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Improving Teamwork and Timeliness of Insulin Administration in the Respiratory Rehabilitation Unit

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Abstract

The microsystem assessment conducted by a Clinical Nurse Leader student at an acute care hospital in the Respiratory Rehabilitation Unit (RRU) revealed that two of eight patients were diagnosed with diabetes. The RRU nursing staff was 80% compliant with best practices related to insulin coverage administration within 30 minutes after a point of care blood glucose check. The practice improvement project aims to increase staff awareness and timely administration of insulin coverage by introducing situation monitoring, a core component of Team Strategies and Tools to Enhance Performance and Patient Safety (TeamSTEPPS). After baseline data collection, a 30-minute education intervention was implemented for 39 nurses reflecting 100% of the nursing staff. The anticipated outcome of this improvement project is 100% adherence to best practices related to insulin coverage administration. Results indicated that the nursing staff felt more confident post intervention. Clearly, the integration of TeamSTEPPS to increase awareness and timeliness of correct insulin coverage in acute care microsystems will result in creating a culture of improvement to optimize sustainability.

Keywords: insulin coverage, acute care, timely, TeamSTEPPS, clinical nurse leader

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According to the American Diabetes Association (ADA) (2018), 1.5 million Americans are diagnosed with diabetes annually and diabetes remains the 7th leading cause of deaths in the United States. Diabetes is common in any hospital unit. The microsystem assessment conducted in the Respiratory Rehabilitation Unit (RRU) at an acute care hospital revealed that two out of eight patients were diagnosed with diabetes. According to Sharpe (2012), poor blood glucose management places patients with diabetes for increased morbidity and mortality. Proper management of patients' glucose level is particularly important during hospitalization and can expedite recovery leading to decreased length of hospital stay. The goal of this practice improvement project is to improve awareness of insulin coverage administration at mealtime within 30 minutes after point of care (POC) blood glucose check and increase RRU's compliance to 100%. According to Szelc & Nicolaus (2018), best practices for insulin coverage should be administered within 30 minutes for clinicians to provide the correct insulin dose.

Problem description

Patient records of timeliness regarding POC blood glucose check were matched with insulin coverage administration. This baseline data over a 3 month period shows that there were times when insulin coverage administration occurred more than 30 minutes post POC blood glucose check. The average gap between POC blood glucose check and insulin administration was 18 minutes which reflects best practices. However, a review of 203 documented insulin administrations revealed that over a 3 month period 9% occurred over 30 minutes, 6% occurred over 45 minutes, 5% occurred over 60 minutes, and 1 occurred over 90 minutes. A graph illustrating the interval between POC blood glucose check and insulin coverage administration

(see Figure 1: Baseline Data of Interval in Minutes Illustrating Gap Between POC Blood Glucose Check and Insulin Coverage Administration from January to March of 2018).

The best practice of administering insulin coverage within 30 minutes post POC blood glucose check is critical for patient safety because blood glucose levels could increase or decrease in minutes. The CNL conducted a retrospective chart review and revealed 3 instances where POC blood glucose levels needed to be rechecked which emphasizes the potential for patient harm. For example, on 01/01/18, POC checked at 1722 hours resulted 173 mg/dL and a 1725 hours recheck resulted 179 mg/dL which equates to POC blood glucose level increase of 6 mg/dL in 3 minutes. On 03/03/18, POC checked at 0557 hours resulted 299 mg/dL and a 0600 hours recheck resulted 278 mg/dL which equates to POC blood glucose level decrease of 21 mg/dL in 3 minutes. On 03/05/18, POC checked at 0511 hours resulted 265 mg/dL and a 0515 hours recheck resulted 245 mg/dL which equates to POC blood glucose level decrease of 20 mg/dL in 4 minutes. Clearly, the timeliness of insulin coverage administration impacts patient safety.

In a study conducted by Szelc & Nicolaus (2018) on the University of Pittsburg Medical Center's Passavant Hospital, a process change to check blood glucose levels within 30 minutes of meals provided more accurate blood glucose results to determine correct insulin doses. Blood glucose is dynamic, and when treatment is performed outside the ideal time range, it may lead to the administration of the wrong insulin dosage. Thus, the importance of nursing education to improve timeliness of insulin coverage administration.

Insulin coverage administration post POC blood glucose check over 30 minutes leads to inaccurate insulin dose which could also lead to complications such as hypoglycemia or hyperglycemia. Hypoglycemia can induce chest pain, tachycardia, and myocardial infarction.

Hyperglycemia can cause headaches, vision problems, fatigue, weight loss, and infections. Unfortunately, these are preventable patient complications that occur in the RRU which can be addressed with increased awareness.

The CNL conducted a Strengths Weaknesses Opportunities Threats (SWOT) analysis by involving nurses and other interdisciplinary team members (see Figure 2). This analysis revealed strengths such as a highly motivated team, nurse to patient ratios of one to two, the presence of a supportive charge nurse, and staffing patterns that employed relief nurses on the floor to supplement bedside nurses. The CNL team leader identified some weaknesses during unit observation such as incomplete communication between the relief and staff nurses. Opportunities for improvement were generated by the team which included increasing awareness of diabetes care management, preventing diabetes complications, and decreasing patient length of hospital stay. One major threat that was identified suggests that management decision-makers may not fund the project on an ongoing basis; in addition, some nurses do not believe the problem even exists. Therefore, the gap between POC blood glucose checks and insulin administration is a high priority for this microsystem.

Rationale

The RRU employs 39 regular staff nurses and so unit leaders questioned whether a knowledge deficit or an awareness problem existed based on retrospective data defined earlier. Therefore, a practical survey was conducted with all nurses and results indicated adequate knowledge because 100% of participants answered, “within 30 minutes” when asked, “What is the acceptable gap (in time) between POC blood glucose check and insulin coverage administration while considering meal consumption?” The RRU is clearly facing an awareness problem which warrants education and improvement. According to Kaisen, Parkosewich, & Bonito (2018), the proper intervention

to increase adherence with best practices for inpatient diabetes care management focuses on raising staff awareness and administering insulin coverage in a timely manner.

Staff nurses need to feel that they are not alone in caring for their patients and that there is a team to help, guide, and support them. According to the Royal College of Physicians (2017), effective teams must have the ability to define and contribute to the achievement of team goals for patient safety. As an educator, team leader and outcomes manager, the CNL collects and analyzes data, introduces evidence-based solutions, and educates the staff to further improve team effectiveness which impacts the quality of patient care.

One intervention to increase education is the introduction of an evidence-based framework such as Team Strategies and Tools to Enhance Performance and Patient Safety (TeamSTEPPS) developed by the Agency for Healthcare Research and Quality (AHRQ) (2013). A core component of TeamSTEPPS is a tool to enhance teamwork and communication called "situation monitoring." This tool can lead to increased communication and compliance related to insulin coverage administration. The CNL conducted informational interviews with all nurses to assess learning needs and preferences for classroom or small group education sessions. The anticipated outcome of the learning needs assessment was to identify the best approaches for nurses to absorb the information about best practices and to alter timeliness. Most nurses agreed that an educational intervention using small groups would be most effective and the CNL subsequently developed an educational series to introduce TeamSTEPPS and situation monitoring.

Specific aim

The aim of this practice improvement project is to raise the staff awareness and optimize timeliness of acceptable intervals related to insulin coverage for diabetes care management. Specifically, the best practice of insulin coverage administration has been defined as within 30

minutes after POC blood glucose check. To accomplish this aim, two key interventions will be tested. First, TeamSTEPPS, an evidence-based framework (Agency for Healthcare Research and Quality, 2017) will be introduced using the situation monitoring strategy. Second, an *Insulin* sign on the appropriate patient's diet sheet aims to improve timeliness of insulin coverage administration adherence from 80% to 100% by the end of August 2018.

Context

According to AHRQ (2013), TeamSTEPPS is a teamwork system developed jointly by the Department of Defense and AHRQ to improve institutional collaboration and communication in patient safety. Situation monitoring is an effective approach for team members to become more aware of what is going on around them (the situation) which will enable nurses and other team members to more readily adapt to changes in the microsystem. There are 3 phases to situation monitoring. The first phase addresses an individual skill that incorporates a process of actively assessing the elements of the situation to gain information. In the second phase an individual adopts a state of knowing the conditions that affect one's work. The final and third phase of situation monitoring is creation of a shared mental model among team members. These three phases produce outcomes which are the result of each team member maintaining his or her situational awareness and sharing timely and relevant facts with the entire team (AHRQ, 2013). Thus, TeamSTEPPS can contribute to high performing teams and patient safety and will ensure that everyone on the team is "on the same page."

Microsystem setting

RRU has ten private rooms. There are five staff nurses and each staff nurse cares for two patients. There are two relief nurses that provide oversight and assistance to staff nurses. There is a supportive charge nurse at the desk that provides oversight to the unit. The flow of the RRU

was studied via a microsystem assessment including unit observation. Relief nurses were noted by the CNL team leader to be the nurses performing POC blood glucose checks and feeding patients which supported staff nurses to perform other important tasks. However, staff nurses, not relief nurses, administer insulin coverage. Hence, multiple team members are participating in diabetes care management.

Evidence-based best practice

In a study conducted by Lampe, Penoyer, Hadesty, Bean, & Chamberlain (2014), 65% of POC blood glucose tests were performed outside ideal time frame and the longest testing interval occurred over 2 hours which also reflects the current state in the RRU microsystem. Such lack of coordination can lead to patient harm including complications, medication errors and adverse drug events. When multiple team members provide key procedures related to insulin, there is a significant risk for adverse events and lack of coordination of care is often the root cause.

In this microsystem, a flow process map was created to showcase workflows (see Figure 3). As indicated in best practices described by Lampe and colleagues (2014) staff nurses in the RRU are more likely to administer timely insulin coverage if the relief nurse provides some sort of a reminder to emphasize the correct window of time the blood glucose is checked and the time the insulin should be administered. Current RRU workflows reflect that relief nurses communicate with the staff nurses when the POC blood glucose has already been checked. However, timeliness of insulin administration would improve if an emphasis was placed on the time when the POC blood glucose check was performed.

Intervention and methods

As a system's analyst and a member of a profession, the CNL employed Lippitt's theory to implement change. According to Mitchell (2013), Lippitt's theory is useful to nurse leaders

because not only does it incorporate a detailed plan of how to generate a change, but also comprises the 4 elements of the nursing process which includes: assessment, planning, implementation, and evaluation. The seven phases of Lippitt's theory are diagnose the problem, assess the motivation and the capacity for change, assess the change agent's motivation and resources, select progressive change objective, choose appropriate role of the change agent, maintain change, and terminate the helping relationship (Mitchell, 2013). As an educator and team leader, a CNL is fully capable of assessing for motivation and presenting the practice improvement project to everyone involved.

Gap analysis

The identified gap in patient care and the practice improvement project was discussed with the Unit Manager, the Assistant Nurse Manager, and the Staff Developer of the RRU. According to the Nurse Manager, this is a problem that desperately needs a solution. The Assistant Nurse Manager and the Staff Coordinator stated that it is a worthy project with a proposed solution that has a great potential to be successful. After presenting the plan to complete the practice improvement project, all 3 mentioned leaders in management gave their approval to implement the evidence-based intervention.

Successful implementation of the project is imperative to the improvement of diabetes care management. The project was implemented by obtaining a list of all 39 nurses that regularly works in the RRU. The acute care hospital's mission is to increase staff training, reduce the burden of illness, improve customer experience, and increase a healthy lifespan. The CNL student utilized the skills and tools to educate all 39 nurses for half an hour in small groups targeting all shifts as preferred by RRU's nurses. A motivated unit champion was selected by the team leader for each shift to provide oversight over the project. By providing the necessary

education to RRU's nurses, the unit will continue to improve patient care outcomes by providing the best possible care to patients. Further, assuming the success of the project, the acute care hospital can expect a cost avoidance of $7,160 in the first year and $8,330 in the following and subsequent years.

Cost of in service

The budget needed to accomplish the proposed practice improvement project is $2,340 as showcased by the budget plan (see Table 1). The start up cost of $2,340 is enough to cover the first year because a second course (if needed) is included. It is safe to predict that one course will be taught for the continuing education for the following and subsequent years which will only cost $1,170.

According to Office of Statewide Health Planning and Development (2018), a medical bed would cost $267 per hour which equates to $6,624 per day. Also, a bed in a rehabilitation unit would cost $16,972 a day. RRU's nurse manager has confirmed that around $9,500 is the average daily charge for most patients of the RRU. If one extra day of hospitalization is prevented for one patient, then a cost avoidance of $9,500 will be more than enough to cover the $2,340 practice improvement project for the first year leaving the organization $7,160. A $9,500 saving will also be more than enough to cover the $1,170 cost of continuing education the following and subsequent years which will leave the organization $8,330 for every extra day of hospitalization prevented. According to Comino et al. (2015), patients with diabetes were 24% more likely to have a hospital admission for any reason, had more admissions, and longer length of stay than those without diabetes.

Study of the intervention

According to McNamara (2014), planning should be carefully executed where the participants are evaluated by a nurse leader before and after training. A microsystem assessment was conducted in February. Chart reviews were performed in March. Unit observation and initial surveys were completed in April. Planning of the implementation were completed in May. Gathering of supplies and the creation of the teaching materials were completed in June. Practice improvement project implementation was performed in the first week of July. Chart reviews and unit observation was accomplished at the end of July and first week of August. A Gantt Chart is readily available for review (see Figure 4).

Every intervention must be evaluated to assess its effectiveness. A 30-minute in service were provided to 1-3 nurses in different shifts to educate all staff members of the RRU. A questionnaire was handed out before the in service to assess their confidence level. Each in service lasted approximately 15 to 20 minutes providing time for questions and feedback. There were not many questions asked; however, nurses provided numerous feedback such as, “I like that the information was presented in a simple and easy to understand manner,” “I have been waiting for something like this because I understand how important timeliness is in regards to insulin coverage administration,” “I like what you’re doing, I’m looking forward to the end results.” One nurse commented after the presentation, “I like that you are trying to enhance our teamwork and your solution might actually work.” The feedback received was well appreciated and communicated to the unit leaders. As an educator, a CNL is proud to learn that everyone who received the in service had verbalized commitment to the goal of 100% adherence. Having a shared goal creates an effective team who are well prepared to provide proper diabetes care management.

Measures

According to Alwan, Chipps, Yen, & Dungan (2017), inpatient hyperglycemia is associated with increased length of stay and mortality, as well as more complications and admissions to extended care facilities. 451 hospitalized patients were retrospectively analyzed, and 35 nurses were asked to complete a survey assessing perception of insulin dosing. Evidently, hospital staff reported low confidence in the administration of insulin on time. In the article, most nurses perceived that a reminder to notify the nurse would improve timely insulin administrations (Alwan, Chipps, Yen, & Dungan, 2017).

Before the intervention, a survey asking the nurses how confident they were in insulin coverage administration timeliness and 38% of the nurses anonymously admitted to being "Confident." One week after the intervention, a survey was again distributed to all the nurses to assess their confidence level and 87% responded to feel "Confident," in timely insulin coverage administration post POC blood glucose check. A pie chart will showcase the survey results pre and post intervention (see Figure 5).

Analysis

During the initial survey, nurses were asked "what might be causing the delay between POC blood glucose check and insulin coverage administration?" Top 3 answers were: "Who checks the blood glucose versus who administers the insulin," "Finding a second nurse to sign off," and "Sometimes due to workflow because POC blood glucose check is done by relief nurse, not bedside nurse." Evidently, by improving teamwork and collaboration via TeamSTEPPS situation monitoring could decrease the delay between POC blood glucose check and insulin coverage administration. RRU's root cause analysis (see Figure 6: Fishbone Diagram).

Poor Diabetes control places patients' lives at risk. Administering rapid insulin coverage past the recommended time frame places patients at risk for either hyperglycemia or hypoglycemia. To have the relief nurse report the time when the POC blood glucose check was done, then return within 30 minutes to ensure the insulin administration takes place during mealtime will surely improve timely insulin coverage administration. RRU desperately needed the practice improvement project related to the improvement of timely insulin coverage administration because severe harm or death are potential consequences of errors in insulin administration.

Ethical consideration

At the RRU, patients with diabetes are placed on a "Carb-controlled diet." However, the microsystem assessment highlighted a patient with diabetes who was placed on a "Regular diet" due to their co-morbidities. Consequently, there is no indication from the tray that the patient has diabetes and a float nurse, someone who is helping the unit, or a support system (such as a family member) could bring the patient's tray and help with feeding without realizing the patient's condition. Therefore, all staff nurses were trained to add an *Insulin* sign, after obtaining consent from the patient, on the appropriate patient's diet sheet located on their wall to heightened awareness of the patient's condition if a patient with diabetes is placed on a "Regular diet."

There are those who are sensitive to their diagnosis and patients deserve to be treated respectfully. According to the ADA (2018), diabetes does not define people and that the word "diabetic" should no longer be used to describe people with diabetes. The acute care hospital aims to provide a compassionate care to all patients and will always strive to improve customer experience to promote healing. Thus, the decision to use the word *Insulin* on the patients' diet sheet is the obvious choice.

Results

RRU currently has one patient with diabetes. However, their blood glucose level is within normal limits and the patient has not required any insulin coverage. This project is ongoing and will continue with the evaluation phase in August of 2018 with a goal of 100% adherence with best practices. The 49% increase in the nurses' confidence level related to timely insulin coverage administration after POC blood glucose check is significant and worthy of consideration. Unit decision makers praised the practice improvement project after learning the increase in the nurses' confidence level.

Summary and Conclusion

Uncontrolled diabetes is associated with increased length of stay and potential harm to patients. Baseline data in the RRU microsystem demonstrated an 80% compliance rate with best practices for timely and accurate insulin coverage and administration. This practice improvement project aimed to reach 100% adherence by facilitating a culture of learning and improvement. Effectiveness of nursing staff improved through the implementation of TeamSTEPPS including the practice of situation monitoring that the CNL student taught and role modelled during one week of small group sessions. Ongoing reinforcement of best practices and monitoring trends through microsystem reassessments can lead to long-term clinical benefits for patients and cost avoidance for the organization by decreasing length of stay. In conclusion, this change project proved to be a practical and feasible solution for frontline staff education and behavior change. The incorporation of TeamSTEPPS and specifically situation monitoring in hospital microsystems should be encouraged to improve timeliness and accuracy of insulin coverage administration.

References

Agency for Healthcare Research and Quality. (2013). *TeamSTEPPS 2.0: Team strategies & tools to enhance performance and patient safety*. Rockville, MD: Author.

Alwan, D., Chipps, E., Yen, P., & Dungan, K. (2017). Evaluation of the timing and coordination of prandial insulin administration in the hospital. *Diabetes Research and Clinical Practice*, *131*18-32. doi:10.1016/j.diabres.2017.06.021

American Diabetes Association. (2018). Statistics about diabetes. Retrieved from http://www.diabetes.org/diabetes-basics/statistics/?loc=db-slabnav

Kaisen, A. R., Parkosewich, J. A., & Bonito, K. A. (2018). Factors Associated with Timely Blood Glucose Testing and Insulin Administration in Patients Receiving Mealtime Insulin Coverage in Medical Surgical Units. *Diabetes Educator, 44*(2), 188. doi:10.1177/0145721718760514

Lampe, J., Penoyer, D., Hadesty, S., Bean, A., & Chamberlain, L. (2014). Timing is everything: Results to an observational study of mealtime insulin practices. *Clinical Nurse Specialist*, *28*(3), 161-167. doi:10.1097/NUR.0000000000000045

McNamara, C. (2014, June 4). Orienting new employees (new hires, on-boarding). Retrieved June 25, 2017, from http://managementhelp.org/training/employee-orientation.htm

Mitchell, G. (2013). Selecting the best theory to implement planned change. *Nursing Management –UK*, *20*(1), 32-37.

Office of Statewide Health Planning and Development. (2018). *Hospital Chargemasters and Charges for 25 Common Outpatient Procedures*. Retrieved from https://www.oshpd.ca.gov/chargemaster/

Royal College of Physicians. (2017). Building effective teams. *British Journal of Healthcare Assistants,11*(12), 610-615.

Sharpe, L. (2012). Improving safety of insulin administration: A pilot audit of hospital staff knowledge. *Journal of Diabetes Nursing*, *16*(1), 8-16.

Szelc, K., & Nicolaus, L. (2018). Internal experts collaborate to reduce critical hypoglycemia and insulin errors and improve insulin administration timing. *Clinical Diabetes*, *36*(2), 191 197. doi:10.2337/cd17-0058

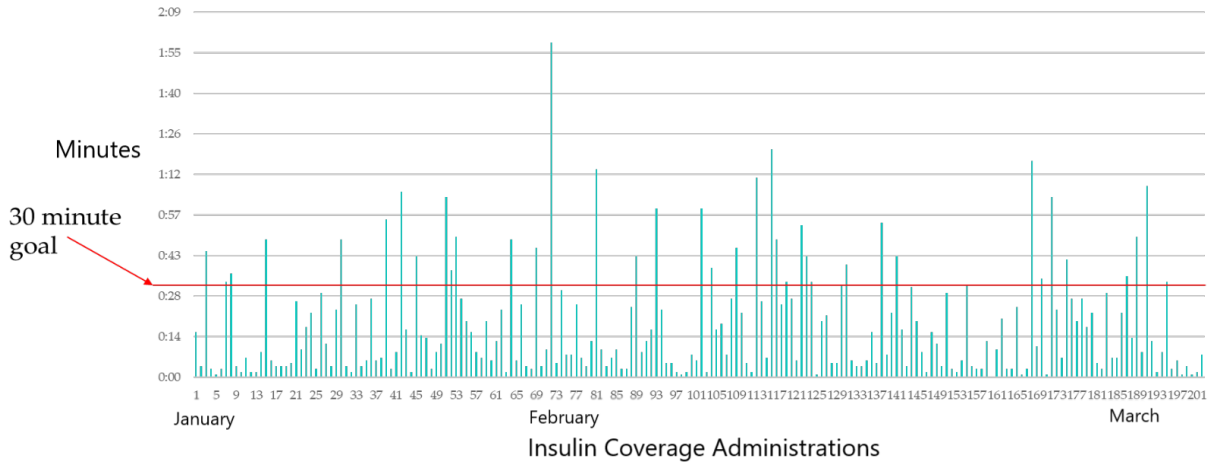


Figure 1: Baseline Data - January to March 2018.

Note: Interval in Minutes Illustrates the Gap Between POC Blood Glucose Checks and Insulin Coverage Administration.

Figure 2: SWOT Analysis.

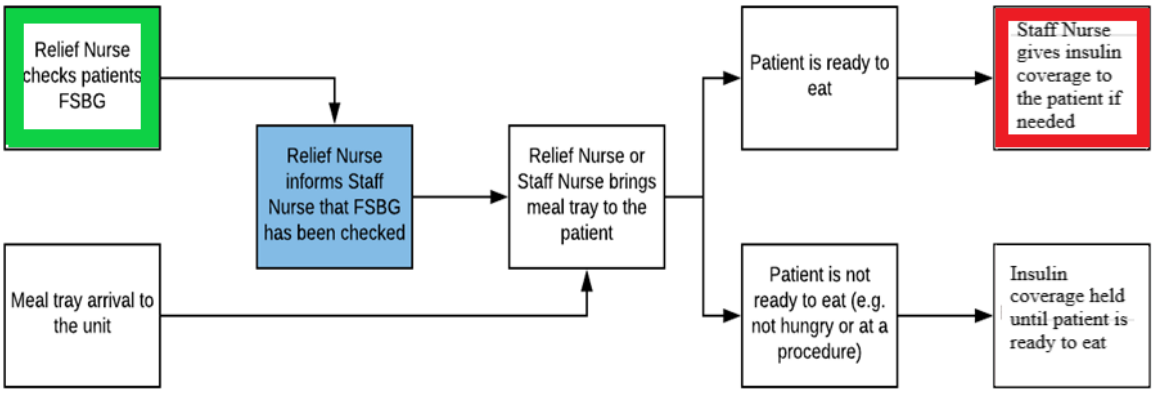


Figure 3: Process Map-workflow for insulin coverage.

Table 1

Unit Budget for Practice Change

Initial Education

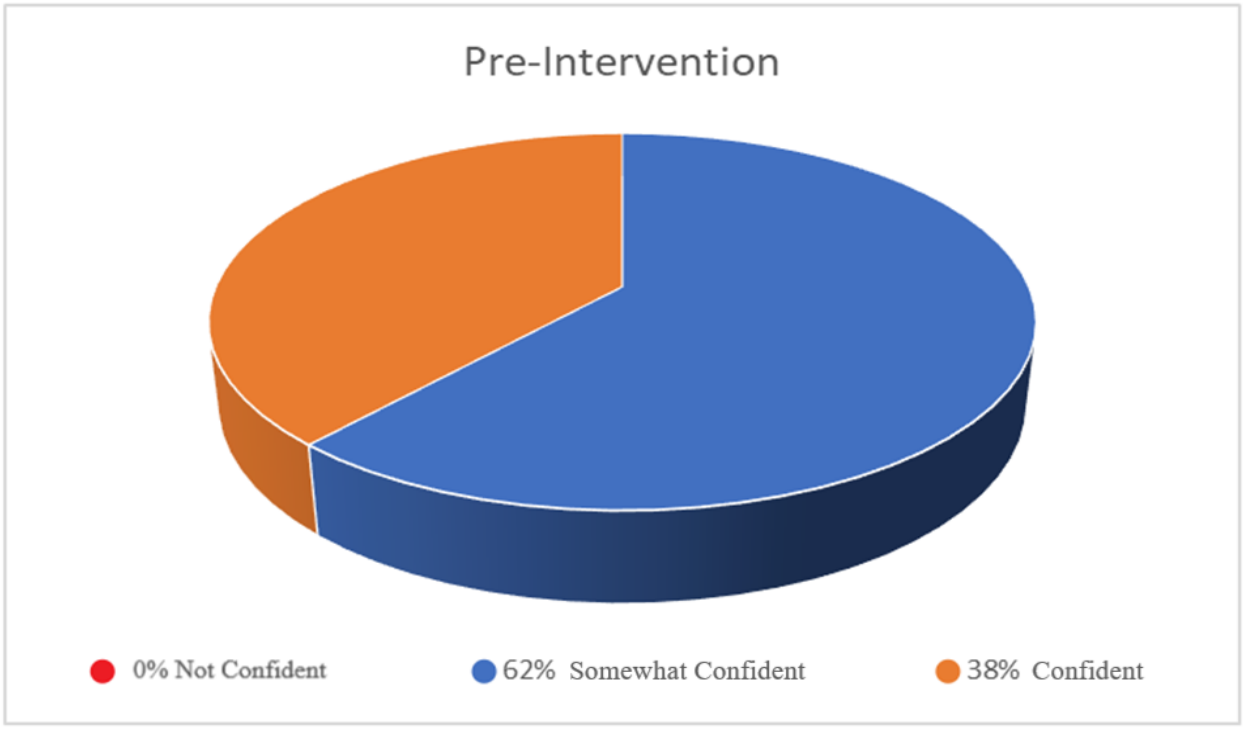
Nurse Education (First year)	# of Nurses	($) Average Salary per hour	Total
First Course	39	$60.00 per hour for 30 minutes	$1,170
Second Course (If Necessary)	39	$60.00 per hour for 30 minutes	$1,170
Total	78	$60.00 per hour for 30 minutes	$2,340

Continuing Education

Nurse Education (Following and Subsequent years)	# of Nurses	($) Average Salary per hour	Total
One Course	39	$60.00 per hour for 30 minutes	$1,170
Total	39	$60.00 per hour for 30 minutes	$1,170

Activities Year 2018	Feb	Mar	Apr	May	Jun	Jul	Aug
Microsystem Assessment							
Chart Review							
Unit Observation							
Initial Surveys							
Implementation Planning							
Supplies & Teaching Materials							
Implement Change							
Study Change							
Write Paper							
Evaluate Change							
Prepare Poster							
Present Poster at USF Campus							

Figure 4: Gantt Chart



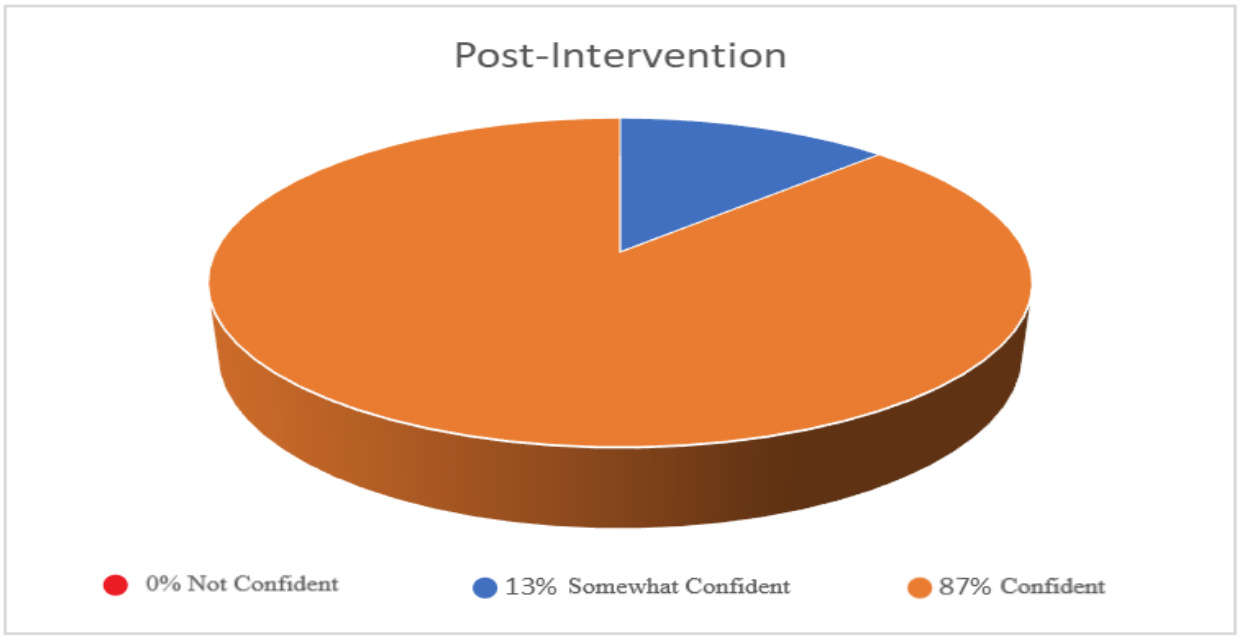


Figure 5: Pre and Post Intervention Nursing Staff Survey Results.

Author Note: Key question: How confident are you about administering insulin coverage in a timely manner?

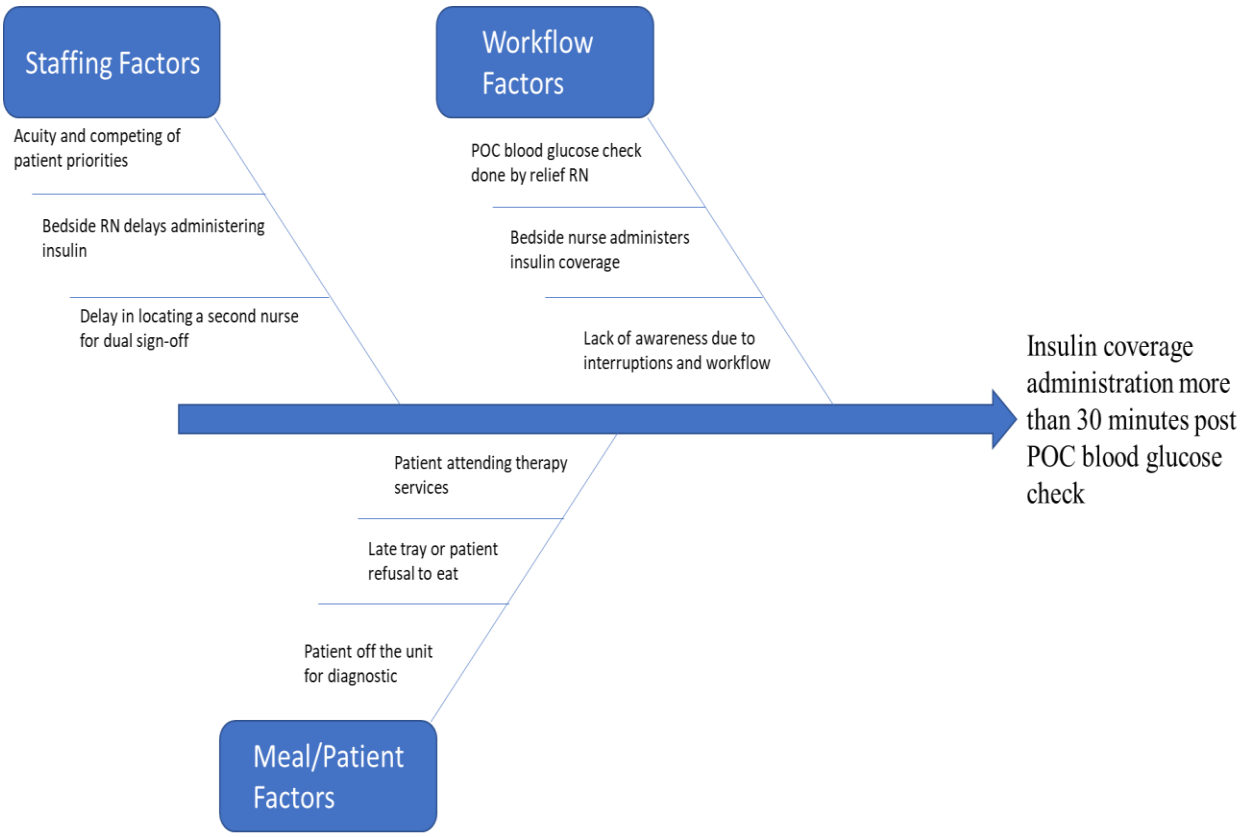


Figure 6: Ishikawa: Fishbone Diagram.