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# Reducing Medical Assistants Clinical Errors through a Focused Training Program: A Quality Improvement Project

Jackie Thomas

# Reducing Medical Assistants Clinical Errors through a Focused Training Program: A Quality Improvement Project

Jacqueline A. Thomas

Duquesne University

**Abstract**

**Purpose**: To develop and implement an organization-based focused medical assistant (MA) Training Program for all newly hired, previously untrained MAs resulting in zero errors in medication administration, blood pressure (BP) measurements, and pediatric growth chart measurements and documentation.

**Background and Significance**: Ambulatory Care Clinics models are traditionally staffed by MAs who come with a wide range of education or experience leading to an assortment of skills abilities and competencies. To provide safe and effective high-quality patient care it is imperative that MAs are competent in many skills (MAERB, 2015). With no standardized training program and no system in place to perform skills competency checks, the risks of errors due to lack of knowledge and skills incompetence increases (Chapman et al., 2015; Hull et al., 2013).

**Intervention and Implementation Plan:** Based on anecdotal error reporting and the percentage of clinic patients impacted, training and skills competency in medication administration, BP measurement and pediatric growth chart measurements and documentation were the focus of the MA Training Program. Unannounced clinical leadership rounds at 30-45 days post program completion evaluated for ongoing competency.

**Results and Implications:** As a result of the training, MA skills were standardized and a zero error rate in all three skills was achieved. Future recommendations included continuation of the program with the addition of other skills, annual evaluation and training for all clinical staff, and consideration of development of a clinical ladder to support professional growth and promotion.

*Key terms:* medical assistant, training program, skills competencies, medication administration, blood pressure measurements, pediatric growth chart measurements and documentation

**Reducing Medical Assistants Clinical Errors through a Focused Training Program: A Quality Improvement Project**

Since the early ages physicians, nurses, healers, and practitioners have relied on the support of assistants to help them in their role. Historically hospitals, clinics and treatment centers employed and relied upon these 'unlicensed assistive personnel' (UAP) to carry out administrative and clinical functions. The term 'unlicensed assistive personnel' (UAP) refers to those health care workers who are not licensed to perform nursing tasks/skills. It also refers to those health care workers who may be trained and certified but are not licensed, an example of which is the medical assistant (MA). During the 1950's the assistants came together and formed state-based professional societies. As medical assistants (MAs) have assumed both administrative and clinical functions within the clinics, the working relationship between them and nurses has become confusing, muddy, and even hostile as the role delineation lines have blurred (Elder et al., 2014; Quallich, 2005). In 1956 Kansas Medical Assistants Society founded the American Association of Medical Assistants (AAMA). The AAMA developed the educational standards and principles, and ultimately the accreditation standards and certification process that guides the training and role of today's MA. In 2007 the American Nurses Association (ANA), supported and affirmed the use of the UAP in the provision of patient care if tasks/skills were delegated appropriately and directed by a registered nurse (RN) (ANA, 2007). In the wake of the continued nursing shortage and buoyed by the 2007 ANA position statement and the need for cost containment strategies, many healthcare organizations and providers embraced the addition of the UAP. Today many Ambulatory Care Clinics and individual physician's offices are staffed, often exclusively, by UAPs in the form of MAs. As the numbers of nurses decreased many of the tasks and skills previously performed by the nurse, including medication administration, blood pressure (BP) measurements, and pediatric growth chart measurements and documentation, transferred to the MA.

MAs continue to be one of the fasted growing segments within the healthcare occupations, with a 23% projected growth in this workforce demographic in the next 10 years (U.S. Department of Labor, 2018). Medical assisting programs are available online, in vocational schools and through community colleges, and cost between $1,200 – $10,000. Undertaking national certification adds another $125 – $250 to the total cost. Many MAs also enter the workforce without a formal education, and gain 'on-the-job' training. Because of these various options and out of pocket costs, MAs are entering the workforce with a multitude of different education and training backgrounds, experience, and abilities. This projected growth steers the impetus to both strengthen the traditional MA role and to position the MA for transition into more expanded roles in healthcare delivery. In order to recruit and retain this well-trained, sustainable MA workforce, an accredited program (which includes didactic, lab practice and clinical placements) would ideally be available at a local college or technical institute. Accreditation focuses efforts on development of structured education, standardizes and utilizes competency-based assessments and enforces regulatory oversight of both programs and individuals in the medical assisting field. However, this is not always possible.

For example, in Hawai'i (HI) availability and attendance at an accredited program is more challenging. Located in the central Pacific Ocean, the state is made up of separate and distinct islands and is not one large conjoined land mass. Of the four major islands (Oahu, Maui, Kauai, and Hawai'i) there are only two accredited programs one located on Oahu and one on Kauai. The lack of available programs has led to the applicants for MA positions presenting with a wide range of education, experience or background leading to an assortment of skills abilities and competencies. In the absence of attendance at an accredited program it is left to the employer to assure MA training and competence. This clinical training of MAs often occurs on the job by physicians, advanced practice providers (APPs), Registered Nurses (RNs) and Licensed Practical Nurses (LPNs), and as such is relatively unstructured and unsystematic (AAMA, n.d.; Buppert, 2008; Hull et al., 2013).

MAs account for 37.9% of the total clinical workforce of the large multi-specialty Ambulatory Care Clinic in Maui, at the center of this project. Recruitment and retention of a trained workforce of MAs to staff the organization has always been difficult due to the lack of formal MA programs. Additionally, competition between local healthcare providers has triggered MAs to move from job to job leading to recruitment and retention problems. This has led to the clinic hiring untrained MAs, who largely come from retail, hospitality and occasionally the skilled nursing environment.

In HI as in many other states, MAs have no formal scope of practice, and there is nothing in HI law that regulates which tasks may be delegated to MAs. It is ultimately the responsibility of the supervising provider to determine which tasks are delegated, as well as to ensure that the MA is adhering to the standard of care by monitoring his/her performance of the delegated task. At the Ambulatory Care Clinic central to this project, the MAs perform medication administration, BP measurements, and pediatric growth chart measurements and the related documentation under the direction of the clinic provider. The ability to perform these skills effectively impacts a large percentage of the patients seen at the Ambulatory Care Clinic.

Over the last year an increasing incidence of medication errors, inaccurate blood pressure measurements, and incorrect pediatric growth chart measurements and related documentation occurred within the organization. The impact of a medication error, or erroneous BP or pediatric growth chart measurement can include adverse patient outcomes, unplanned hospital visits or admissions, and a resultant increase in the cost of care to both patients and organizations (Hammoudi et al., 2018; Lipman et al., 2000; Myers et al., 2011). Anecdotal and real time reporting of these errors coupled with focused interview data with leadership, physicians, and clinical staff regarding skills competency needs and gaps in training were obtained and reviewed. The results of which form the basis of the initiative: Reducing Medical Assistants Clinical Errors through a Focused Training Program: A Quality Improvement Project.

## Available Knowledge

### Literature Review

Extensive literature searches in the following databases CINAHL, PubMed, OVID and Google Scholar were undertaken. Search terms included: medical assistants, unlicensed assistive personnel (UAP), accredited programs, skills assessment, blood pressure measurement, delegation, competency, medication administration errors, growth charts, and linear growth measurements. Searches were limited to articles from 2000 to 2020. Articles that included the role of the medical assistant, delegation of duties, measurement of BP, medication errors and/or management and growth chart information were included. Additionally, information from national organizations such as the American Association of Medical Assistants (AAMA) and the American Registry of Medical Assistants (ARMA) were reviewed to determine education guidelines and recommendations. Articles that did not include specified areas of study were not included, but if relevant to the topic were reviewed and considered as additional information. All articles selected were further scanned for other relevant references.

A total of twenty-three articles were selected. Using the Johns Hopkins Nursing Evidence-Based Practice - Individual Evidence Summary Tool Appendix G, each article was systematically reviewed (Table 1). The quality and level of evidence was determined, using category level(s) of I, II, III, IV or V, and an overall quality rating of A-High, B-Good or C-Low (Dang & Dearholt, 2012, p. 298).

Major themes emerging from the articles included: (a) the significant diversity of the MA scope and job responsibilities in different practice environments; (b) the requirement for education/training and skills competency checks; (c) the necessity for a nationally set of standards and guidelines. None of the articles were contradictory, or had inconsistencies when compared with each other, all supported the themes and when taken individually made compelling arguments for each area.

### *(a) Diversity of Scope and Job Responsibilities*

Faced by pressure from oversight groups, third party payors and patients to provide safe, efficient, patient-centric, cost-effective care, individual provider clinics and large ambulatory service organizations are challenged to improve workflow processes. Acknowledgment that physicians and APPs spend less time with patients and more time on tasks that could often be performed by other staff members, has led to strategies to reorganize, and expand duties and maximize the workforce. Often in ambulatory care settings it is the MA who takes on these new or expanded duties (Chapman & Blash, 2017; Chapman et al., 2010; Chapman et al., 2015; Taché & Chapman, 2006; Taché & Hill-Sakurai, 2010).

Frequently, the role of the MA is that of a patient escort and overseer of patient flow. The MA escorts the patient to the exam room, undertakes vital signs and required measurements (e.g. height, weight, BMI), notes a chief complaint and reconciles any other pertinent medical information, and then leaves the room, unless needed to assist with a procedure. Further clinical tasks are dependent on the type of clinic in which the MA functions. The same MA, in some instances, also may provide administrative support, work with health insurances, referrals and coding and billing functions. Cross training of MAs to function in multiple roles is not unusual. In some practices the MA role includes phlebotomy, taking basic radiological images, and performing diagnostic tests such as 12-lead EKGs, neurodiagnostic and audiology testing. Other care models have the MAs serving as medical scribes, care coordinators and health coaches, functioning in 'teamlet' dyads first described in 2007 by Bodenheimer & Laing (as cited in Chapman & Blasch, 2017, p. 386).

Allowing the MAs scope of practice to be dictated by the supervising physician's and APPs rather than driven by national guidelines or regulations, opens the door to diversity in roles and responsibilities. Leaning heavily on the MA to undertake the multiple roles results in initial and continued costs for initial cross training and continued competency. The subsequent

expansion in the MAs marketability can also have the consequence of them leaving to pursue employment with competitors offering higher wages.

### *(b) Education and Skills Competency*

To provide safe and effective high-quality patient care it is imperative that MAs are competent in many skills. Delegation of duties including these skills by supervising providers occurs with great frequency and can have positive and/or negative effects on patient outcomes. Following the principles of delegation require that the delegator has a comprehensive understanding of the delegees (the MAs) education and experience. Furthermore, follow up supervisory activities are important in assuring the desired outcome occurs. This is not always possible in the case of larger practices where the provider may work with multiple MAs or a different MAs daily. It is therefore incumbent upon the organization to provide a robust training program that affords the provider significant trust that each MA can undertake those duties delegated to them (Anthony et al., 2000).

When no standardized training program is available and no system is in place to perform skills competency checks, the risks of errors due to lack of knowledge, incorrect techniques, and skills incompetence increases. Skills competency checks play a vital part in assessing and validating that the staff has the skills and abilities to perform their duties by highlighting gaps in performance that can be closed (Chapman et al., 2015; Eden, 2016; Hull et al., 2013; Levine & Johnson, 2014). Undertaking clinical skills has the potential for patient harm. For example, MA performance errors in medication administration, BP measurement and pediatric growth chart measurements and documentation, can have significant impacts on patient safety and outcomes.

**Medication Administration.** A medication error can be described as any preventable event where an inappropriate medication was received by a patient or led to patient harm. Despite significant progress and safety innovations medication administration errors and deviations from safe practice remain the leading causes of adverse patient safety events

(Blignaut et al., 2017; Kim & Bates, 2013). Regardless of the category of the administrator (whether RN, LPN, UAP, MA, etc.), interruptions, increased pressure of time management, multiple medication orders and multiple patients all are noted variables that can increase the incidence of a medication error. MAs are frequently tasked with preparing and administering medications and immunizations, using all routes (except intravenously). As noted in both Table 4 and Appendix A, operationally this skill includes a level of pharmacology knowledge, manual dexterity, dosage calculation and accurate documentation (Blignaut et al., 2017; Härkänen et al., 2015; Young et al., 2008).

**Blood Pressure Measurement.** Obtaining accurate BP measurements are vital. Errors of underestimation in BP measurements can lead to ramifications in the patient's health and quality of life. Overestimation leading to unnecessary treatments and referrals can cost both the patient and the health care system. Studies and articles have repeatedly reported that marked discrepancies in measurement techniques and documentation are made by all levels of clinicians (Armstrong, 2002; Rodrigues et al, 2018; Coogan et al, 2015; Myers et al., 2011; Ogedegbe & Pickering, 2010; Tomlinson, 2010; Vongpatanasin, 2018). In order to close the gap in technique and knowledge standardized methods were developed, from patient positioning, to selection of appropriately sized equipment, through the techniques of inflation and deflation to obtain the most accurate measurement (Williams et al, 2009a, 2009b). The 2017 ACC/AHA Task Force clinical practice guideline focuses on the prevention, detection, evaluation, and management of hypertension in adults. Within its guidelines are the steps for proper BP measurement (Whelton et al., 2018, p. e23).

**Pediatric Growth Chart Measurements and Documentation.** Interpretation and assessment of pediatric growth is well established as an important and sensitive indicator of child health. Erroneous measurements can lead to unwarranted referrals, further unnecessary testing, increased expenses (in and out of pocket), as well as psychological and psychosocial impacts to parents and children following misdiagnosis of abnormalities. Growth measurements

are frequently performed incorrectly. Inaccuracy is often due to faulty equipment, incorrect measurement techniques, incorrect criteria for obtaining linear growth measurements (length versus height), and the movement of the infant/child during the measuring process (CDC, 2013; Foote et al., 2009, 2011; Foote, 2014; Lipman et al., 2000; Lipman et al., 2004). Documented errors occur when measurement units (pounds, kilograms, inches, and centimeters) are interchanged, and/or results are not plotted appropriately and documented accurately on the correct growth chart following CDC and WHO guidelines (CDC, 2013; Grummer-Strawn et al., 2010).

### *(c) Nationally Set Guidelines and Standards*

Nationally set standards and guidelines are needed to ensure programs preparing individuals to enter the MA profession meet minimum standards of education and quality. These minimum standards are used as the basis for accreditation of MA programs and guarantee that the student has a specified body of entry-level knowledge (MAERB, 2015). The current variability in the length and type of MA Training Programs has led to unstructured and inconsistent educational foundations, and an inability to assure professional competence that ensures patient safety. By aligning learning to standards, higher levels of learning and benchmarking can be achieved.

While certification can serve as verification of the necessary expertise and professional competency to perform the functions of an MA, they may only be taken after satisfying specific educational and training pre-requisites. In comparison to the large numbers in the MA workforce only a small number are certified MAs or registered MAs. Of the 686,600 MAs there are 85,000 CMAs and 60,000 RMAs, this accounts for only approximately 20% of the workforce (AAMA, 2019; N. Pudelek, personal communication, April 17, 2020). Based on these figures it is of little surprise that few employers require certification as a prerequisite to employment or pay for achieving it, giving little incentive for the uncredentialled MA do it (Chapman et al., 2015; Taché & Chapman, 2006; U.S. Department of Labor, 2018).

## Rationale/Theoretical Framework

The organization's mission includes:

- Improving the health of our community through a partnership with patients, providers, and employees.
- Offering quality services that set community standards and exceed expectations in a caring, convenient, and accessible manner.

(MMG, personal communication, 2018)

As the MA role is ubiquitous and expanding within the ambulatory services environment, the need for a well-trained and competent work force to support this mission is fundamental. Two significant hurdles occurring on Maui include: (1) the demographic confines of living on an island which results in a significantly smaller pool of qualified applicants to choose from, and (2) the applicants come from a wide range of education and experience backgrounds leading to an assortment of skill abilities and competencies. Faced with these obstacles the organization was challenged to find alternative strategies to both increase and train its MA workforce. This led to the decision to develop and implement an organization-based MA Training Program for newly hired, previously untrained MAs.

The Plan-Do-Study-Act (P-D-S-A) approach was the conceptual framework utilized for this project. Commonly used in the healthcare environment to implement a substantial practice change, P-D-S-A cycles represent small-step tests of change. These include developing the plan to test the change, carrying out the test, observing and learning from the consequences, and determining what (if any) modifications need to be made**.** Mitigation of any unintended consequences that may be uncovered during the change cycles can also be executed (Health Quality Ontario, 2012, p. 9). By focusing on the problem of a lack of foundational knowledge and improving standardization of skills performance, it was hoped that the organization would see enhanced performance and efficiency, and the patients would see benefit from an improvement in safety and quality of care.

The project was initially presented to key stakeholders at the organization's Board Meeting in March 2019. The presentation included information detailing the:

1. Lack of availability of previously trained MA staff
2. Staff turnover due to increased local competition for trained MAs
3. Negative impact of having untrained staff undertaking clinical skills
4. Three reported high problem areas of skills incompetence
5. Specific aims and objectives of the training program
6. Proposed timeline starting in September/October 2019
7. MA Training Program plan (including didactic and classroom-based hours, formal testing, competency skills evaluation, clinic precepted hours)
8. Initial cost analysis (included CBA and NPV)

**Categorizing and Monetization of the Costs and Benefits**

To determine whether a net social benefit existed, the costs and benefits to the organization were analyzed. Table 2 details the costs involved in implementation of the training program. Increased resource utilization following an adverse event in the ambulatory care setting, such as errors in medication administration, BP measurements and pediatric growth chart measurements and documentation, are costly. This increased resource utilization often will include a mix of services including, but not limited to, emergency department visits, hospital admissions, individual physician fees, ambulance rides, diagnostic testing, and medication use. While difficult to calculate a specific amount for the mix of services required per patient for such an event, estimates close to $30,000 are representative of tangible and intangible benefits of program implementation (Table 3). Comparison of the estimated cost of one adverse event for an individual patient (~$30,000) to the total cost of implementation of the training program ($18,985.00), supported the net social benefit. Implementation of an MA training program to improve skills and reduce errors, is one strategy to decrease adverse events.

Mitigating the adverse events by reducing errors will result in decreased financial costs for the patient, the organization, and third-party payors.

With support from the administrative team (including the CEO/President, Medical Director and Administrator), resources for hiring, staff training, staff time, implementation and monitoring costs were approved by the Board. Hiring of staff commenced in March 2019 and was completed in September 2019. Following IRB approval and submission of all documents (including formal written permission from the organization and agreement from the Medical Director to function as the facility preceptor for the project) official permission to start the DNP project was received on October 16th, 2019.

## Specific Aims

By developing and implementing an organization-based focused MA Training Program for all newly hired, previously untrained MAs the goal was to standardize skills, and realize zero errors in medication administration, BP measurements and pediatric growth chart measurements and documentation.

**P**: MAs hired between January 1st, 2019 and September 30th, 2019 practicing in a multi-specialty Ambulatory Services organization in Maui

**I**: Development and implementation of a focused MA Training Program (education, knowledge assessment and competency testing)

**C**: No comparable interventions as there is no current MA Training Program

**O**: Following completion of the focused training there will be zero errors in:

- Medication administration
- Blood pressure (BP) measurements
- Pediatric growth chart measurements and documentation

100% of newly hired previously untrained MAs hired during the identified timeframe completed medication administration, initial blood pressure (BP) skills and pediatric growth chart

measurement and documentation training, competency validation, and remediation, as necessary.

**T**: 8 weeks of training (see below) and outcome data collection at 30-45 days of errors in actual clinical practice

8-week MA Training Program including:

| **Week(s)** | **Instruction** |
|---|---|
| 1-4 | Didactic, classroom-based, and clinic-based training and practice (8 hr. per week) |
| 5 | Successful completion of competency skills checklists and formal written and scenario-based testing |
| 5-8 | Clinic-based preceptor supported hours - minimum of 30 hours total (8 hr. per week) |
| n/a | Unannounced skill compliance and competency 30-45 days **after** successful completion of training program |

**Project Aims/Objectives**

***Aims:***

1. Develop a focused MA Training Program for all MAs hired after January 1st, 2019 who have not had medical assistant training and are working in an organization of multi-specialty Ambulatory Care Clinics.
2. Implement a focused training program to teach clinical skills competency in medication administration, blood pressure (BP) measurements, and pediatric growth chart measurements and documentation to eliminate these errors by newly hired untrained MAs.
3. Achieve zero errors in medication administration, blood pressure (BP) measurements, and pediatric growth chart measurements and documentation as a result of the focused MA Training Program.

***Objectives:***

**Aim #1.** Development of a focused training program including:

- 8 hours per week of didactic and/or clinical training over an 8-week period
- Competency-based skills evaluation documents (checklists) for all three areas: medication administration, blood pressure (BP) measurement and pediatric growth chart measurement and documentation

**Aim #2.** Implementation of a focused training program:

- 100% of all newly hired MAs without previous training will complete medication administration, initial blood pressure (BP) skills and pediatric growth chart measurement and documentation education training modules, clinical practice, and skills competency validation

**Aim #3.** Unannounced clinical rounds at 30-45 days post program completion will evaluate on-going skill compliance and competency of all program attendees in:

- Medication administration
- Blood pressure (BP) measurements
- Pediatric growth chart measurement and documentation

## Methods

### Setting/Participants

The organization is comprised of 33 multi-specialty Ambulatory Care Clinics. The clinic providers (totaling approx. 47 [27 MD and 20 APP]) include a mix of single physician provider clinics and larger physician and APP staffed clinics. The organization has five locations across the island of Maui. Within the clinics staffing is provided to meet a minimum level of 1.5 full time equivalent (FTE) per APP and 2.0 FTE per physician. The staff is a mix of MAs, nurses (RN and LPN), and medical office assistants (MOAs). The role of the medical office assistant (MOA)

is purely administrative in nature. The type of staff member is determined based on provider request. There are some providers who prefer an RN/LPN as a member of the staff, others who prefer MAs and MOAs only. Some providers employ a medical scribe in addition to, or in place of one of the FTE positions.

Workforce breakdown includes:

| Job Title | Number | % of total |
|---|---|---|
| Medical Assistant (MA) | 36 | 37.9 |
| Medical Office Assistant (MOA) | 18 | 19 |
| RN | 7 | 7.4 |
| LPN | 14 | 14.7 |
| Medical Scribe | 8 | 8.4 |
| Assistants (includes: Neurology, Audiology, Ophthalmology, Physical Therapy, Referrals) | 12 | 12.6 |
| TOTAL | 95 | 100% |

Fourteen previously untrained employees were identified to undertake the MA Training Program. Of the 14, four were current employees (in MOA roles), and 10 were hired (between March and September 2019) specifically with the goal of enrollment in the MA Training Program after meeting eligibility criteria*. These 10 were hired and placed in the MOA role until undertaking and completion of the MA Training Program. In the event of the employee not successfully completing the MA Training Program it was agreed that they would retain a MOA position within the organization.

Eligibility criteria* for the MA Training Program included:

No previous MA training

Minimum of six-month** employment at the organization (in role of MOA)

Current unexpired BLS card

Evidence of previous completion of nurse aide (NA) or certified nurse aide (CNA) training

**due to the resignation of the DNP student from the organization, coupled with the potential impact of the COVID-19 pandemic, the decision was made to start Cohort C earlier than

planned. This resulted in three of the staff only having been employed at the organization for 5 months.

**Intervention**

The MA Training Program was split into four distinct elements and required successful completion of each part in order to 'graduate' from the program. The elements included:

1. Didactic and classroom-based training modules - attendance at 8 hours per week over 4 weeks
2. Formal testing (written and scenario-based) - passing score of 60% or greater
3. Completion of skills competency checklists - passing score of 85% or greater
4. Clinic-based preceptor supported hours - logged a *minimum* of 30 hours over 4 weeks

The education plan consisted of weekly classroom-based modules with a total of 8 hours of learning, and were split into two four-hour blocks, with 4 hours of lecture and 4 hours of skills practice (Table 4). Following completion of each weekly module the student was scheduled for 8 hours of observation and precepted practice with a department lead in their own clinic. During this clinic-based session with preceptor the student was able to reinforce all steps of the week's specific skill with real life application.

***Didactic and Classroom-Based Modules***

Concentrating on the three areas identified as the focus for the MA Training Program, medication administration, BP measurements and pediatric growth chart information and documentation, the 4-week education plan was developed. Review of several accredited and unaccredited MA Training Programs, along with the Medical Assisting Education Review Board (MAERB) *Standards and Guidelines for the accreditation of educational programs in medical assisting* provided guidance in the development of the didactic and classroom-based modules.

Education modules were developed during July and August 2019 using clinical textbooks by Patton & Thibodeau, (2016) and Proctor et al., (2017). Audiovisual media of the individual skills were viewed and if applicable were chosen for each area of study. Review of the competed

education modules and chosen videos was performed by the site preceptor in September 2019. Feedback including suggested edits were made and after a final review was conducted by September 3, 2019, the modules were ready to be utilized.

**Medication Administration.** Didactic classroom-based education modules included foundational learnings in pharmacokinetics, medication related terminology and definitions, medication administration practices, and basic medication calculation. Classroom practice included handling, preparing, and administration, and documentation included each category of medication administered (parenteral and non-parenteral). This offered the student the opportunity to prepare, administer and document each type of medication and served to underscore theoretical knowledge.

**BP Measurement.** Didactic education modules included the cardiovascular and respiratory system. Cardiovascular system topics included related anatomy and physiology of the heart, blood flow, coronary circulation and conduction system and blood pressure. Respiratory system topics included parts and functions, common illness and the relationship and influence on the cardiovascular system. Classroom practice included measurement of vital signs. Focus on BP measurement practice aligned the knowledge with, (1) developing a robust knowledge of factors critical in the accurate measurement of BP, and (2) standardization in performance of the skill following American Heart Association (AHA) guidelines.

Note: Although the primary focus did not include obtaining all vital signs the decision to include them in the training program was made to ensure full understanding of the relation between the systems, and for completeness.

**Pediatric Growth Chart Measurements and Documentation.** Classroom-based didactic education modules reviewed normal pediatric growth and developmental, developmental milestones, factors impacting normal growth and development and common disorders caused, and common childhood illnesses and reasons for clinic visits. Classroom education covered practice in undertaking pediatric growth chart measurements and

documentation, and included time spent in the Pediatric Clinic undertaking the skill with real patients alongside one of the Department Leads (a pediatric LPN).

### *Formal Testing*

Formal testing was undertaken using a written test, scenario-based simulations, and skills competency evaluation stations. All participants had to undertake and successfully complete each of the testing requirements

1. A written test consisted of 30 questions (including multiple choice, fill in the blank and true/false) and 5 math-based questions. Students had to score 60% or above to pass the exam.
2. Scenario based simulation of typical clinic patients (one adult and one pediatric focused) were undertaken by each participant. Each scenario included obtaining a chief complaint, history of present illness, full set of vital signs, and included medication administration, and/or procedure. Again, students had to achieve a score of 60% or above.

### *Skills Competency Checklists*

Skills competency evaluation was undertaken by rotation through each of three skills competency stations.

Station 1: Vital Signs and Pediatric Growth Chart measurements and documentation

Station 2: Medication Administration (Parenteral)

Station 3: Math Calculations and Medication Administration (non-parenteral)

Applicable skills competency checklists (Appendix A) were selected directly from Proctor et al., (2017) *Study guide and procedure checklist manual for Kinn's the clinical medical assistant: an applied learning approach (13th ed.)*. Permission to use can be viewed in Appendix B. Skills competency checklists were used as the foundation for the classroom-based hands on learning experience. Following classroom-based practice the participant was scheduled to spend

8 hours the following week with preceptor oversight (provided by the Department Lead) practicing the learned skill. The skills competency checklists were used by the participant and preceptor to ensure accuracy in learning the skill. Skills competency stations were also included as part of the final examination day. Participants had to retake a station if they were unsuccessful, based on the skills competency checklist steps. A score of 85% or above was required to pass.

### *Clinic-Based Preceptor Supported Hours*

Following completion of the training program each participant had to undertake a minimum of 30 precepted hours over a 4-week period. During the precepted hours the department leads functioned as preceptors. Logs detailed the skills undertaken during the precepted hours, and skills competency checklists were used as an ongoing resource to ensure accuracy in skill performance.

### Team Involved

- DNP student - taught all the required education modules, oversaw initial skills training, and undertook and oversaw final skills competency and scenario-based assessments, and unannounced clinical rounds
- Three Department Leads (including two LPNs and a senior Medical Assistant) - assisted with the hands-on teaching of all required skills, undertook skills competency assessments and scenario-based examination of the participants, and functioned as preceptors during the clinic-based hours
- Administrative Assistant to the Director of Nursing - proctored the final written test (which occurred on the same day as the scenario-based simulations)
- Organization Medical Director as the facility preceptor - available for consultation during all phases of the MA Training Program

- Organization Data Analyst - provided all statistical data supporting use and importance of each of the skill focus areas

**Potential Barriers**

It was anticipated that the project would encounter barriers such as:

- Pockets of resistance: Despite realizing there is a need for an appropriately trained workforce some of the current MA staff may not accept this group of 'in-house' trained employees. Having viewed them as 'administrative' coworkers' recognition of the transition to 'clinical' coworkers may be difficult
- Cultural 'norms': with some staff espousing the "we have always done it this way, why do we need to train anyone' mentality, compared to other staff wanting to learn and see changes in processes
- MA experience levels: Following the MA Training Program a variety of experience levels and education backgrounds will remain. With the future implementation of an annual skills assessments there may be a fear of change, and a sense of concern about undertaking such assessments that an identified deficiency in competency may lead to termination
- Project time frame: time needed to undertake the training program and individual assessments may be longer than anticipated
- Fiscal cost: despite organizational support there may be some resistance due to the cost (labor, time, and resources) of having this group of employees undertake this amount of education

Elements that drive the performance of any organization are tasks (or the work of the organization), people, formal organization (structure and systems) and informal organization (which includes "culture"). When they work in unison the system functions efficiently and effectively, when any piece is out of synch the resulting negative impact results in a poor output,

which in this instance is a service provided. The introduction of such a change must be planned for and managed based on the impacts it will have on the organization as a whole or on the area in which the change is occurring. Harnessing the support of informal leaders and early adopters, along with consistent messaging and communication will serve to address these potential barriers.

## Study of the Intervention

The Agency for Healthcare Research and Quality (AHRQ) Knowledge Transfer Framework was chosen as the evidence-based practice model for implementation and dissemination of the project (Figure 1). Developed to disseminate and implement patient safety initiatives this model's concepts were readily applied to this project. Faulty clinical skills and erroneous measurements impact safe and efficient patient care. Adjustment to this in the form of training results in improved skills leading to decreased errors and skills decay (Weaver et al, 2012). Recognition and support from all of the organization's providers that the MAs needed to be educated and complete skills competency according to accepted practice gave further validation and credibility to the project. The framework consists of three major stages: 1. knowledge creation and distillation, 2. diffusion and dissemination, and, 3. adoption, implementation, and institutionalization.

### *Knowledge Creation and Distillation*

Nieva et al., (2005) describe the first stage in the framework as "the creation of new knowledge and the process of sifting through that knowledge to identify actionable products and findings for particular end users." (p. 455). The sifting process is labeled 'knowledge distillation'. New knowledge came in the form of anecdotal reporting of increasing errors in medication administration, BP measurements and pediatric growth chart measurements and documentation. Statistical data validated that large numbers of patients are exposed to these clinical skills during clinic visits. Workforce data in turn validated that MAs are the largest number of the workforce undertaking these skills. Knowledge distillation identified that within

that work group disparities in training and skills competency existed. This important and actionable finding led to the determination that a method of training and validating skills in this work group was required.

### *Diffusion and Dissemination*

The second stage of the framework involves creating partnerships (with key stakeholders), mass diffusion (providing information and raising awareness) and targeted dissemination (persuading and motivating end users) "to disseminate actionable knowledge to potential users." (Nieva et al., 2005, p. 446). Partnerships with key physician champions and administration leaders were developed. Mass diffusion occurred through constant 'messaging' to get the word out about the issue (through department leads, providers, meetings, etc.) raised awareness and gathered more interest and support. Targeted dissemination focused on harnessing the interest and motivation of the early adopters within the clinical work group, in order to gain further support and traction for the training program, and to work on early acceptance of this new model of training for MAs.

### *Adoption, Implementation, and Institutionalization*

The final stage of the framework centers on intervention development, adoption and implementation**,** confirmation, adaption, and institutionalization with a goal of "getting organizations and individuals to adopt and consistently use evidence-based research findings and innovations in everyday practice." (Nieva, 2005, p. 449). Intervention development (in the form of a training program) used evidence-based research and practices, along with current clinical guidelines and standardized skills competency checklists. Adoption and implementation of the program was facilitated by the project change champion and its handful of early adopters. By staying open to this change the clinical staff remained engaged and supportive. Confirmation and support by the key physician and administration stakeholders paved the way for ongoing sustainability and institutionalization of the training program.

### Timeline for Implementation

With the modules competed and the final education plan developed, dates for implementation were scheduled based on securing formal permission to commence the project. Formal permission was obtained from the organization's Administrator and submitted to the University, where upon a waiver was received from the University's Institutional Review Board (IRB). The initial group (10 staff) commenced their training program in October 2019. The decision was made to divide the staff into two cohorts of 5 staff. Assignment to each cohort was based upon the needs of the clinic in which each staff member worked. The staff subsequently were assigned to a class for four hours over 2 days in order to preserve and support staffing in the clinics. Cohort A took the course on Wednesday morning and Thursday morning, and Cohort B on Wednesday afternoon and Thursday afternoon. The second group (4 staff) commenced their training program in February 2020. The class in this instance was presented over a full 8-hour day each week (in this instance Thursday) and staffing in the clinics was not impacted.

## Measures

The goals of this project were that, all newly hired previously untrained MAs undertake a focused MA Training Program, the standardization of clinical skills, and the realization of zero errors in medication administration, BP measurements and pediatric growth chart measurements and documentation. While these errors occurred across all roles those particularly at risk for making mistakes are the group of employees identified as newly hired and previously untrained MAs.

To meet the first goal all previously untrained MAs hired between January 1st, 2019 through September 30th, 2019 were recruited into the MA Training Program. MA programs vary in length and cover many of the skills required to practice in the role. For this project, the MA Training Program focused on three skills identified to impact many patients, and to have been performed incorrectly on many occasions. The MA Training Program incorporated didactic,

classroom and clinic-based precepted hours. The 4-week education plan included 4 hours of lecture and 4 hours of hands on class-based practice per week. (Table 4). Measurement was through formal standardized testing (including a written test and scenario-based testing) taken at the end of the didactic education and determined by a passing score of 60% or greater. Clinic based precepted hours were set at a minimum of 30 hours over 4 weeks and were tracked using time and attendance logs which also detailed any skills undertaken.

The second goal was to standardize clinical skills. To measure clinical skill performance, skills competency lists for medication administration, BP measurement and pediatric growth chart measurement were selected directly from Proctor et al., (2017) *Study guide and procedure checklist manual for Kinn's the clinical medical assistant: an applied learning approach. (13th ed.). (Appendix A).* Permission to use can be viewed in Appendix B. Each individual checklist defined the task to be accomplished, listed equipment and/or supplies needed, and the skill steps to be performed. Failure to perform any of the steps designated critical steps resulted in an overall unsatisfactory score. The checklist provided for 3 attempts. For the purpose of the MA Training Program the first attempt was recorded during initial hands on practice, when the student was learning the skill, and therefore not scored. Candidates were evaluated during the classroom training sessions and again during precepted clinic hours. The second attempt was scored during either preceptor-led clinical time or during classroom-based practice time, and the third attempt was evaluated and scored at the skills competency check day. Successful completion was achieved by a minimum score of 85% at the mandatory skills check day. Although the preceptee undertook several skills during the precepted experience these checks focused on the evaluation of on-going skill compliance and competency of all program attendees specifically in medication administration, BP measurements and pediatric growth chart measurement and documentation

Unannounced clinical rounds by the DNP student and the data collectors occurred at approximately 45 days post completion of the training program. Using the appropriate skills

competency checklist, each student was assessed on each of the three skills, medication administration, BP measurement and pediatric growth cart measurement and documentation. In the case of medication administration, the student was assessed on only one medication administration (either parenteral or non-parenteral) based on the provider's order. Again, competency was achieving a score of 85% or greater on the skills checklist.

The third goal of the project was to have zero errors in medication administration, BP measurements, and pediatric growth chart measurements and documentation. To determine the extent to which this goal was met a two-pronged approach was used. Primarily, zero errors were measured by continuation of the clinical rounds by the data collectors at different times of the day during regular clinic hours. Clinical rounding included observation of skills competency and random chart reviews to measure documentation accuracy. Secondly, by the development and implementation of an organizational occurrence reporting tool (Appendix C) to capture accurate error reporting versus sole reliance on anecdotal accounts, errors were captured. Specific details in the event reporting tool allowed for measuring the numbers and types of errors, thus directing the focus of remediation, further training, and future education.

**Measurement Tool**

Skills competency checklists were chosen as the tool to measure skills competency. Although assessing competency this way provides only a snapshot in time this observational method approach is used in many health and allied health programs as a measurement approach. Applicable skills competency checklists (Appendix A) were selected directly from Proctor et al., (2017) *Study guide and procedure checklist manual for Kinn's the clinical medical assistant: an applied learning approach. (13th ed.).* Permission to use can be viewed in Appendix B. This textbook and its associated checklists have been used by many accredited Medical Assisting (MEDA) programs, making it applicable for this training program.

In order to ensure inter-rater reliability, the DNP student met with the data collectors prior to use of the checklists in the training program. Areas covered involved:

1. Familiarization with the checklists that were used
    a. Review of each step in each list to assure all collectors interpretations were the same.
    b. Review also included the use of the scoring system.
2. Each member of the data collectors performed each of the skills following the competency sheet steps on each other to cement the process
3. Three MAs from the organization (not involved in the training program) volunteered to undertake each of the skills and be evaluated by the data collectors

At the end of these sessions all raters had agreed on the "official" rating of a performance, agreed with each other about the exact ratings to be awarded, and agreed about which performance is better and which is worse.

**Data Collection**

The timeframe for collection of data included 8 weeks of training and competency practice and evaluation, followed by an approximately 30-45 days re-measurement of skills competency and compliance. The data collection was overseen by the DNP student. The DNP student was solely responsible for data collection pertaining to any of the statistics supplied by the organization, written examination/scenario testing scores, and attendance/clinical hours logs. Evaluation and data collection using skills competency checklists were performed by 3 members of the organization, all clinical department leads. These data collectors were present during the education sessions to observe content and areas taught to the students. All documents (including examination results, clinical hours logs, and completed competency checklists) were secured by in one location, maintained by the DNP student. The students were given individual copies of the skills competency checklists to use as a resource. Those used by the DNP student and data collectors to assess and score competency was secured by the DNP student.

## Analysis

Quantitative and qualitative data were collected in the project. Quantitative data collected focused on the total numbers of patients seen, and of those how many patients had medication administration, BP measurements, and/or pediatric growth chart measurement and documentation performed at the visit. Quantitative data also formed the basis of analysis of the MA Training Program testing and skills competency assessment scores. All quantitative data was inputted into an excel spreadsheet by the DNP student. Basic data checks looked for outliers or empty fields and ensured accuracy. Univariate analysis using descriptive statistics focused on percentages of patients impacted by the performance of each individual skill at each clinic visit. Scores of the written and scenario-based tests provided pass/fail data for the students. For the skills competency checks scores were taken during the program, at a required skills competency check day and during unannounced clinical rounds 30-45 days post completion of the program. Scores were analyzed, looking at the pass/fail criteria, and the range of values. Unannounced clinical round competency scores were compared to the skills competency check day scores looking for a regression in number indicating possible skills competency decay.

Qualitative data from the students evaluation the program (including Likert scores and narrative) was also transcribed by the DNP student. Content analysis focused on responses regarding the training program, its elements and perceived level of difficulty. Students were encouraged to add narrative feedback as desired in order for the DNP student to make improvements to the training program based upon their suggestions.

## Ethical Considerations

The project was formally submitted to the University's IRB on 8/3/2019 for review. The protocol was verified as a quality improvement project, and as it did not meet the definition of research was deemed exempt from IRB review (Appendix D.). The organization did not require any additional review and accepted the decision of the University's IRB. All students were members of the organization and were fully supported by it to undertake the MA Training

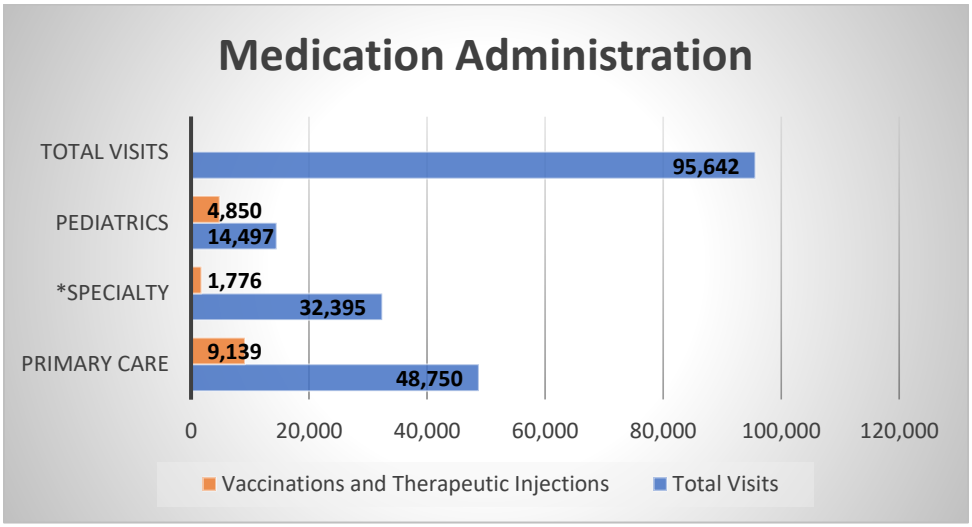
Program. No conflicts of interest were identified, all related work was undertaken outside of the DNP student's working hours.

## Results

### Data Supporting the Training Program Initiative

Initial baseline data came directly from the organization and included the total patients seen between December 1, 2018 and November 30, 2019. During the time period the organization saw a total of 95,642 patients. For the purpose of the project inclusion criteria consisted of all patients who had one (or more) of the following, medication administration, BP measurement, and pediatric growth chart measurement and documentation performed during a clinic visit. Data was split into three distinct areas, Primary Care Clinics, Pediatric Clinics, and Specialty Clinics. Primary Care Clinics included both Family Practice and Internal Medicine Clinics. Specialty Clinics undertaking these specific skills included Women's Health, Surgery, Neurology, Ear/Nose & Throat (ENT), Dermatology and Orthopedics. Data was not included from Audiology, Ophthalmology or Behavioral Health as these clinics do not perform any of the three clinical skills being evaluated.

#### *Medication Administration (parenteral only)*



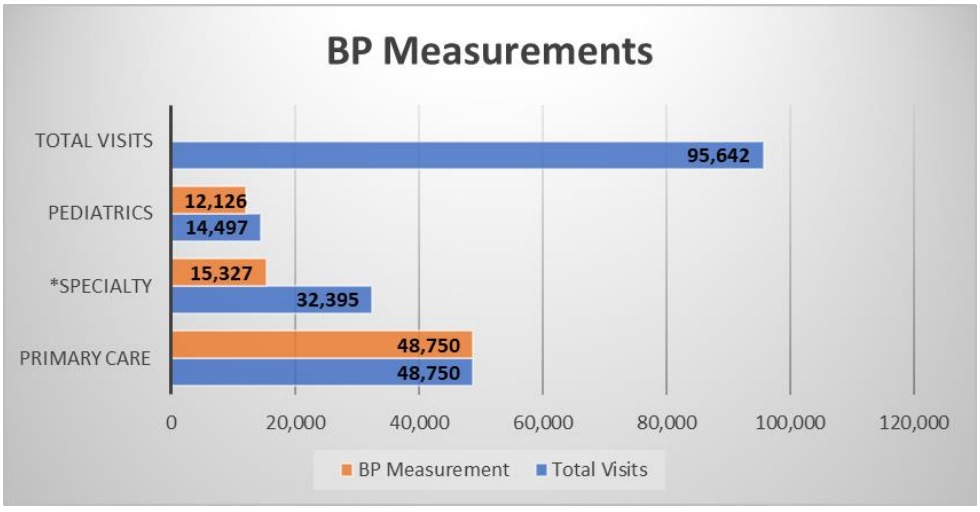

Medication administration data collection focused on parenteral (intramuscular, subcutaneous, and intradermal) medication only. During the time period considered parenteral

medication administration occurred in 33% of Pediatric Clinic patients, in 5.5% of Specialty Clinic patients and in 19% of Primary Care Clinic patients.

While other medications (non-parenteral) are certainly administered parenteral medications, in the form of vaccinations and therapeutic injections, are undertaken frequently. These numbers reflect the large numbers of patients that receive vaccinations or therapeutic injections as part of a clinic visit. This skill is one of the more high-risk skills performed by the MA and requires careful teaching and monitoring.

***BP Measurement***

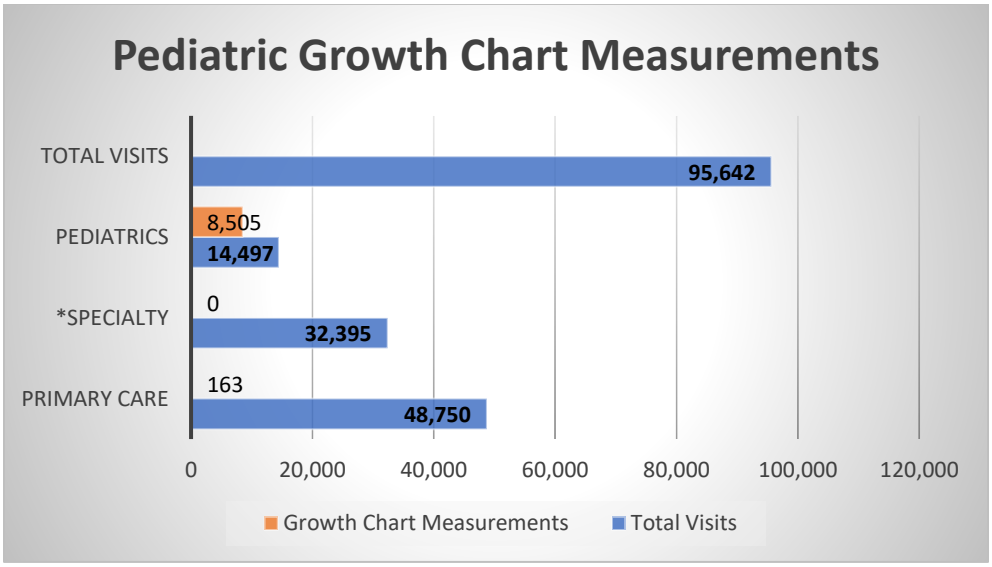
84% of Pediatric Clinic patients had BP measurements taken, this included those presenting for any physical examination (PE) appointment or as a 'sick visit' (if older than 3 years of age). 47% of patients presenting to a Specialty clinic had BP measurements taken. Specialty Clinics that do not include BP measurement as part of vital signs include: ENT, Dermatology, and Orthopedics. 100% of all Primary Care Clinic patients had BP measurements taken at every clinic visit.




The high percentages clearly indicate that BP measurement is a regularly performed skill, and as such has a high chance of negative impact if not performed correctly.

### *Pediatric Growth Chart Measurement and Documentation*

Pediatric growth chart measurements and documentation are undertaken predominantly in the Pediatric Clinics. However, there are instances when pediatric patients are seen by Primary Care providers at the Urgent Care (After Hours and Weekend Clinics) and the staff are required to measure and document growth chart measurements. 59% of patients presenting to the Pediatric Clinic underwent pediatric growth chart measurement and documentation. Of the pediatric patients that presented through Urgent Care (After Hours Clinic), 163 had measurements taken, accounting for a small percentage, 0.33%, seen by a Primary Care provider rather that a pediatrician.




Based on the results of the initial baseline data for the three chosen clinical skills it was clear that a significant number of clinic patients were routinely impacted by staff undertaking each of them. This coupled with the physical, psychological, and financial implications if the skill being was performed incorrectly supported the need for this initiative.

### MA Training Program

The first goal of the project was to develop and implement an organization-based focused MA Training Program. The MA Training Program followed a structured approach that consisted of didactic learning, hands on classroom-based skills learning and clinic-based

preceptor-led application of the learned skill. At the end of each weekly module the student was scheduled to spend time in the clinic practicing the newly taught skill. As each subsequent module was learned that skill was added to those the student was expected to undertake in the clinic environment. At the end of the 4-week training program all three skills, medication administration, BP measurement, and pediatric growth chart measurement and documentation, had been taught and were being practiced (under the guidance of a preceptor) in the clinic. Following successful completion of the didactic and classroom-based modules the students had to undertake testing and a further precepted clinical experience (meeting a minimum of 30 hours) in order to successfully graduate from the MA Training Program.

Of the 14 students enrolled four were unable to advance through the program due to the COVID-19 pandemic and its implications. These students were able to complete all didactic learning modules, hands on classroom-based skills learning and initial clinic-based preceptor-led time. They were not able to undertake examination or skills competency testing, the 30 hours of precepted clinical experience or subsequent unannounced skills competency checks. These students are currently working at the organization in MOA roles and will be able to resume the MA Training Program once they return from furlough and the organization resumes normal business operations. The team leads have committed to following the MA Training Program in order to ensure structure and standards are met.

Of the 10 remaining students, Student ID No 10 resigned her position part way through the program. The nine remaining students all successfully passed the scenario-based testing with scores ranging from 60-100% in the adult scenarios and ranging from 60-90% in the pediatric scenarios (Figure 2). Student ID No 9 and student No 4 both failed the final written examination, scoring less than the required 60% (Figure 2). Both were offered the opportunity to study and to retake the written examination. It was offered 3 weeks later, to give ample time to study. Student ID No 4 re-took and successfully passed the examination, with a score of 70%. Student ID No 9 did not show up to re-take the examination, and during a follow up meeting

expressed that she no longer wanted to undergo MA training (despite her successes), preferring to remain in her MOA position. The 8 remaining students all successfully completed all parts of the MA Training Program.

Qualitative data was collected through anonymous evaluations collected after the completion of the MA Training Program. A Likert scale was used to rate the questions asked. Questions related to presenter knowledge and if the classes were informative all rated at '5 – strongly agree.' The question related to the challenge of learning to perform each of the skills used the following scale.

| | | | | |
|---|---|---|---|---|
| 1<br>Very Challenging | 2 | 3<br>Somewhat Challenging | 4 | 5<br>Not Challenging |

All results indicated a score of between 3-Somewhat Challenging and 5-Not Challenging. The mean score for medication administration was 4, the mean score for BP measurement was 4 and the mean score for pediatric growth chart measurement and documentation was 3.75, indicating the students found working with the pediatric population to be the most challenging skill.

Scores related to confidence level in undertaking each of the skills were measured using the scale:

| | | | | |
|---|---|---|---|---|
| 1<br>Not Confident at all | 2 | 3<br>Somewhat Confident | 4 | 5<br>Very Confident |

Responses indicated a high level of confidence rated between 4 and 5. Individual skills mean scores were as follows: medication administration = 4.25, BP measurement = 4.75, and pediatric growth chart measurement and documentation = 4.5, indicating that the students felt most confident undertaking the skill of BP measurement, and least confident in medication administration. This was also borne out in the narrative comments which included, "more hands on med admin training", "I would love to have more training in medication administration" and, "more medication administration". Comments regarding the training program were positive and included, "loved the class and working as an MA", I want to thank all of you who helped in

putting this class (training) together", "I enjoyed learning in both the lecture and clinicals" and, "The program really does properly prepare a person to work as an MA".

## Standardizing Clinical Skills

The second goal of the project was to standardize skills performance. Each clinical skill (medication administration, BP measurement, and pediatric growth chart measurement and documentation) was assessed using applicable skills competency checklists. Each of the skills had different numbers of applicable skills checklists. The skills were scored a total of 3 times. Initially after skill training and practice prior to the mandatory skills check day, secondly at the mandatory skills competency check day, and finally on an unannounced clinical rounding 30-45 days post program completion. To successfully meet the standard the student was required to achieve a minimum score of 85%. Several steps were considered critical steps, which if missed or were performed poorly resulted in an overall poor score. Figures 3 – 10 show the performance of each individual student on each skills competency checklist. Scores reflect that each student successfully passed each skill and continued to practice above the expected standard at the time of the unannounced checks.

### *Medication Administration*

Medication administration included medication math skills checklists, as well as separate skills checklists for the administration of both non-parenteral and parenteral medication.. Medication math consisted of learning the basic formula, pediatric weight-based dosing, and substitution of different units within a formula. All students struggled with medication math, achieving initial scores ranging from 19% – 84% across all three areas. Additional class-based learning and practice was introduced and performance at the skills competency check day showed an improvement with overall scores increasing to 82% – 100%. One student, ID No 1 required remediation and re-testing at the skills competency check day in order to successfully pass the competency. Math problems were also part of the final written examination. Total available points for the five questions was 10. Scores achieved ranged from 0

– 10 points, with a median of 8 points, a mode of 10 points and a mean of 7 points. The student who scored 0 points Student ID No 9 failed the written examination. Student ID No 4 scored only 4 points and failed the written examination, however, did score a total of 10 points on retaking the examination.

Non parenteral medication administration (including instilling eye drops, ear drops, giving oral medication and giving a nebulizer treatment) consistently yielded higher scores for the students, at both the initial and skills competency check day. For this group of medications initial scores ranged from 33% - 100%, with a median of 85%, a mode of 85% and a mean of 83.61%. Skills competency check day scores ranged from 94% - 100%, with a median score of 100%, a mode of 100% and a mean of 99.33%.

Based on this the decision was made to focus unannounced clinical competency checks on parenteral administration routes only. The organization's team leads will continue to monitor the non-parenteral skills moving forward.

Parenteral medication administration in the form of therapeutic injections (antibiotics, allergy shots, PPD placement, etc.) and vaccinations occur with regularity in the clinics. Based on this and the increased risk for error, this area was the focus of the unannounced checks 6-weeks post completion of the training program. During the classroom and clinic-based practice the students learned how to withdraw medication from an ampule, a vial, and how to reconstitute powdered medication and prepare it for administration. Medication administration routes undertaken by the MA include intramuscular (IM), subcutaneous (SQ) and intradermal (ID), therefore all routes were taught and practiced. The initial scores for IM administration ranged from 74% - 95%, with a median of 92%, a bimodal score of 94% & 95%, and a mean of 89.22%. Skills competency check day scores ranged from 96% - 100%, with a median score of 100%, a mode of 100%, and a mean of 99.44%. Unannounced rechecks of this specific route of administration occurred with 5 of the students. The scores ranged from 98%-100%, with a median of 98%, a mode of 98%, and a mean of 98.8%. These recheck scores were only slightly

lower than those attained during skills competency day and showed that the students were still performing this skill at a high standard, notably higher than the 85% passing standard.

The SQ administration route initial scores ranged from 81% - 98%, with a median of 90%, no mode, and a mean of 90.44%. Skills competency check day scores ranged from 97% - 100%, with a median of 99%, a bimodal score of 97% & 100%, and a mean of 98.55%. Unannounced recheck scores of this specific route occurred with 2 of the students who scored 95% and 97% respectively. While lower than their skills competency check day these scores continue to exceed the standard and are significantly higher than the 85% passing score.

The ID administration route initial scores ranged from 87% - 97%, with a median of 93%, a bimodal score of 90% & 96%, and a mean of 92.44%. Skills competency check day scores ranged from 98% - 100%, with a median of 100%, a mode of 100%, and a mean of 99.66%. The individual student who undertook this route as her unannounced check scored 100%. All students were concerned that his would be the most difficult skill to learn and stated they had practiced it the most.

Overall analysis of the skills checklists revealed that the most commonly omitted steps included the verification of date of birth (DOB) when giving the patient the medication, and the expiration date on medications when preparing it for administration. Improvement was eventually noted in the checking of expiration dates on medications, as this was added to the documentation requirements for all medications, not only vaccinations. Regarding the verification of DOB, this had not been standard practice in the clinic, and became a recommendation for future practice.

### *BP Measurement*

This skill is by far the most frequently undertaken in the clinic. The BP measurement skills checklist followed the steps developed in the clinical practice guideline by the 2017 ACC/AHA Task Force, improving standardization and decreasing errors due to incorrect technique (Whelton et al., 2018, p. e23). Initial scores ranged from 79% - 89%, with a median of

87%, a bimodal score of 87% & 89% and a mean of 85.22%. Skills competency check day scores ranged from 95% – 100%, with a median of 100%, a mode of 100% and a mean of 99.11%. Unannounced recheck scores ranged from 85% – 99%, with a median of 92%, a bimodal score of 92% & 95% and a mean of 92.25%. The initial scores reflected the different levels of experience the group had in taking BP measurements from their previous roles as nurse aides. Following continued practice, improvement resulted in a successful competency evaluation at the skills competency check day with scores ranging from 95%-100%. While scores did fall slightly at the 6-week unannounced check (ranging from 85%-99%) none of the students scored below the required 85% passing score.

### *Pediatric Growth Chart Measurement and Documentation*

Pediatric growth chart measurement and documentation included two skills checklists; these followed the standards set by the Centers for Disease Control (CDC) and World Health Organization (WHO) guidelines (CDC, 2013; Grummer-Strawn et al., 2010). Of the two areas, head circumference and weight and length/height, the students' scores reflected more of a challenge with undertaking head circumference measurements. Initial scores for head circumference measurements ranged from 76% - 94%, with a median of 79%, a bimodal score of 78% & 82%, and a mean of 82%. Skills competency day checks showed a range between 96% - 100%, a median of 100%, a mode of 100%, and a mean of 99.55%. Unannounced checks dropped only slightly, with a range of 90% - 100%, a median of 95%, a mode of 98%, and a mean of 95.12%. For the weight and length/height skills the initial scores ranged between 80% - 92%, with a median of 87%, a mode of 81%, and a mean of 85.88%. Skills competency day checks scores resulted in every student scoring 100%. Unannounced checks scores ranged from 94% - 100%, with a median of 97.5%, a bimodal score of 95% & 98%, and a mean of 97%. Initial scores indicated that the staff were challenged by this skill, and this was borne out in feedback received about the program.

It was noted that the students scored the highest at the required skills competency check day. Undertaking a measure of competence or level of competency over a continuum of time, integrating the known level of experience of the student, and performing the checks over time in the real clinical environment may prevent a snapshot in time result. The snapshot in time type of competency validation may result in the student performing for the sake of making the grade, then not practicing to the same standard at the bedside (Franklin & Melville, 2013). Unannounced clinical rounds scores showed all the students has experienced some skills decay, but not to the point where they failed ongoing competency check. Continuation of these unannounced rounds may help to prevent absolute skills decay.

**Zero Errors**

The final goal was to have zero errors in medication administration, BP measurement and pediatric growth chart measurement and documentation. Skills decay or skills degradation can be caused by several factors. These factors include information retention ability, the ability to retrieve the information, individual factors (such as fatigue, baseline skills ability, etc.), and things that impact the ability to undertake the task or skill. Once trained, the students have to apply the new knowledge to clinical practice. Without consistent use, following the same practice or regular learning refreshers, skills will deteriorate (Weaver et al., 2012). Zero errors in the three skills were measured by continuation of the clinical rounds by the data collectors at different times of the day during regular clinic hours. Clinical rounding included observation of skills competency and random chart reviews to measure documentation accuracy. Just in time education, constructive feedback, and demonstration of role modelling by the data collectors (team leads of the organization) facilitated learning and conceptualization of the newly learned skills. The development and implementation of an organizational occurrence reporting tool (Appendix C), formed the second part of the strategy to capture and respond to data regarding errors in a real time, structured manner. Integrating this tool into the organization's process supported improvement of patient care and safety and worked towards management of the

everchanging landscape of quality and risk. There has been no reported use of the new tool at the writing of this manuscript.

## Discussion

### Summary

The ambiguity surrounding the definition of clinical or skills competence, coupled with no evidence supporting one best method of assessing or validating it has led to many different methods being followed. For most organizations skills or procedural competency is usually validated upon initial employee hire, in the event of a new policy, protocol or skill being introduced, and annually thereafter. For the organization in question there had been no process in place to undertake any level of competency assessment or validation at any stage of employment. Undertaking skills competency validation is one of the cornerstones of education and training. According to Levine & Johnson (2014) competency is usually evaluated:

> To ensure staff has the skills and abilities they need to perform to the expectations of their job description and organizational policies and procedures.
> To determine gaps in employee performance that need to be closed to ensure safe and competent care.
> To evaluate job performance.
> To provide aggregate data on competency patterns and trends as a basis for staff education and practice changes.
> To use competency data in organizational quality improvement efforts.
> (pg. 59).

While not the only measure considered it is a method of promoting the performance of safe, competent patient care and decreasing the risk and impact of adverse patient outcomes. Miller's Pyramid of Competence distinguishes between knowledge at the lower levels and action at the higher levels. The framework has commonly been used to illustrate the process through which competency is acquired and measured. As applied to this project levels included, (1) what each individual 'knows' (measured by knowledge) assessed by a written examination, (2) that each individual 'knows how' (measured by competence) assessed by skills competency checklist, (3) that each individual 'shows how' (measured by performance) assessed by scenario-based testing, and, (4) what each individual 'does' (measured by action) assessed by unannounced clinical

rounding to check skills competency and compliance at 4-6 weeks post completion of the MA Training Program (Miller, 1990, Levine & Johnson, 2012, Sullivan et al, 2019).

**Interpretation**

In their article, *Implementation of a training and structured skills assessment program for medical assistants in a primary care setting,* Hull et al (2013) described a clinical skills assessment program undertaken at orientation that focused on all MAs employed by the organization. All MAs attended, and all MAs were candidates for, or had passed national certification. The skills chosen in the article included BP measurement, intradermal (ID) injections and induration measurement, and syringe competency (correctly drawing up specified volumes in the correct size syringe). In the article post instruction pass rates for the same skills assessed by the DNP project resulted in similar scores, with BP measurements achieving a 90%-94% pass rate and ID injection pass rate scores of 84%-94%.

While the MA Training Program certainly cost the organization financially (Table 2), the benefits including, but not limited to, improved patient care, increased savings and reimbursement, and potential employee recruitment, far outweighed the potential costs (Table 3). Information regarding the availability of the MA Training Program already found its way into the community, resulting in several potential applicants calling for information adding further value to its continuity.

**Limitations**

The MA Training Program was designed based on the needs within the organization practice and may not translate to other settings. Many clinic settings use newer technologies, for example, digital BP measuring devices, and unit dose medications, which improve quality issues. However, knowledge and skills are still required to mitigate user error in these instances. The project focused only on newly hired, previously untrained MA staff which led to a small group of participants. This group were also presumed to have the same deficiencies as none of them had previous training or experience in an MA role.

## Conclusions

All aims and objectives of the project were met. The MA Training Program was developed and implemented and all newly hired (from January 1st, 2019 through September 30th, 2019), previously untrained, MA staff were enrolled. For the three areas identified as problematic, medication administration, BP measurements and pediatric growth chart measurements and documentation, all skills were standardized through training and competency evaluation. As a result of the training, MA skills were standardized and a zero error rate in all three skills was achieved. Following implementation of the organization-based training program deficiencies in the three basic skills for newly hired previously untrained MA staff no longer represent an acute concern. Skills competencies are now assessed during the onboarding process for all newly hired MAs (whether previously trained or not), and further training or remediation with a preceptor occurs if gaps are identified. In the event of unsuccessful training or remediation within the 90-day evaluation period, employment is terminated.

The value of a focused MA Training Program including skills competency assessment for MA staff was demonstrated and the organization stakeholders acknowledged the value not only on immediate patient care, but also on quality measures and reimbursement for participation in third party payor Payment Transformation programs. The success of the program resulted in the addition of 8 newly trained MAs to the workforce. Future recommendations included continuation of the MA Training Program, as well as broadening the subjects taught, and supplementing other skills into it in addition to medication administration, BP measurements and pediatric growth chart measurements and documentation. Annual evaluation and training for all clinical staff (including MA, RN and LPN staff) to further ensure standardization across the organization was also recommended, as well as considering developing an MA Career Ladder to support professional growth and promotion.

While implementation of an organization-based MA Training Program is valuable, the need for a college-based accredited MA program has been recognized. The DNP student and the organization joined forces with the local university and championed for the introduction of an accredited MA program on the island, which resulted in the piloting of a small cohort of MA students being trained in a hybrid synchronous/asynchronous program alongside students from one of the outer islands. As the numbers of MAs in healthcare continue to increase, and newly expanded roles are being considered there are still areas for further study, including the need for a standardized, legal scope of practice, the cost-effectiveness of MA use in the clinic environment, and, their impact in terms of patient safety and patient outcomes.

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**Table 1**
*Synthesis of the Literature*

| Article | Author & Date | Evidence Type | Findings That Help Answer the EBP Question | Evidence Level, Quality |
|---|---|---|---|---|
| 1 | Anthony, October 2000 | Mixed Methods, Exploratory Cross sectional survey | -An MA is a UAP, and as such has no 'official' scope of practice.<br>-Based on staff member education, experience, appropriate delegation of tasks is important as they can have positive and/or negative effects on patient outcomes. It is important to follow the five principles of delegation to assure appropriateness of the delegation…these include right task, right circumstance, right person, right direction,<br>and right supervision.<br>-Delegation of 'tasks' to a UAP is part of the scope of practice of the licensed staff member (RN/LPN) and is used in part to limit the UAP (MA) to function within scope. | Level III, B (Good Quality) |
| 2 | Armstrong, 2002 | Qualitative, Survey method | -Findings indicated that inaccuracies in blood pressure measurements occur in all groups of healthcare providers.<br>-Education and ongoing competency validation would encourage the systematic following of the correct steps to measure a blood pressure. | Level III, A/B (High/Good Quality) |
| 3 | Blignaut, 2017 | Quantitative, nonexperimental, Cross sectional, observational study | -The study demonstrated that medication error types (in order of most frequent) occurred as follows: wrong-time (42%), omission of dose (41%), wrong-dose (12%), wrong-route (2%), wrong-medication (2%), and, wrong-patient (1%).<br>-Variables including interruptions, rank of administrator (RN, LPN, student nurse), administration route (enteral versus parenteral), patient acuity and type (level) of facility<br>-The increased pressure of time management, multiple medications, multiple patients and multiple medications impacted the staff in the article.<br>-This is a similar theme in the errors made by MAs in busy clinics<br>-Deviations from safe practice were noted to be particularly high in the following areas: patient identification, hand washing prior to and post medication | Level III, A/B (High/Good Quality) |

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| | | | administration, and documentation of administration<br>-Calculation competence was checked and found to be lacking<br>-Recommendations included: improved training/education in medication dosage calculation, increased student oversight, improved compliance with existing policies regarding safe medication administration and hand washing, and patient identification. | |
| 4 | Centers for Disease Control and Prevention (CDC), 2013 | Clinical Practice Guideline | -Instructs the health care provider how to use and interpret the WHO and CDC growth charts to assess growth in children.<br>-Provides further links to procedure for obtaining accurate measurements | Level IV, A (High Quality) |
| 5 | Chapman, February 2010 | Qualitative, Focus groups | Findings include:<br>-little regulation of scope of practice<br>-little standardization of education<br>-little regulation of certification (not a requirement to practice)<br>-MAs are underprepared for their roles, are positioned for high turnover rates, leading to large numbers of inexperienced MAs who in turn are more likely to make errors. | Level III, A/B (High/Good Quality) |
| 6 | Chapman, October 2015 | Expert Opinion | -Conclusions included: the need for a standardized training program (including length of program, curricula and accreditation), scope of practice regulation (including national standardization), licensure and certification (to standardize and validate competencies) to strengthen the traditional MA role, but also to position the MA for transition into more expanded roles in healthcare delivery. | Level V, A (High Quality) |
| 7 | Chapman, 2017 | Qualitative, individual, and small group interviews | -The study focused on the roles and responsibilities of the MA, and how expansion could meet increased demand for services within clinics and organizations<br>-New role categories included:<br>1. Relational roles – health coach, patient navigator, community health worker, dual role interpreter.<br>2. Health Information Technology/Documentation roles – medical scribe, panel | Level III, A/B (High/Good Quality) |

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| | | | manager, quality improvement assistant, EHR superuser<br>3. Cross-trained rotation roles – referral coordinator, radiology tech (limited), phlebotomy, phones, coder, biller<br>4. Leadership roles – lead MA, preceptor, trainer, floor coordinator<br>-Limitations – the study did not include small or single provider practices where MAs are expected to multitask. The study only included sites who had successfully implemented new MA roles. Limited outcome data was available usually comprising individual improvements (Areas included: patient satisfaction, staff/provider satisfaction, quality of care, efficiency/operations, and costs/productivity/utilization).<br>Recommendations included extensive additional training and education, along with increased compensation. | |
| 8 | Coogan, 2015 | Organizational Experience-Quality Improvement | -An evidence-based practice QI project undertaken following identification of faulty BP measurement techniques in an ambulatory surgical unit.<br>-AHA guidelines were used to collect pre and post intervention data<br>-Education – included several 1 hour in person didactic lectures, one-on-one (staff) education, flyers, wall and tabletop posters and pocket guides.<br>Recommendations: (a) re-education and ongoing training on the proper BP measurement techniques every 6 months to hard-wire best practice, (b) user-friendly educational tools for staff, (c) readily available tools and resources (different sized cuffs, etc.), (d) add to initial new hire orientation program, and, (e) continued staff awareness through peer and leader support and influence | Level V, A (High Quality) |
| 9 | Eden, 2016 | Clinician Experience | -Developing a broad scope of practice that is organized and standardized<br>-Engaging in comprehensive, ongoing education of the MA | Level V, B (Good Quality) |
| 10 | Foote, 2011 | Clinical Practice Guidelines | -The clinical practice guideline (CPG) focuses solely on the linear growth (recumbent length and stature) measurements of infants, children and adolescents and does not include head circumference, weight, use of growth charts or interpretation of growth patterns.<br>https://www.unitypoint.org/blankchildrens/filesimages/Education%20Center/Posters/Clinical%20Practice%20Guideline%20on%20Linear%20Growth%20Measurement.pdf | Level IV, A (High Quality) |

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| | | | Guideline includes:<br>-Posters and regular education sessions in correct measurement techniques<br>-Annual education and competency sessions<br>-The use of calibrated, standardized equipment in all areas that undertake linear growth measurements | |
| 11 | Foote, 2014 | Expert Opinion | -Presents strategies for increased awareness of importance of accuracy in linear growth measurement and the guideline.<br>Recommendations include: the need for standardized growth measurement techniques, the importance of standardized instruments, undertaking staff training and competency, and the need for standardized documentation. | Level V, A (High Quality) |
| 12 | Grummer-Strawn, 2010 | Clinical Practice Guideline/ Position Statement | -CDC and WHO participants focused on factors to be used to select which chart to use, and the implications in clinical practice. The goal was to select a standard for the measurement of children in the United States.<br>-Recommendation: use WHO growth charts for children aged <24 months, transition to and use of CDC growth charts for children ages 24-59 months.<br>-Education and training on accurate measurement techniques | Level IV, A (High Quality) |
| 13 | Härkänen, 2015 | Quantitative, nonexperimental, Cross sectional, observational study | -The study demonstrated that of medications given 1 in 4 resulted in a medication error.<br>-The most common error (in order of most frequent) occurred as follows:<br>1. Administration errors (specifically incorrect medication administration technique and omission of administration)<br>2. Documentation errors (specifically related to defunct drugs)<br>-Deviations from safe practice included giving pt. medication without oversight of taking it, and, leaving the medication on pt. tables though pt. was not in room<br>-Distractions and interruptions were constant during the medication administration process<br>-Decreased medication errors occurred when double checking occurred, and with medications given orally<br>-Recommendations for error prevention: more attention to medication administration techniques, administration instructions and attitudes towards medication safety. | Level III, B (Good Quality) |

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| 14 | Hull, July/August 2013 | Quantitative – Quasi-experimental | -Baseline skills assessment and instruction are essential to validate clinical skills<br>-Competency driven clinical ladders drives staff growth and development<br>-Prior to testing instruction and demonstration of each skill being assessed improves successful outcomes<br>-Annual competency validation prevents skills decay, and results in remediation as needed<br>-Improved skills pass rates have been realized since the implementation of the skills assessments and clinical ladder<br>-Manipulation of the variable (BP and syringe skills) to reflect current practice resulted in improved skills, and improved skills = decreased errors | Level II, B (Good Quality) |
| 15 | Lipman, 2000 | Qualitative, Telephone Survey method | -Inaccurate measurements are taken due to incorrect application of policies pertaining to measurements lying down (length) versus standing (height)<br>-Inaccurate documentation occurred, e.g. height plotted on length charts, leading to referrals to specialists for 'decelerated growth',<br>-Faulty equipment was used resulting in inaccurate measurements<br>-Lack of staff education, foundational knowledge leads to inaccuracies | Level III, A/B (High/Good Quality) |
| 16 | Lipman, 2004 | Quantitative Randomized controlled multicenter study | Accuracy of linear growth measurements are impacted due to faulty equipment, incorrect measurement technique, incorrect criteria for obtaining length versus height, and movement of the child during measurement.<br>-In order to ensure accuracy of linear growth measurements it is imperative to educate health care providers that:<br>1. correct measurement technique is essential<br>-technique and skills ability in taking linear measurement is important and readings are influenced<br>-three consecutive measurements are recommended, the average of the three is closer to the true height<br>2. use of accurate/calibrated equipment is required<br>-measuring instruments must be accurate and installed correctly<br>-the most used method (marking of exam table paper) is extremely inaccurate | Level I, A (High Quality) |
| 17 | Medical Assisting Education | Clinical Practice Guidelines | -MA program clinical content outline – description and verification of skills | Level IV, B (Good |

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|---|---|---|---|---|
| | Review Board (MAERB), 2015 | | required by MA, including medication administration, blood pressure measurement, measurement and recording of pediatric height/weight (growth chart) (Appendix B pp 11-13) | Quality) |
| 18 | Myers, 2011 | Quantitative Multi-site cluster randomized controlled trials | -In order to decrease 'white coat' hypertension BP measurements need to be undertaken in a systematic manner, the patient needs to be alone and not distracted by conversation or other interventions (e.g. vital sign measurement)<br>-automated BP readings taken in this manner closely correlate with BP readings taken over a 24-hour period<br>-Technique and skills ability in taking BP measurement is important and readings are influenced<br>-Digit preference (rounding up/down to zero) occurs with manual BP measurement and would impact treatment.<br>-If manual measurement occurs the patient must have 5 minutes quiet time before the reading is obtained | Level I, A (High Quality) |
| 19 | Taché, Winter 2006 | Expert Opinion | -Conclusions drawn support the need to have a structured, standardized training program, a defined scope of practice and a method of competency-based assessment and regulatory oversight of programs and individuals in the medical assisting field.<br>-Verified there is limited data available and suggested alternative literature search areas (e.g. medical journals versus nursing journals) | Level V, A (High Quality) |
| 20 | Taché, 2010 | Mixed Methods Exploratory study design | -Great variation in training and job responsibilities<br>-Variation in scope of practice/responsibilities within practice environment, MA scope being 'supervised' by physician rather than driven by national guidelines or regulations<br>-Multitasking example – giving immunizations to individuals while continuing to undertake other duties for different patients - that would support the distractions and potential for medication errors. (p.295)<br>-Busy workday leading to rushing to get things done – including blood pressure measurement, etc. (p.294)<br>-Diversity in scope of practice – including medication administration, vital sign measurement and interpretation. (p. 298) | Level III, A/B (High/Good quality) |

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|---|---|---|---|---|
| 21 | Tomlinson, 2010 | Literature Review | -Reviewed literature and discussed factors and circumstances that directly affect the accuracy of BP measurements.<br>Conclusions include:<br>1. annual review of skills, technique and competency in academic programs,<br>2. health care professionals need to remain current in technique through reflective practice, self-study activities and continuing education programs<br>addition of review of BP technique to CPR classes | Level V, A (High Quality) |
| 22 | Whelton, 2018 | Clinical Practice Guidelines/ Position Statement | -The CPG is for the prevention, detection, evaluation, and management of high blood pressure in adults.<br>-Clinic/office BP measurement recommendations and guidelines are located on p. e23-e24.<br>-Recommendations include education and training of all healthcare providers engaged in the measurement of BP in the doctor's office/clinic setting. | Level IV, A (High Quality) |
| 23 | Young, 2008 | Quantitative, Cross-sectional observational study | -The study demonstrated that medication errors occur more often when the staff member is a UAP.<br>-The increased pressure of time management, multiple medications, multiple residents impacted the UAPs in the article.<br>This is a similar theme in the errors made by MAs in busy clinics<br>-Recommendations included improved training/education | Level III, C (Low Quality) |

Note: Adapted from 'Johns Hopkins Nursing Evidence-Based Practice - Individual Evidence Summary Tool Appendix G" by D. Dang & S.L. Dearholt. p. 298.

**Table 2**
*Training Program Cost*

| Categories | Individual Cost ($) | Units | Calculation | Total Cost ($) |
|---|---|---|---|---|
| ***Labor:*** | | | | |
| Evaluators (Individual Training) | Salary average: $22.00/hr. | 8 hours training^ 3 x Evaluators | 8 hr. x $22.00 x 3 evaluators | $528.00 |
| Evaluators (Training & Evaluation) | Salary average: $22.00/hr. | 40 hours (per Evaluator per cohort) 3 x Evaluators | 40 hr. x $22.00 x 3 evaluators | $2,640.00 |
| Staff member (student) (education days) | Salary average: $15.50/hr. | 40 hours (classroom-based training & evaluation) x 14 staff | 40 hr. x $15.50 x 14 staff | $7,440.00 |
| Coverage for staff member (student) during education days | Salary average: $19.50/hr. ǂ (ǂ average rate of float pool staff member) | 40 hours x 10 float pool staff¤ | 40 hr. x $19.50 x 10 float pool staff | $7,800.00 |
| Staff member (student) (precepted hours in clinic) * | $0 | | | $0 |
| Coverage for staff member (student) during precepted experience days* | $0 | | | $0 |
| DNP Student Leader | $0 | | | $0 |

| Categories | Individual Cost ($) | Units | Calculation | Total Cost ($) |
|---|---|---|---|---|
| ***Classroom /IT support:*** | $0 | | | $0 |
| ***Equipment/Supplies:*** | | | | |
| Education Materials | $0.50 each (copies of materials per student) | 14 x students | 14 x $0.50 | $7.00 |
| | | 8 x copies (additional for teaching and projected loss) | 8 x $0.50 | $4.00 |
| | $72.00 (each) | 3 x stethoscopes (dual) | 3 x $72.00 | $216.00 |
| BP – skill check | $45.00 (per box) | Syringes/needles (Box = 100) | 3 x $45.00 | $135.00 |
| Med Administration | $15.00 (each) | | 1 x $15.00 | $15.00 |
| | $0 | Sharps container (1) | $0 | $0 |
| Ped Growth Chart | $100.00 (each) | Baby scale (1)<br>Doll (baby manikin) (2) | 2 x $100.00 | $200.00 |
| **Overall Total Cost** | | | | **$18,985.00** |

Key:
^ training included: initial review and familiarity with checklists; interrater reliability testing
ǂ average hourly rate of float pool staff member
* no cost associated as current staffing in clinic allowed for self-coverage
ˣonly 10 of the staff required coverage

**Table 3**
*Discounted Rates*

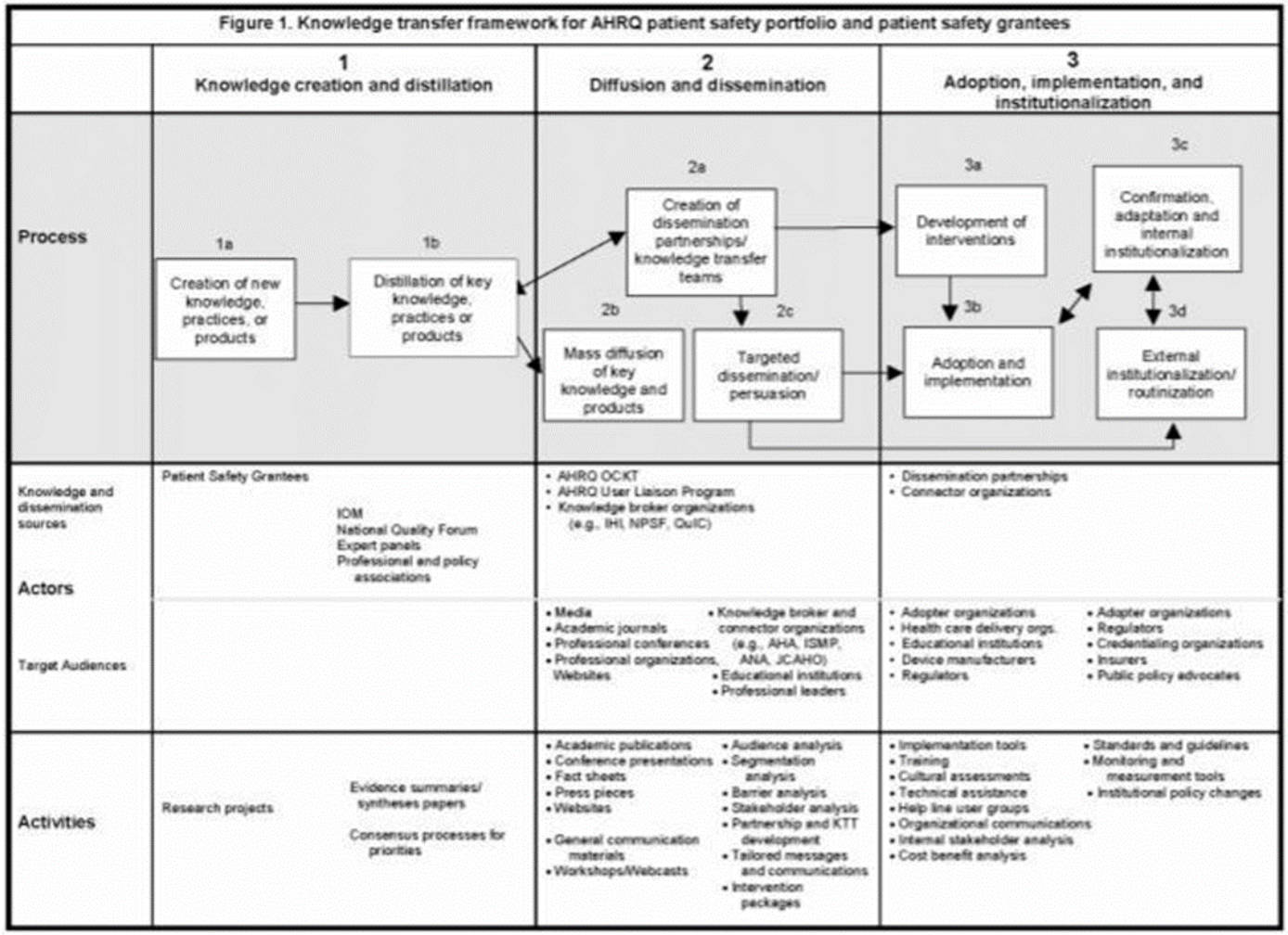
| Cost Benefit Analysis | Values | Calculation | Totals |
|---|---|---|---|
| Total Costs | Training Program Cost | | $18,985.00 |
| Benefits | Tangible = $30,000<br>(~annual cost per *individual* patient)<br><br>Average cost for this example includes: unnecessary medical referrals (~$25-$250), the premium implications at the Medicare and commercial insurance levels (~$2000), and costs of specific treatment options, including pharmaceutical management, (~$5000) diet and nutrition programs (~$3000) and unplanned hospital admissions (~$15,000 per day)<br><br>Intangible = unable to quantify | | $30,000.000 |
| Discount | 3% for 3 years | $30,000.00 - $18,985.00 = $11,015.00<br><br>**1st year:**<br>$11,015.00/1.03 = $10.694.17<br><br>**2nd year:**<br>$11,015.00/$1.03^2$ = $10,382.69<br><br>**3rd year:**<br>$11,015.00/$1.03^3$ = $10,080.53 | Year 1 = $10.694.17<br><br>Year 2 = $10,382.69<br><br>Year 3 = $10,080.53 |
| | **Net present value (NPV) = $10,080.53** | $30,000/$1.03^3$ divided by $18.985.00 /$1.03^3$<br>$27,454.93 divided by $17,374.39<br><br>**Benefit-Cost ratio = 1.58** | **ROI = 158%** |

**Table 4**
*Education Plan*

| **Education Plan** | |
|---|---|
| **Week 1: (800a – 12noon)**<br>Anatomy & Physiology:<br>Cardiovascular System: *Identify/describe the components/functions of, and disorders of the circulatory system. Describe BP (homeostasis) process and the mechanics of high BP*<br>Respiratory System: *Identify and describe the components, functions, and disorders of the respiratory system* | **Week 1: (1p – 5p)**<br><br>Vital Signs: BP, Apical HR, Pulse, EKG<br><br>Vital Signs: RR/POX, temp, Temp<br>(Skills Competency Checklist(s): 14, 16, 17, 18, 19, 20) |
| **Week 2: (800a – 12noon)**<br>Pediatric Patients: *Discuss/describe normal growth and development (in utero), childbirth, normal pediatric growth, and development (stages of), pediatric milestones, explain longitudinal growth chart measurements and why used, identify, and describe FTT, growth retardation and disorders.* | **Week 2: (1p – 5p)**<br>Pediatric Growth Chart Measurements:<br>Height/length<br>Weight<br>Head circumference<br>Documentation (eCW/WebCharts)<br><br>(Skills Competency Checklist(s): 21, 22) |
| **Week 3: (800a – 12noon)**<br>Medication Administration:<br>Introduction to Medications, Medication Calculations and Medication Administration<br><br>Safe Administration of Medications:<br>*The 6 rights of medication administration in action*<br>*Application of pharmacological and mathematical principles in medication calculations* | **Week 3: (1p – 5p)**<br>Safe Administration of Medications:<br>Administration of oral, aural, optic, and topical medications, Nebulizer (O2 and MDI), PFT<br><br>Prepare medication for administration (from blister packet, bottle, etc.)<br><br>(Skills Competency Checklist(s): 1, 2, 3, 4, 12, 13, 14, 15) |
| **Week 4: (800a – 12noon)**<br>Medication Administration:<br>Pop Quiz: Medication Math (Oral, Aural, Topical, Optic)<br><br>Prepare medication for administration (from blister packet, bottle, etc.)<br><br>Administration of oral, aural, optic, and topical medications<br><br>Inhalation medications: respiratory treatment, MDI | **Week 4: (1p – 5p)**<br>Safe Administration of Medications:<br>Administration of ID, SQ, and IM/Z-track medications<br><br>Prepare medication for administration (from vial, ampule, etc.)<br><br>Identify/locate injection sites (ID, SQ and IM)<br>Administration of medications via ID, SQ, and IM route (practice)<br><br>(Skills Competency Checklist(s): 5, 6, 7, 8, 9, 10, 11) |

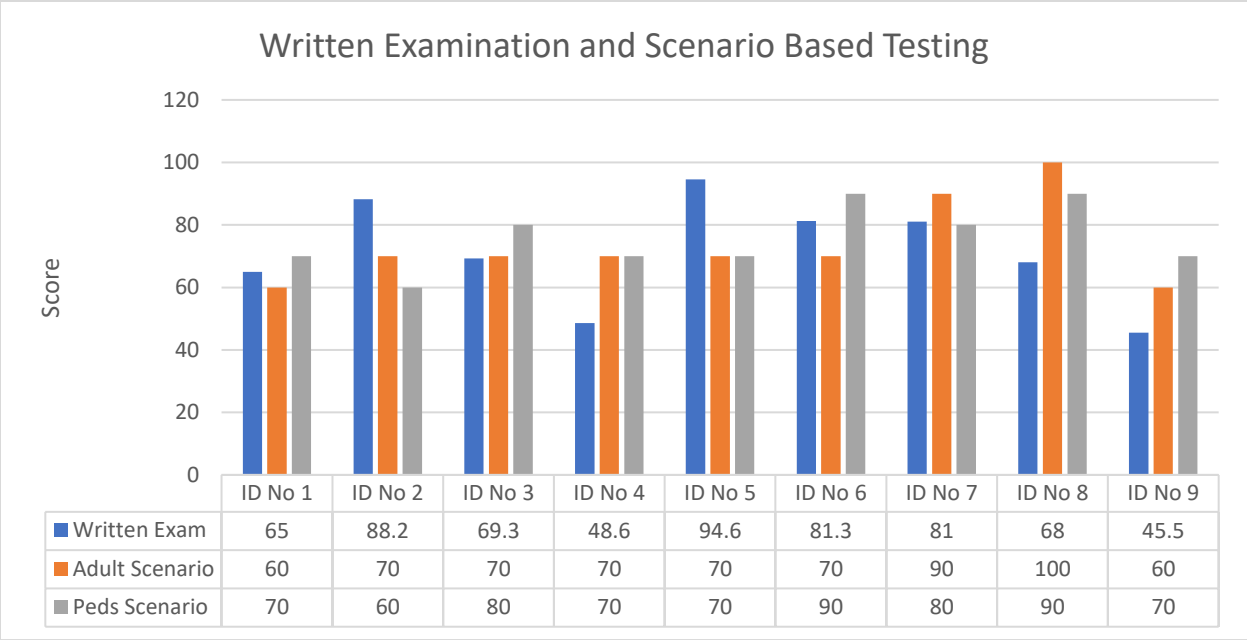
**Figure 1**

*Knowledge Transfer Framework for AHRQ Patient Safety Portfolio and Patient Safety Grantees*




*Note*. From Nieva et al., From Science to Service: A Framework for the Transfer of Patient Safety Research into Practice. In: Henriksen et al., editors. Advances in Patient Safety: From Research to Implementation (Volume 2: Concepts and Methodology). Rockville (MD): Agency for Healthcare Research and Quality (US); 2005 Feb. Available from: https://www.ncbi.nlm.nih.gov/books/NBK20521/

**Figure 2**
*Written and Scenario-Based Testing Results – All Students' Performance*




| | ID No 1 | ID No 2 | ID No 3 | ID No 4 | ID No 5 | ID No 6 | ID No 7 | ID No 8 | ID No 9 |
|---|---|---|---|---|---|---|---|---|---|
| Written Exam | 65 | 88.2 | 69.3 | 48.6 | 94.6 | 81.3 | 81 | 68 | 45.5 |
| Adult Scenario | 60 | 70 | 70 | 70 | 70 | 70 | 90 | 100 | 60 |
| Peds Scenario | 70 | 60 | 80 | 70 | 70 | 90 | 80 | 90 | 70 |

Criteria for successful completion:

Written Examination: score **60%** or greater

Scenario Based Testing (Adult): score **60%** or greater

Scenario Based Testing (Peds): score **60%** or greater

**Figure 3**

*Skills Competency Checklist - Individual Performance Student ID No 1*

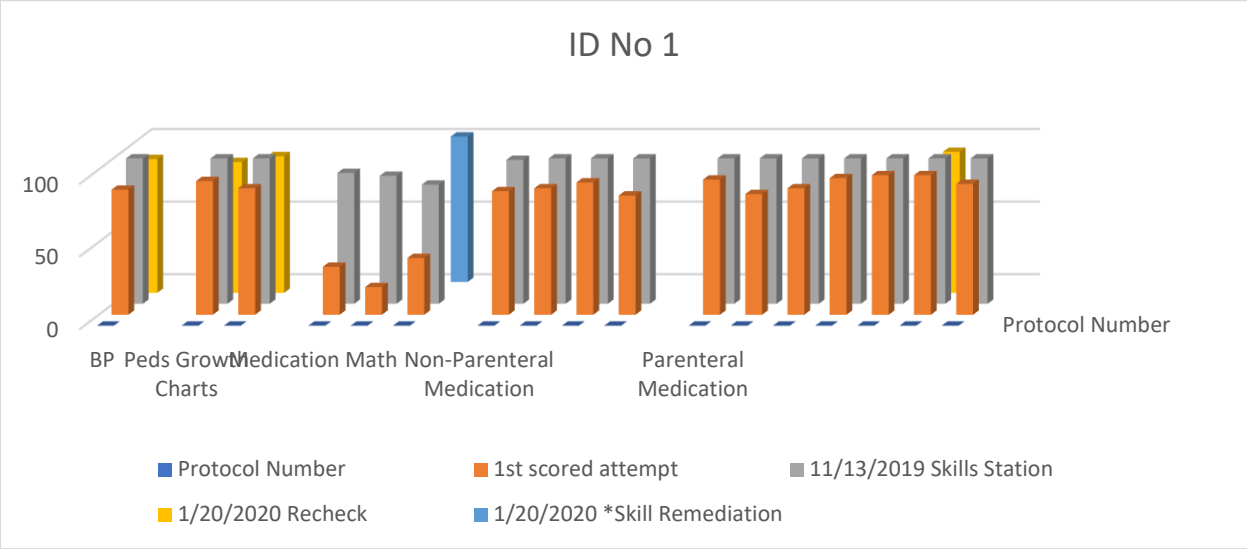



**Figure 4**

*Skills Competency Checklist - Individual Performance Student ID No 2*

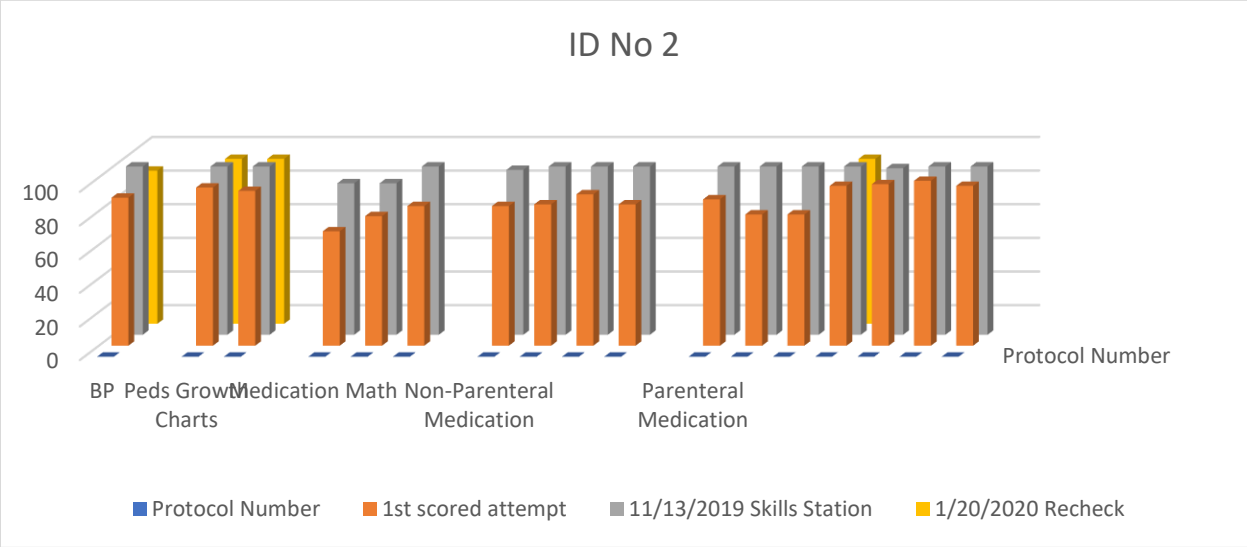


**Figure 5**

*Skills Competency Checklist - Individual Performance Student ID No 3*

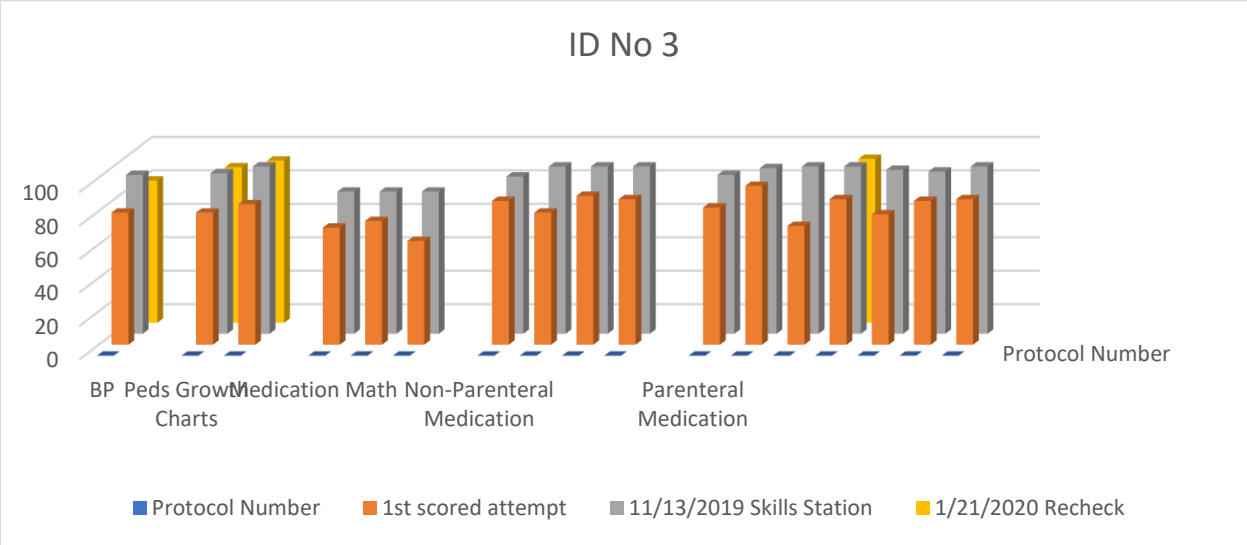



**Figure 6**

*Skills Competency Checklist - Individual Performance Student ID No 4*

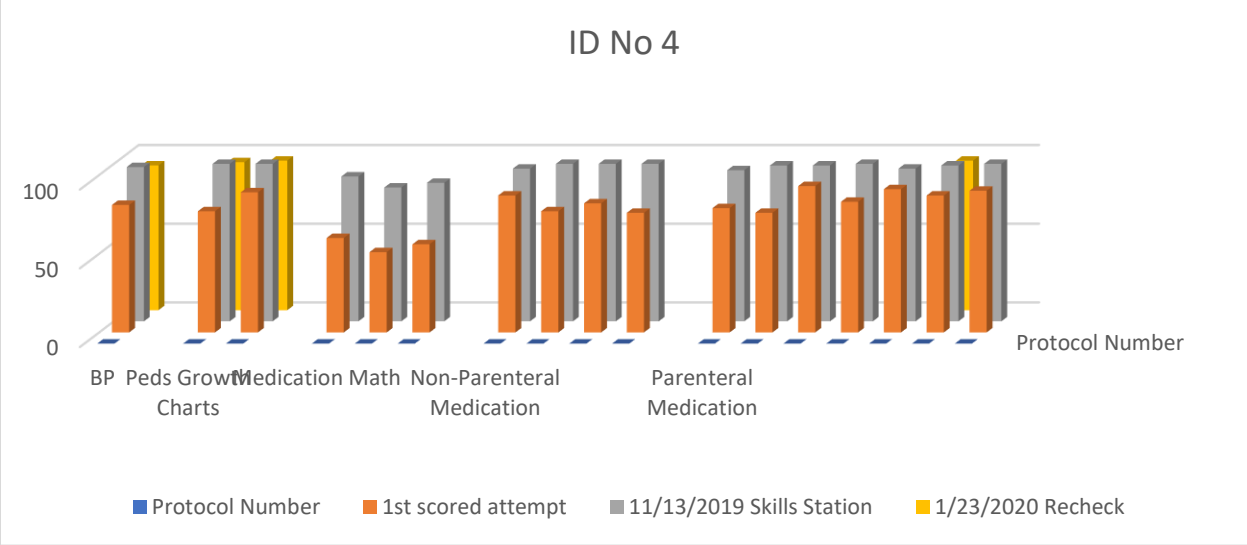


**Figure 7**

*Skills Competency Checklist - Individual Performance Student ID No 5*

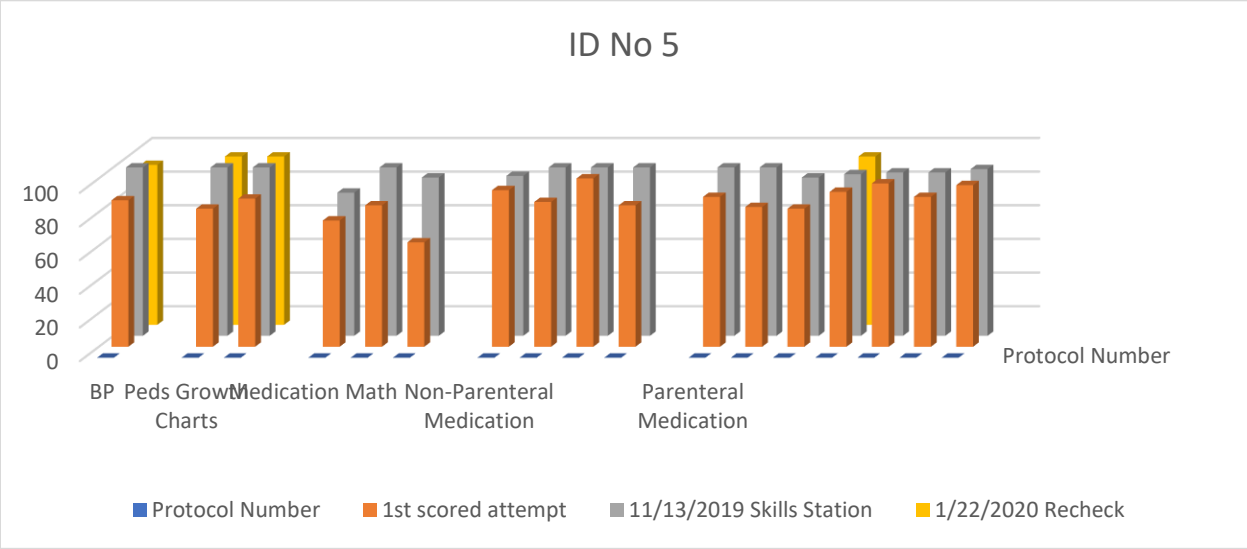



**Figure 8**

*Skills Competency Checklist - Individual Performance Student ID No 6*

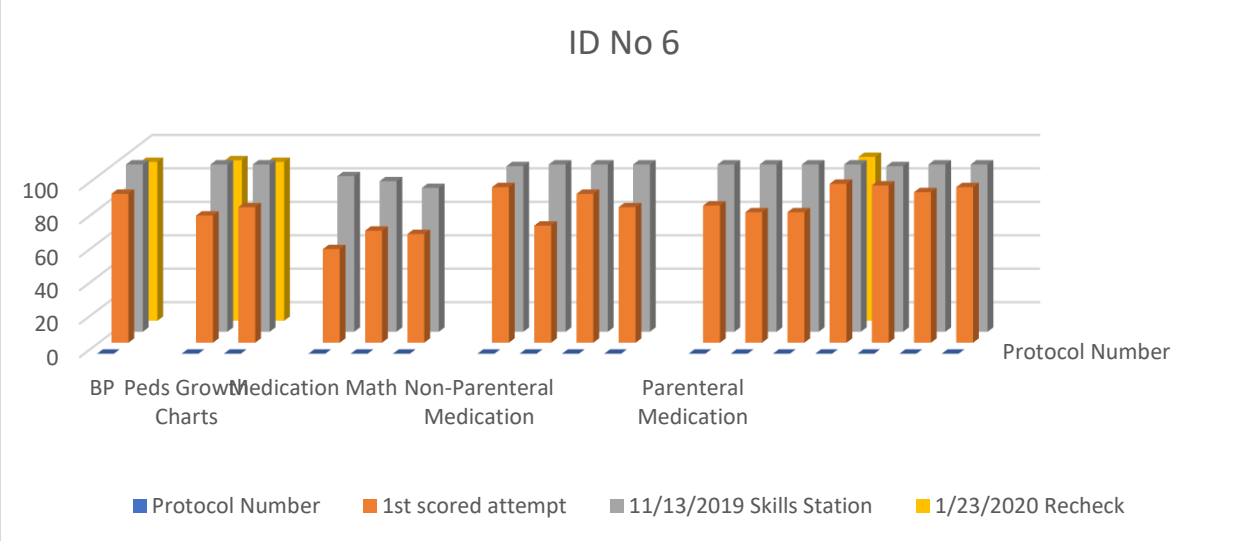


**Figure 9**

*Skills Competency Checklist - Individual Performance Student ID No 7*

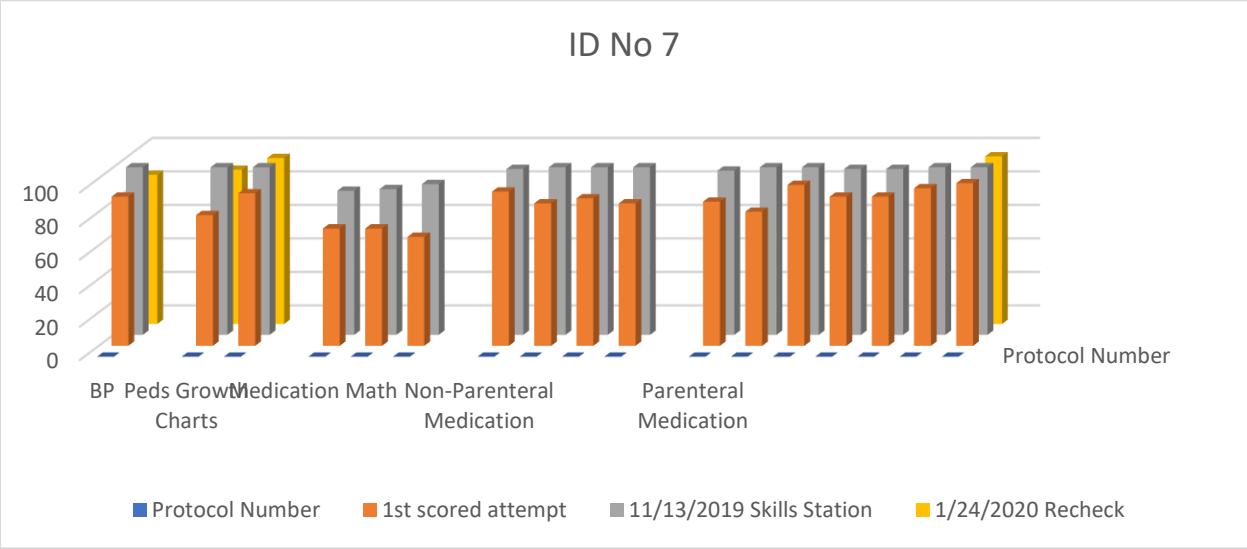
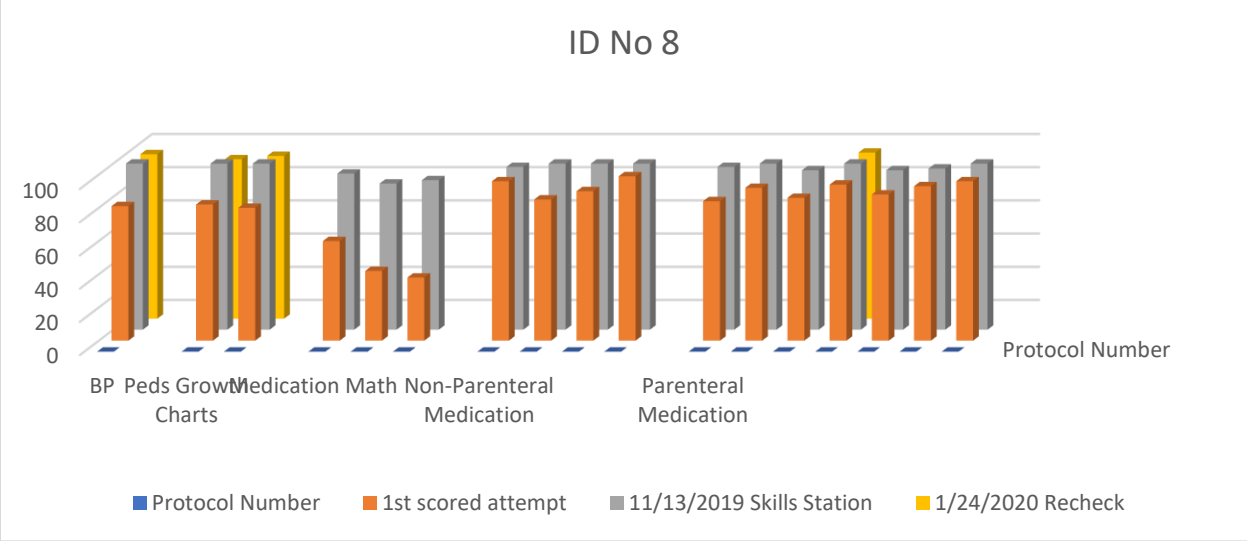



**Figure 10**

*Skills Competency Checklist - Individual Performance Student ID No 8*



## Appendix A

*Skills Competency Checklists*

*Medication Administration:*

1. Procedure 10-1. Demonstrate knowledge of basic math computations
2. Procedure 10-2. Calculate proper dosages if medication for administration: Convert among measurement systems
3. Procedure 10-3. Calculate proper dosages for administration: Calculate the correct pediatric dosage using body weight
4. Procedure 11-1. Administer oral medications
5. Procedure 11-2. Fill a syringe from an ampule
6. Procedure 11-3. Fill a syringe from a vial
7. Procedure 11-4. Reconstitute a powdered drug for administration
8. Procedure 11-5. Administer parenteral (excluding IV) medications: Give an intradermal injection
9. Procedure 11-6. Select the proper sites for administering a parenteral medication: Administer a subcutaneous injection
10. Procedure 11-8. Administer parenteral (excluding IV) medications: Administer an intramuscular injection into the deltoid muscle
11. Procedure 11-10. Administer parenteral (excluding IV) medications: Give a Z-track intramuscular injection into the dorsogluteal site
12. Procedure 13-4. Instruct and prepare a patient for a procedure or treatment: Instill an eye medication
13. Procedure 13-7. Instruct and prepare a patient for a procedure or treatment: Instill medicated ear drops
14. Procedure 22-1. Instruct patients according to their needs: Teach a patient to use a peak flow meter**
15. Procedure 22-2. Assist the provider with patient care: Administer a nebulizer treatment
16. Procedure 25-1. Perform electrocardiography: Obtain a 12-lead ECG**

*BP measurement:*

17. Procedure 7-7. Obtain vital signs: Determine a patient's blood pressure
18. Procedure 7-6. Obtain vital signs: Assess the patients radial pulse and respiratory rate**
19. Procedure 7-5. Obtain vital signs: Obtain an apical pulse**
20. Procedure 22-4. Perform patient screening using established protocols: Perform pulse oximetry**

*Pediatric Growth Chart measurement:*

21. Procedure 18-2. Maintain Growth Charts: Measure the circumference of an infant's head
22. Procedure 18-3. Maintain Growth Charts: Measure an infant's length and weight

*Notes*:

1. Checklists marked** were not included in the project or re-evaluated following completion of the focused training program.
2. Permission to use the established checklists can be found in ***Appendix B***
3. During skills competency checks and re-evaluation of medication administration, the participant may have been assessed using more than one checklist – e.g. giving an IM medication may entail checklist #: 1, 2, 5, 7 & 10.

## Appendix B

*Copyright permission to use Skills Competency Checklists*

Proctor, D., Niedzwiecki, B., Pepper, J., Garrels, M. & Mills, H. (2017). *Study guide and procedure checklist manual for Kinn's the clinical medical assistant: an applied learning approach. (13th ed.)*. St Louis, MO: Elsevier Inc.

file:///F:/Duquesne%20University/GPNS%20952%20-%20Leadership%20Residency%201/Manuscript/elsevier.com-Terms%20and%20conditions%20-%20Kinns%20Checklists.pdf

## Appendix C

*New Organization Occurrence Reporting Form*

Occurrence Report

Instructions: Please print all information. Complete ***all*** parts of this form, submit completed report to the office of the Director of Nursing

### PART I (Reporting Person Information)

Name: _____Title: _____

Location/Clinic: _____Reporting Date: _____

### PART II (Patient/Visitor/Staff Information)

Name: _____DOB: _____

Contact Information:
Address_____
_____
Phone Number (_____) _____

### PART III (Event Information)

Date of Event: _____Time of Event: _____Location: _____

Type of Occurrence:

- Medication Event
- Documentation Event
- Procedure Event
- Fall Event
- MERT Event*
- Equipment Event

Description/Details of Event:

_____
_____
_____
_____
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_____
_____
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_____
_____

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_____
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_____
_____

Disposition (of person, equipment, etc.):

_____
_____
_____
_____
_____
_____
_____
_____

Witness' Names/Contact Information:

1. _____
   _____
   _____
   _____
2. _____
   _____
   _____
   _____
3. _____
   _____
   _____
   _____

MERT Event*:

Names of provider(s) and staff present:

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

Signature: _____Date: _____

# Appendix D

**From:** Duquesne IRB <noreply@axiommentor.com>
**Sent:** Sunday, August 18, 2019 1:22 PM
**To:** Jacqueline Thomas <thomasj13@duq.edu>
**Subject:** [External] Quality Improvement Verified - IRB ID: 2019/08/3

Institutional Review Board
DUQUESNE UNIVERSITY

Duquesne University IRB — QI Protocol Notification

To: Jacqueline Thomas
From: David Delmonico, IRB Chair
Subject: Protocol #2019/08/3
Date: 08/18/2019

The protocol **2019/08/3. Reducing Medical Assistants Clinical Errors through a Focused Training Program: A Quality Improvement Project** has been verified by the Institutional Review Board as a **Quality Improvement Project**, and accordingly does not meet the definition of "research" at to 45CFR46.102(d). Your protocol is thus exempt from IRB review.

Please note that changes to your protocol may affect its exempt status. Please contact me directly to discuss any changes you may contemplate.

Thanks,

David Delmonico, Ph.D.
Institutional Review Board, Chair
irb@duq.edu

https://outlook.office.com/mail/deeplink?version=2020032904.10&popoutv2=1&leanbootstrap=1