

University of New Hampshire

University of New Hampshire Scholars' Repository

Master's Theses and Capstones

Student Scholarship

Summer 2023

Improving Nursing Intake and Output Documentation Utilizing Chart Audits and Staff Education: A Quality Improvement Initiative

Cayla Marie Barretto

University of New Hampshire, Durham

Follow this and additional works at: <https://scholars.unh.edu/thesis>

Recommended Citation

Barretto, Cayla Marie, "Improving Nursing Intake and Output Documentation Utilizing Chart Audits and Staff Education: A Quality Improvement Initiative" (2023). *Master's Theses and Capstones*. 1674.
<https://scholars.unh.edu/thesis/1674>

This Thesis is brought to you for free and open access by the Student Scholarship at University of New Hampshire Scholars' Repository. It has been accepted for inclusion in Master's Theses and Capstones by an authorized administrator of University of New Hampshire Scholars' Repository. For more information, please contact Scholarly.Communication@unh.edu.

**Improving Nursing Intake and Output Documentation Utilizing Chart Audits and Staff
Education: A Quality Improvement Initiative**

Cayla Barretto

University of New Hampshire

Faculty Mentor: Pamela Kallmerten PhD, DNP, RN, CNL

Practice Mentor: Bronwyn Gallant, MS, RN, CNL

Date of Submission: July 28th, 2023

Table of Contents

Abstract.....	4
Introduction.....	5
Problem Description	5
Available Knowledge.....	6
Rationale	10
Specific Aim	11
Methods	11
Context.....	11
Intervention.....	14
Study of the Intervention	16
Measures.....	16
Analysis.....	17
Ethical Considerations.....	17
Results.....	18
Results.....	18
Discussion.....	22
Summary.....	22
Interpretation.....	24
Limitations.....	25

Conclusions	26
References.....	28
Appendix A.....	30
Appendix B.....	31
Appendix C.....	32
Appendix D.....	33
Appendix E.....	34

Abstract

Background: Inaccurate and unreliable fluid balance documentation has been a long-standing issue in nursing. Best practice for “strict intake and output monitoring” is real-time accurate documentation.

Local Problem: Within a medical-surgical microsystem, it was identified that intake and output documentation (I/O) was not being completed thoroughly. A brief chart audit was conducted to identify gaps in documentation. In total, forty charts were audited, and two charts (5%) passed the audit. Common areas where documentation was incomplete included daily weights, output entered as “unmeasured occurrence”, IV fluid administration not totaled, or no intake recorded at all. We aimed to see a 30% increase in passed audits after intervention.

Methods: The *A3 Problem Solving* model for quality improvement was used as a framework for this project (*A3 Problem*, 2022). This model is based on the Plan, Do, Check, Act model. Chart audits were used during the *plan* phase to establish current state and a staff education on intake and output documentation was developed during the *do* phase.

Interventions: The intervention includes a pre-and-post intervention chart audit on patients ordered for “strict intake and output”. As well as a microsystem specific “intake and output” documentation and importance education poster.

Results: All elements of the chart audits saw at least a 30% increase in “pass” rates. This included intake, output, and fluid administration totals. It was also found that many fall-outs were patients that were ambulating to the bathroom independently.

Conclusion: This quality improvement project saw a positive impact on documentation after staff education and chart auditing. Further efforts should go into identifying a process for educating independent patient on the need to report their intake and output.

Key words: intake and output, I/O, documentation, charting, nursing staff, nursing practice

Introduction

Problem Description

Within a medical-surgical microsystem, it was identified that intake and output documentation (I/O) was not being completed thoroughly. This microsystem primarily serves surgical patients that require close monitoring of intake and output prior to and after surgical intervention. Currently, there is no policy in place or guidelines regarding what “strict intake and output” documentation expectations are. Through weekly meetings with unit specific providers, it was discussed that inaccurate documentation was impacting patient care. The microsystem hospitalists stated that when patients decompensate, accurate I/O records would have aided in assessing acute changes (C. Brauer & M. Trautwein, personal communication, February 21, 2023). This has led to delays in prescribing necessary interventions in a timely manner.

After this feedback was received, a brief chart audit in March and April was conducted to identify gaps in documentation. On average, thirty-six percent of the patients were ordered for “strict intake and output”. In total, forty charts were audited. Of these forty charts, only two charts (5%) passed the audit. Common areas where documentation was incomplete were recording a patient’s daily weight, output entered as “unmeasured occurrence”, IV fluid administration not totaled, or no intake recorded at all. To further identify barriers to documentation, a root cause analysis was completed using a fishbone template with the *Unit Practice Council* (Appendix A). This was used to identify where an intervention would be most impactful.

We aimed to improve intake and output documentation accuracy on the microsystem. Intake and output documentation is important to support the mission of the organization to which

is “... to assist patients and their families to achieve the highest level of physical and emotional health” (Elliot Hospital, 2023). This process begins with a provider-initiated order for “strict intake and output monitoring” and ends with nursing documentation of the patient’s intake and output. “Strict intake and output monitoring” is defined by the macrosystem as documentation of all intake and output the patient has throughout their stay or until the order is discontinued (B. Gallant, personal communication, February 21, 2023).

Available Knowledge

Inaccurate and unreliable fluid balance documentation has been a long-standing issue in nursing. Prior to the use of an electronic medical record, intake and output was often tracked on paper chart. Now that most healthcare facilities have moved to electronic documentation continued support and education needs to be utilized to ensure accurate documentation. Best practice for “strict intake and output monitoring” is real-time documentation that accurately reflects everything the patient is intaking in through all routes as well as excretion of any type of fluid.

“Fluid balance” is defined as the balance between the volume of water lost from the body and the volume of water gained (McGloin, 2014). The identification of a patient’s fluid balance is primarily driven by nursing documentation in addition to assessment findings. This includes recording all the patient’s intake and output. “Intake” can include oral, enteral, and parenteral routes as well as intravenous administration of medications and fluids. “Output” includes voiding, stool, emesis, wound drainage, as well as surgically implanted drain output. Both positive and negative fluid balance have the power to negatively impact patient outcomes. Positive fluid balance is associated with cardiac, liver, and renal failure while negative fluid balance can lead to fatigue, confusion, reduced cardiac output, and oliguria (McGloin, 2014).

Monitoring a patient's intake and output can help the healthcare team intervene before this dysfunction begins to occur.

The assessment of fluid balance is especially important for patients on the microsystem because they often are transferred to this level of care after being in the Intensive Care Unit. Also, many patients are post-surgical at the time of transfer. The fluid balance of critically ill surgical patients (on days 4 to 7) has a consistent impact on long-term mortality (Wu et al., 2021). If patients are beginning to become fluid overloaded or dehydrated at this point in their stay it needs to be rapidly identified to prevent long-term complications. Therefore, it is crucial that the staff is knowledgeable about the impact of fluid balance on patient outcomes and diligent when it comes to documentation.

Search Methods

The databases used to find articles were MEDLINE and PUBMED. Articles were limited to the past ten years to ensure evidence was up to date. The following keywords were used to search the database: intake and output, I/O, input, and output; monitoring, assessing, documentation, charting; medical record, nursing, nurses, nurse, nursing staff, nursing practice, and health care worker.

The keyword search resulted in two hundred and three articles. The PRISMA flow diagram (Appendix E) outlines the screening process. The nature of most of the studies were quantitative data as they were auditing charts retrospectively pre-and-post intervention. Five articles within the search fit these criteria.

Critical Appraisal of Subjects

The settings of the articles reviewed were all medical surgical units except for Vincent & Mahendiran (2015) which was conducted on a respiratory ward. The sample sizes used by the

authors varied. Lim et al. (2021) audited 2,199 charts pre-intervention meanwhile Madu et al. (2021) completed a “snap audit” of forty charts on one chosen day. The size of units also varied with as few as twenty-nine patient beds and as many as forty (Albsoul et al, 2022; Madu et al. 2021).

Critical Appraisal of Problem Identification

While the issue of inaccurate charting was highlighted in all the articles, two did not enact an intervention and only identified current state. Albsoul et al. (2022) highlighted intake and output as a missed portion of nursing care by surveying the nurses’ perceptions. Intake and output were cited as the second most missed nursing care reported by the nurses. Lim et al. (2021) also identified that seventy-seven percent of patient intake and output charts were inaccurate with “void in toilet” being the most common mistake. For further implications, both authors did cite that education and further staff training should be considered in further quality improvement work.

Critical Appraisal of Intervention Being Evaluated

The foundation of many of the interventions implemented involved a form of chart auditing followed by dissemination of an education for staff and reauditing to evaluate for improved learning. Vincent & Mahendiran (2015) created an online learning module for staff education. In addition to the education, the authors also displayed posters around the unit to continue to bring awareness forward. Madu et al. (2021) had staff engage in one-on-one education as well as displayed posters and information around the unit. Meanwhile, Jeypala et al. (2015) took a different approach and used a visual cue to influence intake and output documentation. This involved a magnet located on the care board in the patient’s room to denote that the patient needed intake and output recorded.

Critical Appraisal of Findings

Vincent & Mahendiran (2015) and Madu et al. (2021) saw improvement in intake and output documented after implementation of an online learning module. Prior to education Vincent & Mahendiran (2015) had thirty percent completion of documentation compared to seventy percent post-intervention. Madu et al. (2021) had similar results with only fourteen percent completion pre and sixty-eight percent improvement post after completing one-on-one staff education. Meanwhile, with the implementation of a visual cue Jeypala et al. (2015) did not see any improvement in documentation.

The articles were then evaluated using the Quality Assessment Pyramid Haber & LoBiondo-Wood, (2018). Three of the articles were quasi-experimental research and were categorized as level III evidence. These three articles identified the problem on their unit and selected an intervention to implement. Pre- and post-intervention data was collected to identify improvement. Meanwhile, two articles only identified the issues on their unit these articles were identified at level IV as they were single nonexperimental studies.

Implications for this Quality Improvement Project

Overall, the review of the literature provides supporting evidence that staff education has a strong impact on intake and output documentation. A key recommendation is that after training and education the practice is continually reinforce. Vincent & Mahendiran (2015) used an online education module for this purpose. The macrosystem education team does have “*Health Stream*” which is used for online education modules. The use of an online module for education regarding this topic on the microsystem was proposed for this project. However, through stakeholder feedback it was discovered that nursing staff do not retain information in this format and simply click through the module (Unit Practice Council, personal communication, April 27th, 2023).

This was further reinforced in discussions with the unit educator who stated, “HealthStream is often not impactful due to nurses just clicking through the module and not paying attention to the content” (L.Paris, March 30th, 2023).

Madu et al. (2021) had staff engage in one-on-one education as well as displayed posters and information around the unit. One-on-one education of staff in the microsystem would not be feasible due to the number of staff, rotating days, limited educator availability, and a high number of traveling nurses, and turnover. While one-on-one education guarantees the staff will hear the message it is not feasible for this project timeline and team size.

Jeypala et al (2015) had used a sign outside the patient room to flag healthcare providers that the patient needed intake and output monitoring. However, it did not achieve a significant improvement in documentation. Originally, during the development of this project stakeholders endorsed the idea of a sign. On further investigation, it was realized that the unit educator had previously printed signs for this purpose, and they were initially implemented. Over time, the nursing staff stopped utilizing the signage. Therefore, this intervention did not appear to be strong enough to sustain change.

Lim et al (2021) suggests that regular auditing occur to identify areas for opportunity. Albsoul et al (2022) also suggests a deeper look be taken as to what nurses perceive as the barriers to this documentation. With these recommendations in mind, to improve intake and output documentation, a chart auditing process and staff education will be developed.

Rationale

The *A3 Problem Solving* model for quality improvement was used as a framework for this project (*A3 Problem*, 2022). This model is based on the Plan, Do, Check, Act model. During the *Plan* phase charts were audited to assess current state. After this audit, a root-cause-analysis

was performed. This involved surveying members of the *Unit Practice Council* as to what they perceive are the barriers to documentation. During the *Do* phase a nursing staff education implemented highlighting the components of intake and output documentation and ways to mitigate barriers was created. This education was presented in a tri-fold poster placed in the unit break room as well as posted on the unit's Facebook page. The *check* phase involved auditing the charts again with the same process as pre-intervention. Finally, the *act* phase involved presenting the findings to the microsystem to identify areas for further work.

Specific Aim

The tri-fold education poster regarding strict intake and output documentation was displayed in the staff break room starting June 8th, 2023, and posted to the unit's Facebook page. After registered nurses and licensed nursing assistants reviewed the education, we aimed to see a 30% increase in passed audits by July 10th, 2023.

Methods

Context

A 5P assessment was conducted on the microsystem to understand the current state of the unit and to establish the purpose of this quality improvement project. Information regarding the purpose, patients, professionals, and processes of the unit were identified.

Purpose

The microsystem is a medical-surgical unit that provides care to post-surgical patients. The unit also has the compacity for post-surgical telemetry monitoring. The unit's mission is stated on the hospital website as "to make your stay here... as pleasant as possible and to assist patients and their families to achieve the highest level of physical and emotional health" (Elliot

Hospital, 2023, p.3). This mission focuses on helping patients become active participants in their care as they recover from surgical procedures.

Patients

Those that are admitted to this unit include a variety of surgical patients. Examples of surgical services include general abdominal, orthopedic, bariatric, ear, nose, and throat, vascular, trauma, urology, plastics, lung, and spine (Elliot Hospital, 2023). Common diagnoses under these services include small bowel obstruction, abscess formation, sepsis, falls, and motor vehicle accidents. Many of the patients on this unit are admitted under the Trauma and Acute Care Service (TRACS). Patients are predominantly admitted from surgical services or the emergency department. Inpatient length of stay is typically 7.69 days with a mortality rate of 4.46 patients per 1,000 (Tableau, 2022).

Fluid balance monitoring is especially important for this population. Postoperative patients are at an increased risk for fluid imbalance as bodily fluid composition can change rapidly resulting in impaired wound healing and homeostasis (Kayilioglu et al., 2015). The average age of this patient population is 65 years old (B. Gallant, personal communication, 2023). This population is more susceptible to dehydration and electrolyte abnormality due to physical disability as well as intragenic causes (El- Sharkaway et al., 2014). This reinforces the need for accurate and timely documentation when caring for this population.

Professionals

The main services on the microsystem include Trauma and Acute Care Surgery (TRACS) and orthopedics due to the surgical population of the floor. Other specialties such as hospitalists, palliative care, neurology, etc. may also be consulted depending on the patient's needs. Members of the care team for these services include physicians, physician assistants (PAs), and nurse

practitioners (NPs). Assigned to the patients each shift are also a registered nurses and licensed nursing assistant. Meanwhile, interdisciplinary team members consulted for the patient include physical therapists, occupational therapists, speech therapy, social workers, case managers, and respiratory therapists.

Patients are assigned a registered nurse (RN) and licensed nursing assistant (LNA) for each shift. There is also a dedicated unit rounder who also provides care. Intake and output documentation responsibilities overlap with these roles. LNAs can document any oral intake as well as output from surgical drains, voids, stool, or urinary catheters. RNs can document this data in addition to medication, fluid administration, and tube feeding volumes.

During the day shift nursing leadership may be present such as the unit manager and clinical nurse leader. The staffing structure has nursing scheduled with a charge nurse, resource nurse, and team lead each shift. These roles provide support for nursing care and can intervene in critical or difficult situations.

Process

When the patient is admitted to the unit the attending provider service inputs admission orders. When the patient arrives to the unit these orders are released by the admitting nurse and become active. One of the orders used depending on provider preference and patient diagnosis includes “strict intake and output”. This order should prompt nursing staff to measure and document all intake and output for the patient. This information can then be used by providers to guide treatment for the patient.

Depending on patient condition this order may prompt the nurse or licensed nursing assistant to collaborate on the best way to collect patient output. This can include external catheters, cylinder to measure foley catheter output, or a hat/urinal to aid in output measurement.

If either the registered nurse or licensed nursing assistant is unaware of this order, then intake and output may go unmeasured.

Cost Benefit Analysis

The costs for this quality improvement project include poster materials to create an intake and output education, paper to print chart audit cards, and the target that displays the audit information. In addition, to incentivize nurses to view the education a tumbler mug was purchased for \$10. Staff signed off their name that they viewed the education and put down a guess for how many milliliters they thought the tumbler could hold. The closest staff member got to keep the tumbler. These materials totaled \$40. A total of 500 hours were spent on pre-intervention data collection, auditing, intervention education, post-intervention auditing, and data analysis.

Perceived benefits of this quality improvement project are improved patient outcomes related to fluid balance. Both fluid overload and dehydration have increased costs per visit for the macrosystem. It has been found that fluid overload can increase hospital costs by as much as \$14, 062 per visit (Magee & Zbrozek, 2013). This complication also has an impact on length of stay. The length of stay for a patient experiencing fluid overload is 29% longer than those hospitalized without this complication (Magee & Zbrozek, 2013). Prompt assessment of these issues and intervention can help to leverage these costs and reduce length of stay. The main tool for these assessments is documentation to analyze 24-hour intake and output.

Interventions

This project included the use of a chart audit and staff education to improve intake and output documentation compliance in patients ordered for “strict intake and output”. The team

involved in this project was microsystem providers, nursing staff, *Unit Practice Council*, and the Clinical Nurse Leader.

At the beginning of this project the *Unit Practice Council* wanted to implement a microsystem standard of strict intake and output documentation for all patients. However, when this was brought to providers there was discussion that this would not help the issue. It was stated that the providers are mindful of who they are ordering “strict intake and output” for and would rather the focus be on clear documentation on these patients (M. Trautwein, personal communication, March 21, 2023).

This information was brought back to the *Unit Practice Council* for further discussion. At this step in the project, a fishbone was completed with the *Unit Practice Council* to determine where the greatest impact would be (Appendix A). It was determined that the biggest impact would be achieved by educating staff on importance and components of “strict intake and output” documentation.

Intake and Output Education

When reviewing the literature, there was no readily available education that could be replicated. It seemed that the education was needing to be microsystem specific to reflect their processes and equipment. It was decided the education would be made specifically for this microsystem’s needs.

Multiple modalities were considered for development of the staff education. Through conversations with stakeholders, it was decided that a trifold poster with information regarding “strict intake and output” practices would be placed in the staff breakroom (Appendix B). The poster was also posted to the microsystem’s Facebook [™] page that is often used for education

updates (Appendix C). As staff reviewed the information, they were encouraged to sign off their name on a list of staff.

The education trifold had information pertaining to current state performance, where in the Epic [™] charting system to document intake and output, what counts as intake and output, how to appropriately measure intake and output, as well as the importance and value of this information. Staff had a month to review this education before “post-intervention” audits began. The members of the *Unit Practice Council* were key stakeholders in this process to promote staff to review this information.

Study of Intervention

The goal of this study was to improve intake and output documentation. The intervention used to achieve this was a staff education. Chart audits were used to measure if this was successful. The audits also helped to sustain change by holding staff accountable for the documentation. Chart audits for various aspects of care were already being used on the microsystem at this time. This format was followed to develop an audit for intake and output documentation.

Measures

The chart audits used on the microsystem are a part of the standards set by “Lean Management”. Lean management advises companies to “being with the work- the actions that directly and indirectly create value for the customer – and the people during that work” (Lean Enterprise Institute, 2023, para 2). The macrosystem has adapted this principle by bringing chart auditing directly to the nurses doing the work. The audits, once established, are managed the bedside nurses. The information from the audits is also displayed in the hallways so nurses can directly see the impact of their work.

The fundamental questions that lean also addresses includes purpose, process, and people (Lean Enterprise Institute, 2023). Again, the chart audits play a part in this by establishing the purpose of intake and output documentation, a deep dive into the nurse's charting process, and the people who are documenting and where their fallouts are. Intake and output chart audits (Appendix D) were created with input from the microsystem's Clinical Nurse Leader who had previously created audits for other aspects of care.

In March and April, the two months prior to education intervention, chart audit data was collected. Charts audits were labelled as "pass" or "no pass" based on the elements of the audit card (Appendix D) which include fluid restriction, daily weights, and intake and output documentation. The number (N) of audits that received "pass" were divided by the number of total audits (D) to yield a percent of passed audits. A minimum of total audits (D) was set at thirty due to this being the standard of the macrosystem for all audits of this type.

Analysis

Descriptive statistical analysis will be used noting the frequency and percentage for all categorical data elements. These elements involved documentation surrounding daily weights, fluid restrictions, continuous fluids, intermittent boluses and/or antibiotics, intake, and output. The overall percentage of passed audits was also recorded.

Ethical Considerations

Ethical considerations for this project were centered around nursing staff involved in the auditing process. When following up with staff regarding documentation issues, "just culture" was used. Just culture refers to the shared accountability in which organizations are accountable for the systems they have designed and responding to employee behaviors in a fair and just matter (Mass General Brigham, 2023). These systems being used with the auditing process helps

to develop rapport and ways to identify areas for improvement in intake and output documentation. Furthermore, when chart audits were being completed no patient identifying information is collected.

It was also recognized that the developer of this quality improvement project is a registered nurse within the macrosystem. Although, employment is on not on this microsystem this may still have influence on staff interaction. It was clear that during clinical hours and project work that the developer was acting in a master's student role and not as a bedside registered nurse. This project was also reviewed by the University of New Hampshire's Quality Review Committee and deemed as quality improvement work which is exempt from full Institutional Review Board review.

Results

Results

Initial Steps of the Intervention and Evolution Over Time

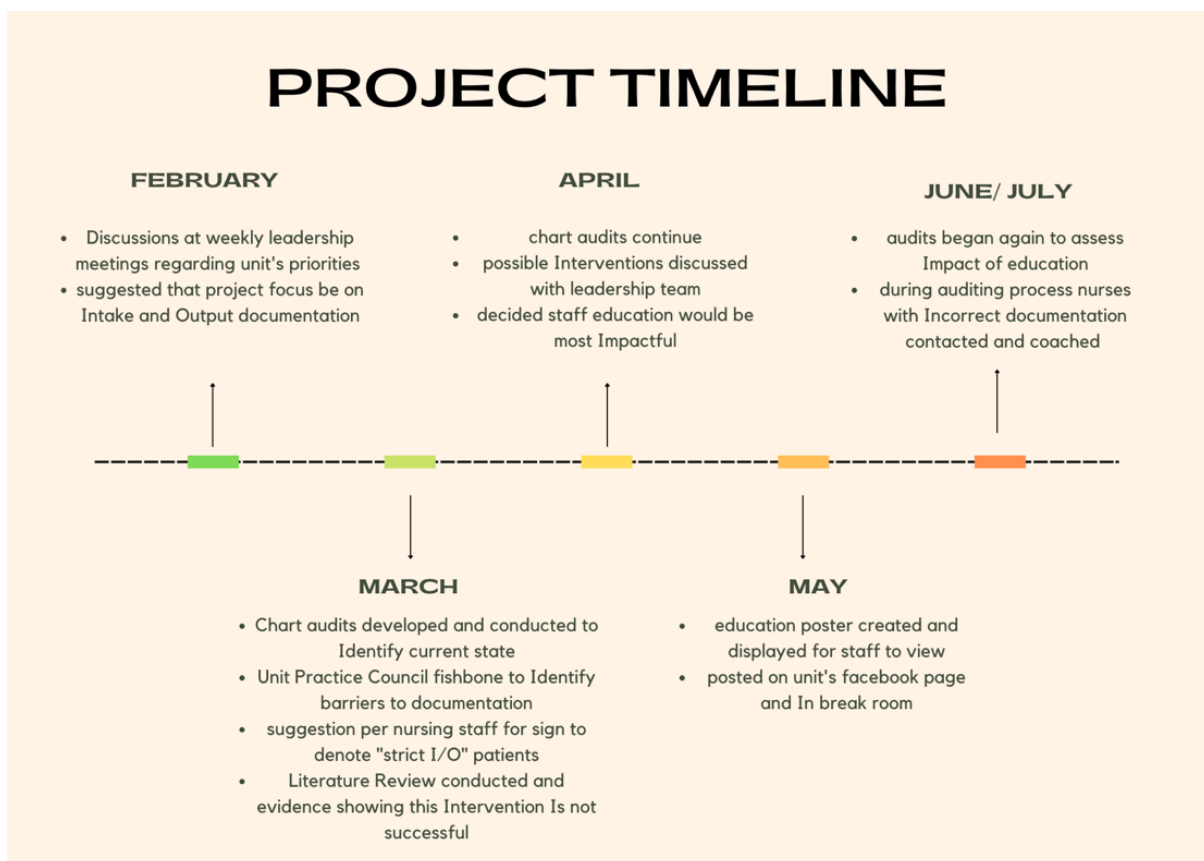
The initial steps for this project included conducting chart reviews to establish the pre-intervention state of nursing intake and output documentation. It was at first discussed to audit all patient charts. However, in discussions with hospitalists on the microsystem it was discovered that this data was most important for their patients ordered "strict intake and output". Therefore, it was decided the data collection would focus on this population.

The audit form created was adapted from the microsystem's current auditing process for other aspects of care. The audit card reflected information pertinent to assessing the patient's fluid status. The original audit card included "provider notified if patient's output was less than 30mL/hr. The Center for Disease Control and Prevention, identifies urine output less than 0.5-1.5mL/kg/hr as oliguria (CDC, 2019). As audits began to be conducted it was evident that this

element would not be useful due to representing missing data. Many nurses were not documenting any urine output therefore this auditor could not assess if the patient truly had decreased output that warranted intervention or if documentation was just not being completed. For a full perspective of the Project Timeline, Figure 1 will aid in understanding.

Figure 1.

Project Timeline



Process Measures

For this quality improvement project, chart audits were used to measure the impact of the intervention toward attainment of the specific aim. Each element of categorical data was measured pre-and-post-intervention. As previously noted, elements of the chart audited include fluid restriction, daily weight, continuous fluids, intermittent fluid and antibiotic boluses, intake,

and output. Pre-intervention pass rates for the audit were 4.34% compared to post-intervention 45.45%. Regarding the documentation of intake every four hours, pre-intervention rates also saw an increase, 41.3% compared to post-intervention rates of 91.67%. The only element without improvement was continuous fluid documentation which saw a pre-intervention rate of 83.33% and post-intervention 66.67%.

Figure 2.

Chart Audit Data

<u>Chart Audit Elements</u>	<i>Pre- Intervention</i> N = 46 (%) Pass = 2 (4.34) Non-Pass = 44 (95.65)	<i>Post- Intervention</i> N = 22 (%) Pass = 10 (45.45) Non-Pass = 12 (54.55)
Fluid Restriction		
Pass	1 (100)	0 (0)
Non-Pass	0 (0)	0 (0)
N/A	45	22
Daily weight		
Pass	0 (0)	0 (0)
Non-Pass	4 (100)	0 (0)
N/A	42	22
Continuous Fluids		
Pass	10 (83.33)	2 (66.67)
Non-Pass	2 (16.66)	1 (33.33)
N/A	34	19
Intermittent boluses and/or antibiotics		
Pass	5 (19.23)	5 (50)
Non-Pass	21 (80.77)	5 (50)
N/A	20	12
Intake recorded Q4H		
Pass	19 (41.30)	18 (81.82)
Non-Pass	27 (58.70)	4 (18.18)
Output recorded Q4H		
Pass	8 (17.39)	11 (50)
Non-Pass	38 (82.61)	11 (50)

Contextual Elements

Contextual elements for this quality improvement project involved determining which patient charts would be audited. Although it is important to be continually assessing the fluid status of all hospitalized patients, it was decided that the audits were to be used on patients ordered for “strict intake and output”. It was also evident that the macrosystem did not have a definition for what “strict intake and output” is in terms of documentation. For this audit, the definition was recording any forms of intake and liquid output the patient may have.

Since the chart audits were done retrospectively, they were used to look at the previous twelve-hour day shift. None of the audits were completed on night shift documentation. Since many patients are not having oral intake during night shift hours it was decided that audit would be more meaningful when completed for 0700-1900.

Unintended Consequences

Unintended consequences included difficulty engaging stakeholders to view the education poster, resistance to change, and competing priorities on the microsystem. At the conception of the project idea there were also many differing opinions from nursing staff and providers. One group proposed having the whole microsystem be “strict intake and output”. While the other argued against this point.

It was also anticipated that stakeholder engagement would be a challenge. It was decided part way into the education implementation that an incentive would be added for staff who signed their name that they viewed the education poster. A 472 mL drink tumbler was purchased for \$10, and staff were able to sign their name and put in a guess as to how many milliliters they believed the tumbler could hold. At the end of the implementation period, whoever had the closest guess kept the tumbler.

It was also apparent that as chart audits were being completed that there were many unintended associations between documentation and patient characteristics. For example, many patients that did not have accurate output recorded were patients that were independently ambulating to the bathroom. Prior to auditing, it was anticipated that the lack of output documentation would be due to incontinence.

Missing Data

It was decided during the post-intervention audits to begin to keep track of which nurses were missing elements of documentation. This step was not taken in pre-intervention data. This was incorporated into the post-intervention audits to continue to reinforce the need for change in the staff. Nurses were messaged via the macrosystems main form of communication Volte™. This helped to create a sense of holding staff accountable for this documentation. This information is not published in this paper to keep the nurse's names confidential. This was only done to help facilitate change and not as punitive measure.

Discussion

Summary

The goal of the quality improvement project was to use a tri-fold education poster with information about strict intake and output documentation and fluid balance to encourage nursing staff compliance. This was displayed in the staff break room starting June 8th, 2023, and posted to the microsystem's Facebook™ page. After registered nurses and licensed nursing assistants reviewed the education, the specific aim was to note a 30% increase in passed audits by July 10th, 2023. Key findings from this quality improvement project included improved documentation, an opportunity to refine strict intake and output definitions and elements, and missing documentation for ambulatory patients.

Key Findings

The most prominent finding was overall improvement for intake and output documentation that met the benchmark aim of a 30% improvement. Pre-intervention, 4.34% of the audits were identified as “pass” while post-intervention this improved to 45.45%. When looking at specific elements of the audit, intake documentation improved from 41.30% to 81.82% achieving and surpassing the goal of a 30% increase in pass rates. Output documentation also saw improvement from 17.39% to 50% which was 32.61% increase.

The only element out of the six audited, that did not see this improvement was continuous fluid volume documentation. This documentation saw decrease in accurate documentation. Pre-intervention there were twelve charts audited for this criterion and 83.33% passed. In contrast, post-intervention three charts were audited and 66.67% passed. This decrease post-intervention could have been related to the number of charts audited.

Another finding from the audits was that it was not common for patients ordered “strict intake and output” to have a fluid restriction or daily weight order. Out of the sixty-eight charts audited both pre-and-post intervention, only one had a fluid restriction ordered and four had daily weights ordered. Further chart review should be utilized to identify if these patients would benefit from these interventions. For example, if patients are “strict intake and output” due to a comorbidity of congestive heart failure, it may be beneficial to include daily weights in the order set.

It was also incidentally discovered during the auditing process that many of that patients with missing documentation were ambulating “independently”. It may be that these patients were not aware that their intake and output was being monitored. In addition, they may not have been provided with a collection device. Originally, it was thought that the missing documentation

would be related to incontinent patients with “unmeasured” occurrences. However, it seems more accurate to say that it was not incontinent patients but rather ambulatory patients with the unmeasured occurrences.

Strengths

Strengths of this quality improvement project included that the chart audit process was already established within the macrosystem. This way of evaluating documentation was already implemented for other aspects of care such as, skin, and wound documentation, patient education, and fall interventions. In addition, this project lead was already familiar with the format from being employed in the macrosystem.

Additionally, this topic had significant key stakeholders support from providers, nurses, and leadership. Each group had awareness that this was an issue in patient care but did not feel they had the resources or time to investigate the issue. Therefore, when presented with this idea they displayed a readiness for intervention.

Interpretation

The association of the intervention and outcome for this quality improvement project shows that education can assist in improving “intake and output” documentation. This type of intervention was captured in the literature as having a significant impact on nursing documentation. However, the way in which the education was disseminated differed. Vincent & Mahendiran (2015) used an online module while Madu et al. (2021) had staff engage in one-on-one education as well as displayed posters and information around the microsystem. In this microsystem, it was more impactful to provide the education as a poster in the breakroom and to post it to the group Facebook™ page. This method was already utilized for communication, so it

was familiar to staff. These projects as well as this quality improvement initiative saw improvements from their educational interventions.

This project impacted staff and patients on a microsystem level. It was apparent in conversations at the *Unit Practice Council* meetings, that staff had the readiness and motivation to improve this practice. They became empowered to address these concerns and engage in thinking about ways to improve “intake and output” documentation.

Differences between observed and anticipated outcomes included findings that the patient population that were the highest rate of documentation non-compliance were independent patients as they often self-monitor intake and output and don't record amounts necessary for intake and output documentation. It was also observed in post intervention data collection that it was more often that travel nurses were missing documentation compared to staff nurses. This may be related to the way travel nurses receive facility orientation. These findings were not considered as possible reasons for documentation non-compliance prior to data collection.

Ongoing “intake and output” education creates a low-cost opportunity to improve nursing critical thinking and assessment when it comes to patient’s fluid balance. This improvement leads to decreased financial cost of admissions impacted by fluid overload or dehydration. These savings for the microsystem outweigh the cost of educational materials and the time it takes to prepare them.

Limitations

The limitations of this quality improvement project include that the education was created specifically for the microsystem population. Replication of the education is not readily available and may not be adaptable to different patient populations. Intake and output documentation guidelines can vary based on microsystem policies.

In addition, the process measure for this project depended on the reliability of one project lead as auditor. Since there was only one auditor interpretation of what would be a “pass” or “no pass”, this may have included implicit bias. To limit this variability, when it was unclear if a chart should “pass” the microsystem’s Clinical Nurse Leader was used as a second auditor. Audits were also only completed for dayshift as this was perceived as when patients would primarily have oral intake.

The project lead also may have had implicit bias due to being employed in the macrosystem. Although the employment was on a different microsystem, this could have influenced the auditing process as well as staff documentation. The project lead purposefully completed this project on a different microsystem than they were employed on to mitigate this effect.

Conclusions

In this quality improvement project, it was noted that documentation of “strict intake and output” was not attaining the benchmark of accurate and real-time documentation. It was found that the microsystem was lacking a policy on this type of documentation. This led to decreased compliance and education deficits within the staff.

The quality improvement project saw increased compliance in “intake and output” documentation after implementing staff education and a chart auditing process. The specific aim of increasing passed audits by 30% was met. However, further work should focus on both implications for practice and quality improvement initiatives. These implications will help to sustain change within the microsystem.

Implications for Practice

To continue to see improvement in “intake and output” documentation, the chart auditing and education process needs be ongoing. The chart auditing process can be sustained by identifying staff who want to champion the process as auditors. These auditors should refer to the microsystem’s Clinical Nurse Leader when they identify a chart that has not passed. At this time, the Clinical Nurse Leader would follow up with the staff member for real-time education. This will help to sustain behavior changes.

Implications for Future Quality Improvement Projects

Next steps within this microsystem should be investigating the connection between lack of “intake and output” documentation and independent patients. A process for providing education to these patients on the need to report their intake and output should be created. Data should also be collected to evaluate if most fallouts are related to traveling nurse’s documentation. This may have implications for modifications to traveler orientation. Also, the macrosystem should work with stakeholders to define a “strict intake and output” documentation policy to lay out expectations for staff regarding this element of care.

References

- A3 report: Problem solving: Quality-one. Quality.* (2022, December 1). Retrieved March 18, 2023, from <https://quality-one.com/a3/>
- Albsoul, R. A., FitzGerald, G., & Alshyyab, M. A. (2022). Missed nursing care: a snapshot case study in a medical ward in Australia. *British journal of nursing (Mark Allen Publishing)*, 31(13), 710–716. <https://doi.org/10.12968/bjon.2022.31.13.710>
- American College of Surgeons. (2023). *Hospital and facilities*. Retrieved February 18, 2023, from <https://www.facs.org/hospital-and-facilities/?searchTerm=elliott%2Bhospital&address=manchester&sort=a-z&page=1>
- Centers for Disease Prevention and Control. (2019). *Urine Output*. <https://www.cdc.gov/dengue/training/cme/ccm/page57297.html>
- Elliot Hospital. (2023) *Inpatient Care and Nursing Units*. <https://www.elliethospital.org/website/inpatient-care-and-nursing-units-fuller-unit.php#:~:text=We%20focus%20on%20quality%20care,%2C%20quality%2C%20and%20caring%20services.>
- Haber, J., & LoBiondo-Wood, G. (2018). *Nursing research: methods and critical appraisal for evidence-based practice* (9th edition.). St. Louis, Missouri: Elsevier.
- Lean Management Institute. (2023). *What is Lean Management?* <https://www.lean.org/explore-lean/what-is-lean/>
- Lim, S. H., Lim, M. L., Aloweni, F. A. B., & Ang, S. Y. (2021). Audit of the appropriateness and accuracy of fluid intake and output monitoring: experience in a tertiary hospital. *British journal of nursing (Mark Allen Publishing)*, 30(11), 660–664. <https://doi.org/10.12968/bjon.2021.30.11.660>
- Madu, A., Asogan, H., & Raoof, A. (2021). Education and training as key drivers for improving the quality of fluid balance charts: findings from a quality improvement project. *BMJ open quality*, 10(3), e001137. <https://doi.org/10.1136/bmjoq-2020-001137>
- Magee, G., & Zbrozek, A. (2013). Fluid overload is associated with increases in length of stay and hospital costs: pooled analysis of data from more than 600 US hospitals. *ClinicoEconomics and outcomes research : CEOR*, 5, 289–296. <https://doi.org/10.2147/CEOR.S45873>
- Mass General Brigham. (2023). *What is Just Culture?*

<https://www.brighamandwomensfaulkner.org/about-bwfh/news/what-is-just-culture-changing-the-way-we-think-about-errors-to-improve-patient-safety-and-staff-satisfaction>

McGloin S. (2015). The ins and outs of fluid balance in the acutely ill patient. *British journal of nursing (Mark Allen Publishing)*, 24(1), 14–18.
<https://doi.org/10.12968/bjon.2015.24.1.14>

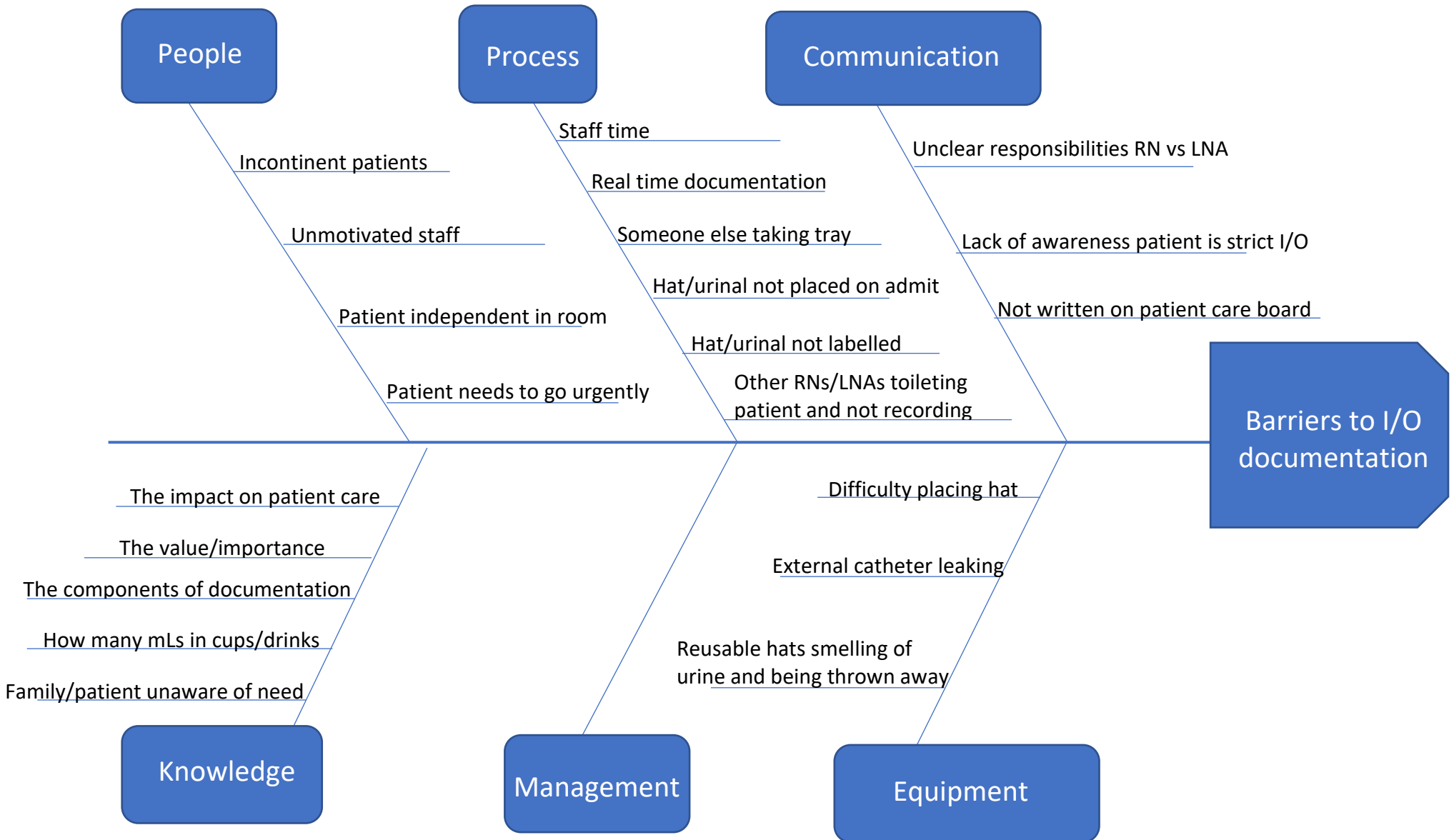
Jeyapala, S., Gerth, A., Patel, A., & Syed, N. (2015). Improving fluid balance monitoring on the wards. *BMJ quality improvement reports*, 4(1), u209890.w4102.
<https://doi.org/10.1136/bmjquality.u209890.w4102>

Tableau. Technical specifications [Internet]. Seattle, WA: Tableau Software [cited December 2022]. <<https://www.tableau.com/products/techspecs>>.

Vincent, M., & Mahendiran, T. (2015). Improvement of fluid balance monitoring through education and rationalisation. *BMJ quality improvement reports*, 4(1), u209885.w4087.
<https://doi.org/10.1136/bmjquality.u209885.w4087>

Wu, C.-L., Pai, K.-C., Wong, L.-T., Wang, M.-S., & Chao, W.-C. (2021, October 22). *Impact of early fluid balance on long-term mortality in critically ill surgical patients: A retrospective cohort study in central Taiwan*. Multidisciplinary Digital Publishing Institute. Retrieved February 28, 2023, from <https://www.mdpi.com/2077-0383/10/21/487>

Appendix A Fishbone Diagram



Appendix B Education Poster

Current State

How are we currently doing?

- Approximately 36% of Fuller patients are ordered for "strict intake and output"
- Provider feedback and chart audits have supported that documentation is not complete for this population
- In March & April 2023 5% of charts passed the audit
- Expectations for documentation are unclear and practices vary nurse to nurse
- Common fallouts include
 - No oral intake recorded
 - Intermittent and continuous fluid not totaled
 - Unmeasured bathroom occurrences (on independent patients)

NEW! CEMBA AUDIT CARDS

Fluid Balance Excellence

What are our barriers to documentation?

Here are some issues highlighted by the unit practice council:

- People: Lack of awareness of the importance of documentation, Lack of knowledge of how to document, Lack of time to document, Lack of resources to document
- Processes: Lack of standardized documentation, Lack of clear documentation guidelines, Lack of consistent documentation, Lack of consistent documentation
- Communication: Lack of communication between providers and nurses, Lack of communication between nurses and patients, Lack of communication between nurses and families
- Technology: Lack of electronic documentation, Lack of electronic documentation, Lack of electronic documentation
- Management: Lack of management support, Lack of management support, Lack of management support
- Equipment: Lack of equipment, Lack of equipment, Lack of equipment

PLEASE sign your name below that you viewed the poster!

Next to your name put a **guess** for **how many mLs** you think this tumbler holds. Closest guess gets to keep it.

The Ins & Outs: Strict Intake & Output

Why is fluid balance important?

The fluid balance of critically ill surgical patients (on days 4 to 7) has a consistent impact on long-term mortality (Wu et al., 2021).

Positive fluid balance is associated with cardiac, liver, and renal failure. It can also be caused by intravenous fluid administration. While negative fluid balance can lead to fatigue, confusion, reduced cardiac output, and oliguria (McGloth, 2014). It can be seen with decreased intake, excessive sweating, vomiting, adrenal insufficiency, ascites, liver dysfunction, as well as many other conditions.

Signs & Symptoms

Negative Fluid Balance

- decreased skin turgor
- dry mucous membranes, sunken eyeballs
- tachycardia, weak pulse
- concentrated urine/decreased output
- decreased blood pressure
- change in mental status
- complaints of thirst or weakness

Positive Fluid Balance

- Weight gain (i.e. importance of daily weights)
- Swelling (edema) noted in arms, legs, or face
- High blood pressure
- Shortness of breath
- Cramping
- Headache

How can we prevent this?

Assess, Assess, Assess!
Is your patient exhibiting any of these signs or symptoms?

Real-time Accurate Documentation!

Epic is also a helpful tool. In the Overview section you can get a view of 72h I/O.

IMPORTANT REMINDERS

- Place a HAT OR URINAL on admission
- Be sure to label it appropriately
- Use the volume infused button to see how much your patient has received
- After documenting the amount, you may select the 'clear' button
- For incontinent patients, external catheters can assist with obtaining accurate output
- If these products don't work, chuck pads can be weighed in the soiled utility to obtain an approximate measure
- Documentation must be in MSLs in order for Epic to count it in the total I/O
- Do NOT take a patient's tray without recording the amount
- Educate independent patients to inform you of their intake and output totals

TYPES OF INTAKE

And where to document them!

Oral or PO

Intermittent IV Fluids/Antibiotics

Continuous IV Fluids

Tube feeding

TYPES OF OUTPUT

And where to document them!

Emesis

Void (Foley, straight cath, toilet, etc)

Drains (i.e. chest tubes, JP drains)

Liquid stool

DOCUMENT BEFORE LEAVING THE ROOM

If someone is using the COM log into Rover via the Voite phone
If you need help learning this system, ask charge, resource, or peer to assist

I/O Documentation should be completed at minimum Q4H

If the patient is not eating and/or voiding chart a 0 for that interval

TAKE A BADGE BUDDY TO HELP YOU RECORD ACCURATE AMOUNTS OF FLUIDS

Appendix C
Facebook Post



Cayla Barretto



Jun 8 ·

Hey all, I'm the CNL student that has been working with Bronwyn!

For my school project I focused on I/O auditing. In the conference room I've posted a poster with some education & where our fall outs are.

💧 There's a space on the left side for you all to provide feedback on what other changes we can make to help with consistent I/O documentation. As well as, badge buddies with the mLs of common things on our floor.

💧 Once you view the poster PLEASE sign the paper on the table + take a guess on how many mLs the tumbler holds. The person who guesses the closest gets to keep it!

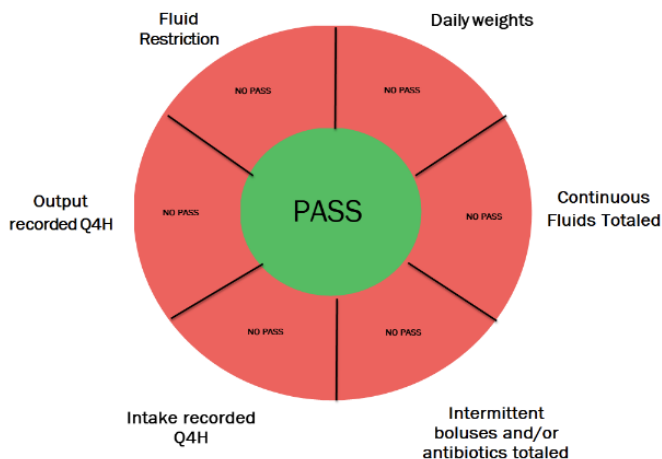
➡ I'll be auditing again next week so do your best to have accurate I/Os on your "strict intake and output" patients!!

Appendix D Chart Audit Template

Fluid Balance Excellence

Month: _____

Year: _____



Aim: 60%

N (total # of PASS): _____

D (total # of cards): _____

% Pass (N/D): _____

Fluid Balance Excellence

Auditor Name: _____

RN Name: _____

Please answer the following questions based on documentation the previous shift. The chart chosen should have a strict I/O order.

Date: _____

Is there a "fluid restriction" order? Was 24h intake compliant with the restriction? If no order, select NA.

Y or N or NA

Is there a "daily weight" order? Was it completed? If no order, select NA.

Y or N or NA

Is the patient is ordered for continuous fluids? Was the total infused during the shift documented? If no order, select NA.

Y or N or NA

Were any boluses and/or antibiotics given? Was the total infused documented for that administration? If no order, select NA.

Y or N or Na

Is intake recorded Q4H? (including tube feeds, PO intake, etc).

Y or N

Is output (in mLs) recorded Q4H? (including foley, drains, external catheter, etc)

Y or N

If all responses are "Y", circle "P"
If any response of "No", circle "NP"

P or NP

- If PASS, please place a dot in the green section of the target,
- If NO PASS, please a dot in the red sections of the target that best describe why

Appendix E
Prisma Flow Diagram

