design**

This project was designed to utilize the 'pre and post' implementation evaluation of patients' laboratory results according to recommendations of the Health TeamWorks guideline. The multiple interventions to promote the use of the Health TeamWorks guideline by providers included the use of opinion leaders, education classes and audit and feedback of performance for providers.

There were baseline HbA1c and LDL results in July 2014 for 88 patients, and HbA1c levels not reaching the target were rechecked every 3-months and LDL levels were checked once during the project year. Six doctors and five nurse practitioners were primary care providers of record for 88 patients whose medical records were accessed to evaluate their HbA1c and LDL levels throughout the year of this project. The pre-implementation questionnaire was administered during the first formal meeting with providers to introduce the project. The questionnaire asked the providers if they were aware of the Health TeamWorks guideline and how to access it online. The post intervention questionnaire asked the providers about the

percentage of time they used the guideline; and also to voice any concerns about facilitators and barriers in using the guideline.

### **Data Collection**

According to the Health TeamWorks guideline, HbA1c levels should be checked every three months if not controlled, and once a year for LDL levels. Data were collected every three months for HbA1c and once during the project year for LDL levels. Answers of the 'pre and post' implementation questionnaires are reported in the results section.

## **Results**

### **Participants**

There were six medical doctors and five nurse practitioners included in this project. These eleven participants were primary care providers (PCP) for 88 patients whose HbA1c and LDL levels were tracked in the year of the project. The years of experience for the doctors ranged from five to 20 years and for nurse practitioners from a few months to 15 years. The time of employment for KPHC for all providers ranged from a few months to 20 years.

### **Data Analyses Findings**

Trends in results were evaluated and results were reported in percentage of units. The 88 patients with HbA1c >8% that visited the clinic in July 2014 provided baseline data. In the first three months, of the 34 patients seen, 74% of them had improved HbA1c levels, and 26% did not show any improvement. Six months after the initiation of the project, 22 patients were seen and of these, 32% had an improvement in HbA1c levels while 52% had increased HbA1c levels. Nine months after the project's initiation, 44 patients had been seen, with 48% having improved HbA1c levels and 52% had levels above 8%. In the last quarter for the year, of the 28 patients

rechecked, 43% had improved HbA1c levels, 39% did not show any improvement and 18 % did not show any difference in their levels.

Between July 2014 and July 2015, HbA1c should have been checked four times if HbA1c was greater than 8%. Of the 11 providers, seven (64%) of them had at least one patient who had HbA1c checked four times, and 100% of them checked at least one of their patient's HbA1c three times. Of the 88 patients included in the tracking, only 17 or 19.3% met the target of HbA1c < 8% at least once during the year of the project. Nine (82%) of providers supported these patients to achieve the targeted goal. Each patient should have had LDL levels checked in 2014 and 2015 for comparison. Of the 88 patients only 43 (49%) had their LDLs rechecked in 2015. Of the 43 patients, only 14 (33%) of patients met the target goal of less than 100 mg/dL.

### **Pre Intervention Questionnaire**

This questionnaire (Appendix C) revealed that of the 11 providers for this project, only two providers knew about the Health TeamWorks guideline and where to find it. This early assessment was important for the DNP student in planning to share with all providers where the guideline could be accessed online (Appendix B). All providers agreed that using one guideline could improve the quality of care without incurring additional cost to KPHC and patients with type 2 diabetes.

### **Post Intervention Questionnaire**

Of the 11 providers included in this DNP project; six of them (55%) responded to the post intervention questionnaire, either via written, email or verbal responses. The questions asked the providers about the percentage of time they used the guideline in the past year and to share any facilitators and barriers in using the guideline. Three providers used the guideline up to 79% of the time; and the rest used it less than 40% of the time. The lower percentage for use of

might be due to the fact that most of the patients were only prescribed metformin and glipizide which are the first and second line treatments for type 2 diabetes according to the guideline. Three of the providers found the guideline helpful in the process of titrating insulin, and two providers found it difficult to access the guideline remotely from home. Facilitators included education classes and having a hard copy of the guideline for reference. Again, having limited access from remote locations was a barrier for some providers and the one year duration for the project was deemed to be too short a time according to one provider.

### **Discussion**

It was difficult to establish adherence of the providers in using the guideline because of other possible patient factors that surfaced. Glycemic relapse can occur at any time in the first year of treatment. For this project, the number of patients with improved HbA1c levels dropped in the 6-month recheck interval. Patients not showing up for appointments and insurance issues were contributing factors to the results. Care coordinators played an important role in bridging the gaps of care for patients in this study.

### **Implications**

Nurses are able to apply the nursing process to identify problems, develop and initiate care plans, and re-evaluate results. The DNP student identified glycemic relapse as the trend and she reached out to care coordinators to assist in contacting patients to return to clinic. This DNP project explored the use of one clinical guideline to standardize care provided by clinicians to determine if this would make a difference in the HbA1c and LDL levels of patients with type 2 diabetes. The positive trend of the results highlighted the value of working in collaborative teams to improve outcome measures.



## **Limitations**

There were multiple barriers for optimal diabetes care for diabetes in the patient population in this study. The high percentage of patient appointment ‘no shows’, having no insurance and/or no financial support made it cumbersome to gauge whether the providers were adherent in using the guideline to provide care. Findings about the providers’ use of the practice guideline could not be established in this project; therefore, results associated with providers using the guideline in this project should be interpreted with caution.

## **CHAPTER 2**

### **PROBLEM**

In the United States of America (USA) in 2012, diabetes and its related complications accounted for \$245 billion of which \$176 billion were attributed to direct medical costs and \$69 billion were due to reduced patient productivity. The total cost of diabetes for people in Hawai'i in 2006 was estimated to be over \$1 billion. This estimate included excess medical costs of \$764 million attributed to diabetes, and the associated loss of patient productivity valued at almost \$274 million according to the Hawai'i Government 2010 report on diabetes (ADA, 2014; Pobutsky, Balabis, Nguyen, & Tottori, 2010).

The cost of diabetes care continues to rise; and the issue of whether the use of evidence based clinical guidelines can reduce costs and inappropriate variability in care has been the subject of much debate. Many variables can affect the adoption of guidelines including the health care setting, geographic location, patient access to insurance and medications, health care provider buy-in, financial incentives, and clinical value of the guidelines (DeMartino & Larsen, 2012). Clinical practice guidelines are evidence based tools used by health care providers to assist in better decision making, as well as reducing medical errors and lowering the costs associated with the care provided (Timmermans & Mauck, 2005). This DNP project aimed at engaging health care providers at KPHC to standardize care for adults with diabetes by implementing the Health TeamWorks guideline in their daily practices. The DNP student investigator not only searched the literature for the best evidence about interventions to implement practice guidelines; but identified a conceptual framework to guide this DNP project.

## **Conceptual Framework**

The Implementation Model, adapted by Titler (2010) and built on Rogers Diffusion of Innovation theory (Rogers, 2003), is further modified to guide this DNP project as depicted in Figure 1. The Implementation Model operationalizes Rogers' work which defines diffusion as "the process by which an innovation is communicated through certain channels over time among members of a social system" (Rogers, 2003, p 35). Rogers proposes that the rate of adoption of an innovation is influenced by the nature of the innovation, the manner in which the innovation is communicated, and the characteristics of the users and the social system into which the innovation is introduced. Figure 1 illustrates the tenets of the conceptual model. The four concepts of innovation, communication, social system, and adopters of the innovation must be addressed within the context of practice change (Titler, 2010).

### **Characteristics of the innovation.**

An innovation is "an idea, practice or object that is perceived as new by an individual or other unit of adoption" (Rogers, 2003, p. 12). It does not matter how long the idea or practice has been in existence or in use; if the idea seems new to the individual, it is considered an innovation. This "newness" may be in the area of knowledge, persuasion, or decision to adopt the idea or practice. For this DNP project, the innovation was the implementation of the Health TeamWorks guideline to standardize the care of adults with type 2 diabetes at KPHC. According to Rogers (2003), there are five innovation characteristics, and each characteristic is important in the decision making process of whether or not to adopt the Health TeamWorks guideline. These characteristics are: (1) relative advantage, where the Health TeamWorks guideline for treatment of adults with type 2 diabetes would be perceived as beneficial to patient outcome and would be cost effective compared to existing practice; (2) compatibility, where the Health TeamWorks

guideline is consistent with individual and organizational values, culture, and needs; (3) complexity, where the Health TeamWorks guideline may be difficult to understand and therefore difficult to utilize; (4) trialability, where the Health TeamWorks guideline will be easy to try out and be utilized; and (5) observable, where the results of using the Health TeamWorks guideline will be transparent and easily noticeable by others (Rogers, 2003).

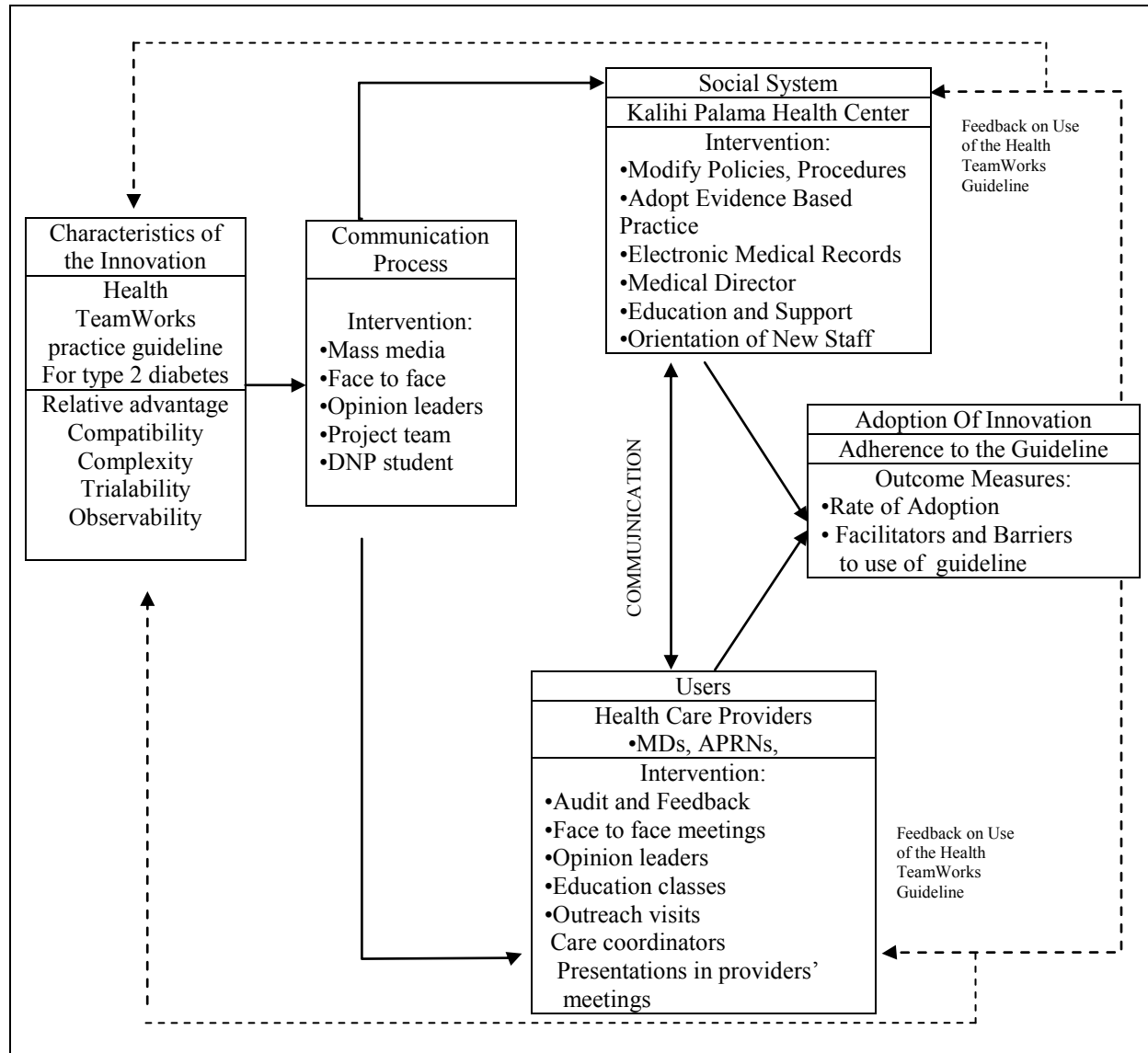


Figure 1. Implementing the Health TeamWork Guideline. Adapted from Implementation Model

(Rogers, 2003; Titler, 2010).

### **Communication Process.**

According to Rogers (2003), "communication is the process by which individuals create and share information with one another in order to reach a mutual understanding" (p. 18).

Diffusion is a type of communication process in which a new idea is shared among users in a social system over time. Both mass media and interpersonal communication channels can be used to transmit new information to individuals. Communication structures include both formal and informal methods of communication networks that occur spontaneously throughout the social system. Opinion leaders in a team play an important role in the diffusion of an innovation. The opinion leaders are usually in authority positions or experts in a specialty area. These individuals have the potential to accelerate diffusion of an innovation when they provide advice (Rogers, 2003). The team for this DNP project included the DNP student investigator, the certified diabetes educator (CDE), a medical assistant (MA), a staff registered nurse (RN), the dietitian, and two physicians. The two physicians in the team were the opinion leaders. They were both respected members of the organization, and would have the potential to influence adoption of the guideline. The student investigator was able to make contact with providers to render support to promote adoption of the Health TeamWorks guideline.

### **Social System.**

A social system is defined as "a set of interrelated units that are engaged in joint problem-solving to accomplish a common goal" (Rogers 2003, p. 23). The size of an organization makes a difference in the adoption of an innovation. The larger organizations have financial support and essential resources that make it easier to adopt new innovations (Titler, 2010). Kalihi Pālama Health Center is not a large organization, and therefore, it might not have the financial support and might lack resources; however, in implementing the Health TeamWorks guideline, KPHC

utilizes an electronic medical record system that is an essential resource for this DNP project. The information sources and computer technology access can improve professional performances and client outcomes. Computer technology is useful in data recording, patient recordkeeping, and computer prompts and reminders - all of which can increase adherence in using the Health TeamWorks guideline (Wensing, Wollersheim, & Grol, 2006).

There is no question that leadership at all levels in the organization is critical to adoption of an innovation. The leader defines and communicates how the innovation is related to the organization's goals and vision (Titler, 2010). In addition, leaders can facilitate adoption by their communication style, providing a non-punitive environment for risk taking, diverting resources to evidence based practice (EBP), providing time for research activities, and promoting a learning environment (Greenhalgh, Robert, Macfarlane, Bate, & Kyriakidou, 2005). Organizational procedures and policies should also support the use of EBP and should contain language explicitly requiring its use in all policies and protocols instituted in the organization (Titler, 2010). One of the physicians in this DNP project team is the Medical Director of KPHC. She supports EBP which is reflected in her decision to include the Health TeamWorks guideline as one of the resources for providers to use.

#### **Users of the innovation.**

Time influences the diffusion of innovations in three major ways. These influences include the innovation decision process, the rate of adoption, and adopter categories. According to Rogers (2003), an innovation passes through a series of stages before it is widely accepted. The stages include knowledge, persuasion, decision, implementation and confirmation. The rate of adoption of an innovation refers to the length of time necessary for a certain percentage of members of a social system to adopt the innovation. Adopter categories refer to the various

degrees of adopters within the population in which an innovation is being introduced. Adopter categories include innovators, early adopters, early majority, late majority, and laggards.

Innovators generally tend to have more years of education, higher social status, have a greater ability to cope with uncertainty and risk, as well as tend to engage in active information seeking through interpersonal networks and the mass media. In contrast, late majority individuals generally tend to be skeptical by nature (Rogers, 2003). The next section includes findings in the literature regarding challenges or barriers that can be encountered when adopting an innovation.

### **Barriers to implementing practice guidelines.**

The unwanted variations in patient care are reflected in the differences in treatment decisions that health care providers make for a specific disease (Wennberg, 2004). Generally, the existence of unnecessary variation in patient care is problematic because it results in the underuse of effective treatments that prolong the life and increase the quality of life of the patients. In addition, the variation in decisions result in the unnecessary use of treatments that will not benefit the patient including exposure of the patients to unwanted risks, as well as increase in costs of care (McGlynn et al., 2003). As delineated by the conceptual model, gaining some understanding regarding the characteristics of the innovation, users of the innovation and communications about the innovation across the social system is important. An understanding of general characteristics of guidelines, patients and providers, and social system and how these characteristics impact the use of clinical practice guidelines is relevant to this DNP project.

Patient safety and “do no harm” are important tenets in the delivery of patient care. The most serious characteristics of clinical practice guidelines is that they may be erroneous due to a lack of scientific evidence, to an inaccurate or incomplete expert opinion, limited clinical experience, and pressure from social or special interest groups (McGlynn et al., 2003). Practice

guidelines may also be based on studies that are methodologically weak; and results are concerning if they are being generalized across various patient and physician populations.

Practice guidelines are not “one size fits all”. A guideline developed for one specific disease will not be appropriate for someone with multiple co-morbidities. The implementation of a guideline may also be difficult to initiate and sustain in the care of a particular patient population. For example, a patient with diabetes who cannot afford a medication required for treatment will not be able to comply with the guideline, even if the provider appropriately prescribes the recommended medication, and the patient is motivated to adhere to the treatment regimen that is prescribed (McGlynn et al., 2003).

Research studies of patient characteristics have shown that a patient's age, gender, ethnicity, income, insurance coverage and socioeconomic status correlate with individual provider's treatment behaviors. These factors could also explain some variation in compliance with practice guidelines at the individual patient level. An individual's environment may impact the ability or desire for one to engage in healthy behaviors (Chen, Martin, & Matthews, 2006). Further, socio-economic status also has a positive relationship with compliance with clinical practice guidelines (Bernheim, Ross, Krumholz, & Bradley, 2008). Education, poverty, lack of health insurance, and lack of a usual source of health care can reduce the likelihood that a patient has access to care, including early detection procedures (Simard, Fedewa, Ma, Siegel, & Jemal, 2012). Financial access to care includes the presence or absence of insurance coverage, and adequacy of income to purchase medications, and pay for diagnostic tests. Being without insurance coverage puts an individual at significant risk for poorer health. In 2006, an estimated 47 million Americans or 18% of those under age 65 years were uninsured. Furthermore, it was



estimated that 22,000 adults ages 25 – 64 years died in 2006 as a result of having no insurance and thus no access to health care (Rowland & Shastzer, 2008).

Research studies indicate that providers' medical specialty, race, and age, influence medical decisions. In addition, research has documented three areas of change required for compliance in using clinical practice guidelines. These areas include knowledge of the guideline, and attitudes and behavior towards making changes in integrating the guidelines in individual practices (McKinlay et al., 2007). The pertinent of these three areas to this DNP project is the providers' knowledge of the guideline. A systematic review of the attitudinal and knowledge characteristics of physicians towards clinical practice guidelines indicates that more than 70% of physicians agree that guidelines potentially improve quality of care, are helpful resources and educational tools. Conversely, 30% of physicians considered guidelines impractical and rigid in their application, 34% felt that guidelines reduce physician autonomy and oversimplify medicine, and 41% believed that guidelines can increase risks of litigation (Farquhar, Kofa, & Slutsky, 2002). These common attitudinal perceptions appear to be strongly correlated with self-reported compliance with using practice guidelines (Maue, Segal, Kimberlin, & Lipowski, 2004).

It is important to have organizational procedures and policies in place to support the use of evidence based guidelines (Titler, 2010). Providers in various settings identify difficulties in implementation of evidence based guidelines due to lack of resources, lack of authority and unsupportive organizational culture, and lack of time to implement ideas (Bryar et al., 2003; Hutchinson & Johnston, 2004). With some understanding of the factors and characteristics of multiple components of the process of implementing guidelines, the literature review in the next section provides evidence for the most effective interventions in implementing and adopting of guidelines by health care providers to improve care for patients with type 2 diabetes.

## **Literature Review**

A growing body of research explores the most effective interventions to increase the use of clinical practice guidelines. Because practice guidelines target specific diseases that become more prevalent as a population ages, the decisions about the use of clinical practice guidelines will become more important in the future in the care of chronic health conditions including diabetes, renal disease, and heart disease (Hagedorn et al., 2006). Implementing an evidence based clinical practice guideline to standardize diabetes care is a way that health care providers at KPHC can reduce unwanted variation in provision of care to a vulnerable group of adults with type 2 diabetes. This literature review focused on research done about the implementation of guidelines and best evidence of interventions to promote adoption of guidelines by health care providers.

The literature review was conducted to search for publications specific to this DNP project. The search engines included PubMed, CINAHL, Google Scholar and Cochrane databases to obtain published relevant articles. Because practice guidelines were formalized in the 1990s; a lot of research in this area was done in the late 1990s. The search included articles that have been published during the past 15 years to include some of the early findings in the 1990s in this topic area. The search terms included type 2 diabetes, practice guidelines, implementation, adoption, multifaceted interventions, multiple strategies, and provider behavior. These terms were used in different combinations to maximize the amount of articles found. Studies that focused on gestational diabetes or type 1 diabetes or any studies with children and pregnant women were not included. The filters used to narrow the search included a time frame of articles being published in the past 15 years, subjects included in the study being 19 years of

age or older, availability of the full text of the article, involved only humans participants, and articles were published in English.

There is substantial evidence to suggest that multifaceted interventions are more effective than single intervention strategies because separating the effectiveness of any single intervention and its usefulness for different contexts is difficult (Grimshaw, Eccles, & Tetroe, 2004). A total of 70 articles were reviewed and a total of 17 articles met the inclusion criteria and are included in the analysis. There was one article that evaluated 13 systematic reviews that examined multiple interventions, three systematic review articles, six randomized trials, one observational study, one controlled study, and five multi-interventional studies for quality improvement. The tool that was used to appraise the level of evidence in articles included in this review is the Melnyk and Fineout-Overholt (2011) Research Critique Tool in Table 1.

Table 1. Melnyk & Fineout-Overholt Research Tool

Level of Evidence	Description	Multifaceted interventions article
1	Systematic review & meta-analysis of randomized controlled trials; clinical guidelines based on systematic reviews or meta-analyses	4
2	One or more randomized controlled trials	6
3	Controlled trial (no randomization)	
4	Case-control or cohort study	1
5	Systematic review of descriptive & qualitative studies	
6	Single descriptive or qualitative study	6
7	Expert opinion	

### Synthesis and critique of literature review

A review of 13 systematic reviews done by Boaz, Baeza and Fraser (2011) included 313 studies which identified four strategies to increase implementation of evidence into practice. The four interventions were: audit and feedback, computerized decision support, opinion leaders and multifaceted interventions. Boaz and colleagues found that the 14 studies that focused on audit

and feedback included in the systematic review by Brywood, Lunnay, and Roche (2008) showed that these interventions had potential in facilitating changes in professional practices related to treatment of alcohol and other drug problems. The quality of studies in this area had methodological flaws and had small and non significant changes in patients' health. Boaz et al. (2011) found that the 67 studies included in the systematic reviews by Durieux et al. (2008) and Mollon et al. (2009) to evaluate the effectiveness of computerized decision support showed benefits in initial dosing of medications, and potential changes in provider behavior. These systematic reviews also showed potential changes in processes; however the quality of studies differed between the two systematic reviews. In Durieux et al. (2008) the quality of studies was generally low; where as in Mollon et al. (2009), there were a few high quality studies focusing on improvement of patient outcome; but many of the studies included were poorly described. Boaz et al. (2011) reported on one systematic review looking at local opinion leaders and their effect on professional practice and health outcomes. The 12 studies included in the systematic review by Doumit, Gattelari, Grimshaw, and O'Brien (2007) found that opinion leaders have the potential to promote adoption of evidence based practice; and results of this systematic review were comparable to the other interventions mentioned above.

For the multifaceted interventions, Boaz et al. (2011) included nine systematic reviews. These individual systematic reviews included studies in different health related specialty areas. These areas included medication prescribing practices, implementation of guidelines in the psychiatric, obstetrics, cardiac, chronic diseases, allied health, and community health specialties. Overall, the reviews suggested that active interventions such as audit, reminders and feedback, and opinion leaders are more effective than passive approaches such as computerized computer support and information campaigns (Boaz et al., 2011).

A systematic review by Ivers et al. (2012) included an analysis of 140 studies evaluating audit and feedback interventions. They found that most of the studies concluded that when used together with other interventions, audit and feedback influence performance in prescribing proper treatments and diagnostics in improving the overall management of patients especially those with chronic diseases such as heart disease and diabetes. The systematic review concluded that audit and feedback on professional behavior are most effective when: (1) the health professionals are not performing well to begin with; (2) the person responsible for the audit and feedback is a supervisor or colleague; (3) it is provided more than once; (4) it is given both verbally and in writing; and (5) it includes clear targets and action plans (Ivers et al., 2012).

Another systematic review by Flodgren et al. (2011) examined studies that assessed effectiveness of local opinion leaders in improvement of practice and patient outcomes. This review included 18 studies involving 296 hospitals and 318 primary care providers (PCPs). The effects of interventions varied across the 63 outcomes from 15% decrease in compliance to 72% increase in compliance with desired practice. The studies compared opinion leaders to no intervention, one single intervention or to multiple interventions. Overall, the median adjusted Risk Difference (RD) across all studies was +0.12 representing 12% absolute increase in compliance in the intervention group.

O'Brien et al. (2007) conducted a systematic review on educational outreach visits as an intervention to improve professional practice. There were a total of 15,000 health professionals included in these studies. This face-face type of intervention is also referred to as academic detailing, educational detailing, and/or educational visiting approach. This intervention involved trained professionals who visited clinicians at their practice sites to provide information about

their performance, and recommendations on how to change their practice. This systematic review found that outreach visits provided small to moderate changes in practice.

In addition to the systematic reviews mentioned above; it was important to search specific randomized studies that examined interventions and processes to increase support for providers in using guidelines to improve outcomes in patients with diabetes. There were six randomized studies found, of which two were prospective randomized studies (Ziemer et al., 2006; Varroud-Vial et al., 2004) and four cluster randomized studies (Frijling et al., 2002; Perria et al., 2007; Hetlevik et al., 2000; Van Bruggen, Gorter, Stolk, Verhoeven, & Rutten, 2008). The four cluster randomized studies took place in international settings, and all evaluated the effectiveness of multiple interventions in groups of health centers or general practices in the community. These four studies included a range of 17 to 124 general practices, and a range of 24 to 252 health care providers. All six randomized studies used measures to evaluate diabetes outcomes including HbA1c, blood pressure, cholesterol, body weight control, titrating medications, foot examination, and eye examination. The interventions included were audit and feedback, use of a facilitator to provide support, education classes and outreach visits, use of computer support systems, and use of one particular guideline or program.

The results of three of the four cluster randomized studies did not demonstrate improvements in the outcomes using the multi intervention approach. Perria et al. (2007) found that the use of a structured learning program to promote the use of the guideline related to diabetes care was ineffective. In addition, the passive dissemination interventions used did not show any significant effect on diabetes outcomes.

Hetlevik et al. (2000) found that implementation of a guideline for diabetes by means of a computer program and several other interventions did not result in a clinically significant change

in the doctor's behavior or in patient outcomes. Frijling et al. (2002) found that feedback reports given to providers in addition to support from a facilitator statistically improved rates of foot examinations (odds ratio 1.68, 95% confidence interval 1.19-2.39), and eye examinations (1.52; 1.07-2.6) in a general practice. Van Bruggen et al. (2008) found that the processes in the provision of diabetes care improved but did not improve the cardiovascular risks of patients with diabetes when they implemented a locally adapted guideline and used multiple interventions to increase the utilization of the adapted guideline. These processes included the increase in frequency of patient visits to see providers on a 3- monthly basis schedule in the intervention group (88% versus 69%;  $p < 0.001$ ); more blood pressure checks done every three months (83% versus 66%),  $p < 0.001$ ); and body weight measurements taken every three months (78.9% versus 48.5%,  $p < 0.001$ ). However, the differences in HbA1c, blood pressure and body mass index (BMI) measurements were not significant.

The prospective randomized study by Varroud-Vial et al. (2004) included 340 patients (192 in intervention and 148 in control group) and 57 general practitioners who were educated in the Staged Diabetes Management (SDM) guideline or program. Results showed that patients were managed more adequately using the SDM guideline ( $p < 0.05$  for 9 out of 10 items). The HbA1c decreased by 0.31% in the intervention group and increased by 0.56% in the control group, resulting in a difference of 0.87% by the end of the study ( $p = 0.001$ ). Blood pressure and cholesterol levels did not differ between the groups and no significant changes occurred in these measures within the groups.

Over the time period of three years, Ziemer et al. (2006) conducted a randomized study that included 345 internal medicine residents. The medical resident providers were randomized to the control group (usual care) or to the intervention groups where one group of residents

received computerized reminders providing patient-specific recommendations at each visit, another group received feedback only, and one more group received reminders and feedback on performance every 2 weeks. There were 4038 patients seen by the 345 resident providers. When patients' glucose levels exceeded 150 mg/dL during visits, the resident provider behavior was characterized as *did nothing*, *did anything* (any intensification of therapy), or *did enough* (if intensification met recommendations).

The results showed that intensification increased more in the feedback alone and feedback plus reminders groups compared to the reminders alone and control groups ( $P < .001$ ). After 3 years, the providers' behavior in the reminders alone and control groups returned to baseline. Improvement of care in the feedback alone and feedback plus reminders groups was sustained where 52% *did anything*, and 30% *did enough* ( $P < .001$  for both versus the reminders alone and control groups). A multivariable analysis showed that the feedback on performance contributed independently to intensification and that intensification contributed independently to improvement of HbA1c levels ( $P < .001$  for both groups).

The randomized controlled study (King & Wolfe, 2009) evaluated the improvements in diabetes care delivered by midlevel clinicians, either a nurse practitioners or physician assistant, in two primary care practices. The inclusion criteria required patients to be 18 years and older and had been diagnosed with type 2 diabetes for  $\geq 6$  months, with one or more identified cardiovascular risk factors. One medical practice was designated as the control group with 101 participants that received usual care, and the other for the experimental group with 34 participants who received care by the midlevel clinicians. The midlevel clinicians who treated patients in the experimental group received training in using the American Diabetes Association treatment algorithms. They also had telephone consultations at 2 to 4 week intervals and patient



bimonthly visits with diabetes specialists, and received support and treatment guidance within 24 hours from diabetes specialists remotely. Weekly diabetes clinics were made available to participants in the experimental group. After 12 months, the last available participant data were extracted from the participants' charts and compared to the 12-month chart data from the control group.

The results showed that the mean HbA1c values decreased from baseline levels by 0.46% in the treatment group versus 0.06% in the control group; however, reduction in HbA1c level was not statistically significant which is potentially attributable to sample size. The mean systolic blood pressure values were significantly reduced in the treatment and control groups ( $p = .015$  and  $p = .031$  respectively); and LDL levels were only significantly changed in the control group ( $p = .001$ ) but not the treatment group.

There were five chart reviews found in this literature search (Govender et al., 2012; Bailie et al., 2007; Kirkman, Williams, Caffrey, & Marrero, 2002; McCraw, Kelly, Righero, & Latimer, 2010; Ward et al., 2004). All chart reviews included audits of clinical processes in the care of diabetic patients. The one intervention reported in all the chart reviews was the audit and feedback given to the providers about their performance and compliance in following recommendations of guidelines. All chart reviews found that adherence to guidelines improved processes in the care of patients with type 2 diabetes. For example, the chart review by Bailie et al. (2007) found that the HbA1c level checks increased in 6 monthly time periods from 41% to 74% (Risk Ratio 1.93, 95% Confidence Interval 1.71-2.10), annual checking of cholesterol from 56% to 74% (1.36, 1.20-1.49), and 3 monthly blood pressure checks from 63% to 76% (1.27, 1.13-1.37). The chart review done by Kirkman et al. (2002) found significant improvements in blood pressure measurements (71% versus 83%;  $p = 0.002$ ), foot exams (19 versus 42%,

$p < 0.001$ ), HbA1c measurements (26 versus 37%,  $p = 0.012$ ), and eye exams (28 versus 46%,  $p = 0.043$ ). All these improved outcomes reflected adherence of providers in using the guidelines.

One observational study (Valk et al., 2004) compared the processes for the care of two cohorts of patients with diabetes, one in Amsterdam and the other in the USA. The interventions for this study were the inclusion of clinical guidelines, a medical record system review, physician education meetings and feedback on performance. There was no mention of how many physicians were included; however, there were 379 patients in the cohort in Amsterdam, and 2,119 in the USA. The results showed that the processes in the care of diabetic patients and achieving diabetes control improved in the cohort in Amsterdam compared to the group in the USA. There were no reported statistical analysis in this study.

There were two “before and after” designed studies found in this literature search. These studies utilized multiple interventions to implement guidelines for the care of diabetes (Nyman, Murphy, Schryper, Naessens, & Smith, 2000; Weber, Bloom, Pierdon, & Wood, 2008). In combination, the interventions included the use of an electronic registry, audit and feedback, computerized reminders and financial incentives, enhanced clinical support and coaching. The results of the study by Weber et al. (2008) showed significant improvement in the percentage of patients with ideal glucose control (HbA1c  $< 7\%$ ) that increased from 32.2% to 34.8% ( $p < 0.001$ ), and blood pressure control improved from 39.7% to 43.9% ( $p < 0.0001$ ). The results of the study by Nyman et al. (2000) showed significant improvement in urine protein testing that increased from 24% to 66% ( $p = 0.001$ ); dilated eye examinations increased from 63% to 84% ( $p = 0.001$ ); and foot exams increased from 86% to 97% ( $p < 0.001$ ). The mean HbA1c values of  $\pm$  Standard Deviation also improved from  $7.8\% \pm 1.0$  to  $7.0\% \pm 0.7\%$  ( $p < 0.001$ ) in patients who received continuing care for diabetes. This study had a small sample of 82 patients, and even though these

results were statistically significant, it would be difficult to generalize these results to other cohorts of patients with diabetes.

### **Summary of literature review**

This literature review revealed mixed results in the interventions that were focused on improving provider implementation of guidelines. The review of 13 published systematic reviews done by Boaz et al., (2011) suggested that multifaceted interventions such as medical record/chart audits, reminders and feedback, and opinion leaders were more effective than passive approaches such as computer support and information campaigns. The randomized studies found mixed results in utilizing multiple interventions to improve care of the adults with diabetes. The four cluster randomized studies did not find any significant changes (Frijling et al., 2002; Hetlevik et al., 2000; Perria et al., 2007; Van Bruggen et al., 2008) in any of the measures evaluated. The two prospective randomized studies, (Varroud-Vial et al., 2004; Ziemer et al., 2006), found some significant changes in the HbA1c levels when a medical record/chart audit was completed with feedback and enhanced support were provided for clinicians in implementing guidelines. The rest of the studies, though not randomized, revealed that the audit and feedback, together with other supporting interventions appeared to be the approach that made the significant changes in these studies. Considering the results of this literature review, this DNP project utilized audit and feedback of providers' performance, use of opinion leaders, education classes and outreach visits as the multiple interventions approach to implement the Health TeamWorks guideline.

## CHAPTER 3

### METHODS

This DNP project is a quality improvement (QI) project that explored if the implementation of the Health TeamWorks guideline by providers would improve and maintain levels of HbA1c and LDLs in adult patients with diabetes beyond the first six months of this project year. The participants were not randomized. The DNP student investigator developed all instruments and tools, and descriptive and trend analyses were used to evaluate outcomes.

#### **Design**

The “pre and post” implementation evaluation of patients’ laboratory work according to the recommendations of the Health TeamWorks guideline was utilized to gather data for this DNP project. Baseline measures of patients’ HbA1c and LDL levels were obtained before implementing the Health TeamWorks guideline. Uncontrolled HbA1c levels were evaluated in three month increments and LDLs levels once during the project year. The multiple interventions to promote the use of the guideline included the use of opinion leaders, education classes and presentations in providers’ meetings, audit and feedback of performance for providers. A “talk story” session at the end of the project was also planned to gather information about barriers to and facilitators for implementing the Health TeamWorks guideline.

#### **Operational Definitions**

An *innovation* is an idea or practice that is perceived as new by an individual or a group of individuals in a setting. The *adoption* of an innovation is a decision to make full use of an innovation as the best course of action available; and *rejection* is a decision not to adopt the innovation. The *rate of adoption* refers to the relative speed in which an innovation is adopted by members of the community (Rogers, 2003). *Implementation* refers to the project period in which

providers ideally become skillful, consistent, and committed in their use of the guideline (Weiner, Helfrich, Savitz, & Swiger, 2007). The goal of this project was to standardize the care of patients with type 2 diabetes by implementing one guideline to direct practice. A *guideline* is defined as a compilation of statements that integrates information from systematic reviews of the evidence, and an evaluation of the benefits and risks for harms of alternative care options. It also includes recommendations intended to optimize patient care (Institute of Medicine [IOM], 2011). The Health TeamWork guideline incorporates recommendations from the American Diabetes Association (ADA) and American Association of Clinical Endocrinologists (AACE) to guide treatments for those patients with type 2 diabetes. *Glycosylated Hemoglobin A1c* (HbA1c) is a measure that reflects the average blood sugar of the individual over the past three months (ADA, 2014). Low HbA1c has been found to prevent microvascular consequences; however, very low blood sugar or hypoglycemic episodes can also be dangerous for those with diabetes. The recommended HbA1c by ADA is less than 7% which is equivalent to an average blood sugar of 154 mg/dL. Because of potential complications associated with blood sugars that are very low, ADA's recommended HbA1c may be lower than other institutions that take care of the elderly with type 2 diabetes (ADA, 2013). Hemoglobin A1c less than 8% is the target for this DNP project. *Low density lipoprotein (LDL)* contains high amounts of cholesterol and is associated with an increased risk of atherosclerosis and coronary artery disease. ADA recommends that the level of LDL should be less than 100mg/dL (ADA, 2014). *Health care providers* are individuals employed by KPHC that are credentialed to prescribe treatments for diabetes including Medical Doctors (MD) or physicians and advanced practice nurses (APRN). These treatments may include medications, nutrition therapy, and hospitalization if necessary. The *opinion leaders* are

critical team members in influencing change. These are the individuals that have the ability to influence other members of an organization in making changes.

## **Setting**

Kalihi Pālama Health Center is an independent, non-profit, organization that provides health and social services for the Kalihi Pālama community. The organization supports and assists patients who face many challenges like living with limited or no financial support, having difficulty accessing housings and health care, and having difficulty with English language. Combined, these barriers pose many obstacles to the delivery of quality health care. The health center is located in an urban, inner city community that is home to approximately 64,000 residents; many of whom are poor Asian, Native Hawaiian, and Pacific Island ethnic minorities and immigrants (KPHC, 2014). Since chronic diseases, including diabetes, are prevalent in the Asian and Pacific Island populations, the Diabetes Clinic at KPHC provides access to care to an average of 15 to 20 patients once a week. KPHC employs approximately 43 health care providers that serve more than 20,000 patients of all ages annually. These 20,000 patients are able to access care in any of the five satellite clinics KPHC has around Kalihi Pālama residential areas, in addition to the main clinic located at 915 North King Street. The 43 health care providers include 19 advanced practice nurses (nurse practitioners and certified nurse midwives), one psychologist, 18 physicians including psychiatrists, three dentists and two optometrists. These health care providers are employed full time, part time or as locum tenens to cover the needs of the clinic. A full time employee works 40 hours a week and a part time employee works less than 40 hours. The locum tenens are only in the clinics if there is a need to fill in for employees who are on leave, or if there is an increase in demand for clinical services. The locum tenens were included in this project if they participated in the implementation phase. Even though all health

care providers are credentialed to prescribe treatments for patients with diabetes, this DNP scholarly project only included the health care providers who were hired to work in the adult medical department, and were able to prescribe treatments for adults with type 2 diabetes.

### **Participants**

Kalihi Pālama Community Health Center is divided into different departments according to specialty areas. These specialty areas include the pediatric department, the women's health department, the adult medical department, the behavioral health department, dental department, and the optometry department. The inclusion criteria for this DNP project required the participants to be credentialed to prescribe treatments for adults with diabetes, and were hired to work in the Adult Medical department. Pregnant female patients with gestational/type 1/type 2 diabetes were not included in the pool of patients whose medical records were accessed for this project. These pregnant patients are taken care of by providers in the Women's Health department. In the scope of their practices, the providers in the Adult Medical department are licensed to prescribe medications, nutrition therapy, admit patients to the hospital if needed, and consultations with other health care providers outside of KPHC. The goal of this DNP project was to standardize the care of adults with type 2 diabetes using one practice guideline in the clinic. This required evidence based interventions to promote utilization of the Health TeamWorks guideline by providers.

### **The Innovation for Practice Change**

Variation in care has risks in patient health outcomes. The innovation for this DNP project was the implementation of the evidence based Health TeamWorks guideline to standardize care for the adults with type 2 diabetes. The practice change had to do with providers at KPHC using and following recommendations of this one guideline for type 2 diabetes care in

their daily practices. Clinical practice guidelines provide directions for treatments based on systematic reviews of the evidence. They also provide an evaluation of balance of benefits and harms, and a clear, defined process for translating evidence to clinical recommendations (Strommen, 2011). The implementation and adoption of a clinical practice guideline by health care providers in any health care setting can be challenging based on many factors. These factors include personal beliefs, self efficacy, social and peer support and organizational support (Ceccato, Ferris, Manuel, & Grimshaw, 2007). In addition, according to the transtheoretical model, behavior change occurs in five stages including pre-contemplation, contemplation, preparation, action and maintenance (Hutchison, Breckon, & Johnson, 2009). The ease of adoption of an innovation by a group of individuals is more likely if the group is homophilus, meaning, the group members have similar educational, cultural and professional background (Rogers, 2003). The group of providers for this DNP project was homophilus in nature and therefore made it easier to conduct education classes, site visits, and provide feedback about progress in using the Health TeamWorks guideline.

The Implementation Model, adapted by Titler (2010) and built on Rogers' Diffusion of Innovation theory (Rogers, 2003), guided this DNP project. Rogers' Diffusion of Innovations Theory describes the phases an individual or a group of providers moves through. These phases include the knowledge phase, persuasion phase, decision phase in adopting or rejecting the innovation, the implementation phase and the confirmation phase (Dobbins, Ciliska, Cockerill, Barnsley, & DeCenso, 2002; Rogers, 2003; Sussman, Valente, Rohrbach, Skara, & Pentz, 2006). An assumption of this DNP project purported that the adoption of the Health TeamWork guideline would also occur in these stages. In the knowledge phase, the health care providers became aware of the Health TeamWork practice guideline as a resource and where to locate it on



the website. The introduction to the guideline took place in providers' meetings in small group presentations and informal communications (Dobbins et al., 2002; Greenhalgh et al., 2004; Rogers, 2003). In the persuasion phase, the DNP student provided education classes highlighting the guideline's characteristics and how simple it was to follow. The student recognized the vast difference in individual providers' experiences that might impact adoption of guideline. Since the Medical Director supported evidence based innovations in improving care provided for patients, it made it easier for this DNP student to move forward with this project.

### **Innovation characteristics**

In the context of this DNP project, the perceived innovation characteristics referred to implementing the Health TeamWork clinical practice guideline. Rogers (2003) identified five innovation characteristics that contribute to the decision to adopt or reject an innovation. These characteristics include relative advantage, compatibility, complexity, trialability, and observability. Relative advantage was defined as the degree to which the Health TeamWork practice guideline was perceived to be better than the existing practice. Compatibility was the perception that Health TeamWork practice guideline was consistent with existing values, needs, and experiences of the health care providers. Complexity was the perceived level of difficulty to utilize or comprehend and apply the Health TeamWork guideline in current practice. Trialability was the extent to which the practice guideline could be implemented or "trialed" on a small scale to determine its benefits for practice. Observability was the degree to which results of utilizing the clinical practice guideline were visible to others (Dobbins et al., 2002; Greenhalgh et al., 2004; Rogers, 2003).

### **Individual Innovativeness**

The health care providers at KPHC had characteristics that contributed to the adoption of the Health TeamWork guideline. These included personal and practice values, interests and beliefs in practice guidelines. In addition, the individual health provider's age, gender, seniority level, and decision making authority as well as ongoing training in research methods might impact adoption of the guideline (Dobbins et al., 2002; Greenhalgh et al., 2004). When applying the transtheoretical theory, all providers at KPHC were at different stages of willingness to make practice changes. The DNP student and opinion leaders provided support for clinicians to facilitate the practice change using the Health TeamWorks guideline.

### **Organizational Innovativeness**

The organizational characteristics of KPHC can significantly influence the adoption of the Health TeamWork guideline. These include the organization size, culture, internal and external communications channels and pipelines, and decision making processes. There is also a strong association of evidence based research utilization in an organization and the influence of decision-making and innovation adoption in clinical practice (Dobbins et al., 2002; Greenhalgh et al., 2004). All personal, organizational and perceived innovation characteristics mentioned above were considered in the implementation phase of this DNP project. The implementation phase of the Health TeamWork guideline involved all health care providers who prescribed care for adult patients with type 2 diabetes. Kalihi Pālama Health Center, as an organization, supported evidence based treatments, and allowed this DNP project to take place.

### **Implementation Phase of DNP project**

In the literature, systematic reviews identified multifaceted interventions as the best approach to improve implementation of practice guidelines (Grimshaw et al., 2004). This DNP

project utilized this approach to influence utilization of the Health TeamWork practice guideline. The five interventions considered for implementation included: (1) use of mass media for communication and distribution of education material; (2) formal and informal face to face education meetings; (3) education outreach visits or academic detailing; (4) collaboration with opinion leaders for this DNP project; and (5) audit and feedback about compliance given to the health care providers (Grimshaw et al., 2004). Each of the five interventions is discussed below.

#### **Educations meetings and distribution of education materials.**

There was one formal “Lunch and Learn” presentation about the Health TeamWork practice guideline for the providers. The presentation highlighted components of the practice guideline in relation to treatment of diabetes. A case study was included at the end to reinforce information presented for the session (Appendix F). This group activity promoted networking among providers which could facilitate behavior change resulting in adoption of guideline (Parboosingh, Reed, Palmer, & Bernstein, 2011). Informal meetings on a one to one basis took place in the hallways and private offices if providers requested verifications of any component of the guideline.

In addition, a copy of the Health TeamWorks guideline was given to all providers present in the meetings. The DNP student demonstrated how to access the guideline on KPHC website; and a snapshot of instructions about how to access the guideline online was given in a handout presented to all providers. The DNP student was also available to answer emails and text messages if there were any questions about the guideline.

#### **Education outreach visits.**

Since KPHC has five satellite clinics in addition to the main clinic, the DNP student visited all the sites to provide one to one short sessions with providers. The DNP student also

participated in Care Coordinators' meetings midway in the implementation of the project. The student presented data and findings from the first six months of the project highlighting the guideline protocols of rechecking uncontrolled HbA1c levels every three months; and LDL levels once a year.

#### **Local opinion leaders.**

In addition to the DNP student, Dr. R. and Dr. T. were identified as opinion leaders in this DNP project. They have the authority status and experience in mentoring other health care providers and medical students in the clinic. The opinion leaders were part of the formal "Lunch and Learn" presentations. They participated in clarifying any components of the practice guideline related to treatment of type 2 diabetes that needed further explanations.

#### **Audit and feedback to the health care providers.**

The 11 clinicians included in this project were primary providers for 88 patients whose HbA1c and LDLs levels were tracked for this project. Uncontrolled HbA1c levels were checked every 3 months; and LDL levels once a year. The DNP student and Medical Director agreed that the best place to present feedback and findings of project was the monthly providers' meetings. During the year of this project, the DNP student presented data during three of providers' meetings.

The last phase of adopting an innovation in Rogers' Diffusion model is confirmation. This phase identifies the positive and negative outcomes associated with adopting and implementing of the Health TeamWork guideline (Rogers, 2003). In the post implementation phase; the student was not able to conduct a "talk story" session due to time constraints; however, the post implementation questionnaire included questions about facilitators and barriers in using the guideline; and the percentage of time providers used the guideline. Results were also

analyzed to determine other factors that could have impacted adoption of the guideline by providers in this project.

### **Instruments**

All the tools for this project were developed by the DNP student. A pre-implementation questionnaire (Appendix C) was given to the healthcare providers who attended the first formal education session. This questionnaire asked providers about their awareness of the guideline, how to access it, and whether or not they currently utilized it in their practice. A post implementation questionnaire explored the percentage of the times the providers used the Health TeamWorks guideline. There were also two open-ended questions asked about facilitators and barriers to adopting the Health TeamWorks guideline (Appendix D). The student planned to conduct a “talk story” session to gain an understanding of providers’ experience in implementing the guideline. Due to time constraint, the student was not able to conduct the “talk story” session.

### **Data Collection**

In the data collection phase of this project, the DNP student investigator utilized the questionnaires to collect data on the measures at certain points of time, and the analysis process involved as outlined in Table 2. The variables examined were pre-implementation and post implementation knowledge, perceived barriers to the guideline implementation and adherence to the guideline. In addition, the data on HbA1c and LDL levels and frequency of guideline use were collected using chart audits, verbal reports and questionnaires.

Table 2. Data Collection

Variables	Instruments	Data Collection Point	Data Analysis
<b><u>Process Measures</u></b>			
Knowledge Pre-implementation	Investigator designed tool	At the end of first education session	Descriptive Analysis
Knowledge post implementation	Investigator designed tool	At 3, 6, & 9 months	Descriptive Analysis
Facilitators Barriers to implementation	One to one interview “talk story” session	Once a month during implementation time	Content Analysis Identify Themes
Adherence to practice change	Chart Audits	Every 3 months	Descriptive Statistics & Trend Analyses
<b><u>Outcome Measures</u></b>			
Improved A1C <8% LDL <100mg/dL	Chart Audits	Every 3 months	Descriptive Statistics & Trend Analyses
Increased frequency of guideline use by providers	Post implementation questionnaire Chart Audits Verbal Reports	Every month	Descriptive Statistics & Trend Analyses

### **Knowledge Pre-Implementation.**

The pre implementation data were collected using the questionnaire to explore if: (1) the providers integrated any evidence based guideline into their current practice; (2) they were aware of the Health TeamWork guideline and how to access the guideline; (3) they could share opinions and beliefs about the use of a guideline; and (4) whether or not they anticipated any facilitators or barriers in adopting the guideline. There were no personal identification data questions included in this questionnaire.

### **Knowledge Post-implementation.**

The data about knowledge using the Health TeamWork guideline post implementation were collected using the questionnaire that the DNP student developed (Appendix D). The questionnaire addressed questions on the percentage of time the providers used the Health TeamWork guideline; their ability to access the guideline, and their experience in using the guideline. As reflected in Table 3, data were collected at four points throughout the process. The data collection occurred at three, six, nine, and twelve months after the first education session with the providers. These data collection points corresponded to the months of October 2014, January 2015, April 2015, and July 2015. The data collected were analyzed using descriptive analysis and trend evaluation.

### **Data Analysis**

Descriptive and trend analyses were utilized in evaluating data for this DNP project. This DNP student used the EXCEL computer program for descriptive analysis and determining trends of data. The “talk story” session planned did not take place; therefore, no qualitative data were collected.

### **Ethical Considerations**

This project had been designed to protect the rights of all human subjects participating in the project. The student investigator has taken the University of Hawai‘i required Collaborative Institutional Training Initiative (CITI) course in Human Subjects Protection (Certification Number 31640) to further understand the rules and regulations to protect the rights of participants. The entirety of this project was reviewed by the student investigator’s academic and clinical advisors and committee members to ensure adequate human subjects protection. Quality improvement projects evaluate clinical practice specific to an agency or an organization and is

not considered research. In this DNP project, standard evidence based practice was implemented and there were no experimental interventions that might reflect a research focus. In order to protect participant's confidential information, all data were reported as de-identified aggregate outcome data. There were no identifiers such as name, social security number, or date of birth collected. The provider participants were asked to sign a consent statement voluntarily before they were involved in this project. The consent gave permission for the student investigator to access information about HbA1c and LDLs levels of the 88 patients tracked throughout the year. This consent form was distributed during the first formal education class to introduce the DNP project (Appendix E). This project had also been presented to the Chief Executive Officer of KPHC; and he had given the approval and support for the project to move forward.

### **Required Resources**

The resources needed for this DNP project included financial support to buy lunches for the providers for the formal education session; and at the end during the last presentation session. Lunch was budgeted at ten dollars per person. There were about 15 providers in the adult medical department and therefore a budget of \$300.00 was estimated for the two days. Since the presentations took place during lunch, there was no cost impact for the clinic. In addition, since the hours are accounted for as a required practicum for the in the student to progress in the DNP program, the student did not get paid for her time to do any of the work related to the project. Another required resource was a private room with adequate space and lightning for the class sessions. In addition, a projector and a lap-top were also needed for the formal presentations of the DNP project. Power-point presentations made it easier for everyone to view content at the same time, and they could ask questions and received answers all at once as a group. Other resources were paper copies of the Health TeamWork guideline, and an available computer on



site to send mass emails to the participants. The website access information about how to locate the Health TeamWorks guideline was also included with the paper copies of the guidelines given to the providers.

### **Limitations**

There were many limitations of this DNP project. The innovation took place in five different locations of KPHC clinics, and therefore the environment and conditions were not constant and variables were not controlled. The Health TeamWorks guideline might also have a different impact on patients with just diabetes versus others with diabetes and other co-morbidities. The sample size of 11 providers for this project was small and therefore any significant findings could not be generalized to the population of providers who take care of adults with diabetes. All questionnaires were developed by the student; therefore, the reliability and validity of the tools had not been tested. The questionnaires also asked the participants to rate how they felt about the innovation. Self ratings are not reliable because there are many factors that can influence a participant's response, for example: influence from others, personal perception and feelings, and the time factor. The data quality in the analysis of this DNP project was a limitation because of the questionnaires used. The descriptive and trend analyses were reflective of HgbA1c and LDL levels for patients; but provided limited information about provider participants adopting the innovation.

### **Timeline**

The time frame for this DNP project was one year starting from July 2014 to July 2015. Table 3 outlines the activities and events that occurred throughout the year. These events and tasks included the preparation of the proposal defense, preparation of instruments, planning briefing sessions with providers and staff, planning how to market the Health TeamWork

guideline, and planning ongoing education sessions and/or communications strategies with providers and staff. There were project progress reviews done at 3-months, 6-months, 9-months and 12-months after the first formal presentation of the DNP project. These checkpoints coincided with rechecking patients' HbA1c levels every three months and LDL levels once during the project year. There were ongoing analyses and evaluation of the data throughout the year of the project.

Table 3. Timeline

Task	July 2014	Aug	Sep	Oct	Nov	Dec	Jan 2015	Feb	Mar	Apr	May	Jun	July	Aug - Dec
Proposal	X													
Defense														
Brief DNP team & staff	X													
Prepare instruments	X													
Develop Marketing Products	X													
Educate Providers & Staff	X	X	X	X	X	X	X	X	X	X	X	X	X	
DNP Progress Review				X			X			X			X	
Develop database	X													
Implement Practice Change		X	X	X	X	X	X	X	X	X	X	X	X	
Collect data: Quantitative														X
Qualitative				X			X			X				X
Enter data	X	X	X	X	X	X	X	X	X	X	X	X	X	
Analyze Data				X			X			X			X	X
Interpret Data										X	X	X	X	X
Prepare & Submit Dissemination Products													X	X

The implementation phase and data inputting took place throughout the year of project. The DNP student utilized an excel spreadsheet to compile the data. Final analyses and interpretation of data took place after the 12<sup>th</sup> month checkpoint for outcome measures. Trend analyses of descriptive data were done and results reported. The planned ‘talk story’ session did not happen; but questions about facilitators and barriers to using the guideline were included in the post implementation questionnaire.

Finally, The DNP student presented results of her DNP project to the staff members at KPHC on October 1, 2015 as part of dissemination of findings. A final manuscript was prepared and distributed to committee members for any comments for further improvements before the public defense scheduled for November 19, 2015 at 0900 in the morning. The DNP student will continue to refine the document for this DNP project. She will ask for permission to submit an abstract to the Asian Americans and Pacific Islanders Nurses Association (AAPINA) Conference in March 4, 2016, and the Association of American Diabetes Educators (AADE) in August 12, 2016, highlighting the role of care coordinators in improving HbA1c after glycemic relapse.

## **CHAPTER 4**

### **RESULTS**

#### **Evolution of Project**

Diabetes 101 is a series of six classes for all new patients that receive care from the Diabetes Clinic at Kalihi Pālama Health Center. After a year of implementing Diabetes 101 from November 1, 2011 to February 29, 2012, a preliminary patient chart review was done to evaluate if the Diabetes 101 classes made a difference in improving patients' HbA1c levels to less than 8% and LDL to less than 100 mg/dL. The review included medical charts of 111 patients (60 females, 51 males) between the ages of 22-81 years. The chart review found that HbA1c and LDL levels were significantly improved after three and six months of treatments, but not significant after nine and 12 months follow up (C-Y Wang, personal communication, September, 2013). The findings raised the question of what else could be done to facilitate patient care in order to maintain controlled levels of HbA1c and LDL after six months. In the partnership between the patient and the provider, the patient is always asked to make changes to improve his/her health. This project considered the providers to also make changes in their practice. The providers were asked to use the Health TeamWork guideline as the resource to standardize care of adult patients with type 2 diabetes at Kalihi Pālama Health Center.

#### **Objective**

The purpose of this DNP scholarly project was to explore if implementation of the Health TeamWork evidence based practice guideline to standardize care for adults with type 2 diabetes at KPHC would improve HbA1c levels to less than 8%, and reduce LDL levels to less than 100mg/dL. Further, it explored if adherence of the providers in implementing one practice

guideline facilitates the improvement in the measured outcomes in caring for adults with type 2 diabetes.

### **Interventions**

The five interventions considered for implementation included: (1) use of mass media for communication and distribution of education material; (2) formal and informal face to face education meetings; (3) education outreach visits or academic detailing; (4) collaboration with opinion leaders; and (5) audit and feedback on compliance given to the health care providers. The DNP student met with all providers at different sites after project was introduced in the providers' meeting in June 2014. The DNP student communicated with providers via email, and mostly face to face conversations during work hours. The nature of conversations included updates on how each provider was doing in checking HbA1c and LDL levels for patients, and also about some of the challenges encountered with patients 'not' coming in for follow up.

Kalihi Pālama Health Center has multiple clinical sites and providers' schedules changed every week; therefore, the DNP student and Medical Director agreed that the best way to reach everyone was to present materials and /or findings at different stages of the project during the providers' monthly meeting. Usually when these meetings are held, KPHC closes all clinics so all or most of the providers can attend the meetings. For the year of this project, the DNP student presented progress of the project three times during these meetings.

In addition to providers, collaboration with care coordinators, the Medical Director, and the Director of Clinical Services was important for the success of this project. Including the Medical Director and Director of Clinical Services as team members for this DNP project made it easier to approach others to assist in facilitating progress of this project. As indicated in framework for this project, organizational characteristics of KPHC could significantly influence

the adoption of the Health TeamWork guideline. These include the organization size, culture, internal and external communications channels and pipelines, and decision making processes. The Medical Director for KPHC supports evidence based research which influences decision making in improving quality of services provided by the clinic. The final presentation of the project was done during the providers' meeting in October 1, 2015. Results of the post intervention evaluation questionnaire for project would be discussed later in this manuscript.

### **Sample**

There are more than 1500 adult patients with type 2 diabetes that receive care from KPHC; however, of all the adult patients with diabetes, only 88 patients with HbA1c greater than 8% visited the clinic in the month of July of 2014. Health measures for this project were retrieved from medical records of these 88 patients. Further, only the 11 primary care providers of record for the 88 patients were included in the sample for this DNP project even though the Health TeamWorks guideline is for all providers to use. Of the 11 participating providers, six were medical doctors and five were nurse practitioners. The years of employment at KPHC among all providers ranged from a few months to 20 years. The years of experience among the medical doctors ranged from five years to 20 years, and the nurse practitioners ranged from a few months to 15 years.

In applying the Diffusion of Innovation framework to this project, the adopters of the TeamWork guideline were the 11 participants. Adopters of any innovation include innovators, early adopters, early majority, late majority, and laggards (Rogers, 2003). Further, individual innovativeness characteristics that contribute to adoption of the innovation would include practice values, interests and beliefs in practice guidelines. It was difficult for the DNP student to determine who the early adopters and laggards in the group of providers were in this project

because every provider was expected to use the practice guideline. In examining the results, it seemed that the newest providers with the least experience seemed to be the early adopters as reflected in the number of times HbA1c and LDL levels for their patients were checked. The laggards on the other hand are known as skeptics and sometimes would wait to see if the innovation worked before adopting the idea (Rogers, 2003). The challenge in this project was the fact that the HbA1c levels were so high to begin with (range of 8.1% to 15%) that even the improvements over the first six months did not reach 100% of patients with targeted < 8% HbA1c. It would be easy for a laggard to judge and say that the innovation was not working, so why should he/she adopt it?

### **Data Analyses Findings**

Hemoglobin A1c levels, according to the Health TeamWorks guideline, must be rechecked every three months if not at target, or every six months if at target. The LDL levels on the other hand must be checked annually, and a goal of <100mg/dl was desired. The number of times these measures were evaluated reflected adherence of the providers in following the recommendations of the guideline. HbA1c for the 88 patients were evaluated every three months after July 2014. Table 4 summarizes the percentage of how many times each provider checked the HbA1c levels compared to previous year.

As indicated in Table 4, 10 of 11 (91%) of providers had an increase of more than 50% in the number of times they checked HbA1c levels for their patients compared to the previous year. Forty five percent (45%) of the providers did not have a decrease in the number of times they checked HbA1c compared to previous year.

Table 4. Percentage of times HgA1c checked compared to previous year per provider

Provider	1	2	3	4	5	6	7	8	9	10	11
# of patients	12	8	7	8	13	5	6	5	9	7	8
<hr/>											
HbA1c ✓											
% Increase	75	88	100	75	54	100	67	80	67	29	75
No change	17	12	0	12	38	0	16	0	11	71	25
% Decrease	8	0	0	13	8	0	17	20	22	0	0

The trend in changes in HbA1c levels throughout the year of this project is summarized in Table 5. The 88 patients with HbA1c >8% that visited the clinic in July 2014 provided baseline data. In the first three months, of the 34 patients seen, 74% of them had improved HbA1c levels, and 26% did not show any improvement. At six months, of the 22 patients visited, 32% had an improvement in HbA1c levels and 52% had increased HbA1c. At nine months, of the 44 patients seen, 48% had improved HbA1c levels and 52% remained above 8%. In the last check for the year, of the 28 patients rechecked, 43% had improved HbA1c levels, 39% did not show any improvement and 18 % did not show any difference in HbA1c levels.

As summarized in Table 5, at the sixth month HbA1c checkpoint, the DNP student recognized the drop in the number of patients who showed up to recheck, drop in percent of improved HbA1c, and the climb in the percentage of increased HbA1c. The DNP student presented her data during the providers' meeting in January 2015 and reached out to the care coordinators to assist in contacting the 88 patients to come in to the clinic for follow up. The DNP student met with the care coordinators in their monthly meeting in February 2014 to



present the data again and asked each care coordinator to contact the patients on their lists, and document that a phone call was made, a letter was sent, or a community health worker was asked to assist and follow up if language was a problem.

Table 5. Trend in HbA1c Changes

July (baseline)	October 2014 <i>(n=34)</i>	January 2015 <i>(n=22)</i>	April 2015 <i>(n=44)</i>	July 2015 <i>(n=28)</i>
Decrease in HbA1c	74%	32%	48%	43%
Increase in HbA1c	26%	68%	52%	39%
No Change in HbA1c	0	0	0	18

In their role, each care coordinator is assigned a number of providers, and are responsible in facilitating the care of those patients with HbA1c levels > 8%, uncontrolled blood pressures, complex patient issues like ‘no shows’ for appointments and multiple emergency room visits (N. Domingo, personal communication, October 3, 2015). The DNP student sorted and grouped the 88 patients according to primary providers of record which made it easier for the care coordinators to contact all the patients. As a result, in the nine months recheck point in April 2015, 48% of the 44 patients who showed up had an improved or decrease in HbA1c levels, and 52% had an increase in HbA1c levels. The DNP student presented this data to the care coordinators meeting in May 2015 and results of the July 2015 data collection were also presented to the group in August 2015. Unfortunately, the 12-month final check for the project year did not show any improved results compared to previous 9-month checkpoint. Documentation by Care Coordinators of reasons why HbA1c levels were not rechecked included

patient ‘no show’, patients not answering the phone, phones being disconnected, and/or patients were visiting families off island.

Noteworthy, of the 88 patients included in the tracking, 17 (19%) of the patients actually met the target of HbA1c levels of < 8% at least once during the year of the project. Eighty two percent (82%) of the 11 providers supported these patients in achieving the goal of HbA1c levels of < 8%.

One aim of the project was to explore if the providers would adhere to using the Health TeamWorks guideline as reflected in the number of times the HbA1c is checked if not at target. Between July 2014 and July 2015, HbA1c levels should have been checked four times if HbA1c levels were greater than 8%. Of the 11 providers, seven (64%) of them had at least one patient who had HbA1c levels checked four times; and 11 (100%) of providers checked HbA1c three times for a few of their patients.

According to the recommendations of Health TeamWorks guideline, the target for LDL is <100mg/dL and should be checked once a year. Table 6 presents the data collected for each provider and the percent of times he/she checked LDLs compared to previous year.

Table 6. Percentage of times LDLs checked compared to previous year per provider

Provider	1	2	3	4	5	6	7	8	9	10	11
# of patients	12	8	7	8	13	5	6	5	9	7	8
<hr/>											
LDL ✓											
% Increase	75	63	100	75	46	100	50	0	0	43	25
% No change	16	13	0	12	46	0	33	20	56	43	37
% Decrease	8	0	0	13	8	0	17	80	44	14	38

Again, LDL levels checked in July of 2014 were captured as baseline data for patients. These values of LDL levels ranged from 44 – 203 mg/dL. Approximately 55% of providers had at least 50% increase in times they checked LDL levels and only one provider was documented to have a more than 50% decrease in times he/she checked the LDL levels compared to previous year. Each patient should have two values of LDLs for comparison. Of the 88 patients only 43 patients (49%) had their LDL levels rechecked in 2015. Of the 43 patients, only 14 (33%) of them met the target goal of less than 100 mg/dL. As a goal of the DNP project, the provider adherence in using the Health TeamWorks guideline would be reflected in the rechecks of LDL levels in 2015. Of the 11 providers, 6 (55%) rechecked at least 50% of their patients' LDL levels in 2015.

### **Post Intervention Questionnaire**

Of the 11 providers assigned to the patients in this DNP project; six (55%) responded to the post intervention questionnaire via written, email or verbal responses. The questions asked the providers about the percentage of time they used the guideline in the past year; if they found it valuable in titrating insulin for patients; if the guideline helped improve the process of taking care of patients with diabetes; and if they were able to easily access the guideline. There were three providers who had used the guideline up to 79% of the time; and the rest used it less than 40% of the time because they already followed the Health TeamWorks guideline in prescribing medications. Metformin and glipizide are the two oral medications recommended as the first and second line treatments for type 2 diabetes. Three of the providers found the guideline helpful in the process of titrating insulin. There were two providers who found it difficult to access the guideline remotely from home. The providers were also asked to identify facilitators and barriers to using the guideline; and if they had any recommendations for the future. The following section

will discuss not only facilitators but barriers for the providers who provided feedback and also for the DNP student in conducting the project. The common recommendation brought up by the providers was the value and usefulness of the case studies presented by the DNP student in providers' meetings. This was where the student integrated the contents of the guideline in case studies; and it was the opportunity to remind everyone about the project.

### **Facilitators**

The providers found the monthly presentations conducted by the student in the first months of the project to be very helpful. The student presented case studies related to diabetes, and also used the Health TeamWorks guideline in the process of making decisions about treatment options. A hard copy of the guideline was given to all providers who were present in presentations. Some of them found it helpful to have the guideline on their desks and/or on bulletin boards.

For the DNP student, facilitators for this project included the great team who collaborated to make this project possible. The team members for this project included everyone in the Diabetes Clinic: nurse practitioner, dietitian, certified diabetes educator, social worker, care coordinator and a medical assistant. The champions for this project were the Medical Director, a senior medical doctor, and the Director of Clinical Services who is also the external advisor for this DNP student. The providers' meeting was the perfect place to present progress and findings of the project to everyone instead of scheduling individual meetings at different clinical sites. Having access to patient information from home made it easier to manage time spent on data.

The care coordinators were valuable to this DNP project. They contacted all patients who were due for HbA1c and LDL levels check after January 2015. They also documented findings, for example: letters sent, left voice mail, non working phone number, no answer or patient

moved off island. The documentation made it easier for the DNP student to compile other reasons for the delayed HbA1c level checks.

## **Barriers**

Some of the providers found accessing the guideline a barrier. Since Kalihi Pālama Health Center has been going through several changes in updating the computer system; it made it more cumbersome for providers to remember where to find the resources online. Another barrier brought up by one provider was the short time period of one year for the project to optimize positive changes in using other team members' specialty knowledge and experience like the dietitian and the certified diabetes educator.

The common barrier for both providers and DNP student were the schedules for meetings and activities. The providers found it difficult to leave their lunch hour for any of the students' presentations; in fact it got to the point where DNP student brought food for lunch for ten people and only a few would show up. This same factor applied to the post intervention evaluation. The DNP student sent emails and text messages and visited the clinic; but only 55% of providers responded. Providers were overwhelmed with changes in computer system to capture 'Meaningful Use' measures for billing purposes that any additional work asked of them could have been stressful.

One barrier in the beginning for this DNP student was having access to the list of patients with diabetes and HbA1c levels >8%. There was only one person in the clinic that had access to this information, and so it was difficult with schedules to get the information in a timely manner. Once the list of patients was established, the DNP student did not need to ask for further assistance because she was also given access to the secured system from home.

Another barrier that could have affected the data had to do with providers leaving Kalihi Pālama Health Center for new employment elsewhere. In the project year, five providers who were included in the original list of 11 providers for the project left the clinic. Patients were reassigned to other providers who were on duty when patients came in for care. The changes in scheduling patients and increase in providers' workload could have also contributed in the delay in patients coming in to check lab work including HbA1c levels.

Another significant barrier to getting patients into the clinic is the fact that a lot of the patients from Micronesia lost insurance from October 2014 to February 2015 due to decrease in health funds from the State of Hawai'i for Marshallese and Compact of Free Association (COFA) citizens from Micronesia. Except for pregnant mothers, children, patients in long term care, dialysis, very elderly, blind, or disabled, all other Marshallese and COFA citizens were asked to sign up for health insurance at the Hawai'i Health Connector. Since everyone was eligible for Obama Care, the State of Hawai'i did not want to spend any health care dollars on any COFA citizens that did not meet criteria above (Hawai'i Government, 2014). The change in process of receiving health insurance was complicated for this population. These patients found it difficult to understand what to do because of language barrier, financial barriers, and therefore patients just would not return to the clinic for care unless they were very sick.

### **Summary**

Taking care of patients with uncontrolled type 2 diabetes can be very challenging. The DNP student identified a practice change in efforts to improve HbA1c and LDL levels for patients with type 2 diabetes. Engaging providers in making a practice change by adopting the TeamWorks guideline to standardize care for adults with type 2 diabetes was the innovation for this DNP project. Characteristics of the innovation were compatible with existing values,

experiences and goals of providers to improve patients' HbA1c and LDL levels. Complexity of the innovation was the perceived level of difficulty in applying the guideline to daily practice. The one year for this project was the trial period for this innovation and the improved results of patients' HgbA1c levels were its observable characteristics. The innovativeness of the providers and the organization had allowed for this project to be completed. Of the five interventions proposed for this project, what worked the best was the use of monthly group meetings to present data, update findings and receive feedback. The trend of improvement in HbA1c was 72%, 32%, 48% and 43% percent in 3-months, 6-months, 9-months and 12-months respectively. It was difficult for the DNP student to determine adherence of providers in using the HealthTeamWorks guideline because of the many patient 'no shows' for appointments versus provider's personal practice style.

One additional intervention that worked was soliciting help from the care coordinators to reach out to patients who were due to recheck HbA1c and LDL levels after six months. Since there was an improvement after the phone calls and contacts made, care coordinators were recognized in one of the providers' meeting for their hard work. The care coordinators are invaluable employees who are involved in multiple roles to assist and facilitate processes for improved patient health outcomes. Including them in the process of making improvement in the one year of this project had strengthened the delivery of quality care provided for patients with type 2 diabetes served by Kalihi Pālama Health Center.

## **CHAPTER 5**

### **DISCUSSION**

The complexity of type 2 diabetes makes it more complicated to make lifestyle changes to improve and maintain HbA1c levels at target of <8%. The purpose of this project was to explore if implementing the Health TeamWorks guideline to standardize care for patients with type 2 diabetes would improve HbA1c and LDL levels. The providers implemented the intervention to augment other treatments to help patients maintain HbA1c levels at target after 6 months; and LDL levels after one year. This DNP project included 88 patients whose HbA1c levels ranged from 8.1% to 15% and LDL levels of 44-203 mg/dL at baseline. Of the 88 patients only 43 (49%) had their LDL levels rechecked in 2015. Of the 43 patients, only 14 (33%) of patients met the target goal of less than 100 mg/dL. Results also showed that of patients who returned to recheck HbA1c levels, 74%, 32%, 48%, and 43% had improvement in their HbA1c levels in the 3-months, 6-months, 9-months and 12-months checks respectively. These findings mirrored patterns of glycemic relapse found in the chart review done in the Diabetes Clinic which resulted in the development of this DNP project. In the original chart review, outcome analyses were based on 111 patients (60 females and 51 males) diagnosed with diabetes. Results of their HbA1c levels between January 2009 and February 2012 revealed that the mean in HbA1c level was 9.04% (SD= 2.44%, ranged from 6.1% to 16.0%) at baseline. Mean scores in HbA1c levels decreased to 7.86% (SD=1.34) at the 3-month follow-up, but increased to greater than 8% at the 6-month follow-up. Health literacy and language barrier were identified as some of the factors that attributed to why patients could not maintain LDLs levels at target and HbA1c levels below 8% (Wang, Braginsky, & Leake, 2014).



Glycemic relapse is defined as a subsequent HbA1c level  $\geq 8\%$  and an increase of at least 1% above the post-intervention level (Elasy, Graber, Wolff, Brown, & Shintani, 2003). Elasy and colleagues evaluated HbA1c levels of 265 patients with type 2 diabetes who participated in a 3-month intensive outpatient intervention and were followed at least 1 year after completion of the intervention. All participants had HbA1c levels of  $>8\%$  before the intervention and had achieved marginal glycemic control of  $< 8\%$  after the intervention. The mean HbA1c levels before intervention was  $10.1 \pm 1.7\%$  and the mean HbA1c after intervention was  $6.8 \pm 0.7\%$ . Twenty-five percent of participants were receiving insulin therapy before the intervention, and an additional 25% initiated insulin during the program. The cumulative incidence of relapse at one year was 25%. For those patients who relapsed, the median time of relapse was 9 months. The initiation of insulin therapy during the intervention was the only identifiable independent predictor of relapse (Elasy et al., 2003).

An observational study by Santos de Luna, Mendoza and Mercado-Asis (2015) evaluated 16 patients with diabetes who were taking liraglutide as an additional treatment for diabetes as the intervention. Seven patients were already on insulin and all were taking one or more oral anti-diabetic drugs. The three outcome measures included changes in HbA1c levels. The range of HbA1c levels was 5.2% to 13.0% at baseline. Reduction in HbA1c levels from baseline was observed in 19% and 52% of patients at 3 and 6 months, respectively; however, a relapse increase at 12 month of HbA1c level of 7.15% compared to baseline levels was noted. The factors identified for the relapse among the patients were poor adherence to treatment plan and not taking medications because of cost (Santos de Luna, Mendoza & Mercado-Asis, 2015).

A chart review done in the Queen Emma Clinic in Honolulu included 364 records of patients who visited the clinic between January 2005 and June 2006 (Lee, Onopa, Mau, & Seto,

2010). Of these patients, 309 (85%) were new to the clinic and the remaining 15% of patients had established care. The majority of patients were Pacific Islanders (58%), followed by Native Hawaiians (17%), Asians (15%), and Caucasians (10%). The authors evaluated eight outcome measures that included HbA1c levels  $\leq 9.0\%$  and LDL cholesterol levels of  $< 130$  mg/dL.

Results of HbA1c and LDL levels will only be reported in this write up because of the interest of this project. The 6-months follow-up found that, compared with Caucasians ( $7.9 \pm 2.3$ ), Native Hawaiians ( $9.2 \pm 2.6$ ,  $p < 0.05$ ) and Pacific Islanders ( $8.6 \pm 2.2$ ,  $p < 0.05$ ) had a significantly higher HbA1c levels while Asians had a similar level ( $7.8 \pm 2.3$ ). Compared with Caucasians ( $137 \pm 96$  mg/dL), Asians ( $151 \pm 138$ mg/dL) and Native Hawaiians ( $149 \pm 110$  mg/dL) had a slightly higher LDL level, and Pacific Islanders ( $123 \pm 54$  mg/dL) had a slightly lower level, although the differences were not statistically significant. The results were similar at the 12-month follow up. The authors of the study did not include any reasons that might have attributed to the findings.

From the results of this DNP project and others as reported above, glycemic relapse can happen at anytime within the first year of treatment. There are multiple reasons why patients are not able to maintain HbA1c and LDLs levels at target values. As noted from some of the studies above, these reasons included diet, exercise, self-monitoring of blood glucose and the type of medication regimen. It is important for providers to recognize that glycemic relapse is a complex problem and they should utilize resources available to implement interventions to prevent it.

For this DNP project, the DNP student recognized the drop in the number of patients returning to recheck HbA1c levels after 6-months. She reached out to care coordinators to assist with contacting patients to return for a recheck of their HbA1c levels. The care coordinators play an important role in achieving improved outcomes for patients, their families, and the clinic.

These outcomes include improved HbA1c levels and blood pressures, increased patient satisfaction with services provided at each visit, increase in patient access to services, and a decrease in visits to the emergency room (N. Domingo, personal communication, October 3, 2015).

In optimizing the quality of service and reimbursement cost, a pilot study conducted by Mullins, Mooney, and Fowler (2013) in a highly productive clinic in Tyler Texas included four primary care physicians and two advanced practice providers that cared for an estimated 10,000 patients. The clinic provided high-quality care, had a few ‘no-shows’, and had no physician turnover for many years. The patient population predominantly had insurance. In addition to the team of providers, two licensed vocational nurses (LVN) were added as care coordinators. Each one of them was expected to make 40-45 patient contacts per day. The LVNs’ duties included confirming scheduled visits, scheduling preventive services, ordering all labs in advance per protocol, conducting medication reconciliation, and ordering medication refills before patients came in to the clinic for visits. In managing ‘care gap’ issues, the LVNs contacted patients who were overdue for services and whose health measures were out of range, especially in chronic disease management, for example, HbA1c and lipid levels. If patients were admitted to the hospital, care coordinators contacted the patients upon discharge from the hospital. Including the LVNs as care coordinators resulted in fewer patient ‘no shows’ for appointments, higher visit volume, improved patient satisfaction, and increased adherence to treatment, and increase in clinic revenue. Including the care coordinators also improved health outcomes and increased primary care follow up and decreased readmissions to hospital.

Of note, the approximate cost to the clinic for nine months of care coordination was \$68,400, which included LVNs’ salaries of \$19 per hour plus benefits. Overall, the health system

generated an additional \$117,528 in net downstream revenue through the care coordinators' closing of care gaps (Mullins, Mooney, & Fowler, 2013). There are cost benefits to a healthcare facility and patients when HbA1c, hypertension, and LDL levels are at target. If there is a 10-50% reduction in the above stated targets, an estimated 48,000 to 239,000 potential health complications could be avoided annually, amounting to a savings of \$39 billion to \$196 billion by the year 2031 (Fitch, Iwasaki, & Pyenson, 2010).

The values of care coordinators can benefit primary care clinics as also found in this DNP project. After the care coordinators made contact with patients, there was an increase in patients who showed up for appointments in the clinic. Even though most of the HbA1c levels were greater than 8%, there was a trend of improvement in HbA1c levels and also in the number of visits to the clinic for follow up.

The patient 'no show' for appointment factor in primary care is a well known phenomenon to healthcare providers. Patients who do not keep appointments limit opportunities of access to care for other patients and lower providers' productivity. With each 'no show' patient, a clinic slot is lost that could have been filled with a patient who needs care. Frequently missed appointments for diabetes and other chronic co-morbidities can delay review of treatment goals and plans, and extend the time between screening and consultations. Poor clinic attendance by patients with diabetes has also been associated with poorer risk factors for achieving glycemic control (Rhee, Slocum, & Ziemer 2005; Schectman, Schorling, & Voss 2008).

Ethnic differences in keeping appointment may play an explanatory role in poorer health outcomes among minority patients. Poor appointment keeping (PAK) is defined as missing more than a third of planned, primary care appointments (Parker et al., 2012). A cohort study (n= 12,957) by Kaiser Permanente Diabetes Study of Northern California (DISTANCE), from

2005-2007, examined the correlation of frequent missed appointments in primary care among patients with diabetes and outcomes in health care measures of HbA1c levels, LDL levels and blood pressure. The Poisson regression model was used to estimate ethnic specific relative risks of PAK (adjusting for demographic, socio-economic, health status, and facility effects). PAK rates differed greater than 2-fold across ethnicities. Specifically, the PAK rates documented for the various ethnic groups were as follows: Latinos 12 %, African Americans 10%, Filipinos 7%, Caucasians 6%, and Asians 5% with variation noted among different facilities. PAK was also associated with 20%, 30%, and 40% increased risk of elevated HbA1c levels (>7 %), and LDL levels (>100 mm/dL), and systolic blood pressures (>130 mmHg), respectively (Parker et al., 2012).

For this DNP project, in using Table 4 in previous chapter to determine trend of patient ‘no shows’ to recheck HbA1c levels, there were 61%, 75%, 50%, and 68% of patients who did not show up for appointments in the 3-month, 6-month, 9-month and 12-month checks respectively. There might have been multiple reasons why patients did not show up. In the review of ethnic groups included in the DNP project, patients from the Republic of the Marshall Islands and COFA nations in Micronesia made up an estimated 33% of patients in the data. Other Asian Pacific Islands included were Tongans, Samoans, Chinese, Filipinos, Koreans and a few Caucasian patients. In the time frame of this DNP project, there had been new changes in health insurance coverage policies in the State of Hawai‘i related to the initiation of Obama Care. These new changes related to Obama Care affected a lot of the patients from the nations in Micronesia. Many patients lost insurance coverage and therefore could not come to the clinic for appointments. The patients were asked to register with Hawai‘i Health Connector to obtain health insurance; in addition, they were expected to pay premiums which patients never had to

do before. This further complicated the process for patients who did not have financial support and/or ability to speak English.

Lack of insurance coverage equals lack of access to care. This is not a new issue for the patients who come to KPHC for care. In a mixed method study by DeVoe and colleagues (2007), responses from 722 low income parents were used in identifying barriers related to accessing health care. The three main themes related to barriers included lack of insurance coverage, poor access to services, and unaffordable costs. Higher percentage of uninsured parents (87%) reported experiencing difficulties in obtaining insurance coverage compared with 40% of those with insurance. A few uninsured individuals (19%) expressed concerns about access to specialty services; and health care costs. Common concerns raised by parents had to do with access, and insurance; and having one or both elements did not assure care (DeVoe et al., 2007).

As delineated in the discussion section, it's a web of multiple facilitators and barriers that affected the ability of providers to use the Health TeamWorks guideline. Glycemic relapse in the first year of treatment is a common trend. The relapse could be attributed to many factors. When patients did not show up for appointments, the providers were not able to prescribe care. When patients did not have means of contact, the care coordinators could not remind patients to come in for appointments let alone be able to manage 'care gaps'. When patients lost insurance coverage, patients stopped coming for care unless they were very sick.

The DNP student on the other hand recognized that she needed the care coordinators' assistance in getting the patients to the clinic. The intervention was successful as reflected in the subsequent checks for HbA1c and LDLs levels. The DNP student was able to engage the providers when she presented case studies in a group setting during lunch time. Taking away the providers from their lunchtime could have been burdensome for the new providers who had just

started in the clinic. Overall, the trend of change in this DNP was positive, and DNP student plans to continue to look at other aspects of care to improve measures related to diabetes and other chronic health problems.

### **Limitations of Project**

There were multiple barriers for optimal care for diabetes in the patient population in this study. For example, ‘patient no show’, ‘no insurance’, and ‘no financial support’, and, therefore, it was difficult to gauge whether the providers were adherent in using the guideline to provide care. Any findings about the providers’ use of the practice guideline could not be established in this study; therefore, results of this project should be interpreted with caution.

### **Implication for Nursing**

This DNP project explored if using one clinical guideline to standardize care would make a difference in the HbA1c and LDL levels of patients with diabetes. The positive trend of results highlighted the value of working in collaborative teams to improve outcome measures. Nurses are able to apply the nursing process to identify problems, develop a care plan, implement and evaluate the intervention. The nurses are also able to revise care plans to meet the needs of patients if original care plan did not work. As noted in this project, the DNP student identified glycemic relapse as the trend. Instead of waiting for patients to return for follow up, the student reached out to care coordinators to assist in contacting patients to return to clinic.

### **Integrating the 8 Essentials for APRNs**

The DNP student had the opportunity to integrate and apply the 8 Essentials for Advanced Practice Nursing in this project (American Association of Colleges of Nursing [AACN], 2006). Researching and grading the evidence for this project was important (*Essential I: Scientific Underpinnings for Practice*). The Health TeamWorks clinical guideline which is the

innovation for this project includes evidence based studies on the best treatments available for diabetes. The literature review also provided best evidence on interventions to facilitate adoption of the guideline by providers. Based on Roger's Diffusion of Innovation Theory (Rogers, 2003), the Implementation Model by Titler (2010) was adopted for this project. The Diffusion model is based on decades of evidence about processes in adopting innovations. Involving the Medical Director and the Director of Clinical Support (*Essential II: Organizational and Systems Leadership for Quality improvement*) was important in facilitating this project to be completed. Their support made it possible for others to recognize the value of everyone's effort to find ways to improve quality of diabetes care at KHPC. The DNP student was involved in ongoing education classes for staff and providers reporting on current data and information related to diabetes based on evidence (*Essential III: Clinical Leadership and Analytical Methods for Evidence-based Practice*). In addition, reporting progress and findings of the project in ongoing monthly meetings for providers was a strategy based on recognizing that not everyone would adopt the innovation at the same time as in the Diffusion Theory.

Kalihi Pālama Health Center has been making updates and changes to the computer system to provide optimal not only to access to patient information as well as the resources and tools to assist in decision making by providers (*Essential IV: Information Systems and Technology and Patient Care Technology for the Improvement and Transformation of Health Care*). Health TeamWorks guideline was part of the resources available online for easy access. Further, email and texting were other technological ways in which the DNP student communicated with providers regarding progress and results of project. Clinical guidelines augment ability of providers to make decisions about treatments for their patients with diabetes. For safety purposes, this DNP project promoted the use of the Health TeamWorks guideline to



standardize the care for patients with diabetes. Advocating for patient safety was an important aspect of this project (*Essential V: HealthCare Policy for Advocacy in Health Care*). Choosing the collaborative team for this project was the greatest asset that contributed to the successful outcomes (*Essential VI: Interpersonal collaboration for improving patient and population health outcome*). The DNP student worked with the Diabetes Clinic team which consisted of a nurse practitioner, a certified diabetes educator, dietitian, behavioral health social worker, a registered nurse and a medical assistant. In addition, the Medical Director, the Director of Clinical Support and a senior medical provider were the champions and change leaders of this project. Further, the DNP student reached out to the care coordinators to assist in contacting all patients to come in for HbA1c levels rechecks. The subsequent months' results showed an improvement in the number of patients who showed up at the clinic for their needed follow-up.

Prevalence of diabetes in Native Hawaiians and Asian-Pacific Island populations is well documented. These populations are known for poor health related to limited resources (*Essential VII: Clinical Prevention and Population Health for Improving the Nation's Health*). Kalihi Pālama Health Center provides access and other services for patients with diabetes who are insured or uninsured. The DNP project originated in the Diabetes Clinic where there are ongoing reassessments of patient treatments to prevent complications related to uncontrolled diabetes. Each team member in the Diabetes Clinic plays an important role in helping patients with diabetes make lifestyle changes for optimal health outcome.

Finally, *Essential VIII* is about advancing nursing practice. The DNP student is a nurse practitioner who envisioned a practice change by health care providers at KPHC. There were facilitators and barriers during the one year for the project; however, the positive trend in the

results shows that the DNP student should continue to reassess how else she can contribute in making a difference in the lives of patients with type 2 diabetes for tomorrow.

### **Dissemination**

The DNP student shared the results of this study in the KPHC providers' meeting on October 1<sup>st</sup>, 2015 and final document submitted to committee members. Further, the DNP student will continue to refine the document for this DNP project to be submitted to the Office of Graduate Education at the University of Hawai'i. She will ask for permission to submit an abstract to the Asian Americans and Pacific Islanders Nurses Association (AAPINA) Conference in March 4, 2016, and the Association of American Diabetes Educators (AADE) in August 12, 2016, highlighting the role of care coordinators in improving HbA1c after glycemic relapse.

### **Sustainability**

The care coordinators were identified as valuable team members in this DNP project. The DNP student will continue to work with care coordinators and also the community health workers (for language purposes) in contacting patients to return to the clinic for follow up appointments. The DNP student will also ask for permission to work with Information Technology (IT) to see if there is a way to group patients with HbA1c levels >8% according to PCP of record. This organization of data would make it easier for the PCP and care coordinators to have the lists instead of waiting for one person who has access in order to have the information available.

### **Summary**

Diabetes is a chronic health problem that requires the attention of everyone involved in the care, not simply the primary care providers. This project explored how adoption of one guideline to standardize care of patients with type 2 diabetes could improve HbA1c and LDLs

levels beyond 6-months. Involving nurses in collaborative team work can also contribute in helping patients maintain HbA1c levels to <8% and LDL levels to <100mg/dL. The best intervention in promoting the use of the guideline for this project was the presentation of data during providers' meeting. There might have been facilitators and barriers to using the guideline by the providers, but collaborative work among team members ameliorated some of the obstacles. Glycemic relapse in the first six months, and patients not showing for appointments were identified challenges that prevented consistent implementation and evaluation of adherence of providers in utilizing the guideline during this project. The positive trends in the results of this project affirmed that collaborative teamwork promotes and sustains projects in a primary care facility.

# APPENDIX A, p-1

## HEALTH TEAMWORKS GUIDELINE

# HEALTH TEAMWORK GUIDELINE

**HealthTeamWorks**  
*Building Systems. Empowering Doctors.*  
 page 1 of 2

### Guideline for Type 2 Diabetes

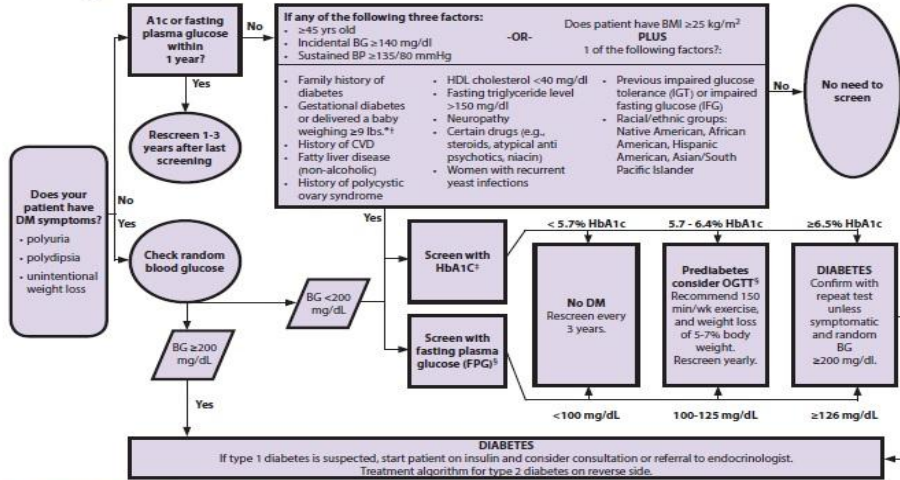
Intended for any age.

**Prevention**  
 Help your patients prevent or delay onset of type 2 diabetes mellitus (DM) by encouraging:

- A healthy diet
- An active lifestyle with a minimum of 150 minutes of physical activity per week
- Maintenance of a healthy weight (BMI = 18.5-24.9 kg/m<sup>2</sup>)
- A reduction in body weight of at least 5-7% for overweight (BMI ≥25-29.9 kg/m<sup>2</sup>) or obese (BMI ≥30 kg/m<sup>2</sup>) patients

**Lowering A1c by only 1% can reduce the risk of eye, kidney, and nerve damage by 40%.**  
 - Centers for Disease Control and Prevention

### Screening Methods



### Prevention of Diabetes Complications

MEDICATIONS / IMMUNIZATIONS	FREQUENCY	GOAL / COMMENTS
Aspirin (if benefit outweighs risk)	Initially/Ongoing	Women: age 55-79 or with CVD. May use low dose of 81 mg/day. Men: >45 years old or with CVD. May use low dose of 81 mg/day.
ACE inhibitor (ARB if ACE-I intolerant)	Initially/Ongoing	Individuals with hypertension, microalbuminuria or CVD.
Statin	Initially/Ongoing	Use if not at lipid goal (LDL goal: <100 mg/dL). In all patients >40 years old, consider statin regardless of LDL if baseline total cholesterol ≥135 mg/dL.
Influenza vaccination	Annually	Per CDC recommendations at <a href="http://www.cdc.gov/flu">www.cdc.gov/flu</a>
Pneumococcal vaccination	At least once	Once; revaccinate if ≥65 years old, AND first shot at <65 years AND first shot ≥5 years ago.
Hepatitis B	Once (series)	Age 19-59 as soon as possible after diagnosis. Age ≥60 clinician discretion after assessing risk and likelihood of adequate immune response to vaccination.

\* See HealthTeamWorks guidelines at [www.healthteamworks.com](http://www.healthteamworks.com)  
<sup>1</sup> Gestational diabetes: Within 12 weeks of delivery, if patient had gestational diabetes she should be screened with an oral glucose tolerance test (OGTT).  
<sup>2</sup> Should not screen with A1c if patient has known hemoglobin trait or increased RBC turnover (hemolytic anemia, chronic malaria, major recent blood loss, blood transfusion).  
<sup>3</sup> Additional screening with an OGTT or a post-prandial glucose should be considered for individuals with A1c=6.0-6.4%. Blood glucose >140 mg/dl would indicate diabetes. Confirm diagnosis with FPG or A1c.

This guideline is designed to assist clinicians in diabetes screening and management. It is not intended to replace a clinician's judgment or establish a protocol for all patients. For national recommendations, references and additional copies of the guideline, go to [www.healthteamworks.com](http://www.healthteamworks.com) or call (801) 486-7208. This guideline was supported with funds from The Colorado Health Foundation. Approved February 2012.

# APPENDIX A, p-2

## HEALTH TEAMWORKS GUIDELINE

### Clinical Assessment

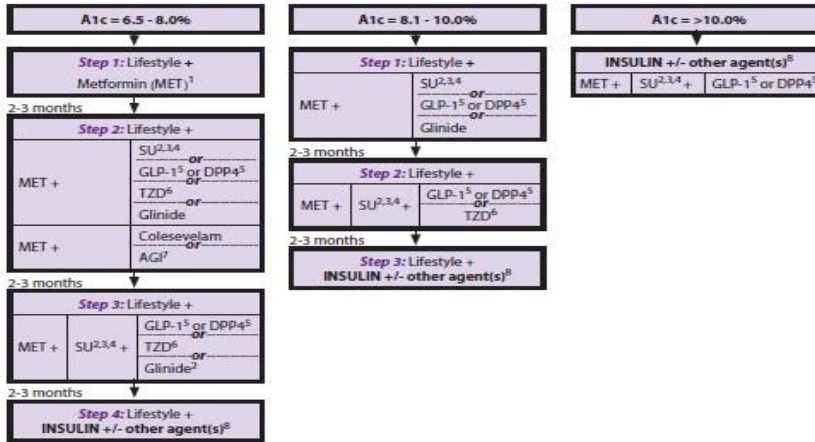
Diabetes-focused visit every 3-6 months or more often if needed.

	MONITORING	FREQUENCY	GOAL / COMMENTS
History	Assess medication adherence	Every visit	Have patient bring in all medications and do a medication reconciliation.
	Glucose control/assess for hypoglycemia	Every visit	Ask about home glucose monitoring and instances of hypoglycemia or hyperglycemia.
	Tobacco use	Every visit	Any tobacco use: Ask, advise, refer to QuitLine (1-800-QUIT-NOW).
	Alcohol and drug use assessment*	At least annually	See HealthTeamWorks Alcohol and Substance Use Guideline.
	Mental health*	As needed	Assess for depression, cognitive impairments for elderly, etc.
	Physical activity and dietary habits*	Every visit	Assess physical activity and diet. If necessary, encourage positive changes in behavior.
Physical Exam	Body mass index (BMI: kg/m <sup>2</sup> )*	Every visit	Normal = 18.5-24.9. Overweight = ≥25-29.9. Obese = ≥30. Use BMI percentile for children under 18 years old: Overweight = 85-94%ile, Obese ≥95%ile.
	Blood pressure	Every visit	Goal BP <130/80 mmHg. Higher goal may be appropriate in certain situations.
	Comprehensive lower-extremity exam	Annually	Inspect feet at every visit. Vascular (Ankle Brachial Index for those over age 65), musculoskeletal, neurological exam (w/ monofilament). Encourage patient self-management care daily (see patient education supplement). If abnormal, consider referral to foot care specialist.
	Retinal	Annually	By ophthalmologist, optometrist or retinal photograph (read by trained, experienced clinician). Ask about vision changes.
	Oral health assessment	Every 6-12 months	Refer to dentist or dental hygienist.
Labs	A1c screening	Quarterly if not meeting treatment goals or q 6 months	General Goal: <7%. Lower goal may be beneficial if no significant risk of hypoglycemia and if appropriate for patient age, life expectancy and co-morbidities. Higher goal may be appropriate in certain situations (e.g., elderly and patients who are prone to hypoglycemia).
	Fasting lipid profile	Annually	Goals: LDL <100 mg/dl, Optional Goal: LDL <70 mg/dl in patients with CVD. HDL: >40 mg/dl for men, >50 mg/dl for women. Triglycerides: <150 mg/dl.
	Urine microalbumin	Annually	If >30 mg/dl creatinine, start ACE inhibitor (ARB if ACE-I intolerant). Continue to titrate ACE-I/ARB until blood pressure is ≤130/80 mmHg.
	Serum creatinine	At least annually	Use to estimate Glomerular Filtration Rate (GFR). Consider referral to nephrologist if GFR <60 mL/min.
Counsel	Physical activity and diet or other self-management goals*	Every visit	Assess and set Specific, Measurable, Attainable, Realistic and Time-limited (SMART) goals. See HealthTeamWorks Patient Action Plan.
	Preconception counseling*	Every visit	Three-fold increased risk of birth defects, which may be reduced with good glycemic control prior to conception. Women with poor glycemic control should use effective birth control.

### Treatment for Type 2 Diabetes: Glucose Management Algorithm

See HealthTeamWorks Medication Supplement for Insulin Titration Algorithm at [www.healthteamworks.org](http://www.healthteamworks.org).

Lifestyle includes: encouraging weight loss, decreased calories, decreased refined carbohydrates and starches, and increased activity.



#### Glossary:

AGI: Alpha-Glucosidase inhibitors  
 DPP4: Dipeptidyl peptidase-4 inhibitor  
 GLP-1: Glucagon-like peptide-1  
 MET: Metformin  
 SU: Sulfonylureas  
 TZD: Thiazolidinediones

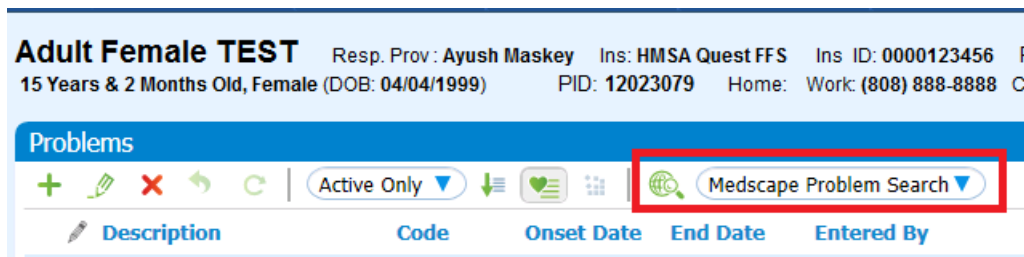
#### Footnotes:

1. If contraindicated, use SU, DPP4, GLP1, TZD or AGI.
2. Glinide if increased post-prandial glucose excursion or SU if increased FPG.
3. Low-dose secretagogue recommended.
4. If A1c <8.5%, combination Rx with agents that cause hypoglycemia should be used with caution.
5. Decrease secretagogue by 50% when added to GLP-1 or DPP-4.
6. TZD-pioglitazone. Refer to black box warning on Medication Chart.
7. AGI if increased post-prandial glucose excursion.
8. a) Discontinue insulin secretagogue with multidose insulin.  
 b) Can use pramlintide with prandial insulin.

\* See HealthTeamWorks guidelines and tools at [www.healthteamworks.org](http://www.healthteamworks.org)

## APPENDIX B

### HOW TO ACCESS GUIDELINE



**Adult Female TEST** Resp. Prov: **Ayush Maskey** Ins: **HMSA Quest FFS** Ins ID: **0000123456** F  
15 Years & 2 Months Old, Female (DOB: **04/04/1999**) PID: **12023079** Home: Work: **(808) 888-8888** C

**Problems**

+ ✎ ✕ ↶ ↷ | Active Only ▾ ↓ 📄 📌 🌐 Medscape Problem Search ▾

**Description** **Code** **Onset Date** **End Date** **Entered By**

Click on the drop down arrow and you will see the TeamWorks Guidelines in here.

Select where you want to go and then click on the green globe with the magnifying glass.

## APPENDIX C

### PRE-IMPLEMENTATION QUESTIONNAIRE

#### Demographics

- a. Title/Credentials: MD / APRN / PA / other \_\_\_\_\_  
b. Gender Male / Female  
c. Years of service at Kalihi Pālama < 5 years ≥ 5 years  
< 1 yr ≥ 1 year

1. As a provider, I utilize evidence-based clinical practice guidelines to inform my decisions in taking care of patients with diabetes  
a. Always                      b. Sometime                      c. Never

2. As a provider, I am aware of the Health TeamWork practice guideline we have as one of our online resources for the care of our patients with diabetes?

Strongly agree              Agree              Neutral              Disagree              Strongly disagree

3. As a provider, I have access to the Health TeamWorks clinical practice guideline to inform my decisions in taking care of adults with  
Strongly agree              Agree              Neutral              Disagree              Strongly disagree

4. Do you agree or disagree that implementation of one evidence based guideline would improve the quality of patient care at Kalihi Pālama Community Health Center

Strongly agree              Agree              Neutral              Disagree              Strongly disagree

5. Do you agree or disagree that standardization of care using one evidence based clinical guidelines can result in reducing cost without affecting patient outcome?

Strongly agree              Agree              Neutral              Disagree              Strongly disagree





**APPENDIX E**  
**CONSENT LETTER**

Dear \_

This letter is a request for your participation in the scholarly inquiry project titled “Implementing the Health TeamWork guideline to standardize care for adults with type 2 diabetes” at Kalihi Pālama Health Center. This project explores if adoption of one evidence based practice guideline by providers who take care of adults with diabetes results in a decrease in hemoglobin A1c and low density lipoproteins. Any significant findings from this project will contribute to what is known about the value of implementing evidence based clinical practice guidelines not only to standardize care but to improve health care measures for adults with diabetes.

This project is being conducted by nurse practitioner, Nafanua Braginsky, as part of her Doctorate in Nursing Practice (DNP) degree at the University of Hawaii at Manoa. Your time commitment will include attendance at a one time “Lunch and Learn” education presentation related to diabetes and the Health TeamWork guideline. At this education session, you will be asked to sign a statement of consent to participate, and an opportunity to answer a pre implementation questionnaire regarding your general perception of a guideline. At the conclusion of the project, you will be asked to fill out a short post implementation questionnaire; and participate in another Lunch and Learn “talk story” session. The “talk story” session is an approach to gain understanding of your experience in using the Health TeamWork guideline. With your permission, we would like to tape record the “talk story” session for the purpose of analysis for this project.

All participants must be 18 years of age or older to provide consent for this project. Any information provided for this project will be kept confidential. Your participation is voluntary; and therefore, you may withdraw at any time. Your standing as a provider at Kalihi Pālama Health Center will not be affected if you decide not to participate or to withdraw from the project.

Should you have any questions about this scholarly inquiry project, please feel free to contact the project student investigator at 808 358-8905 or email: [nafanua@hawaii.edu](mailto:nafanua@hawaii.edu). You may also contact the advisor for this project, Ms. Marissa DelaCruz @ [mdelacruz@kphc.org](mailto:mdelacruz@kphc.org). Thank you again for your time and consideration in helping with this project

You will be given a copy of this form to keep for your records.

**Statement of Consent:** I have read the above information, and have received answers to any questions I asked. I consent to take part in the study.

Your Signature \_\_\_\_\_ Date \_\_\_\_\_

Your Name (printed) \_\_\_\_\_

In addition to agreeing to participate, I also consent to having the “talk story” tape recorded.

Your Signature \_\_\_\_\_ Date \_\_\_\_\_

Signature of person obtaining consent \_\_\_\_\_ Date \_\_\_\_\_

Printed name of person obtaining consent \_\_\_\_\_ Date \_\_\_\_\_

*This consent form will be kept by the researcher for at least three years beyond the end of the study*

## APPENDIX F

### APPLICATION OF HEALTH TEAMWORKS GUIDELINE

#### Pre-session Questionnaire

1. A healthy diet, an active lifestyle with a minimum of 150minutes of physical activity per week, and maintenance of a healthy weight (BMI of 18.5-24.9) delay the onset of type 2 diabetes

**a. True                      b. False**

2. Checking the Hemoglobin A1C or Fasting Plasma Glucose are the methods to screen for Type 2 diabetes

**a. True.                      B. False**

3. Screening for type 2 diabetes:

- If A1C < 5.7% (No diabetes); rescreen every 3 years **a. True                      b. False**

- If A1C is 5.7 to 6.4% (prediabetes), consider Oral Glucose Test; recommend lifestyle changes; and re-screen yearly **a. True                      b. False**

- If A1C is  $\geq 6.5\%$  (diabetes), confirm with repeat test unless symptomatic. **a. True                      b. False**

4. Retinal exam, comprehensive lower extremity exam, fasting lipid panel, and urine microalbumin are recommended to be checked annually

**a. True      b. False**

5. For prevention of Diabetes Complications; recommendations include:

i. EC ASA 81 mg ordered for women ages 55-79 or with CVD; and for men > 45 yrs of age; or with CVD

**a. True      b. False**

ii. Annual Influenza vaccination

**a. True      b. False**

iii. Pneumococcal Vaccination (at least once)

**a. True      b. False**

iv. Hepatitis B Series(once)

**a. True      b. False**

## APPENDIX G

### APPLICATION OF HEALTH TEAMWORKS GUIDELINE

#### Post session Questions

#### Case Study \_Mr. Suke

Mr. Suke is 58 a yr old Chuukese established patient at the clinic; left 3 years ago to visit family in Chuuk. He returns to clinic today with c/o polydipsia, polyuria, blurred vision, random finger stick today = 353 mg/dL. Has an interpreter with him.

Family hx: Mother with Diabetes

Social Hx: Married; wife in Chuuk. No insurance. Smokes 1ppd

Vital signs: Bp 160/90; HR 80; T. 98.9; resp 20; BMI 33.

#### Q1. What would you do for Mr. Suke?

- Tell him to wait for insurance to be effective then come back for labs
- Will start him on metformin only
- Will start him on glipizide only
- Will order labs and ask Mr. Suke if he can pay out of pocket, if not, to go to the DM clinic to get them done for reduced cost

**Lab results: A1C 10.0%; high cholesterol/lipids**

#### Q2. What do you next?

- Start with Step 1 treatment according to Health TeamWork guideline
- Use team approach; set goals
- Educate on medications, diet, and physical activities
- All of the above

**You rechecked A1C 3 months later; A1C was 9.1%**

#### Q3. What is your next plan for Mr. Suke?

- Start with Step 2 treatment according to Health Team Guideline
- Use Team Approach; review goals from last visit; set new goals prn
- Reinforce education on medications, diet, and physical activities
- All of the above

Mr. Suke comes back after 3 months for more medications. You rechecked his labs.

His A1C dropped to 8.5%; cholesterol/lipids improved; blood pressure improved

Urine microalbumin WNL

#### Q4. What is your next plan for Mr. Suke?

- Scold him for not walking for 30 minutes 5 times a week like he said the last time
- Tell the interpreter to send patient to another provider
- Tell the patient you won't refill medications next time if A1C does not drop to 7%
- Start with Step 3 treatment according to Health Team Guideline

**Q5. Which insulin would you start Mr. Suke on?**

**If you start NPH at bedtime; how many units would you order for Mr. Suke?**

**Weight: 260 lbs**

I will start Mr. Suke on 10 units of NPH as a baseline dose or 23 units according to his weight

- a. True                      b. False

**If you choose the basal/bolus regimen, how many units would you order for Mr. Suke?**

I will start Mr. Suke on 10 units of lantus or levemir as a baseline dose or 23 units according to his weight

- a. True                      b. False

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