

Improving the Awareness of Medication Administration at a Primary Care Clinic

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Abstract

Medication errors occur too frequently in healthcare. As such, a medication administration framework was created to help prevent such errors. The medication administration framework was initially called the five rights of medication administration. A practice improvement project stemmed from these rights as medication administration errors continued to occur among staff in a Primary Care Clinic. The overall goal of this project was to increase awareness and knowledge among the medical staff of a Primary Care Clinic with an educational in-service, which would ideally reduce medication errors. An educational program was created using a PowerPoint presentation. Participating staff were asked to complete a pre-questionnaire before the program started and a post-questionnaire after the presentation. A paired *t*-test found no statistical significance, $p > 0.05$, among the sessions. However, despite not having statistical significance, aggregate data showed improvement in each pre- and post-session for the educational program. Furthermore, despite the educational sessions and improvement in post-scores, the medication rights framework is still not ingrained within daily medical staff practice, which could result in future medication errors. This aspect may continue to threaten patient safety and should be further reviewed by the Primary Care Clinic.

Keywords: five rights, medication errors, vaccination errors, Primary Care, medication administration, vaccine administration

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Chapter One: Statement of the Problem

Introduction

The Institute for Safe Medication Practices (ISMP) employed the five-rights framework in 1999 as a guide for the desired goal or outcome for patient safety. Despite having this framework as a guideline, medication errors still occur. The ISMP argues that healthcare practitioners are partly accountable for ensuring the rights of medication administration are carried out properly inasmuch that the rights are also not a failsafe. Furthermore, the ISMP state that additional rights beyond the initial five are also not the answer; being that failure of medication safety will ensue regardless. Of note, the ISMP recognizes the failure of carrying out the five rights are not just solely on the administrator, but also on organizational weaknesses as contributing factors. (ISMP, 2007, January 25).

Human factors and system weaknesses contribute to medication errors as the literature has reported errors occur due to one, if not several, of not meeting the basic five rights (MacDowell, Cabri, & Davis (2021), but healthcare systems must create processes to uphold these patient rights, for example asking two patient identifiers (ISMP, 2007, January 25). According to MacDowell et al., (2021), it was found that the average error rate among 91 direct observational studies involving hospital and long-term facilities were 8-25% and intravenous and timing errors ranged from 48-53%. Vaccination administration errors, a large category, are unfortunately common in outpatient settings. The ISMP found from January to December 2017, 54% of vaccination errors were in public health clinics or outpatient medical clinics and 54% involved medical assistants (ISMP, 2018).

Nurses complying with the five rights framework in the safe and effective administration of medications are related to other complex factors like nursing workload, nurse staffing, various interruptions affecting nursing workflow, in addition to the health literacy of patients including language barriers (Martyn, Paliadelis & Perry, 2019). Aside from financial costs, medication errors can lead to adverse patient outcomes like increased risk of mortality, possible disability, increased hospitalization or recovery time, and distrust in the healthcare delivery system. Understanding that medication administration errors are multifaceted, focusing on knowledge (and awareness) of proper medication administration is one aspect to ensure patient safety.

Problem Statement

Patient safety is a priority among regulating bodies, like the Center for Disease Control, the ISMP, the Federal Drug Administration, the Centers for Medicare and Medicaid Services, and the Joint Commission with their national patient safety goals. Medication errors, unfortunately, occur too often in healthcare, whether in an inpatient or outpatient setting. An error as defined by the Institute of Medicine (1999) is, “the failure of a planned action to be completed as intended or the use of a wrong plan to achieve an aim” (p.1). The National Coordinating Council for Medication Error Reporting and Prevention defines a medication error as, “any preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is in the control of the healthcare professional, patient or consumer” (The National Coordinating Council for Medication Error Reporting, 2015, para. 1). Not all medication errors cause harm to patients, but unfortunately an estimated 1.5 million people every year are affected by medication errors which cost health care systems approximately \$3.5 billion annually (da Silva & Krishnamurthy, 2016). The costs related to adverse drug events from medication errors are estimated to be \$42 billion annually (Tariq, Vashisht, Sinha, & Scherbak,

2021; WHO, 2023). Seeing as this is also a global concern, one of the aims of the World Health Organization (WHO) is to “reduce severe avoidable medication-related harm by 50%, globally in the next five years” which was launched on March 29, 2017, in Germany at the Second Global Ministerial Patient Safety Summit (Medication Without Harm section, 2023).

Medical or health professionals, patients/families as a system, and organizational systems can be categorized as such for contributory factors in medication errors. The delivery or handling of medications is usually the responsibility of nursing staff, and patient safety initiatives have arisen out of sentinel events or incident reports of administration errors. Understanding nursing knowledge of proper medication administration is imperative to verify that increased knowledge will reduce medication errors.

Goal of the Project

This project arose out of incident reports involving medication and vaccination errors that occurred amongst medical assistants in a Primary Care Clinic located in Honolulu, Hawaii. Very few vaccination errors occurred over the past several years, four in 2019, one in 2020 and three in 2021. Medication and vaccination errors occurred over the past several years however, in 2022, there were 13 and was considered significant by the clinic administration. This was a concern for the Clinic Director who wanted to address what the issue(s) may be.

There were several guiding questions for this project, “Why are medication errors happening at the clinic?”, “Are medication administration errors consistently reported per clinic policy and procedure?”, “Is there a communication failure amongst nursing and medical assistant staff with physicians and mid-level providers?”, “Is there a knowledge deficit among nursing and medical assistants with all types of medications administered at the clinic?”, “Is there a

standardized protocol for administering medications and specifically immunizations?”, “Do the staff know the rights of medication administration?” and finally, “Will an in-service on proper medication administration and prevention strategies, increase staff knowledge and awareness to reduce or eliminate medication errors?”

Upon review of the incidents, common themes of the errors arose out of the ‘five rights’ medication framework. The overall goal of this project was to increase awareness and knowledge among the medical staff of a Primary Care Clinic with an educational in-service ideally reducing medication errors. The target population are the nurses and medical assistants who are the primary administrators of medications via various routes.

Specific Aims and Objectives

Medication errors are not unique to one clinic or hospital, state, or country. It is unfortunately an issue across the globe. Understanding the community the clinic serves is important to the healthcare providers servicing this area in addressing the aims and objectives to ensure patient safety. In order to achieve the goal, the following aims and objectives will help to define the project:

Aim 1: Increase knowledge of medication administration among nurses in a clinic healthcare setting.

Objective 1: Determine current recommendations and identify best practice models or tools regarding medication and vaccination administration.

Objective 2: Construct an evidenced based or best practice education program to medical assistants (MAs) and registered nurses (RNs) regarding medication administration.

Aim 2: Implement medication administration educational program.

Objective 1: Participants will complete the pre- and post-test as part of the educational program. The results will be used to measure medication administration awareness among the study participants.

Aim 3: Evaluate the medication administration module to determine effectiveness and the potential for future adoption of the educational intervention to be utilized as a routine or standard training for all medical staff.

Objective 1: Based on the results of the pre- and post-test, evaluate the effectiveness of the educational intervention to identify if there was a change.

Objective 2: Determine the needs and identify potential barriers and facilitators for potential adoption of the educational module for standardized training of all MAs and RNs.

Objective 3: Present findings to clinic administration to recommend the use of the educational program to be utilized as part of their training or continuing education for medical staff.

Significance of the Study

Nurses have been tasked with providing patient care and medication administration in a growingly complex healthcare system. Medication errors arise from a common theme involving the rights of medication administration. Traditionally, they were the five rights: the right patient, the right drug, the right time, right route, and right dose (Hanson & Haddad, 2022). A medication error is thought of as a failure in executing these patient rights. However, with the advancement of healthcare and the continued demand for patient safety, organizations and regulating bodies

understand that the administration process can be quite complex in any setting thus try to adjust clinical workflows because of this.

The list of the five rights have grown to the 10 rights including the right documentation, the right to refuse medication/treatment, the right education which should be individualized, the right reason/assessment, and finally the right response or evaluation to ensure the desired effect of the drug (Nursecepts.com, 2017), (Health PEI, 2021). The expanded medication administration framework is to help guide the provider or nurse or other health care practitioner to address each component to reduce if not prevent medication errors. Inadequate training, distractions, complex system processes and system misconfiguration are examples of system-related causes of medication administration errors (MacDowell Cabri & Davis of the AHRQ, 2021). So, understanding that medication errors are multifactorial, having a good foundation in this framework can be beneficial.

Regarding vaccination administration, Evans, Cooper, Williams and Carson-Stevens (2016) states, that vaccine errors occur in one-third of patients. Furthermore, Evans et al. (2016) mentioned “the United States wastes \$26.5 million per annum on unnecessary vaccines given to infants between 19 and 35 months” (p. 1280). Wexler (2014) stated “although some improperly administered doses may be considered valid, all such errors open the possibility of patients being unprotected against disease, losing faith in the provider, or even experiencing a serious adverse event following vaccination” (para. 3).

Vaccines have been established to eradicate disease and prevent illness and had been a worldwide achievement as to reduce morbidity and mortality among all citizens. The Center for Disease Control (CDC) provides recommendations for infants, children, adolescents, adults, and

older adults. The current vaccination schedule lists Hepatitis B, Rotavirus, Diphtheria, tetanus, acellular pertussis, Haemophilus influenzae type b, pneumococcal conjugate, inactivated polio, influenza, measles, mumps, rubella, varicella, Hepatitis A, human papillomavirus, meningococcal, meningococcal B, pneumococcal polysaccharide, and zoster. Recently added to the schedule for those under 18 years old is the Dengue vaccination for those who are seropositive and live in endemic areas only (CDC.gov, 2022). Scientists have also created vaccines for emergency use authorization against the COVID-19 virus to help arm immune systems in this pandemic. Now that the COVID-19 vaccine has been approved for use in children ages 6 months through 12 years old, the different formulation and doses can be a daunting task for staff to remember. Though the recommended Dengue and COVID-19 vaccinations are not based on routine vaccinations linked with well-child examinations, the likeliness of errors occurring at those type of visits are presumed less. Despite efforts by the CDC to provide a schedule for vaccine administration from birth to adulthood including a catch-up administration schedule, errors still occur. Errors not only can create mistrust in the medical system, but it can also lead to unnecessary adverse effects which can contribute to parents' refusal of necessary measures to maintain well-being. While educating patients about prevention of disease is necessary, it is also imperative to prevent harm and ensure patient safety with vaccination administration.

Vaccinations have been proven to save lives globally and prevent the spread of diseases. Due to advances in healthcare and medical technology, disease prevention and health promotion can be more daunting to address as evidenced by the complex vaccine schedule put forth by the CDC. "The World Health Organization (WHO) points to a larger number of adverse events (defined as "an incident that results in harm to a patient") from vaccine delivery outnumbering

adverse events from the pharmacological properties of the vaccine” (Evans, Cooper, Williams & Carson-Stevens, 2016, p. 1280). Evans et al. (2016) acknowledge a lack in research and development in understanding the safety of vaccinations. “Research and improvement efforts may now mitigate harm occurring in the vaccination process, which commonly include giving the wrong vaccine; giving vaccines at the wrong time in a schedule; giving extra (unnecessary) vaccines; administering vaccines via wrong route; and prescribing or administering the wrong dose (Evans, Cooper, Williams & Carson-Stevens, 2016, p. 1280).

Chapter Two: Background and Project Description

A review of literature was conducted to determine the current causes or understandings and strategies related to medication and vaccination errors nationally and globally. The literature review helped to determine the best evidenced-based practices to reduce errors in medication administration with a focus in Primary Care. Four relevant themes emerged from the literature pertaining to the project's aims and objectives.

Methods of Literature Review

An online literature search through PubMed, CINAHL and Google Scholar was conducted for academic, peer-reviewed, full-text journal articles published between 2005 through 2022. The search terms in the databases were “medication errors AND Primary Care”, “vaccination errors AND Primary care” or with “Ambulatory care”, “medication AND patient safety”, “medication AND vaccine administration AND knowledge”, “immunization errors among pediatrics”, “proper medication administration AND awareness”, “reducing medication errors in clinics”, “improving clinic immunizations in children AND reducing errors”, “survey for clinic staff AND pediatric vaccine knowledge assessment”. A review of the literature and the application of theoretical framework in Google Scholar was also conducted using the terms, “logic model AND medication errors,” “Knowles’ Learning Theory AND nursing knowledge AND patient safety”, and “Pilinahā framework”.

Concept Map

A concept map is a conceptual diagram or way of brainstorming that shows relationships between concepts or issues related and even assumptions related to the core or center topic. It provides a visionary or pictorial view to explain or describe ideas of the core topic. A concept

map is common in nursing to help students visualize and build on critical thinking skills related to health conditions. Figure 1 depicts proper medication administration as the focus and an important concept that affects the health of all populations, young and old and the healthcare practitioners involved in patient care. The outside concepts in Appendix A are all related to the core concept of proper medication administration which helps to support the concept map.

Figure 1

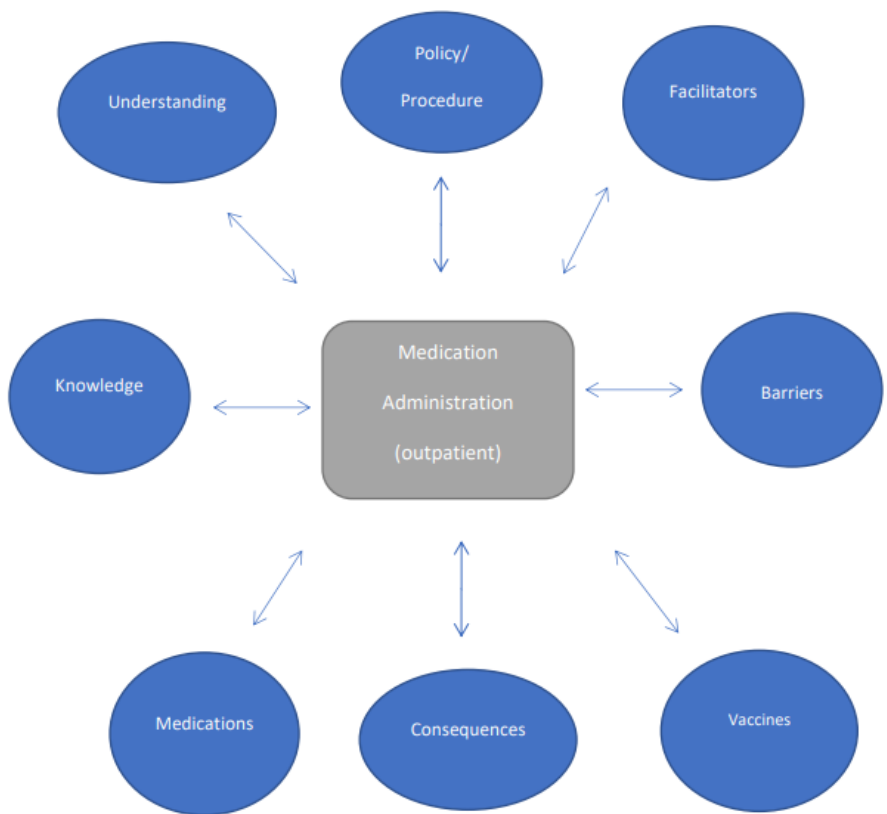


Figure 1. Outpatient Medication Administration Concept Map

Medication administration in the outpatient setting is centered as the primary concept with encircling relationships that have direct and indirect influence in proper administration.

Results of Review of Literature

The Rights of Medication Administration

Nurses play a key role in medication safety; having pharmacological and delivery knowledge of any medication as well as competency is important. Adhikari, Tocher, Smith, Corcoran, and MacArthur (2013), state the five rights are fundamental guidelines for medication safety, and should be involved in the medication reconciliation process while also having input from pharmacists. The rights of medication administration or the five-rights were created for patient safety, “to ensure that the right patient receives the right drug at the right time in the right dose and by the right route” (Martyn, Paliadelis, & Perry, 2019), p. 109).

Nursing educators utilize the five-rights framework to teach medication administration and assess pharmacological competency, in addition this framework is utilized to audit medication errors that have occurred (Martyn et al., 2019). In their qualitative inquiry study, Martyn et al. (2019) used a data collection tool based on the five-rights and found that the rights were not routinely practiced among medical-surgical staff nurses as the process is not simple and linear. However, they found nurses went above and beyond the framework to ensure safe and timely medication administration. The five-rights are an accepted standard for safe medication administration globally (Martyn et al. 2019).

A database review of outpatient vaccination errors in the pediatric population between January 2003 through December 2006 was done by Bundy, Shore, Morlock and Miller (2009). They found most errors (607 reports reviewed) were found in children less than six years old, one-fourth occurred in those in infancy and was related to a failure in the application of the five rights of medication administration. In addition, 93% of errors reached the patient only 10 caused

harm, where 70% occurred during administration phase (Bundy et al., 2009). The three most commonly reported vaccination errors in this pediatric population were an extra dose given, the wrong drug was given, and also improper dose/quantity given (Bundy et al. 2009). Look alike and sound alike vaccinations specifically the tetanus vaccines had more than one-third of reported errors making it the highest prevalence of vaccination error reported.

Medication Error Types

In a review article by Bryan, Aronson, Williams, and Jordan (2019), medication names that look and sound alike can be mistaken for each other and account for *wrong* drug errors. Look alike and sound alike medication are found in prescribing, dispensing and administration errors which can lead to dosage errors (Bryan et al. 2019). Types of errors with medication names were found in medication error reports related to generic-generic names, brand-brand names or generic-brand names causing confusion (Bryan et al. 2019). This poses a significant threat to patient safety. In the United Kingdom, Bryan et al. 2019, extrapolated data of all prescriptions and found that look alike and sound alike prescription errors incidents are 2.2 million errors per year.

In a cross-section descriptive study conducted in Turkey, physicians and nurses were interviewed to determine if medical errors are a result of communication failure amongst themselves. Among the 1,654 nurses and 619 physicians, 15.6% of nurses and 54% of physicians reported a past medical error in their career (Topcu, Turkmen, Sahiner, Savaser & Sen (2017). Of those who had reported such an experience, 52.3% of nurses and 54% of physicians reported the medical error was a result of poor communication (Topcu et al., 2017). Within this group, communication failures reported from physicians were verbal orders (75.7%) and reading written

orders (39.2%) whereas nurses reported 59.3% occurred in verbal orders and 42.2% was in reading written orders (Topcu et al., 2017). Furthermore, these physicians reported experience errors in medication administration (32.8%) and nurses experienced dispensing incorrect medications (40.7%) (Topcu et al., 2017). The setting of these errors was primarily experienced in adult surgical clinics by physicians and in an internal medicine ward by nurses.

Regarding pediatric patient safety, a journal article by Huth, Hotz, & Starmer (2020) reviewed the categories of medical errors in ambulatory pediatrics in the literature. The most common type of error was medications due to “challenges with weight-based dosing, frequent use of liquid formulations with variability in compounding practices, and lack of standards for medication preparation and dosing” (Huth et al., 2020, p. 351). Again, another issue with medication errors is related to look alike and sound alike medications. Errors also occur with prescribing, dispensing, administration and monitoring afterwards to see the effect or outcome of medications. Medication errors examples were wrong drug, dose, route, frequency, or duration, omitted or duplicate dose, drug-drug interaction and also known allergy (Huth et al., 2020). Vaccine error examples also relate to the five rights framework and are wrong timing, route, wrong vaccine administered, and errors with storage and dispensing (Huth et al. 2020).

Vaccination Errors

Reed, Tarini & Andreae (2019) conducted a long-term study on vaccine administration errors and error rates over time by vaccine type and age of the patient affected at a large Midwest academic health system. The vaccination administration error rate was found by “dividing the total number of vaccine administration errors by the total number of vaccine doses administered during the study period” of January 2006 through December 2017 (Reed et al, 2019, p. 5391).

Highest error rates occurred in children ages 2, 3, and 19 years. The common and highest error rate were Td, rabies, and the two pneumococcal vaccines. Overall vaccine doses have decreased during their study period.

Huth et al., 2020, noted that vaccination administration errors are unique compared to medication errors. There is a national database to report errors called the vaccine errors reporting program or VERP. If there are adverse patient outcomes the Vaccine Adverse Event Reporting System (VAERS), (Huth et al, 2020), is what providers use to document such reactions. The most common errors noted in this article is related to inappropriate schedule, storage and dispensing errors like expired vaccinations, and administration of the wrong vaccine (Huth et al. 2020). The European reporting system, the England and Wales National Reporting and Learning System, described 1745 errors over 11 years and the most common themes arise again, “failure of timely vaccination, wrong number of doses, wrong timing and wrong vaccine administered” (Huth et al., 2020, p. 354). Similarly, a systematic review of peer reviewed studies from 2009-2018 was conducted by Morse-Brady and Hart (2020). They also found that most reported errors were wrong vaccines administered (81.76%) and “off-schedule administration” (14.71%)

According to the ISMP National VERP’s report from January through December 2017, 23% of vaccination errors were due to the wrong vaccine (ISMP, 2018). Of those, it was also due to look alike and sound alike vaccinations due to marketing brands and generic names, vaccine packaging/labeling and also abbreviations. The common vaccinations were regarding diphtheria, tetanus and/or pertussis (23%), measles, mumps, rubella and/or varicella vaccines (16%), Hepatitis A and B and combination of these vaccines (Twinrix and Pediarix) (11%), two pneumococcal vaccines (10%) and lastly the influenza vaccine (9%) (ISMP 2018).

A study was conducted to perform a root-cause analysis on pediatric vaccination administration (expired and wrong vaccine) that occurred in a clinic by Durham, Didovic, & Gingell (2020). They also noted that 27-35% of errors occurred in pediatrics, 48% of errors occurred in family practice and 54% involved medical assistants. Results of their study found success because of a small sample but can be learned to incorporate best practices with vaccination administration (Durham et al., 2020).

Knowledge and Understanding

Abdulla, Johnson, Munir, and O'Dwyer (2020) conducted a mixed methods quantitative pre- and post- survey plus qualitative interviews to assess nurses' knowledge of immunizations. They found that providing immunization education increases the nurses' knowledge of immunizations at their clinical site. This educational program addressed vaccine safety, efficiency, and contraindications to delivery. Their study found "a significant number of participants demonstrated a lack of immunization knowledge" for the following question, "Is mild illness, with fever, is a reason to withhold vaccination?" (Abdulla et al., 2020, p. 384). Their study also indicated a need for "a carefully developed, routinely repeated training and educational program" (Abdulla et al., 2020, p. 384). It was found, too, that more experienced nurses developed more practical knowledge and skills with their daily duties.

An Australian study by Hewitt, Tower, & Latimer (2015) was done to determine the perceived effectiveness of an education intervention with bachelor's prepared nurses on the adverse effects and errors on medications. Understanding that errors occur also based on system or organizational factors helped to bring increased awareness of how errors occur which then encourages the nursing students to bring that knowledge into the clinical setting.

Chapter Three: Project Design and Evaluation Plan

Theoretical Framework

Models in healthcare exist to help health professionals guide their thoughts and goals. Whether or not one wants to create a new health curriculum, develop programs, change or assess the health needs of the community, or apply for grant money the use of the logic model and a theoretical framework will help articulate and guide their thoughts in a visual presentation.

Logic Model

Logic as interpreted by Community Toolbox (2016), refers to “the relationship between elements and between an element and the whole”. It also means reasoning, understanding, thinking, and projecting with other disciplines. One can even imply that logic involves a systematic process of reasoning. Key members and organizations of the healthcare community have assisted in health promotion by identifying areas of concern across all age groups. In order to affect change, they may employ various theoretical frameworks, curriculum designs or models to reach their desired goal(s). An example of such a tool to promote healthy change is the Logic Model. The Logic Model as defined by W.K. Kellogg Foundation (2004) is “a systematic and visual way to present and share your understanding of relations among the resources you have to operate your program, the activities you plan, and the changes or results you hope to achieve” (The Pell Institute, 2016).

A logic model is linear and follows a sequence of activities to which will bring about the expected outcome. Some questions that one may ask in the process are, “what is the community need? What is the vision for the future? How can the vision be achieved?” (The Pell Institute, 2016). These questions help to identify the problem, formulate ideas on how to address the

problem and how those ideas will achieve the end goal. The logic model can also be used in any discipline to evaluate existing programs and initiatives (Community Toolbox (2016)).

There are two views of thinking that can guide the construction of a logic model: forward and backward logic (Community Toolbox (2016)). Forward logic questions the reason behind the proposed or current activities of the given project or program. In other words, the rationales are based on “but why” questions and “if-then” thinking (Community Toolbox (2016)). Reverse logic starts with the final outcome or end goal. Reverse logic compels one to ask, “but how” questions in order to create change (Community Toolbox (2016)).

The logic model is a sensible and visual tool to help create partnerships and keep stakeholders focused on the outcomes of their program or project. Community Toolbox (2016) has an illustration of the basic components of a logic model, seen here in Figure 2.

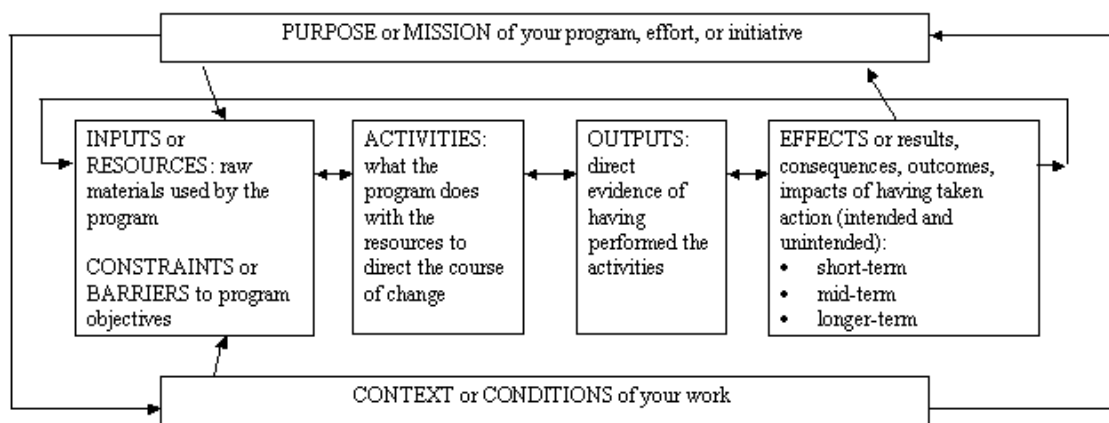
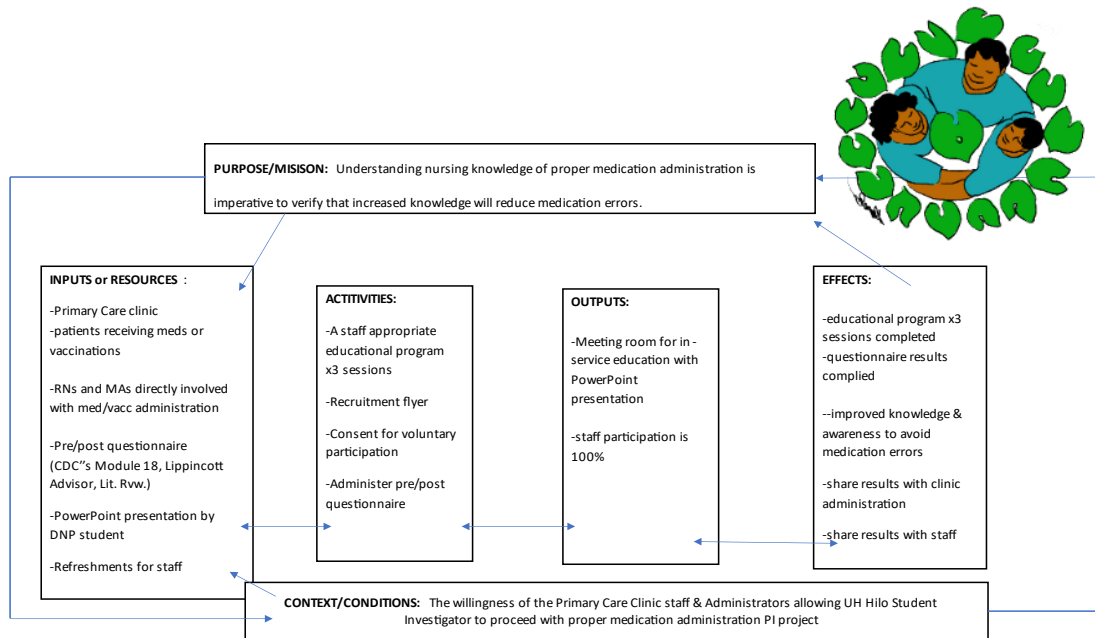


Figure 2 *Logic Model*

A figure of the Logic Model using this project is noted here in Figure 2-A, see below.

components are straightforward and simple. The top box brings focus and attention to the purpose or mission of a project. Here, the author of the project states the problem or opportunity

Figure 2-A *The Logic Model for Awareness of Medication Administration*



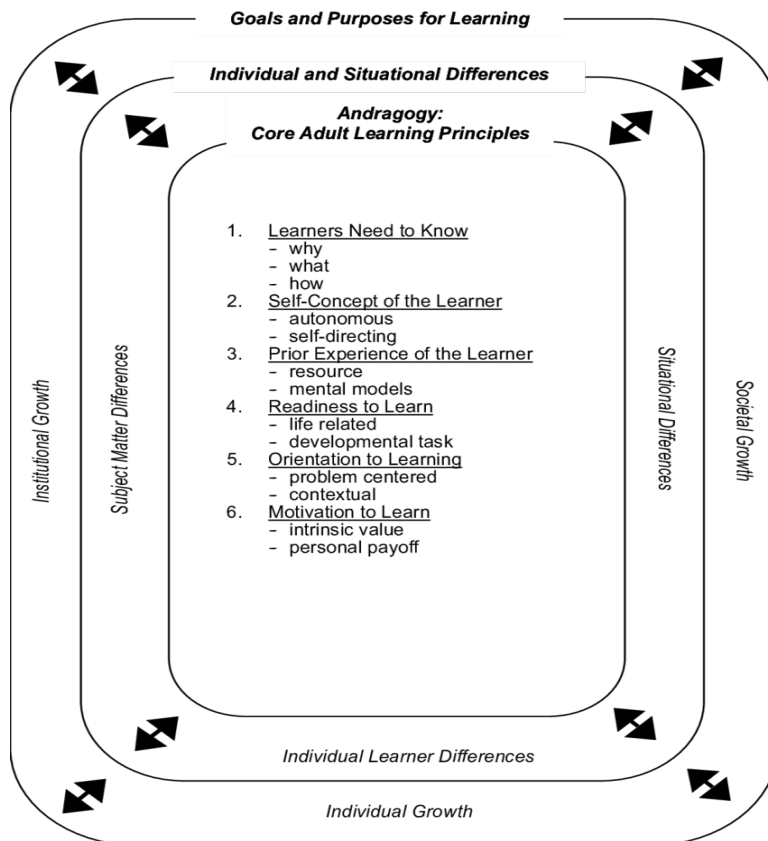
of interest. Now the focus then shifts to the context of the project. The context asks how the change will take place given current circumstances. Inputs, in the first box, would include the resources/infrastructure and effort needed to conduct the project. It is important the author also includes any barriers to the project's objectives. Next in activities, an important question to ask is, what will or how will the resources available direct the course of action or change? This is where the author is guided by risk factors and protective factors of the project. The third box, outputs, highlights the outcome of related activities that were carried out as planned. Lastly, the effects section would list the outcomes of the project and can be identified in a timeline fashion; short-, mid-, or long-term. The arrows indicate that each area is interdependent on the other and is an ongoing process that may need revision over the course of the program or project (Community Toolbox, 2016).

Many research articles displayed the use of the logic model in many disciplines. Goeschel, Weiss and Pronovst (2012) used the logic model in their quality and patient safety improvement program regarding central line-associated bloodstream infections (CLABSI) in Michigan hospital intensive care units. The logic model helped Goeschel et al. (2012) with creation of five objectives to reduce CLABSI mortality per quarter. Regarding addressing patient outcomes and safety, they were able to reduce CLABSI rates by 66% and improve their safety environment scores by 10% Goeschel et al. (2012).

Theory of Adult Learning: Andragogy

An appropriate theoretical framework is the use of Malcom Knowles' theory of adult learning, andragogy, which was further developed from the earlier concepts of andragogy by Alexander Kapp and Eduard C. Lindemann (Chan, 2010). Knowles defines andragogy as, "the art and science of helping adults learn" (Bouchrika, 2021). The adult learner theory can be applied in many disciplines and is useful in training as the adult learners in this paper's sample population are adult medical assistants and nurses.

There are six assumptions of the adult learner in the andragogical method of Malcolm Knowles. They are "the need to know, the learner's self-concept, the role of the learner's experiences, readiness to learn, orientation to learn, and motivation" (Knowles, Holton, & Swanson, 1993, p. 64-68). Figure 3 by Knowles, et al. (1998), depicts these assumptions as it relates to the world of the adult learner,



These assumptions seem to be simple, fundamental concepts of the adult learner. As one gets older, becomes mature, accumulates life experiences, and has worldly perspectives, one would be self-motivated or driven to seek further knowledge and opportunities for growth. The first assumption, learners need to know the details of what they will be learning before undertaking the educational activity (Knowles, et al. 1998). The concept is that adult learners would invest time, energy; be engaged, in the advancement or supplement of their education. And conversely, they would know or understand the consequences of their lack of engagement. The second assumption, the learner's self-concept, is the positive and negative thoughts and experiences of a lifetime of learning. Whereby being responsible in self-development will guide or lead to self-direction of learning.

The third concept, the role of the learner's experiences, is an asset because of the variability of experiences. Knowles, et al. (1998) state that the quality and quantity of experience vary by adults of different backgrounds (age, work history, learning style, interests, needs, motivation, etc.) and this can also be a downfall as well. The negative impact on learning is that "as we accumulate experience, we tend to develop mental habits, biases and presuppositions that tend to cause us to close our minds to new ideas, fresh conceptions and alternative ways of thinking" (Knowles, et al., 1998, p. 66). To help breakaway from these potential negative consequences, educators need to be creative to the adult learning style which enhances the experience; by use of case studies, group discussions, simulation exercises or lab simulation/practicum and problem-solving techniques (Knowles, et al., 1998). Cosejo (2018), further adds for nursing education, the adult educational experience can be met with hands-on actual experiences from the teacher or educator as the educator's sharing, reflection and lectures of life experiences helps with engagement for the "related learning experience".

The fourth assumption, readiness to learn, "adults become ready to learn those things they need to know and be able to do in order to cope effectively with their real-life situations" (Knowles, et al., 1998, p. 67). This comes with development and maturity; hence readiness to seek new knowledge and skills. In the fifth assumption, orientation to learning, involves the motivation and according to Knowles et al. (1998), a change or shift from subject-centered to problem-centered learning because of the maturity and willingness of the adult learner to be able to apply what is taught to real-world situations. "Furthermore, they learn new knowledge, understandings, skills, values, and attitudes most effectively when they are presented in the context of application to real-life situations" (Knowles, et al., 1998, p. 67). The final assumption, motivation, relies on the prior five assumptions as well. One's motivation would be

individualized whether it is a desire for advancement of career, skills, promotion, job satisfaction, or even quality of life, etc.

Furthermore, the thought or assumption of the self-motivated learner would also be “self-directed, task-oriented, life-focused, and problem-centric” (Bouchrika, 2021). The principles and assumptions of the adult learning theory can be applicable with medication safety among nursing. Educators need to facilitate the teaching/learning experience of the adult learner. In order to achieve an optimal learning environment, these principles of Knowles’ are necessary:

- Adult education must focus on solving specific problems
- Adult education must rely on the experience of teachers
- There should be significant knowledge and experience gained by the teachers from training
- Teachers should be able to analyze and check teaching material
- Teachers should receive feedback about their progress (Bouchraki, 2021).

In planning a program or curriculum around health promotion, disease prevention, or patient safety, one needs to incorporate a conceptual framework to guide and anticipate behaviors of the focus group. These theoretical frameworks and models help to explain human behavior and guide strategies to address safety, disease prevention and health promotion (Rurualhealthinfo.org, 2002-2016).

Pilinahā Framework

Tying in the Logic Model and the Adult Learning Theory to create a culture of safety at the clinic would be beneficial to ensure both healthcare workers feel safe, connected, and supported. One theory that is already used in the clinic is their Pilinahā Framework, Figure 4. It

addresses a patient’s four connections “to feel whole and healthy in their lives: connection to place, connection to community, connection to past and future, and connection to your better self” (Odom, Jackson, Derauf, Inada, & Aoki, 2019, p. 32). While it appears that these vital connections seem to be relatable only to the patient’s perspective on health and healing; this interconnectedness can be applied to healthcare workers and the clinic/the patients/the community they serve as their vital “work” connections. The clinic is their ‘place’, ‘community’ is the community the medical staff serve. Learning from past medical errors (owned or learned) will have a sense of responsibility to ensure that it does not occur again. Lastly, to know one’s better ‘self’ is to commit to that responsibility of providing health and healing; not lose inclusiveness with the community the medical staff care for or the interconnections amongst coworkers/colleagues. This Piliṅahā Framework would be the basis for sustaining a culture of safety amongst the entire medical clinic who work together to “advance health, inspire healing, foster reconciliation, celebrate abundance” in their community “through strong relationships that honor culture and place (KKV.net, 2023, introduction section).

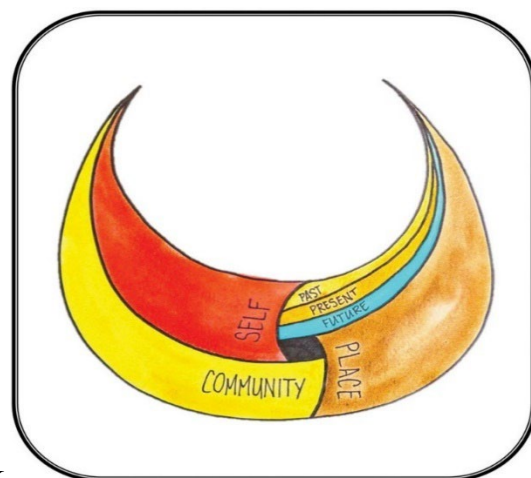


Figure 4. *Piliṅahā: Four Connections Framework*

Project Design, Setting and Participants

The overall goal of this quality improvement project was to increase awareness and knowledge among the medical staff of a Primary Care clinic with an educational in-service which would ideally reduce medication errors. The methods used to implement the aims and objectives will be described in this chapter for the proposed project. From the literature gathered and reviewed, it appears that medication errors and vaccination errors are not grouped together, but rather separated topics including the settings in which the error occurs. The methods to meet the aims and objectives are discussed further, including the budget for this project.

Project Design

This DNP study will be conducted over three educational in-services, two weekdays and one weekend, with nursing staff utilizing a PowerPoint presentation on patient safety and proper medication administration. All participants will participate in a pre-and post- questionnaire regarding patient safety measures such as, proper medication administration such as vaccine handling, the rights of medication administration, and proper techniques with injectable medications. Both pre- and post- questionnaires were developed from the CDC's vaccine training module entitled, "WB4424: Immunization: You Call the Shots-Module 18-Vaccination Administration (3 learn): (CDC.gov, March 16, 2021) and incorporating concepts of medication errors through Lippincott Advisor. The aim of this project is to increase the knowledge, confidence, and skills of each staff member.

Setting and Participants

The setting for this project is at a Primary Care Clinic in Honolulu, O'ahu. The inclusion criteria were individuals who are employed at the clinic (medical staff) and administer

medications, namely medical assistants (n=40) and registered nurses (n=2). Exclusion criteria were advanced practice registered nurses (APRNs), physicians and other administrative support staff. The participation in the educational program was voluntary. The staff were encouraged to participate as their input would be useful and valuable to ask their opinions about medication errors and if the educational program could be standardized staff training.

Methodology

The Logic Model's linear style guided the development of this project's methodology and evaluation plan (Figure 2). Knowle's Adult Learning Theory (Figure 3) helped to understand the dynamics of being an adult learner and how to address their wants/degree of readiness to learn. The Piliñahā Framework (Figure 4) used the four connections tie in the sense of self with the community and using time as experience to prevent errors from one's. The assumption of nursing staff in this DNP project is readiness and motivation; that staff will be ready to assess their current knowledge of medication administration and be motivated to learn the proper methods therefore reducing medication errors.

Project Methods: Aims and Objectives

To understand the project's design, the description of the methods utilized to accomplish each aim and objectives will be discussed here.

Aim 1: Increase knowledge and awareness of medication administration among medical staff in a Primary Care Clinic.

Objective 1: Determined current recommendations and identify best practice models or tools regarding medication and vaccination administration.

Methods. Searched peer-reviewed literature (PubMed, CINAHL, Google Scholar) and regulatory organizations for evidenced based and best practice models or tools to assist with proper medication and vaccination administration.

Objective 2: Utilized an evidenced based or best practice education program to medical assistants (MAs) and registered nurses (RNs) regarding medication administration.

Methods. Utilized a vaccine educational module from the CDC, “WB4424: Immunization: You Call the Shots-Module 18-Vaccination Administration (e-learn). Incorporated Medication Errors from Lippincott Advisor into the education program.

Aim 2: Implemented the medication administration educational program.

Objective 1: Participants completed the pre- and post-questionnaires as part of the educational program. The results were used to measure medication administration knowledge and awareness among the study participants.

Methods. Designed the pre- and post-questionnaire utilizing part of the 26 test questions from WB4424 Immunization: You Call the Shots-Module 18-Vaccination Administration and design questions from Lippincott Advisor’s Medication Errors reference section, and the literature review.

Aim 3: Evaluated the medication administration module to determine effectiveness and the potential for future adoption of the educational intervention to be utilized as a routine or standard training for all medical staff.

Objective 1: Based on the results of the pre- and post-questionnaire, evaluate the effectiveness of the educational intervention to identify if there was a change.

Methods. The pre- and post- questionnaire was evaluated by using a paired-comparisons t-test.

Methods. Talled the '8 Rights' identified correctly in pre- and post-questionnaire sessions.

Objective 2: Determine the needs and identify potential barriers and facilitators for potential adoption of the educational module for standardized training of all MAs and RNs.

Methods. Identified themes of open-ended questions in the pre-questionnaire, "I think medication/vaccination errors occur in our clinic because of:" and also the in the post-questionnaire, "Do you think this educational program has increased your knowledge base? Please explain why or why not".

Objective 3: Present findings to clinic administration to recommend the use of the educational program to be utilized as part of their training or continuing education for medical staff.

Methods. Plan to attend the monthly risk management meeting on April 27, 2023, at 10:30 a.m.

Evaluation of the Project

The pre-and post- questionnaires distributed to the staff also included descriptive data such as participant characteristics, demographics, and open-ended evaluation questions. A pre-questionnaire was completed by the participants prior to the start of the in-service to obtain baseline data. After the presentation of the in-service, a post-questionnaire was completed to

measure if the project was able to meet the specific aims and objectives of the overarching goal. The pre- and post- questionnaire assessments will be evaluated statistically by using a paired-comparisons *t*-test to analyze for change in knowledge and awareness of proper medication administration.

Budget

The financial budget for this project was minimal. The cost for the surveys was provided by the student investigator at a local FedEx Kinko's printing site. A total of 90 copies of questionnaires were made, costing \$0.19 per copy for a total cost of \$17.10. Refreshments such as pastries, orange juice and passion-orange-guava were also purchased to thank the staff for their time in participating and provided at the largest educational in-service. The cost of the refreshments was \$39.32. All expenses were directly paid for by the student investigator.

Protection of Human Subjects

A memorandum of agreement was in place between the University of Hawaii at Hilo and the Primary Care clinic. The University of Hawaii at Hilo's School of Nursing provided approval of this project. In addition, this project also sought approval with the University of Hawaii Institutional Review Board prior to implementation. The clinic's Executive Director provided a letter of approval to proceed with the educational program. A project recruitment flyer (see Appendix A) was provided to the clinic's head nurses and clinic's Medical Director. Before commencement, the project consent for voluntary participation (see Appendix B) was provided to the Clinic Director and head nurses who disseminated to the medical staff. All questionnaire forms were anonymous for each participant's protection. No identifiable information in the demographic section of the questionnaire was requested. The pre- and post- questionnaires were

submitted into a manila envelope by the participants upon completion and kept secured with the author.

Chapter Four: Results

Data Collection Process

The data analysis and interpretation are to assess current knowledge and awareness of proper medication administration based on the educational program and share the results with clinic stakeholders to hopefully enhance training and support. The IRB approval for exempt status for this quality improvement project was granted on December 7, 2022. Due to the holiday season and minimal staff availability, the student researcher waited for the return of the Medical Director to coordinate commencement of the project. Further direction was given to coordinate with the primary head nurse to share the recruitment flyer (see Appendix A) and project consent (see Appendix B) on the best dates and times to provide the educational program. Two weekdays and one Saturday were selected in a period of two weeks. A PowerPoint presentation (see Appendix D) was created highlighting findings from the literature review, the CDC's training module WB4424, and Lippincott Advisor.

The initial educational program was on February 10, 2022. The pre-questionnaire included basic demographics. The post-questionnaire included a feedback section providing valuable insight. Upon review of the pre-and post-questionnaire responses of group one, the student investigator identified a missing component in the PowerPoint presentation that was not discussed directly which may have a negative effect in the response for the post-questionnaire. The missing component relates to question number three (open-ended), "name the rights of medication administration used where you work". After advisement from nursing faculty, the PowerPoint presentation was amended to include a slide on the eight rights of medication administration utilized at the Primary Care Clinic. The amended PowerPoint presentation was then used on subsequent sessions.

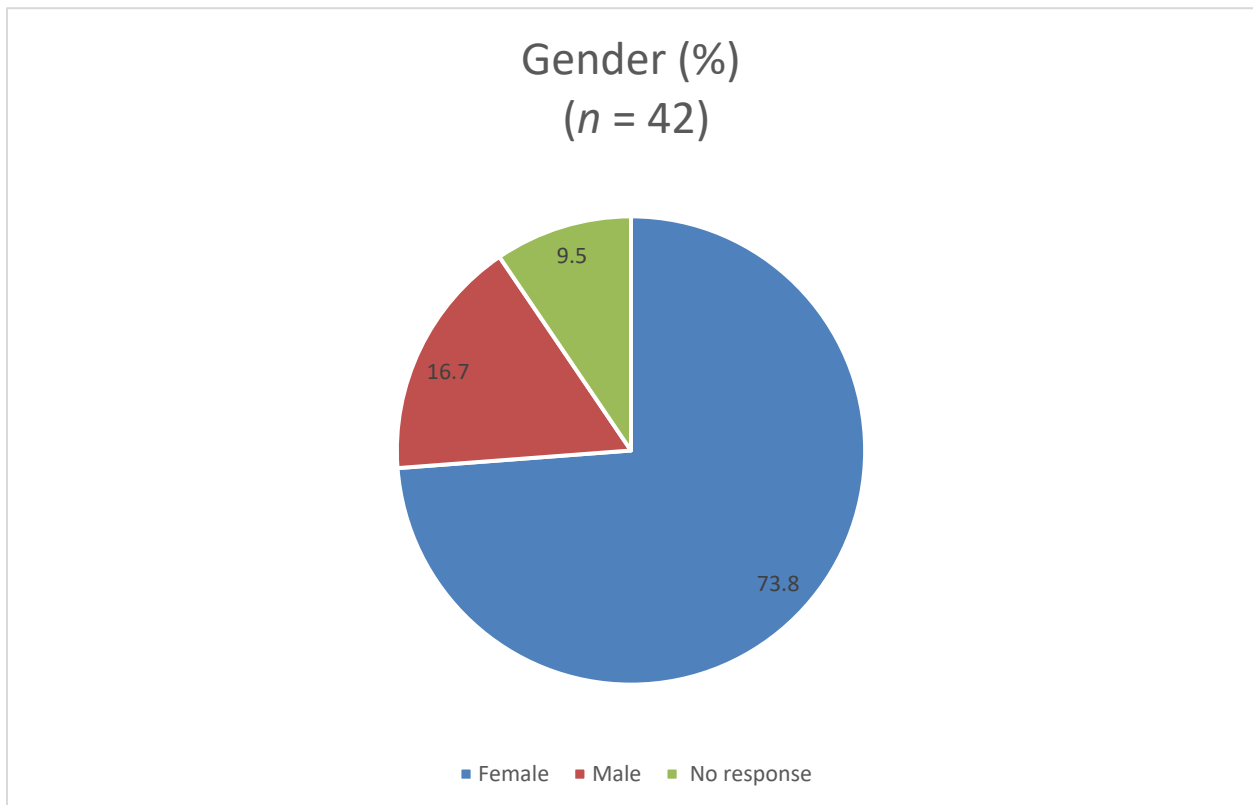
During the presentation week, two medical staff asked the student investigator to participate due to being absent on the initial day of the educational program offering. The recruitment flyer and project consent were provided to both staff to read prior to providing a one-on-one educational program, in which both staff members volunteered to participate. To maintain anonymity and confidentiality, their pre-and post-questionnaire responses were respectively added to day two and day three so their responses could not be isolated or identified.

Demographic Information of Project’s Participants

The demographic information of the 42 participants are as follows. Thirty-one participants were female (74%), seven (17%) were male, four (10%) did not respond.

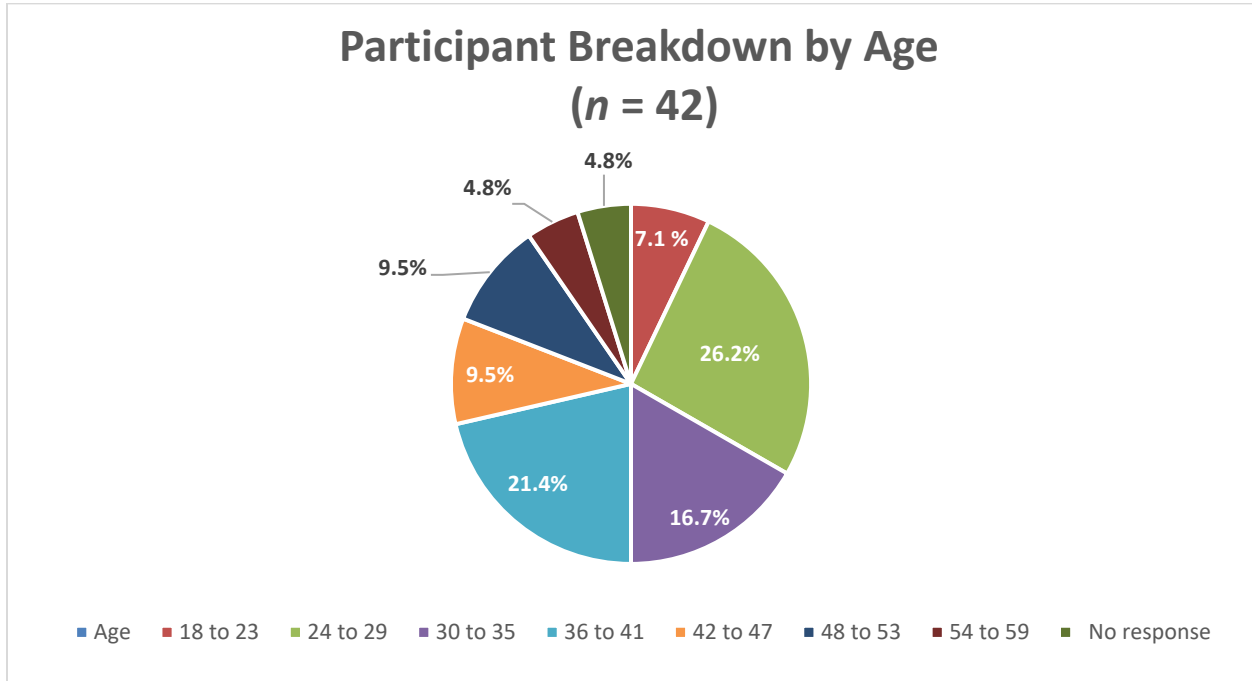
See Graph 1 below.

Graph 1



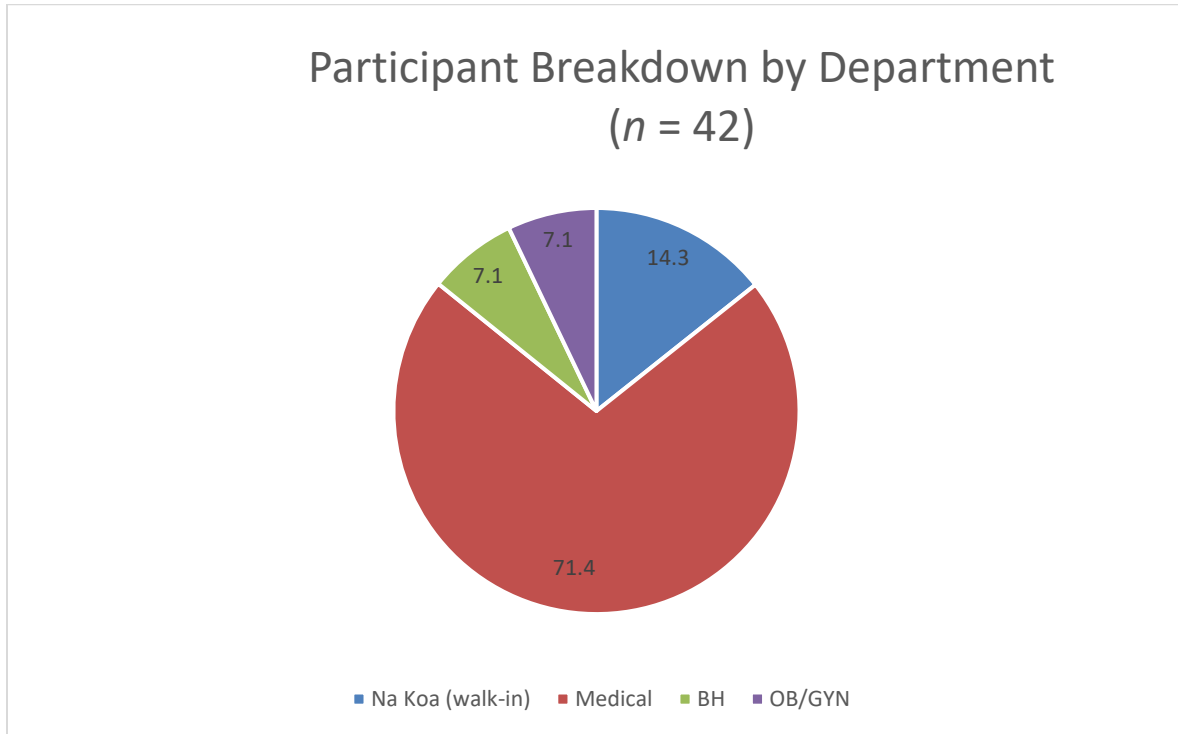
The largest group ($n = 11$) of participants were ages 24 to 29 years old and the smallest group ($n = 2$) were ages 54 to 59; two did not respond. See Graph 2 below.

Graph 2



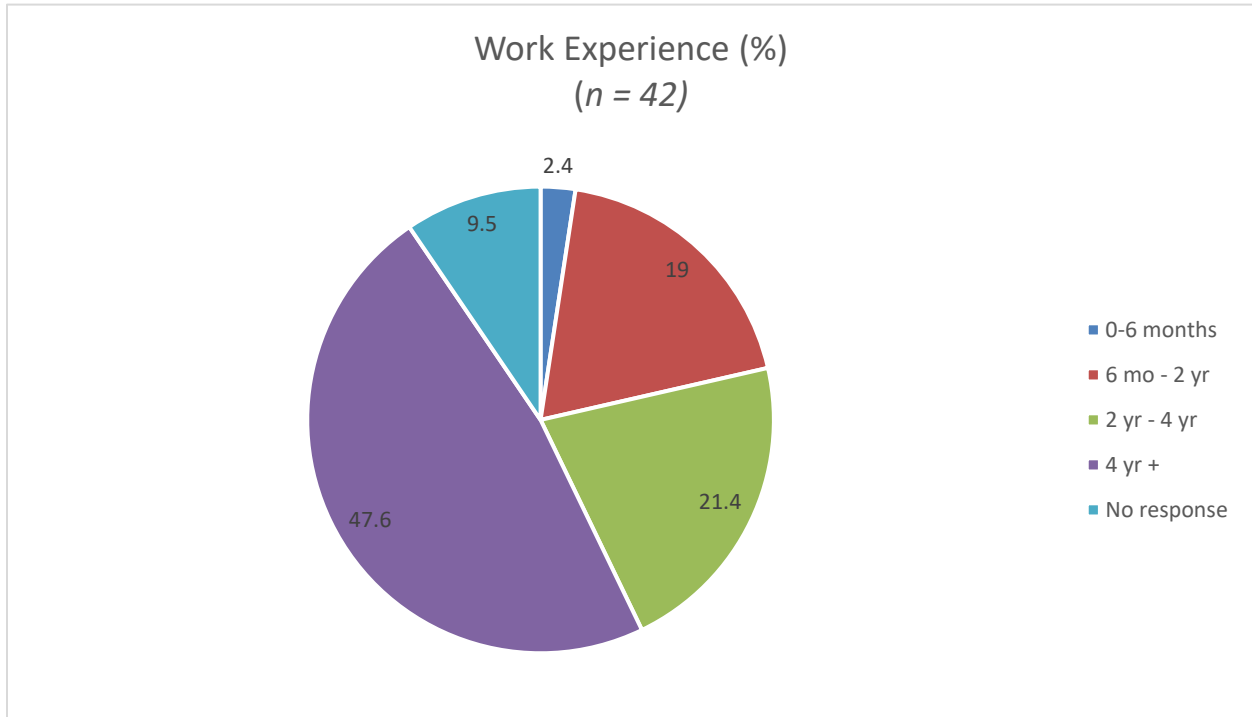
There are several departments in the Primary Care Clinic that the medical assistants work in. The student investigator is familiar with the flow of the clinic. While the staff have a constant or designated area they work in, a few medical assistants rotate or float between the named areas based on staffing needs. The selection of departments in the demographics depicts their primary areas stationed at. The head nurses ($n = 2$) oversee the daily flow and assists where needed between departments. Seventy-one percent of staff work in the medical department. See below Graph 3.

Graph 3



Work history also varied amongst the groups. The largest, 47% of staff (n=20) worked four years or longer. What may have been insightful would be to breakdown work experience into two more categories, 10 to 15 years, and 15 years or longer. See Graph 4 below.

Graph 4



Results

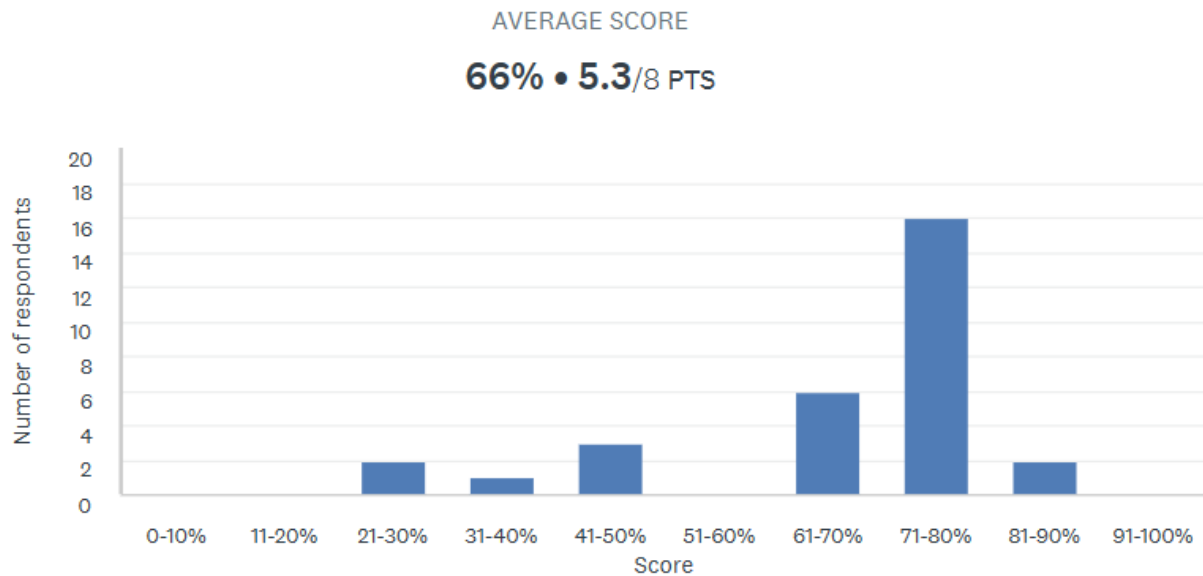
The first aim of this project was to increase knowledge of medication administration among medical staff in a Primary Care Clinic. In reaching this aim, one objective was to determine current recommendations and identify best practice models or tools regarding medication and vaccination administration. The second objective was to utilize an evidenced based or best practice education program to MAs and RNs regarding medication administration. The CDC’s vaccination training module entitled “WB4424: Immunization: You Call the Shots- Module 18-Vaccination Administration (e-learn)” (CDC.gov, March 16, 2021) and in Lippincott Advisor’s sentinel event section, titled “Medication Errors” (October 10, 2022) helped to guide the development of the pre- and post-questionnaires (see Appendices B and C).

The second aim was to implement a medication administration educational program. For the single objective, participants completed the pre- and post-questionnaires as part of the educational program. The results measured medication administration knowledge and awareness among the study participants before and after the PowerPoint presentation. The pre-questionnaire was handed out to the participants prior and informed that it was a baseline assessment of their current knowledge. The pre-questionnaire also included demographics which previously mentioned helped to add descriptive characteristics of the medical staff. They were given 10 minutes to complete and submit into the manila envelope provided.

The educational program was a PowerPoint presentation that took approximately 30 minutes. The post-questionnaire included personal feedback that helped to provide insight into the current issue and possibly recommendations to improve practice at the Primary Care clinic. The staff were also given 10 minutes to complete and place into the second envelope provided. The questions related to staff training, vaccine administration, medication administration, and errors. In addition, there was an open-ended question of, “name the rights of medication administration used where you work”. A second open-ended question, “I think medication/vaccination errors occur in our clinic because of” was considered important to capture qualitative responses from the medical staff. The same process occurred on subsequent educational sessions.

The following table (see Table 1 below) depicts the percentages of correct answers (eight out of eight) in the pre-questionnaires for the open-ended question, “name the rights of medication administration used where you work”. Four participants did not respond to this question. In addition, six participants had ‘other’ responses they believed were in the rights of medication administration framework.

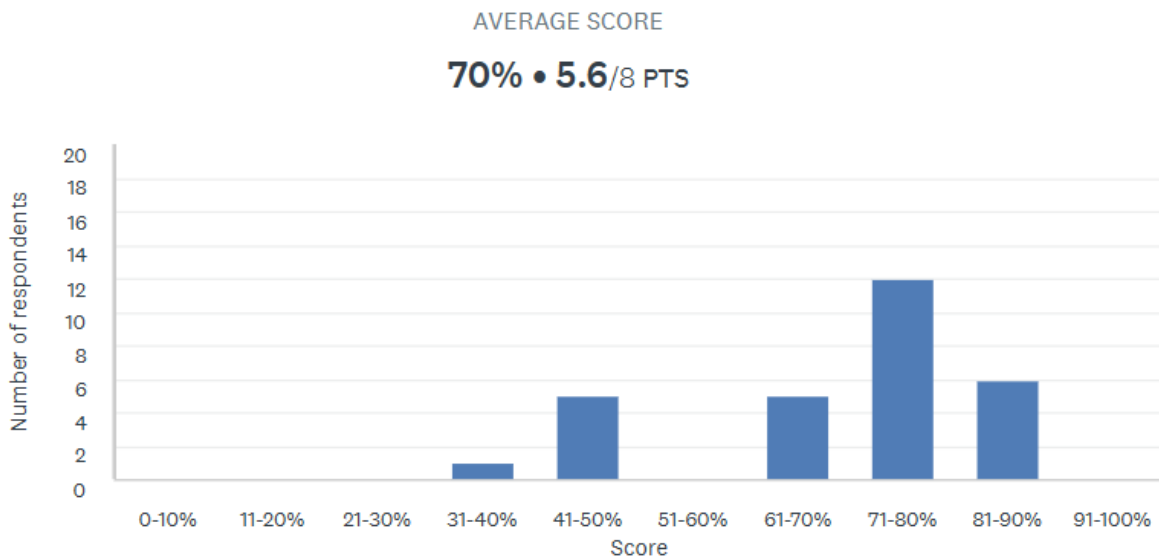
Table 1: Percentage correct, pre-questionnaire, Session 1



The other responses that were not counted or scored as correct were the right to refuse medication (n = 1), doctor’s order (n = 1), date of expiration (n = 4), manufacturer’s name (n = 1), and lot number (n = 2).

The post-questionnaires in session one revealed a slight improvement of four percent with answering the medication rights used in the clinic. The following table (see Table 2 below) depicts the percentages of correct answers (eight out of eight rights) in the pre-questionnaires for the open-ended question, “name the rights of medication administration used where you work”.

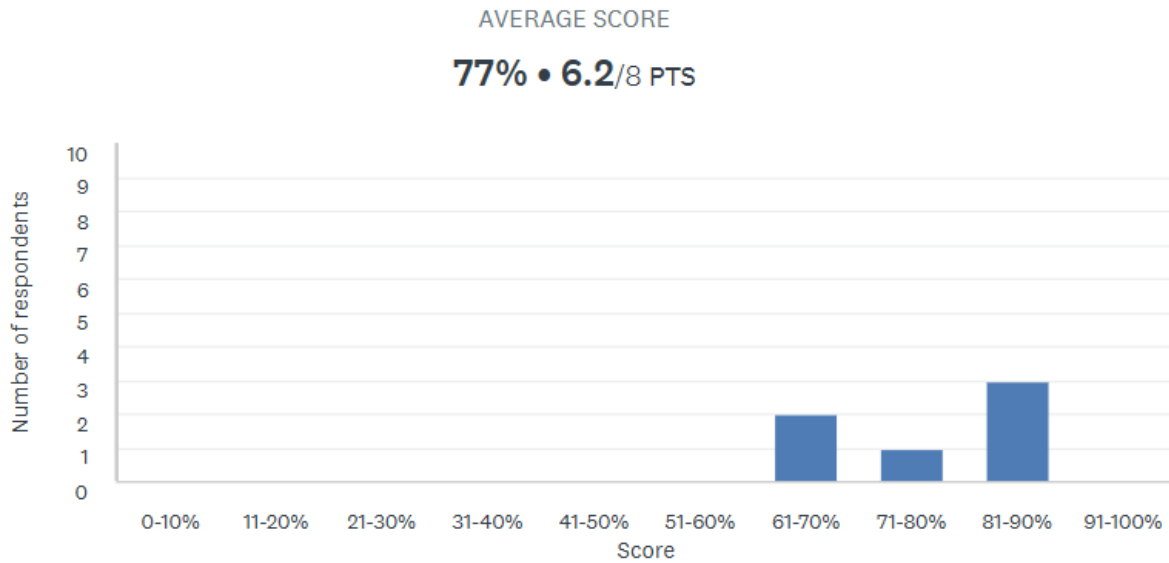
Table 2: Percentage correct, post-questionnaire, Session 1



There were 29 post-questionnaires submitted for review in the first session. Of these participants, 12 had ‘other’ responses that did not align with the rights of medication administration framework. It is important to include those answers: right administration (n = 6), right education (n = 1), right resource/information (n = 2), expiration date (n = 1), right VIS (n = 1), right interval (n = 1), right doctor’s order (n = 1), right to refuse medication (n = 1), and right person administering (n = 1).

There were eight participants who attended session two, however only six submitted their questionnaires. The following table (see Table 3 below) depicts the percentages of correct answers (eight out of eight rights) in the pre-questionnaires for the open-ended question, “name the rights of medication administration used where you work” in session two.

Table 3: Percentage correct, pre-questionnaire, session 2



The following table (see Table 4 below) depicts the percentages of correct answers (eight out of eight rights) in the post-questionnaire for the open-ended question, “name the rights of medication administration used where you work” in session two. There was a one percent improvement.

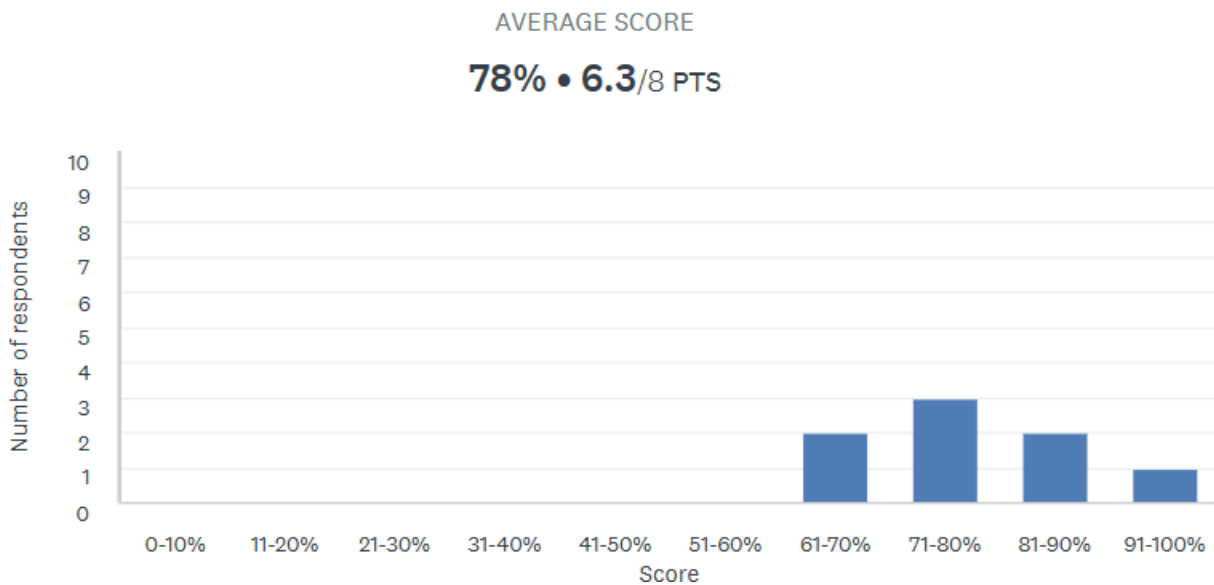
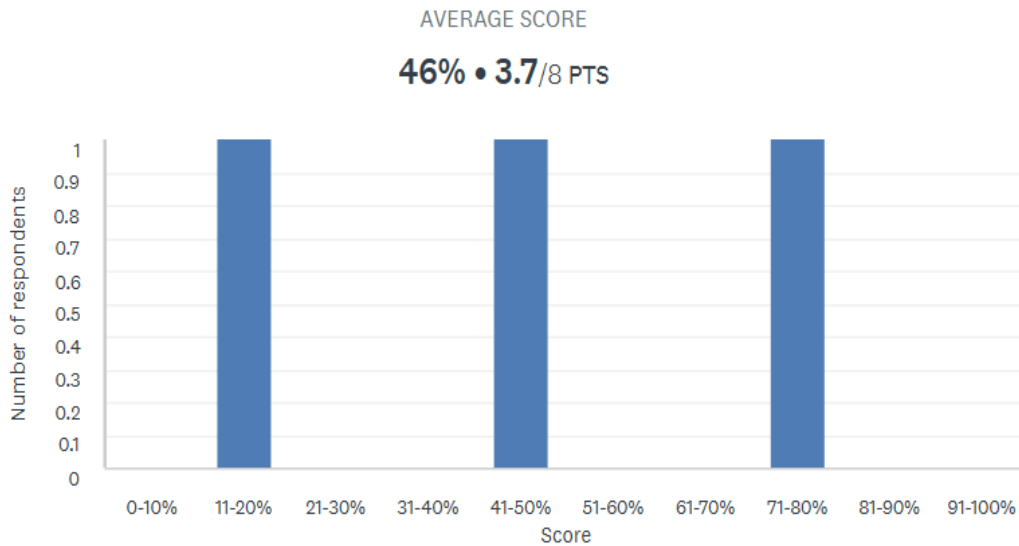


Table 4: Percentage correct, post-questionnaire, session 2

Only one participant received a perfect score of 100% correct. Two additional responses from this participant were “right to refuse and education”. Three participants had additional responses that were not counted as correct or included in the eight rights of medication administration used at the clinic. They were, right education (n = 2), and right to refuse (n = 3), drug approach (n = 1), and history/assessment (n = 1).

The following table (see Table 5 below) depicts the percentages of correct answers (eight out of eight rights) in the pre-questionnaire for the open-ended question, “name the rights of medication administration used where you work” in session three. The three participants scored an average of 46%.

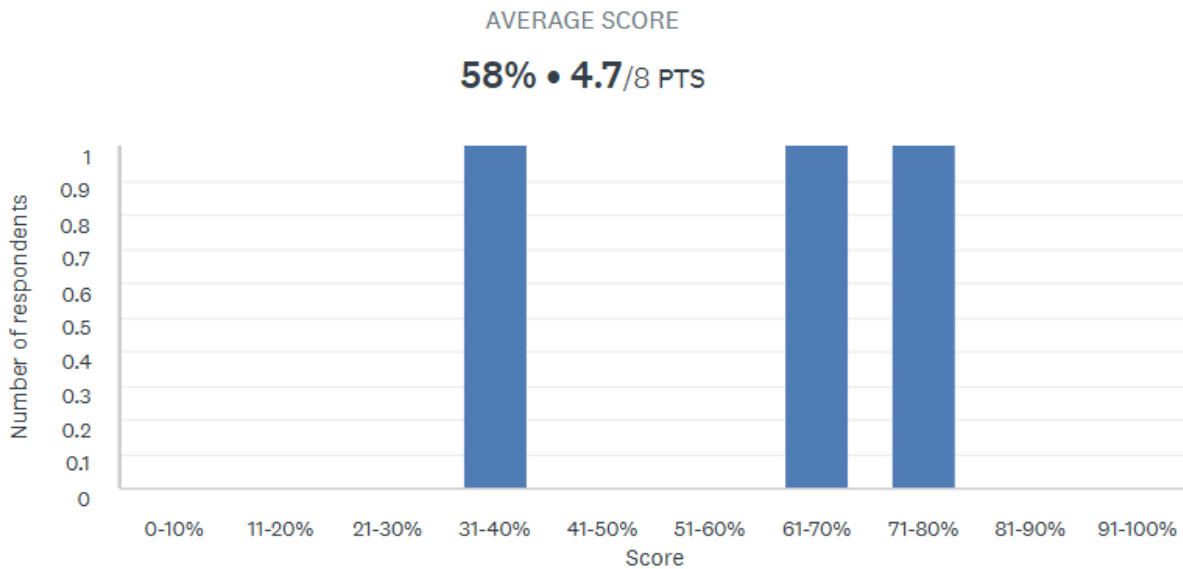
Table 5: Percentage correct, pre-questionnaire, session 3



The following table (see Table 6 below) depicts the percentages of correct answers (eight out of eight rights) in the post-questionnaire for the open-ended question, “name the rights of

medication administration used where you work” in session three. Other responses included assessment/history (n = 1), right education (n = 1), and right expiration date (n = 1). There was an improvement of eight percent after the education program.

Table 6: Percentage correct, post-questionnaire, session 3

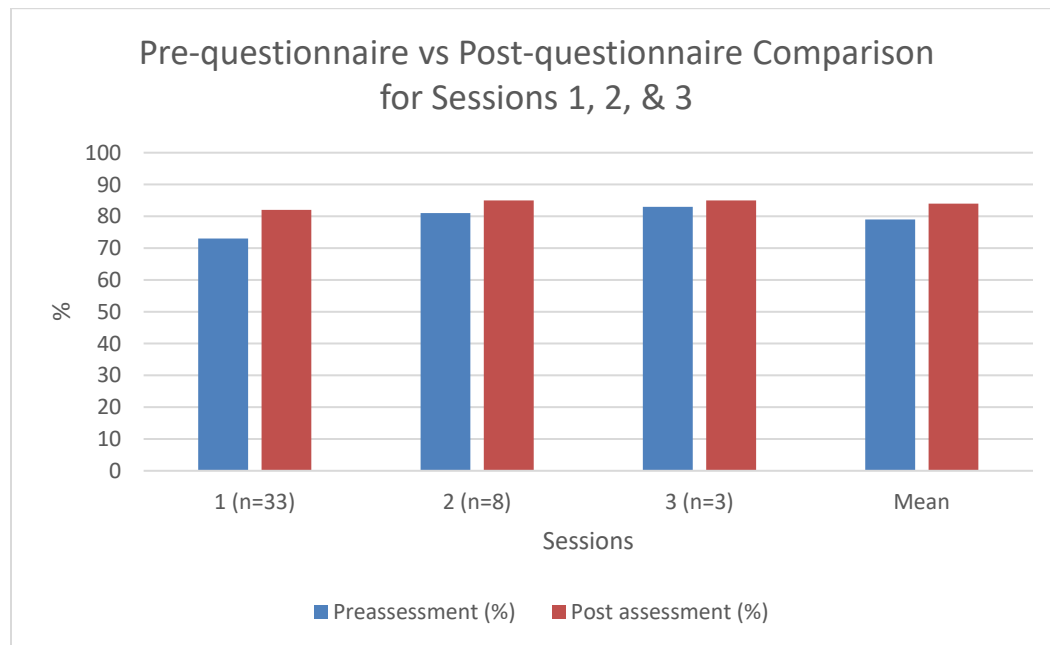


The third aim was to evaluate the medication administration educational program to determine effectiveness and the potential for future adoption of the educational intervention to be utilized as a routine or standard training for all medical staff. The first objective stated, based on the results of the pre- and post-questionnaire, evaluate the effectiveness of the educational intervention to identify if there was a change. Table 7 and Graph 5 below shows the overall mean score from the three pre-questionnaires were 79%, and the mean score for the post-questionnaires were 84%. The pre- and post-questionnaire scores for each session were, respectively, 73% versus 82% for session 1, 81% versus 85% for session 2, and 83% versus 85% for session 3.

Table 7. Pre-questionnaire vs. Post-questionnaire Scores for Sessions 1, 2, and 3

Session	<i>n</i>	Pre- (%)	Post- (%)	% change
1	33	73	82	12.3
2	8	81	85	4.9
3	3	83	85	2.4
Mean		79	84	6.3

Graph 5



A *t*-Test was also performed to evaluate the pre- and post-questionnaires, see Table 8. While the two-tailed *t*-value (0.138) did not show statistical significance with $p > .05$, there was overall improvement as seen in the mean scores. It is safe to state the possible reason for having or starting with above average pre-questionnaire scores reflected some knowledge of current content due to work experience and higher level of education of the medical staff.

Table 8. t-Test: Paired Two Sample for Means

Session	Pre-assessment (%)	Post-assessment (%)
1	73	82
2	81	85
3	83	85

t-Test: Paired Two Sample for Means

	<i>Preassessment (%)</i>	<i>Post assessment (%)</i>
Mean	79	84
Variance	28	3
Observations	3	3
Pearson Correlation	0.981980506	
Hypothesized Mean Difference	0	
Df	2	
t Stat	-2.401922307	
P(T<=t) one-tail	0.069136258	
t Critical one-tail	2.91998558	
P(T<=t) two-tail	0.138272516	
t Critical two-tail	4.30265273	

The second objective was to determine the needs and identify potential barriers and facilitators for potential adoption of the educational module for standardized training of all MAs and RNs. This objective was useful in providing insight into the thoughts of the staff who felt were contributory factors or situations. Table 9 below lists the responses to the open-ended, question, “I think medication/vaccination errors occur in our clinic because” which was tallied and grouped from all three sessions. The table is listed verbatim from greatest to least responses. Emerging themes related to education/training or lack thereof, busyness/feeling rushed, attentiveness/carelessness, and communication failures.

Table 9: Medical Staff Reasons for Medication Errors

staff are not properly trained; lack of orientation	11
we're rushing; in a hurry; rushing to get patients in and out; rushing in preparation of the vaccine	9
not paying attention; not focused while working	5
not double checking immz history; not review patient's flowsheet; not completely checking chart history	4
immunization given and not documented; not putting it on the chart or flowsheet	3
miscommunication/lack of communication	3
too busy; busyness of the clinic	3
right of administration was not performed; not following the rights of medication administration;we should check meds before administering while preparing	3
a majority of us need to remember we need to double check on right/proper medication/vaccination administration	2
lack of update; lack of updated infor from CDC	2
not knowing meds, purpose, route; lack of knowledge about the medication and vaccination	2
short staffed	2
When the MAs are confused and don't communicate with their providers; MA neglect to double check/verify w/ provider	2
careless	1
doesn't ask for help by other peers to double check medication/vaccination that is being given.	1
forgetting about the proper medicaiton administration procedure.	1
labeling errors	1
misdiagnosis	1
no concentration	1
no room in the lab	1
no time to double check especially if you have partner that already prep the medication for you to administer	1
not checking expiration date	1
not checking or read before given (the label)	1
overwhelm	1
patients that are in a rush to go out of the clinic	1
perhaps staff went to a wrong patient, no verification of pts	1
prescription errors	1
pt went to another clinic and got it there	1
staff errors	1

Furthermore, this objective was useful from the feedback provided in the post-questionnaire.

Themes were created to help organize the qualitative responses to the final question, “do you think this educational program has increased your knowledge base? Please explain why or why not”. Twenty-nine staff provided feedback. Only seven staff replied, “yes”. The common themes are listed from frequent to less frequent; finding the program was informative (n = 13), increased awareness (n = 7), appreciated being up to date/refreshed (n = 8). A few responses taken verbatim were felt meaningful to share:

- Hope we have more education or training of aware on medication administration
- Continues research results differ sometimes, an update of routine problems or operations is vital to healthcare
- Prevent my errors in giving or administering and preventing law suites
- It’s good to have a refresher course or training to avoid errors

- There were some things I was unaware of, that I know now after the program
- I don't work with Peds, but knowing this knowledge applies also to adults who I work with most.
- This was helpful and very informative topic. Great job Tracy. Thanks.

Chapter Five: Implications for Practice, Recommendations and Conclusion

Discussion of the Data

This chapter connects the aims and objectives with the results. The three theoretical frameworks used in this project proved useful in following a linear process from the Logic Model, finding meaning for the adult learner who is self-motivated for his or her own learning and lastly the integration of the Pilinahā Connections Framework. The Pilinahā Connections Framework had deeper meaning as to connect the student investigator and staff with their sense of self (not wanting to commit a medical error), place (caring for one's employment as one's home), community (serving the community with integrity) and also time (learning from the past, embracing the present and looking to the future). This framework hopes to have a purposeful mindset while serving the patients of the clinic's community. Furthermore, this chapter discusses the strengths and limitations of this project, implications, and dissemination plans.

Aim 1: Increase knowledge of medication administration among nurses in a clinic healthcare setting.

Objective 1: Determine current recommendations and identify best practice models or tools regarding medication and vaccination administration.

Objective 2: Construct an evidenced based or best practice education program to medical assistants (MAs) and registered nurses (RNs) regarding medication administration.

This aim and these objectives were partly successful in being accomplished, as the student investigator had difficulty in researching a best practice or evidence-based tool, solely for medication administration errors. The literature review found articles focused on registered nurses and acute care settings, such as the hospital setting, as opposed to medical assistants and

outpatient settings. Due to this, fundamental nursing skills and education regarding medication errors were sought to aide in verifying if the training module from the CDC would suffice. In addition, the student investigator completed a self-learning module from the American Medical Technologists, certification body for Registered Medical Assistants, entitled Medication Errors and Safety which addressed the medication rights framework and medication errors.

Aim 2: Implement medication administration educational program.

Objective 1: Participants will complete the pre- and post-test as part of the educational program.

The results will be used to measure medication administration awareness among the study participants.

The student investigator initially planned for three educational sessions. However, two staff were absent on the initial day. Because of their absence, they wanted to participate, and the student investigator held a one-on-one session for each person. To keep their questionnaire identity anonymous, person number one was included in session two and person number two's questionnaires were added in the third session. In addition, the PowerPoint presentation slides had to be edited as it was missing a component related to question number three (open-ended), "name the rights of medication administration used where you work". The amended PowerPoint presentation was then used on subsequent sessions.

Aim 3: Evaluate the medication administration module to determine effectiveness and the potential for future adoption of the educational intervention to be utilized as a routine or standard training for all medical staff.

Objective 1: Based on the results of the pre- and post-test, evaluate the effectiveness of the educational intervention to identify if there was a change.

Despite making minor adjustments to the PowerPoint presentations, the educational program provided was successful. Table 1 and Graph 5 below showed the pre- and post-questionnaire scores for each session were, respectively, 73% versus 82% for session 1, 81% versus 85% for session 2, and 83% vs. 85%. The paired t-Test also was not statistically significant, however aggregate scores showed a positive change. In hindsight the student researcher should have identified the pre- and post-questionnaires with numbers to see if individuals had a positive change.

Objective 2: Determine the needs and identify potential barriers and facilitators for potential adoption of the educational module for standardized training of all MAs and RNs.

The feedback from the staff as adult learners was minimal, but useful. Table 9 listed their reasons medication errors occur in the clinic. The most reported reason was “staff are not properly trained; lack of orientation” (n = 11). Theoretical knowledge in healthcare education is equally important as learning fundamental skills as opposed to solely being task oriented. Continuing education to keep staff up to date with evidenced-based practice or to refresh one’s skills is. According to Ghaghara, M., Saffari, M., Ebadi, A., Ameryoun, A. (2017), “in-service training includes a set of measures taken to promote empowerment and competency among employees for the better undertaking of their tasks, thus helping the organization to achieve its goals” (p. 27). Furthermore, Chaghari et al. (2017) affirms that in-services promote effective learning and development in the respective fields of nurses as they are adult learners who oversee their self-assessment and guide their own learning. The student investigator found this article useful as it

ties into Knowles' Adult Learning Theory of being responsible for one's own knowledge and seeking to be a lifelong learner to better oneself.

Objective 3: Present findings to clinic administration to recommend the use of the educational program to be utilized as part of their training or continuing education for medical staff.

The findings were presented to the Clinic Director and head nurses. In addition, the CDC's WB4424: Immunization: You Call the Shots-Module 18-Vaccination Administration (e-learn) (CDC.gov, March 16, 2021) was completed by the student investigator for continuing education credit (see Appendix F).

Outcomes Evaluation

The student investigator was thanked by the staff and also gave verbal feedback that the educational program provided a desired review of fundamental skills taught. Participants were overall satisfied with the program. No continuing education credit was offered for this educational program. In hindsight, the student investigator realized that the pre-and post-questionnaires were not numbered or paired with each other to see how each participant did. Nonetheless, each session showed an improvement in knowledge. The first educational session did not mention or include the eight rights of medication administration utilized at the Primary Care Clinic. The PowerPoint slides were edited to include them in the later sessions. Interestingly, despite reviewing the eight rights used, all but one staff member got all rights correct in the post-questionnaire of session two. On a positive note, the majority of staff knew the basic, initial five rights of medication administration: namely, the right patient, right medication, right dose, right time, and right route.

Implications for Practice

The impact of the educational program to increase awareness of proper medication administration was successful as participants showed improvement in pre-and post-questionnaire assessments. In addition, participants expressed positively they appreciated the program as a refresher course. The student investigator also made a resource folder for the staff. The head nurse also asked if a second folder could be created for the staff who are in a different department of the clinic. What would be useful is to incorporate the CDC's immunization training module as part of an annual training. The training offers self-guided self-learning modules with a post-test and ability to earn continuing education credit as the student investigator completed, see Appendix F. In addition to the resource folder, the student investigator printed the eight rights used on bright yellow paper and placed on the vaccine/medication refrigerators.

Project Limitations

One of the limitations of this project was the scope. The focus for the clinic was to address vaccination administration, as immunizations are widely administered in the clinic as primary prevention and was the primary area of concern as evidenced by the vaccination errors incurred in 2022. However, since other injectable medications are given like insulin, Prolia and Depo Provera, it was prudent to include and address medications generally. Furthermore, the literature review focused on the acute care setting, hospitals with nurses as the primary population as opposed to medical assistants. It was difficult to find a pre-made survey or test, fortunately, the CDC had vaccine training modules with test questions which proved useful with having incorporated fundamental nursing skills with injectable administration.

Conclusion and Recommendations

In comparing the pre- and post-questionnaires from all sessions, the aggregate scores for each proved successful educational program was conducted. Perhaps utilizing the CDC's vaccination self-learning modules as part of routine training would be useful and a good review for staff. In addition, the clinic should incorporate the 10 rights of medication administration, but also fix internal systems and demand patient safety by using two-patient identifiers as birthdate and full-name for each patient prior to administering any medication or treatment procedure with the use of an interpreter as needed. What would be more useful to the clinic administration and staff would be to monitor for errors for the upcoming quarter for the 2023 calendar year.

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Appendix A Recruitment Flyer

The University of Hawai'i at Hilo

&

Kokua Kalihi Valley Comprehensive Family Services

Is conducting a quality improvement project on:

Improving the Awareness of Medication Administration at a Primary Care Clinic

Do you administer medications and vaccinations at KKV?

If the answer is **YES...**

Tracy Lynne Fernando would like to invite you to participate in our initiative on proper medication administration.

The purpose of this project is to assess current knowledge and awareness of proper medication administration by providing an educational program thereby decreasing medication errors from occurring at our clinic.

The project is a collaboration between the University of Hawai'i student researcher and Kokua Kalihi Valley.

- Educational programs (3) will take place at Kokua Kalihi Valley
- Project volunteers will be provided refreshments during the educational program
- A summary of the results of the questionnaires performed during the project will be shared with administration and the project volunteers.

To learn more about the project, please contact

Tracy Lynne Fernando at tracyf@hawaii.edu

Appendix B Consent to Participate



University of Hawai'i Consent to Participate in a Practice Inquiry Project

Tracy Lynne Fernando, Investigator

Project title: Improving the Awareness of Medication Administration at a Primary Care Clinic

Aloha! My name is Tracy Lynne Fernando and you are invited to take part in a Practice Inquiry Project. I am a graduate student at the University of Hawai'i at Hilo in the Department of Nursing. As part of the requirements for earning my graduate degree, I am doing a project.

What am I being asked to do?

If you participate in this project, you will be asked to fill out a questionnaire.

Taking part in this study is your choice.

Your participation in this project is completely voluntary. You may stop participating at any time. If you stop being in the project, there will be no penalty or loss to you. Your choice to participate or not participate will not affect your employment here at Kokua Kalihi Valley.

Why is this study being done?

The purpose of my project is to assess current awareness and knowledge of patient safety regarding medication administration. I am asking you to participate because medication errors happen which can negatively affect patients and the organization.

What will happen if I decide to take part in this study?

The questionnaire will consist of 20 questions. It will take 20 minutes. The questionnaire will include questions about medication administration, errors, and also ask for your feedback. The questionnaire will be handed to you twice, once prior to an educational program and after the educational program.

What are the risks and benefits of taking part in this study?

I believe there is little risk to you for participating in this practice inquiry project. You may become stressed or uncomfortable answering questionnaire. If you do become stressed or uncomfortable, you can skip the question or take a break. You can also stop taking the questionnaire or you can withdraw from the project altogether.

There will be no direct benefit to you for participating in this questionnaire. The results of this project may help improve Kokua Kalihi Valley's medical staff to benefit with future training.

Privacy and Confidentiality:

I will not ask you for any personal information, such as your name or address. Please do not include any personal information in your survey responses. I will keep all study data secure in a locked office/encrypted on a password protected computer. Only my University of Hawai'i advisor and I will have access to the information. Other agencies that have legal permission have the right to review project records. The University of Hawai'i Human Studies Program has the right to review research records for this practice inquiry project.

Compensation:

You will receive light refreshments for the educational program for your time and effort in participating in this practice inquiry project.



University of Hawai'i
Consent to Participate in a Practice Inquiry Project

Tracy Lynne Fernando, Investigator

Project title: Improving the Awareness of Medication Administration at a Primary Care Clinic

Future Research Studies:

The pre- and post- questionnaires are anonymous and will not contain your personal information. The data collected for this project will not be used or distributed for future research studies.

Questions:

If you have any questions about this study, please email me at tracyf@hawaii.edu. You may also contact my faculty advisor, Dr. Katharyn Daub, at katharyn@hawaii.edu. You may contact the UH Human Studies Program at 808.956.5007 or uhirb@hawaii.edu to discuss problems, concerns and questions, obtain information, or offer input with an informed individual who is unaffiliated with the specific research protocol. Please visit <http://go.hawaii.edu/iRd> for more information on your rights as a research participant.

Filling out the questionnaire will be considered your consent to participate in this project.

Please keep a copy of the consent form for your records.

Mahalo!

Appendix C
Pre-Questionnaire

Demographics

Age: 18-23 ____ 24-29 ____ 30-35 ____ 36-41 ____ 42-47 ____ 48-53 ____

54-59 ____ 60-65 ____

Gender: Male ____ Female ____ Non-binary ____ Decline ____

Work Experience: 0-6 months ____ 6 months-2 years ____ 2 years-4 years ____ 4+ years ____

What Department do you work in?

1. Na Koa (Walk-in) ____ 2. Medical ____ 3. BH ____ 4. OB/GYN ____
5. Other ____
-

1. Medication errors are preventable where I work.

True ____ False ____

2. Medication errors cost approximately _____ a year:

- a. \$3.5 million
- b. \$5.5 million
- c. \$21 billion
- d. \$3 billion
- e. \$17 million

3. Name the rights of medication administration used where you work:

4. I think medication/vaccination errors occur in our clinic because of: _____

5. Staff should receive training in vaccine administration when:

- a. Immunization schedules are updated each year
 - b. Recommendations change
 - c. New vaccines are added to inventory
 - d. All of the above
6. You should review a patients immunization history:
- a. At every visit
 - b. Once a year
 - c. Every 6 months
 - d. When new vaccines are added to the facility's inventory
7. When selecting equipment to administer a vaccine by injection, which of the following steps should you take?
- a. Inspect the needle and syringe packaging
 - b. Check the packaging to see if there's an expiration date
 - c. Use a separate needle and syringe for each injection
 - d. All of the above
 - e. None of the above
8. The recommended site for a subcutaneous injection for an infant is the
- a. Fatty tissue over the anterolateral thigh
 - b. Fatty tissue over the triceps muscle in the upper arm
 - c. Gluteal muscles in the buttocks
 - d. None of the above
9. If an infant spits up or vomits after administration of an oral vaccines, you should repeat the dose
- True _____ False _____
10. For a subcutaneous (Subcut) injection, insert the needle fully into the fatty tissue at a:
- a. 45-degree angle
 - b. 75-degree angle
 - c. 90-degree angle
 - d. None of the above

11. It's September and Anna and her 4-year-old son are at your clinic for their annual flu vaccinations. You are administering inactivated influenza vaccine, which is given by intramuscular (IM) injection. Which is the recommended site for an IM injection for a 4-year-old child:
- Gluteus muscle (buttock)
 - Vastus lateralis muscle (anterolateral thigh)
 - Deltoid muscle (upper arm)
 - All of the above
 - None of the above
12. It's Anna's turn for her flu vaccine. Which is the recommended site for an IM injection for an adult?
- Deltoid muscle (upper arm)
 - Gluteus muscle (buttock)
 - Both of the above
 - None of the above.
13. Maria is 4 years old and came to your medical facility for a preventive health care visit. You determine she needs the following vaccines: dose #5 of DTaP, dose #2 of MMR, dose #2 of VAR, and dose #4 IPV.
Which answer below is true?
- Only one vaccine may be administered in a limb at a time.
 - Administering combination vaccines when possible can decrease the number of injections.
 - Considering the number of vaccines needed, fever-reducing medication should be given before administration.
14. ACIP recommends providers consider routinely observing a patient, seated or lying down, for 30 minutes after administration.
- True _____ False _____
15. Federal law requires the following information to be documented after vaccine administration
- Vaccine lot number
 - Vaccine manufacturer
 - Date of administration
 - Edition date of the vaccine information statement (VIS) provided to the patient or parent
 - All of the above
 - None of the above
16. All of the following vaccine administration errors require revaccination except:
- MMR, MMRV, and varicella given by the IM route if the minimum age and minimum interval have been met
 - Influenza given subcutaneously
 - HPV vaccine given by any route other than the IM injection

- d. Any partial vaccine dose administered because the needle or syringe leaks or the patient moves away
17. Which of the following best practices can help prevent vaccine administration errors?
- a. Storing sound-alike or look-alike vaccines in different containers and areas of the unit
 - b. Using a standardized screening tool for contraindications and precautions every time you administer a dose of vaccine
 - c. Checking expiration dates weekly and removing expired vaccines from inventory
 - d. All of the above
18. Emma is 11 years old and at the health care facility for a sports physical. After consulting the childhood immunization schedule, you determine that she needs, tetanus, diphtheria, and acellular pertussis (Tdap) vaccine, meningococcal conjugate vaccine (MenACWY), and her second dose of both human papillomavirus (9vHPV) and varicella (VAR) vaccines.
- Before administering the vaccines, you take all of the following steps except:
- a. Assess Emma's immunization history
 - b. Screen Emma for contraindications and precautions
 - c. Record the time in Emma's medical record
 - d. Check the expiration dates for all of the vaccines
19. Even though this is Emma's second dose of 9vHPV, you still need to screen her for contraindications and precautions.

True _____

False _____

20. Diluents are interchangeable, as most are only sterile water.

True _____

False _____

Appendix D
Post-Questionnaire

1. Medication errors are preventable where I work.

True _____ False _____

2. Medication errors cost approximately _____ a year:

f. \$3.5 million

g. \$5.5 million

h. \$21 billion

i. \$3 billion

j. \$17 million

3. Name the rights of medication administration used where you work:

4. I think medication/vaccination errors occur in our clinic because of: _____

5. Staff should receive training in vaccine administration when:

e. Immunization scheduled are updated each year

f. Recommendations change

g. New vaccines are added to inventory

h. All of the above

6. You should review a patients immunization history:

- a. At every visit
 - b. Once a year
 - c. Every 6 months
 - d. When new vaccines are added to the facility's inventory
7. When selecting equipment to administer a vaccine by injection, which of the following steps should you take?
- a. Inspect the needle and syringe packaging
 - b. Check the packaging to see if there's an expiration date
 - c. Use a separate needle and syringe for each injection
 - d. All of the above
 - e. None of the above
8. The recommended site for a subcutaneous injection for an infant is the
- a. Fatty tissue over the anterolateral thigh
 - b. Fatty tissue over the triceps muscle in the upper arm
 - c. Gluteal muscles in the buttocks
 - d. None of the above
9. If an infant spits up or vomits after administration of an oral vaccines, you should repeat the dose

True _____

False _____

10. For a subcutaneous (Subcut) injection, insert the needle fully into the fatty tissue at a:
- a. 45-degree angle
 - b. 75-degree angle
 - c. 90-degree angle
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 - c. Deltoid muscle (upper arm)
 - d. All of the above
 - e. None of the above
12. It's Anna's turn for her flu vaccine. Which is the recommended site for an IM injection for an adult?
- a. Deltoid muscle (upper arm)
 - b. Gluteus muscle (buttock)
 - c. Both of the above
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Which answer below is true?

- a. Only one vaccine may be administered in a limb at a time.
 - b. Administering combination vaccines when possible can decrease the number of injections.
 - c. Considering the number of vaccines needed, fever-reducing medication should be given before administration.
14. ACIP recommends providers consider routinely observing a patient, seated or lying down, for 30 minutes after administration.

True _____ False _____

15. Federal law requires the following information to be documented after vaccine administration
- a. Vaccine lot number
 - b. Vaccine manufacturer
 - c. Date of administration
 - d. Edition date of the vaccine information statement (VIS) provided to the patient or parent
 - e. All of the above
 - f. None of the above
16. All of the following vaccine administration errors require revaccination except:
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 - b. Influenza given subcutaneously
 - c. HPV vaccine given by any route other than the IM injection
 - d. Any partial vaccine dose administered because the needle or syringe leaks or the patient moves away
17. Which of the following best practices can help prevent vaccine administration errors?
- a. Storing sound-alike or look-alike vaccines in different containers and areas of the unit
 - b. Using a standardized screening tool for contraindications and precautions every time you administer a dose of vaccine
 - c. Checking expiration dates weekly and removing expired vaccines from inventory
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18. Emma is 11 years old and at the health care facility for a sports physical. After consulting the childhood immunization schedule, you determine that she needs, tetanus, diphtheria, and acellular pertussis (Tdap) vaccine, meningococcal conjugate vaccine (MenACWY), and her second dose of both human papillomavirus (9vHPV) and varicella (VAR) vaccines.
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 - c. Record the time in Emma's medical record

d. Check the expiration dates for all of the vaccines

19. Even though this is Emma’s second dose of 9vHPV, you still need to screen her for contraindications and precautions.

True _____ False _____

20. Diluents are interchangeable, as most are only sterile water.

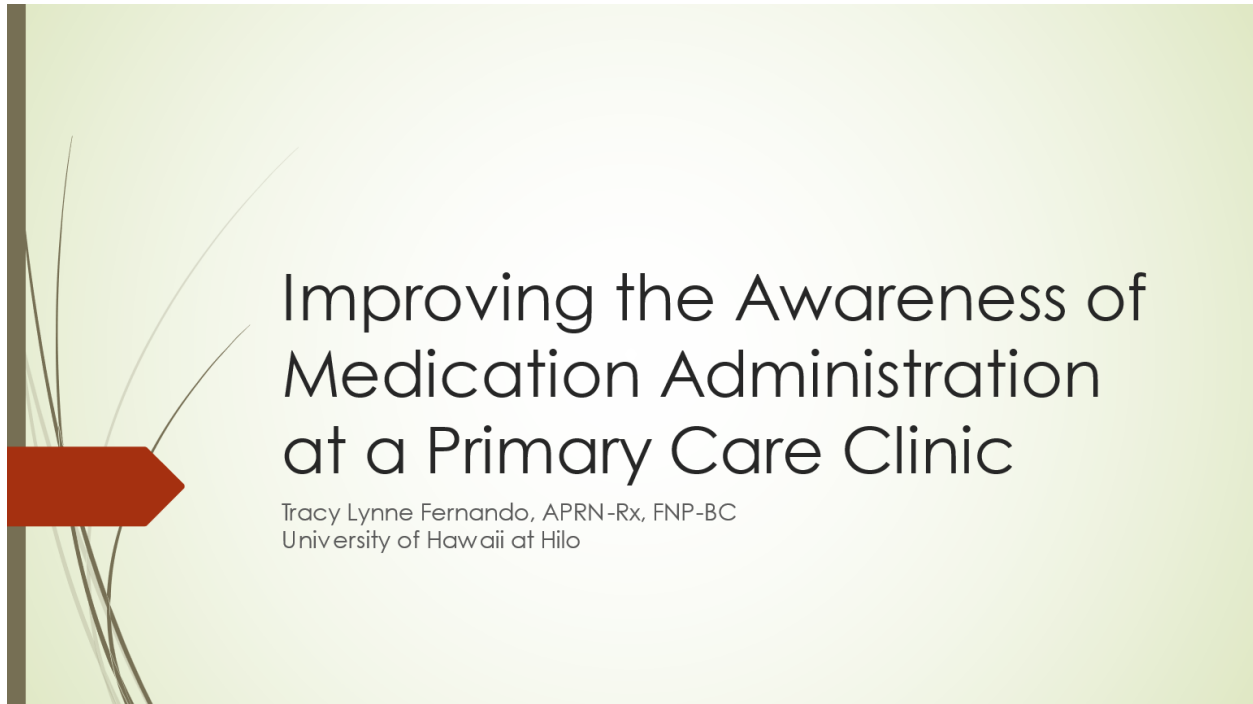
True _____ False _____

Feedback:

1. The educational program increased my awareness of proper medication administration.
Strongly Agree _____ Agree _____ Unsure _____ Disagree _____ Strongly Disagree _____
2. I think this educational program would be useful in future staff training.
Strongly Agree _____ Agree _____ Unsure _____ Disagree _____ Strongly Disagree _____
3. Do you think this educational program has increased your knowledge base? Please explain why or why not.

Appendix E

Educational Program PowerPoint



Appendix F
CE Module 18

The Centers for Disease Control and Prevention (CDC)

certifies that

Tracy Lynne Fernando

has participated in the following educational activity

Immunization: You Call the Shots-Module Eighteen- Vaccine Administration (e-Learn) 2021 (Web Based)

WB4424

and is awarded

1.25 Contact Hour(s)

on 03/01/2023



In support of improving patient care, the Centers for Disease Control and Prevention is jointly accredited by the Accreditation Council for Continuing Medical Education (ACCME), the Accreditation Council for Pharmacy Education (ACPE), and the American Nurses Credentialing Center (ANCC), to provide continuing education for the healthcare team.

The Centers for Disease Control and Prevention designates this activity for **1.25** nursing contact hour(s).

Courtney D. Lee RN, MSN
Team Lead, Accreditation and Compliance Team
Education and Training Services Branch (ETSB)
Centers for Disease Control and Prevention
1600 Clifton Road NE, MS V24-5
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