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# Utilizing a reminder tool to improve post-hypoglycemia recheck rates on a medical surgical unit.

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# Utilizing a Reminder Tool to Improve Post-hypoglycemia Recheck Rates on a Medical Surgical Unit

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**Abstract**

Diabetes is a growing epidemic with profound implications on the healthcare system. One of many possible complications is hypoglycemia, which is any value below 70 mg/dL. Inpatient hypoglycemia is a patient safety concern, and its treatment requires nursing adherence to strict protocols including a recheck within 15 to 30 minutes after treatment. However, evidence from the literature and project site demonstrated low rates of timely post-hypoglycemia rechecks. The purpose of this project was to provide education to all MIPS nurses regarding the utilization of a reminder tool for post-hypoglycemia rechecks. The intervention plan included reviewing the current hospital-wide hypoglycemia policy, describing how to use the reminder tool within Epic, and distributing a step-by-step handout. Rates of timely post-hypoglycemia rechecks were compared pre-intervention vs. post-intervention. Also, the usability of the reminder tool was measured post-intervention using the System Usability Scale (SUS). The process-based aim was acceptable usability of the reminder tool as evidenced by an average post-intervention SUS score greater than 70. The outcome-based aim was an increase in timely rechecks from 64% to hospital-wide goal of 75%.

*Keywords*: diabetes mellitus, hypoglycemia, nursing, inpatient, protocol, quality improvement

## Problem Statement

Many post-hypoglycemia rechecks do not fall within the allotted time frame of 15 to 30 minutes after the initial hypoglycemia reading (Abusamaan et al., 2019; Arnold et al., 2013; Destree et al., 2017; Leighton et al., 2020). At the project site, the hospital-wide goal of a 75% timely recheck rate was not met once over the last three quarters (January to September of 2022). Improving inpatient post-hypoglycemia recheck rates can decrease cost as well as risk of patient morbidity and mortality.

## Background and Significance

Diabetes is a priority health concern in the United States; it affects over 10% of the population, ranks seventh in leading causes of death, and costs over $300 billion a year (Center for Disease Control and Prevention [CDC], 2020). The condition is caused by insufficient insulin production or usage, which leads to a state of high glucose levels known as hyperglycemia. Hyperglycemia is often managed with medications that carry a risk of a low glucose levels known as hypoglycemia, which is any value below 70 mg/dL (American Diabetes Association [ADA], 2020). Inpatient hypoglycemia poses a significant threat to patient safety, as it occurs in over six percent of hospitalized patients, and leads to increased cost, morbidity, and mortality (American Association of Clinical Endocrinology [AACE], n.d.). Its significance has also been acknowledged by the Center for Medicare and Medicaid Services [CMS], (2021) as evidenced by the addition of ‘severe hypoglycemia’ to the list of quality measures that can impact hospital reimbursement.

The ADA (2020) encourages all hospitals to implement a protocol for managing hypoglycemia such as administering 15 grams of carbohydrates and rechecking blood glucose in 15 minutes. This policy is important because “early recognition and treatment of mild to

moderate hypoglycemia (40-69 mg/dL) can prevent deterioration to a more severe episode with potential adverse sequelae" (Destree et al., 2017, p. 196). If hypoglycemia is found once again upon recheck, the treatment and recheck process is repeated to ensure the patient reaches normoglycemia.

## Literature Review

### Problem and Intervention

Although many hospitals have adopted protocols for hypoglycemia management, adherence is often low upon data analysis as found in various descriptive studies. Evidence has suggested that many hypoglycemia rechecks did not fall within the time frame of 15-30 minutes (Destree et al., 2017). Specifically, the action of rechecking glucose post-treatment occurred in less than 50% of patients with one or two hypoglycemia events (Leighton et al., 2020). Approximately 34% of individuals received a repeat glucose check and the median recheck time was 76 minutes ±14 minutes.

Arnold et al. (2013) performed a retrospective analysis at a large hospital in Michigan and found that the average post-treatment recheck was 36 minutes, which is outside the hospital policy's allotted time frame. A retrospective analysis conducted by Abusamaan et al. (2019) included 22,226 hypoglycemia readings over three years from Johns Hopkins Health System hospitals. They discovered the time to recheck ranged from 25 to 115 minutes with a median recheck time of 49 minutes.

Upon the analysis of 12 articles, three types of interventions were commonly utilized including reminders, education, and workflow change. All three interventions had a significant impact on post-hypoglycemia recheck times. However, after considering project feasibility, a reminder-based intervention was selected.

Although all four reminder-based studies aimed to prompt busy nurses to recheck blood glucose in a timely manner, they used different reminder systems including a clip-on digital timer (Destree et al., 2017), pop-up window (Gibbs, 2020), and Pyxis Medstation alert (Araque et al., 2018; Kadayakkara et al., 2019). Two studies took place in non-ICU units (Destree et al., 2017; Araque et al., 2018), while the two other studies took place hospital-wide (Gibbs, 2020; Kadayakkara et al., 2019). Regardless of the reminder system, all four studies observed a statistically significant relationship between the reminder and post-hypoglycemia recheck.

**Limitations and Barriers**

Although the literature review displays promising results, it had a few limitations. The studies were appraised based on their strength and clinical value using the Evaluating the Evidence Algorithm (James M Anderson Center for Health Systems Excellence, n.d.). Of the four reminder studies, one was 3a, two were 4a, and one was 4b. Although a higher level of evidence is preferable, the problem of interest does not lend itself to randomized controlled trials. When managing a patient safety issue, the assignment to intervention and control groups becomes an ethical concern. As a result, this body of evidence was deemed appropriate for the problem at hand. Additionally, confounding variables may have been an issue in the studies that implemented multiple interventions at once (Araque et al., 2018; Kadayakkara, 2019).

**Summary**

Improving post-hypoglycemia rechecks is a patient safety initiative that significantly affects morbidity, mortality, and hospital cost. An integrative review was conducted, and evidence was evaluated to discover evidence-based interventions. Upon the analysis of 12 articles, three types of interventions were commonly utilized including reminders, education, and workflow change. All three interventions had a significant impact on post-hypoglycemia recheck

times. However, after considering project feasibility, the intervention most appropriate for this project was a reminder tool.

## Rationale

### Needs Assessment

The selected site is an acute care community hospital with over 200 beds that has a hypoglycemia protocol for all hospitalized diabetic patients with a blood glucose value less than 70 mg/dL. The protocol involves treatment for hypoglycemia with a recheck fingerstick blood glucose 15 to 30 minutes after treatment. The Inpatient Diabetes Education Department collects monthly data on the rechecks.

The diabetes educators are concerned with the low recheck rates, so they are continually investigating strategies for improvement. The hospital-wide goal is a timely recheck rate of at least 75%. However, despite various interventions, the goal was not met once over the last three quarters (January to September of 2022). The data is further broken down by hospital unit. The target population for this project was bedside nurses in the hospital's largest unit, Medical Inpatient Services (MIPS), which was chosen to maximize project impact. The project's feasibility was enhanced due to the data collection process already in place as well as the diabetes educators who are eager for a solution.

### Conceptual Framework

The identified problem can be conceptualized with the Missed Nursing Care Model (Kalisch et al., 2009). Missed nursing care is any required patient care that is either overdue or never completed. This model displays three categories that contribute to missed nursing care including antecedents, the nursing process, and internal processes. Antecedents are conditions or situations that require the nurse to decide which cares will be provided and which will not. The

next category is the nursing process which is composed of assessment, diagnosis, planning, intervention, and evaluation. The final category is internal processes, including team norms, decision-making processes, internal beliefs, and habits.

For the problem at hand, possible antecedents included short staffing, high nurse to patient ratios, and a limited supply of glucometers. Based on the antecedents and nursing process, the nurse uses internal processes to decide whether to complete the patient care. If the norm is to only recheck glucose when it is convenient, the nurse will likely not make it a high priority. Additionally, nurses might make a nursing judgment to prioritize a more acute patient over the less acute patient who needs a glucose recheck. Also, unless post-hypoglycemia rechecks have become a deeply ingrained habit, it is easy for the nurse to forget to complete the task. Since this project could not feasibly address the antecedents, the focus was on internal processes. The reminder tool was utilized to help post-hypoglycemia rechecks become an ingrained habit.

## Purpose and Specific Aims

The purpose of this project was to provide education to all MIPS nurses regarding the utilization of a reminder tool for post-hypoglycemia rechecks. Education included a review of the post-hypoglycemia recheck policy as well as information on the reminder tool. Step-by-step handouts were given to the nurses and displayed throughout the unit. The process-based aim was acceptable usability of the reminder tool as evidenced by an average post-intervention SUS score greater than 70. The outcome-based aim was an increase in timely rechecks from 64% to 75%.

## Quality Improvement Model

The ACE Star Model of Knowledge Transformation (Stevens, 2004) is a process that depicts the transformation of knowledge into practice. It consists of five steps that include

discovery, summary, translation, implementation, and evaluation. The first step involves discovering the evidence, significance, and potential solutions to the problem at hand. Internal and external evidence of low rates of timely post-hypoglycemia recheck were found. The significance of the problem was established based on AACE and CMS. Potential solutions were discovered using PubMed, CINAHL, EBSCO, and Web of Science. For the second step, an integrative review was composed to summarize all the prior information. The third step involved selecting an intervention and determining goals. A reminder tool was chosen based on evidence as well as project feasibility. Also, specific goals were made regarding the reminder tool's usability and improvement in timely post-hypoglycemia recheck rates.

The fourth step involved implementation with the target population. This included explaining how to use the reminder tool and distributing the step-by-step handout to nurses on the MIPS unit. The last step consisted of data collection, analysis, and evaluation. This included hypoglycemia and SUS data collection, analysis, and evaluation to determine if project goals were met.

## Methods

### Design

This was a quality improvement project that involved nursing education on the post-hypoglycemia recheck policy as well as the use of a reminder tool. Nurses employed on the MIPS unit at the time of intervention were selected for this project. The rate of timely post-hypoglycemia rechecks were compared pre-intervention vs. post-intervention. Also, usability of the reminder tool was measured post-intervention using the SUS.

## Setting and Sample

The project site is an acute care community hospital with over 200 beds. The target population was bedside nurses in the hospital's largest unit, Medical Inpatient Services (MIPS). The inclusion criteria included being employed as a bedside nurse on the MIPS unit at the time of intervention. This included all part time, full time, travel, and PRN nurses ($n$ = 38). Although patient care assistants (PCAs) can do the recheck, this project's target population was bedside nurses, so the exclusion criteria included PCAs. Education was provided at various shift huddles to reach as many nurses as possible. As far as data collection, all hypoglycemia episodes (blood glucose value below 70 mg/dL) on the MIPS unit were included in the analysis.

## Context

Interviews with nurses revealed additional insight into root causes of the problem (personal communication, September 19, 2021). Nurses admitted to forgetting to recheck fingerstick blood glucose when there are no reminders. Another barrier was short staffing, so nurses may be too busy to recheck within the allotted time frame. Another significant issue on their unit is a limited supply of glucometers, so it becomes difficult to perform a timely recheck when they are all being used.

Key stakeholders included the MIPS unit manager and the director of inpatient diabetes educators. Both stakeholders were involved in the planning process and provided feedback along the way. Approval letters were obtained from the MIPS unit manager and the director of inpatient diabetes educators (Appendix A).

Potential project barriers included coronavirus and time constraints. Hospitals were more focused on coronavirus concerns than on quality improvement projects, so the project's significance had to be emphasized to administration. Time is always a potential barrier when

providing education to busy nurses, so implementation took place at huddle before the shift began.

**Ethical Considerations**

Ethical concerns were considered during the project. Since this quality improvement project involved a survey, implied consent was warranted. The implied consent letter was given to the MIPS nurses pre-intervention and post-intervention. Data collection was performed via chart audits by diabetes educators on encrypted and password-protected computers. Only de-identified data was given to the doctorate student, HIPAA policy and procedures were followed, and SUS responses remained anonymous. Additionally, approvals were obtained via an Authorization Agreement from the University of Louisville IRB, an IRB approval from the project site, and the agency approval from the organization's vice president.

**Intervention Implementation**

The project plan was outlined using a GANTT chart (Appendix B). Based on the literature review and project feasibility, a reminder-based nursing intervention was selected. The project site uses Epic software which offers nurses the ability to manually add reminders. This function was available, but not well-known. When nurses log into Epic and scan the hypoglycemia medication, they can add a recheck reminder. Since the hospital-wide policy requires the recheck to occur within 15 to 30 minutes, it is appropriate to make the recheck reminder appear in Epic as a task due 30 minutes after treatment.

The budget included the meeting area for presentations, printed handouts, time, and travel. The meeting area for presentations was of no cost as it took place on the MIPS unit during shift huddle. The 50 color copies of the step-by-step reminder tool handout at $0.60 per copy cost a total of $30.00. The 50 black and white copies of the SUS handout at $0.18 per copy cost a

total of $9.00. These quotes were obtained from a local printing company, and the $39 was paid for by the doctorate student. Time was required of the certified diabetes educator to collect data, but the data collection process was already in place. Time was also required of the MIPS nurses to attend the presentation, but the presentation took place at shift huddle during the nurses' normally scheduled shift. Time was also required of the doctorate student for presentations, SUS administration, and data analysis, but this project time was already built into the doctorate program. Finally, the doctorate student traveled to and from the hospital for presentations and SUS administration. There was a total of eight site visits, including five visits for presentations and three visits for SUS administration. Each visit was 19 miles roundtrip, so the total mileage was 152 miles. Based on the vehicle's average of 25 miles per gallon and the current price of $4 per gallon, this cost $24.32. The cost of gas was paid for by the doctorate student.

The implementation plan included reviewing the current hospital-wide hypoglycemia treatment policy (Appendix C), describing how to use the reminder tool within Epic, and distributing a step-by-step handout (Appendix D) as well as the implied consent (Appendix E) during shift huddle. This was done by the doctorate student who attended multiple shift huddles throughout January of 2023 to reach all the MIPS nurses. Following the education session, nurses signed next to their name to verify attendance. The step-by-step handout was also displayed on the wall in the staff breakroom. Of the 38 nurses employed on the MIPS unit, the doctorate student was able to provide education to 35 nurses. The three nurses that were unable to be reached were due to scheduling conflicts or call-ins (n=2) and nurses on leave (n=1).

The doctorate student then returned to the unit in March of 2023 for SUS administration (Appendix F) as well as another copy of the implied consent. Of the 35 nurses that attended the education sessions, 24 nurses were able to receive the SUS. Exceptions included scheduling

conflicts and call-ins (n=6), nurses on leave (n=3), and nurses that quit (n=2). Of the 24 distributed surveys, the doctorate student received 15 completed surveys.

## Measures

### *Outcome Measure*

Hypoglycemia data was based on blood glucose readings on a CLIA waived system called Accu-Chek Inform II (Roche, 2020). Hospital-wide as well as unit-specific hypoglycemia data was collected monthly. This data was collected via chart audits by a Certified Diabetes Educator (CDE) with password-protected access. De-identified data was entered into an Excel spreadsheet and given to the doctorate student. Timely rechecks were defined as glucose rechecks that occurred within 30 minutes after a blood glucose reading less than 70mg/dL. For pre-intervention, data was utilized from July, August, and September of 2022. For post-intervention, data was collected in February, March, and April of 2023.

### *Process Measure*

Usability of the reminder tool was measured with the SUS. The SUS is a standardized, freely available tool that quickly evaluates usability of a product (Brooke, 1996). It consists of 10 Likert-type questions each scored on a five-point scale. Its reliability has been demonstrated with a Cronbach alpha of 0.91 (Bangor et al., 2008). The author of SUS gave permission for the use of SUS as well as the substitution of the word ‘tool’ for the word ‘system’ (Appendix G). The doctorate student administered this survey to the MIPS nurses post-intervention in March of 2023. To ensure data completeness, each nurse’s name was checked off upon SUS administration.

**Data Analysis**

For hypoglycemia data collection, the independent variable was the reminder tool, and the dependent variable was the rate of timely post-hypoglycemia rechecks. The hypoglycemia data was analyzed to determine if the outcome-based aim of an increase in timely recheck rate from 64% to 75% was met. The data was also analyzed with a two-proportion left-tailed Z-test to test statistical significance. Data was evaluated to determine if the project outcome was met for timely recheck rates.

For the SUS data collection, the independent variable was the reminder tool, and the dependent variable was the SUS score. The test included central tendencies such as mean since this is a continuous variable within one group. However, the raw scores required adjustment because the questions alternated between positive and negative statements. Scores were adjusted by subtracting one from each odd-numbered question score and subtracting each even-numbered question score from five (Sauro, 2011). Next, the scores were summed and multiplied by 2.5 to get the overall value of SUS. This score adjustment was done by the doctorate student. A SUS score greater than 70 is acceptable, scores between 50 and 70 is marginal, and scores less than 50 is unacceptable (Bangor et al., 2008). The SUS data was analyzed to determine if the process-based aim of a SUS score greater than 70 was met.

There were various facilitators and barriers in the data analysis process. Facilitators included the access to baseline data and the use of Minitab. Since the Inpatient Diabetes Education Department already had a data collection process in place, baseline data was available to compare pre- vs. post-intervention. Additionally, Minitab, a statistics software, was helpful in determining statistical significance and drawing conclusions from the data.

Barriers included the small sample size, Glucommander, and nursing turnover. The small sample size limited the generalizability of the project's findings. A possible confounding variable was Glucommander, a new glucose management software that went live a few months prior to project implementation. However, it was only ordered on select patients, so this was considered during data analysis and evaluation. Finally, nursing turnover may have falsely impacted hypoglycemia recheck data because two nurses quit, and multiple nurses were on orientation or coming off orientation during the data collection period.

## Results

### Outcome Measure

The pre-intervention and post-intervention data are presented in Table 1. The average timely recheck rate increased from 64% pre-intervention to 74% post-intervention (Table 2). A two-proportion left-tailed z-test was performed to determine whether the increased recheck rate was statistically significant (Table 3).

**Table 1**

*Number of Timely and Total Post-hypoglycemia Rechecks*

| | Pre-intervention | | | Post-intervention | | |
|---|---|---|---|---|---|---|
| | *July 2022* | *Aug. 2022* | *Sept. 2022* | *Feb. 2023* | *Mar. 2023* | *Apr. 2023* |
| **Timely rechecks** | 49 | 35 | 37 | 32 | 46 | 16 |
| **Total rechecks** | 68 | 63 | 58 | 45 | 60 | 22 |

**Table 2**

*Descriptive Statistics Pre-intervention vs. Post-intervention*

| Descriptive Statistics | | |
|---|---|---|
| | *Pre-intervention* | *Post-intervention* |
| **Timely rechecks** | 121 | 94 |
| **Total rechecks** | 189 | 127 |
| **Proportion** | 0.64 | 0.74 |

**Table 3**

*Two-proportion Left-tailed z-test*

| Two-proportion Left-tailed *z*-test | |
|---|---|
| **Difference** | -0.099 |
| **95% upper bound for difference** | -0.014 |
| ***z*-score** | -1.91 |
| ***p*-value** | 0.028 |

### Process Measure

Based on the analysis of all completed SUS surveys in March of 2023 ($n$ = 15), the adjusted scores were calculated ($M$ = 82, $SD$ = 13). The lowest scoring item overall was question eight. The highest scoring item overall was question 10.

## Discussion

### Summary

This project utilized a reminder tool to increase timely post-hypoglycemia recheck rates. The outcome-based aim was an increase in timely rechecks from 64% to hospital-wide goal of 75%. This outcome-based aim was narrowly missed based on the post-intervention average timely recheck rate of 74%. However, there was a statistically significant increase in the timely recheck rate from pre-intervention to post-intervention. The process-based aim was acceptable usability of the reminder tool as evidenced by an average post-intervention SUS score greater than 70. This process-based aim was met based on the average SUS score of 82.

### Interpretation

In this project, the reminder tool was associated with an increase in timely post-hypoglycemia recheck rates. This finding is consistent with the current evidence identified during literature review. However, the goal of a timely recheck rate of 75% was not quite reached. Additionally, although there was a 9.9% increase in timely recheck rates, it can only be

said that there was a 1.4% increase with 95% confidence. The confidence interval could be improved in the future with an increased sample size via a longer period of data collection or the inclusion of more than one hospital unit. This would allow more specific conclusions to be drawn regarding the association between the reminder tool and timely recheck rates.

The reminder tool's usability was deemed acceptable based on the average SUS score. However, it was worth noting the questions that scored the lowest and highest. The highest scoring item was question ten which indicated that the nurses did not feel that they need to learn many things before they could get going with the tool. This translates to very brief education sessions which is beneficial when time is a limiting factor in nursing education. The lowest scoring item was question eight which indicated that nurses found the tool cumbersome to use. During the project implementation, multiple nurses acknowledged the need for a reminder, but expressed their doubts with this manual reminder.

**Limitations**

There were multiple limitations as far as generalizability, internal validity, and reliability. This project has limited generalizability because it was only implemented on one unit within one hospital. Also, there was no method of tracking the select number of patients on Glucommander, so this was a potential confounding variable that must be considered. The participant dropout was a potential threat to internal validity. Of the 35 MIPS nurses that were provided education, only 15 completed surveys were collected. This project also has limited reliability because two nurses quit, and multiple nurses were on orientation or coming off orientation during the data collection period. This means that post-intervention data was influenced by nurses who had not participated.

## Conclusions

This project found an association between the reminder tool and timely post-hypoglycemia recheck rates. However, a larger sample size and a longer study period would be needed to strengthen this association. This continued monitoring would be possible because of the monthly data collection process already put in place by the diabetes educators. If future studies further prove this intervention's effectiveness, consideration should be given to including this education in all new hire orientations as well as annual competencies.

This project also identified acceptable usability of a reminder tool currently available to all nurses using Epic software. Although nurses required very little education on how to use the tool and acknowledged the need for a reminder, they found this reminder tool quite cumbersome in practice. A recommended next step would be the pursuit of an automatic reminder as opposed to a manual reminder. For example, Gibbs (2020) implemented a pop-up window within Epic that automatically appeared following hypoglycemia. This template was added to the Epic library, which is available to all organizations that use Epic, so this would be a very practical and likely beneficial hospital-wide intervention.

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# Appendix A

## Letters of Approval

*Dear whom it may concern,*

*It is my absolute pleasure to support Laken Heitz in her DNP QI project, "Utilizing a Reminder Tool to Improve Post-Hypoglycemia Recheck Rates on a Medical Inpatient Unit", here at Baptist Health Floyd.*

*Please feel free to contact me at Kristina.Sinex@BHSI.com should you like to discuss further.*

*Best wishes,*

Kristina Sinex MSN, BSN, RN-BC

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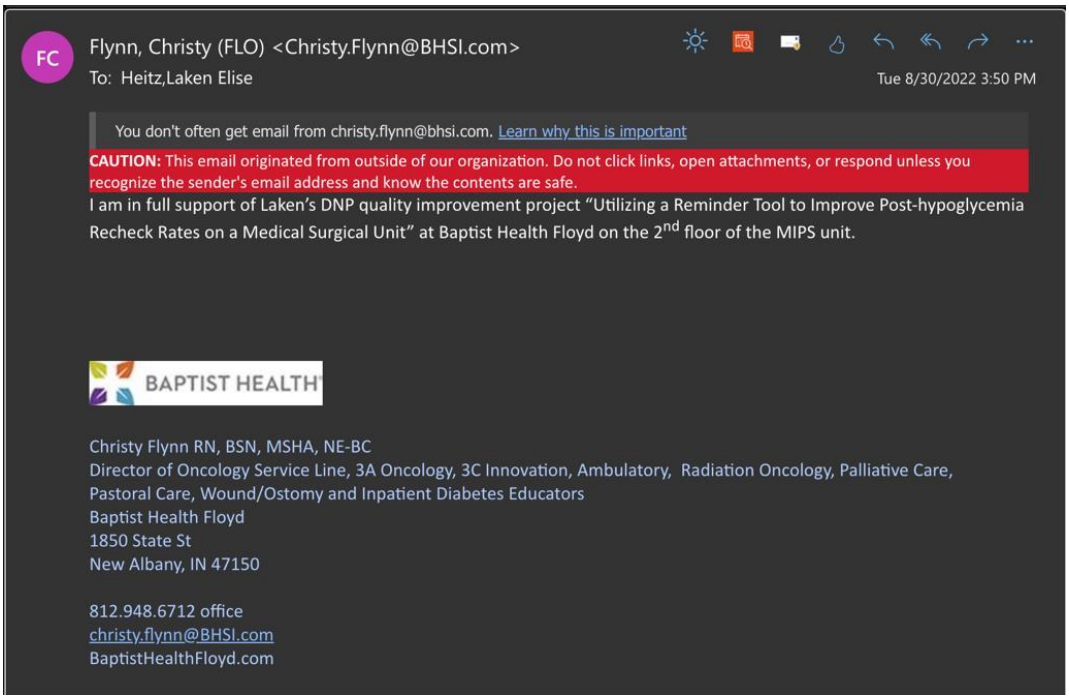

FC

Flynn, Christy (FLO) <Christy.Flynn@BHSI.com>

To: Heitz,Laken Elise

Tue 8/30/2022 3:50 PM

You don't often get email from christy.flynn@bhsi.com. Learn why this is important

**CAUTION:** This email originated from outside of our organization. Do not click links, open attachments, or respond unless you recognize the sender's email address and know the contents are safe.

I am in full support of Laken's DNP quality improvement project "Utilizing a Reminder Tool to Improve Post-hypoglycemia Recheck Rates on a Medical Surgical Unit" at Baptist Health Floyd on the 2nd floor of the MIPS unit.

BAPTIST HEALTH

Christy Flynn RN, BSN, MSHA, NE-BC
Director of Oncology Service Line, 3A Oncology, 3C Innovation, Ambulatory, Radiation Oncology, Palliative Care, Pastoral Care, Wound/Ostomy and Inpatient Diabetes Educators
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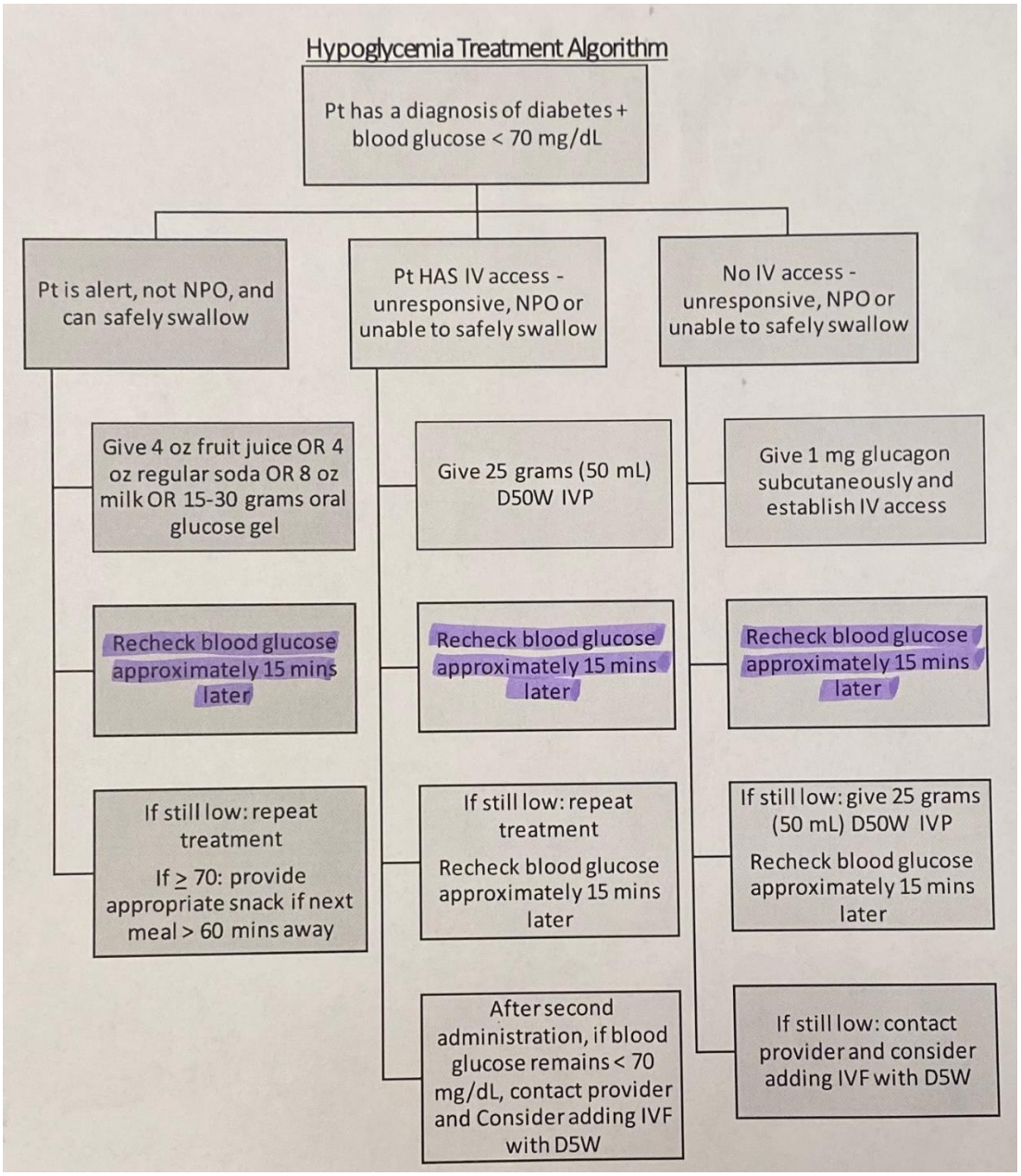
## Appendix B

## GANTT Chart

| | Nov 2022 | Dec 2022 | January 2023 | Feb 2023 | March 2023 | April 2023 | May 2023 | June 2023 | July 2023 | August 2023 |
|---|---|---|---|---|---|---|---|---|---|---|
| Proposal defense | | | | | | | | | | |
| IRB submission | | | | | | | | | | |
| Project implementation | | | | | | | | | | |
| Data collection | | | | | | | | | | |
| Data analysis | | | | | | | | | | |
| DNP project paper | | | | | | | | | | |
| Defense poster presentation | | | | | | | | | | |

## Appendix C

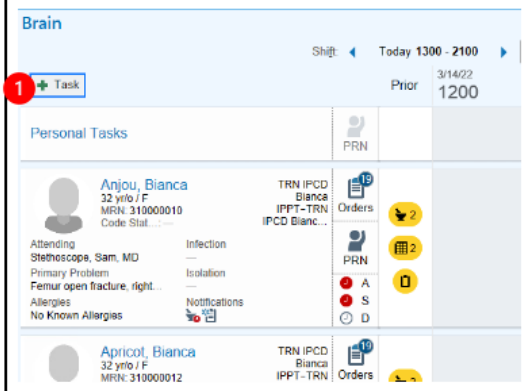
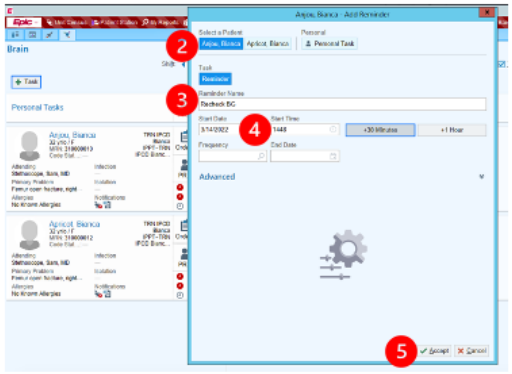
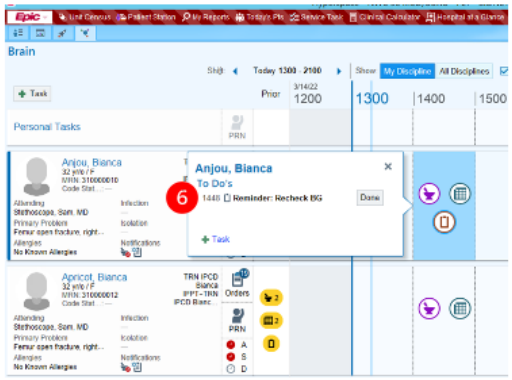
## Hypoglycemia Treatment Policy



## Appendix D

## Step-by-Step Handout

# HOW TO: Add a Reminder to Recheck Blood Glucose

| | |
|---|---|
| 1. Click + **Task**. |   |
| 2. Select the correct patient.<br>3. Type "Recheck BG" into **Reminder Name.**<br>4. Type "n" into **Start Time** and click **+30 Minutes.**<br>5. Click **Accept.** |   |
| 6. Reminder will appear on Brain. |   |

## Appendix E

## Implied Consent

Dear MIPS nurse,

My name is Laken Heitz, and I am a DNP student at the University of Louisville. I've received permission to conduct a research study on this MIPS unit at Baptist Health Floyd, and you are invited to participate. I am interested in post-hypoglycemia recheck rates. I plan to use the information gained from this study to recommend a hospital-wide reminder tool.

Participation in this study involves filling out a survey that will take approximately 5-10 minutes. If you agree to participate, I ask that you answer the 10 questions to the best of your ability. All responses are anonymous.

Your participation or lack of participation will not change your employment at Baptist Health Floyd or the Baptist Health System. The only risk to you, if you choose to participate, is the potential loss of confidentiality. We will make every effort to prevent anyone who is not on the research team from knowing that you gave us information. Any information you provide will be kept in a confidential file that only the principle investigator can access. This study may be reviewed by the Baptist Health Lexington Institutional Review Board (IRB).

Completing this questionnaire can contribute to our knowledge about post-hypoglycemia recheck rates. Study results may be submitted for publication in a national journal but you will not be identified as a participant in the study. Of course, you have a choice about whether or not to complete the System Usability Survey, but if you do participate, you are free to skip any questions or discontinue at any time.

Thank you in advance for your anticipated participation,

Laken Heitz, BSN, RN, DNP student
University of Louisville
lecomi01@louisville.edu
812-989-8914

# Appendix F

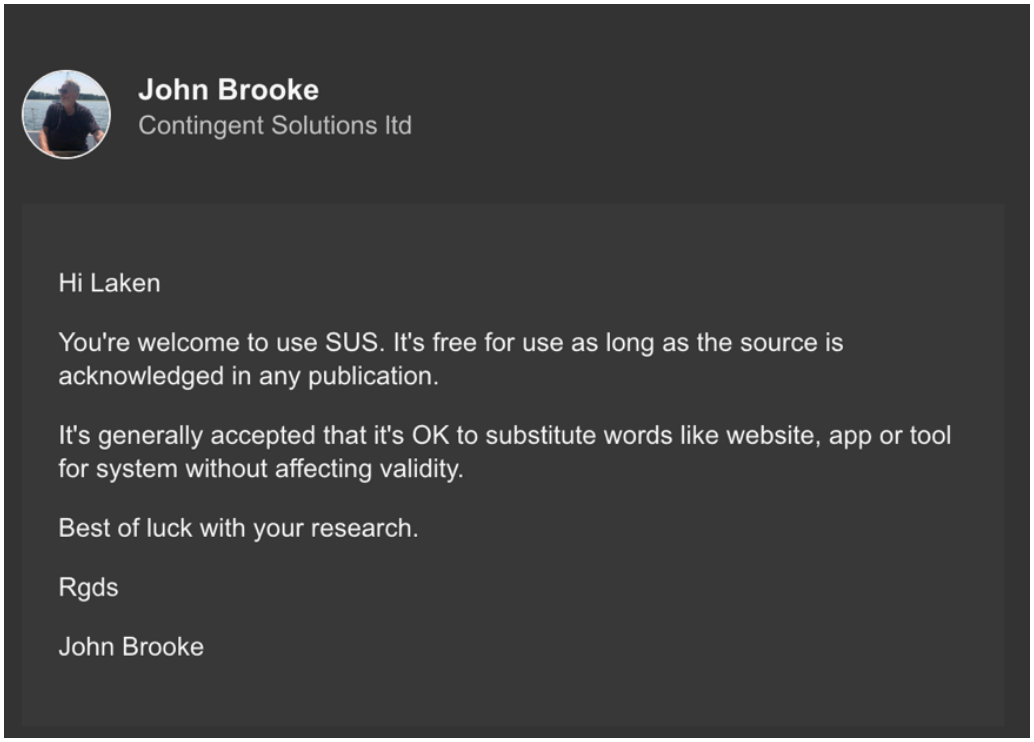
## The SUS Survey

### System Usability Scale (SUS) Survey

| | *Strongly disagree* | | | | *Strongly agree* |
|---|---|---|---|---|---|
| 1. I think that I would like to use this tool frequently | 1 | 2 | 3 | 4 | 5 |
| 2. I found the tool unnecessarily complex | 1 | 2 | 3 | 4 | 5 |
| 3. I thought the tool was easy to use | 1 | 2 | 3 | 4 | 5 |
| 4. I think that I would need the support of a technical person to be able to use this tool | 1 | 2 | 3 | 4 | 5 |
| 5. I found the various functions in this tool were well integrated | 1 | 2 | 3 | 4 | 5 |
| 6. I thought there was too much inconsistency in this tool | 1 | 2 | 3 | 4 | 5 |
| 7. I would imagine that most people would learn to use this tool very quickly | 1 | 2 | 3 | 4 | 5 |
| 8. I found the tool very cumbersome to use | 1 | 2 | 3 | 4 | 5 |
| 9. I felt very confident using the tool | 1 | 2 | 3 | 4 | 5 |
| 10. I needed to learn a lot of things before I could get going with this tool | 1 | 2 | 3 | 4 | 5 |

## Appendix G

## Permission for SUS Use



**John Brooke**
Contingent Solutions ltd

Hi Laken

You're welcome to use SUS. It's free for use as long as the source is acknowledged in any publication.

It's generally accepted that it's OK to substitute words like website, app or tool for system without affecting validity.

Best of luck with your research.

Rgds

John Brooke