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Implementing Nurse Education and Training on Sapphire Patient-Controlled Analgesia (PCA)

Pump to Establish Competency and Improve Patient Pain Management and Outcomes

Gregory Punsalan

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Abstract

Pain management is a never-ending battle when caring for patients, whether post-operative for surgical procedures, managing disease processes, or caring for acute injuries. Nursing understanding and proper utilization of their tools and resources are imperative to maximize patient comfort levels as best as possible when dealing with pain. Patient-controlled analgesia (PCA) pumps are a modern marvel which allow patients to control (to an extent) medication received when feeling discomfort, however, as well all devices, PCA pumps must be programmed correctly and monitored to ensure accurate, effective, safe dosing. This quality improvement project examined the utilization of a new Sapphire PCA pump in a suburban hospital in the Bay area, with the goal of improving user competency and patient pain management and outcomes. After performing a microsystem assessment, the team performed a root cause analysis (RCA) to determine the focus of the project. An in-service was determined to be the most effective way to ensure proper training of staff and evaluate staff competence and confidence in utilizing the Sapphire PCA pump.

Keywords: PCA, microsystem, RCA, in-service

Implementing Nurse Education and Training on Sapphire Patient-Controlled Analgesia (PCA) Pump to Establish Competency and Improve Patient Pain Management and Outcomes

Introduction

Patient-controlled analgesia (PCA) pumps help provide improved post-operative pain control while maintaining safety in the healthcare setting (Campbell & Plummer, 1998). With the use of a PCA pump, patients can co-manage their pain without the need of a nurse present, freeing up healthcare workers to perform other duties. Since their inclusion in medicine, PCA pumps have made pain management safer and more efficient, with one caveat; the nurse programming the pump must be competent and able to properly program the PCA pump, or risk adverse administration of medication. When new equipment is utilized in the hospital, it opens up opportunity to make a workplace safer and more efficient, but staff must be properly trained on the new equipment in order to meet that goal. However, as with all uses of technology, there can be glitches and flaws with the system that was previously unforeseen, as well as programming issues that can make the use of the equipment unsafe or inefficient.

Statement of Problem

The hospital involved in this quality improvement project recently implemented changes regarding their PCA pump equipment being used throughout its healthcare system. The Lifecare PCA syringe pumps were replaced with the Sapphire Infusion System PCA pump to be used as part of their pain management plan. The issue is that only a limited number of the staff attended non-mandatory training on how to use the Sapphire PCA pump. As a result, many of the nursing staff have been programming the equipment without any prior official training. Ultimately, the lack of experience and knowledge about the Sapphire pump could potentially lead to medication

programming errors and inaccurate documentation of medication totals, leading to inaccurate pain management and representing a risk to patient safety.

Literature Review

A comprehensive literature review was conducted to determine the effectiveness of Patient-Controlled Analgesia (PCA) pump for pain treatment and the impact that nursing education and training had on the efficiency of utilizing a PCA pump. Searches of the CINAHL and PubMed databases were conducted utilizing key terms such as, “PCA”, “pain management”, “patient outcomes”, and “nurse education”.

A published document by Campbell & Plummer (1998) describes proper guidelines and procedures for implementing patient-controlled analgesia. Although this article is dated, the protocols are still relevant, and the emphasis on staff education and competence is highlighted throughout the article. A segment of this article focuses on the nursing staff education, and specifies that the aims of PCA is two-fold, the importance of accurate dosage administration and the practicalities of the PCA use, or the importance of proper machine programming.

A study conducted by Connor (2016) aimed to measure the relationship between the effectiveness of acute pain management post major surgery with the overall patient satisfaction. The cross-sectional, observational study was conducted in a large university hospital with 100 patients. The measurement used for patient outcomes was the APS-POQ-R tool. Amongst the group of patients who experienced the most severe pain, the common issue was lack of knowledge of how to operate their PCA device. With the implementation of “subject matter experts” of acute pain, the nurses who explained the device and include patient participation in the decision-making process of their care plan had the greatest improvement of patient satisfaction coupled with greatest reduction in pain severity.

A study conducted by Crowe, Ewart, & Derman (2018) focused on the adult learning theory, in which “adult education is most impactful when it engages learners in activities directly relevant to their own experience” by utilizing a simulation intervention. The purpose of the study was to measure the self-confidence of the nurses using the “Clinical Decision-Making Self-Confidence Scale”, focusing on “four dimensions of confidence: 1) accurately recognizing a change in patient’s condition; 2) performing basic physical assessments; 3) identifying basic nursing interventions; and 4) evaluating the effectiveness of interventions during acute deterioration.” The study of 161 nurses found that “simulation provided an environment that allowed general medicine nurses the opportunity to explore and critically think through situations of deterioration, resulting in increased knowledge and confidence for responding to deteriorating patients.” This shows that with simulation and practice, nurses can become more confident and knowledgeable when applying it to a patient. Although our project differs from the focus of this study, the application of simulation aligns with hands-on in-service training, in which repetition in a controlled setting can lead to efficiency in the clinical setting.

A published article by Ladek, Chan, Easty, & Chagpar (2007) describes the importance of properly selecting an appropriate PCA device, as well as steps to ensure the selected product meets specific criteria, the most important being patient safety. The article describes the importance of selecting an interdisciplinary team and completing a comprehensive process when “selecting the appropriate PCA device to minimize adverse outcomes on patient safety.” Although the final selection essentially came down to preference (weight of the device, ease of use, features available for the device), the study proved that user compatibility and confidence in the device could lead to best possible patient outcomes. However, with the growing number of PCA pumps available, it is

important to know that confidence and competence in utilizing the PCA pump ultimately comes down to training and experience.

A survey study by Patak, Tait, Mirafzali, Morris, Dasgupta, & Brummett (2013) aimed to draw comparisons between PCA pump patient interface and patient satisfaction. The observers concluded that at the time of the study, the current patient interface was inadequate in that it did not provide the patient with information pertaining to the lockout status of the pump. The study found that when patients did not know how much time remained to receive the next bolus, they felt “left in the dark” or were “always in pain because I never knew if I was actually getting any medicine.” Many modern PCA devices have improved their patient interface to include timers or signals that let the patient know when they may receive another bolus. However, if the patient does not know what to look for, they may feel that they are not receiving adequate pain medication, which makes patient education and collaboration an important aspect to overall pain management.

A published article by Taylor (2010) examined patient safety considerations with the use of PCA devices. The article reviewed risks and benefits to both the patient and nursing staff. While the majority of patient safety considerations were due to human error, such as “programming errors, inappropriate dosing, improper selection of patients, and failure to monitor the settings,” the review suggested that implementing proper safeguards can help to minimize many of these errors. Ultimately, patient satisfaction was increased because they had better control over their pain management when using a PCA, and nurses benefited from not having to deliver pain medicine at each request.

Methodology

Theoretical Framework

Due to the nature and focus of our project - how we were focusing on the nurses confidence and ability to efficiently and competently utilize the Sapphire PCA pump - we utilized Lippitt's Phases of Change Theory, which focuses more on the role and responsibility of the change agent, rather than the evolution and result of the change itself. According to Lippitt, Watson, and Westley (1958), the seven phases are as follows:

- Diagnose the problem
- Assess the motivation and capacity for change
- Assess the resources and motivation of the change agent.
- Choose progressive change objects.
- The role of the change agents should be selected and clearly understood by all parties so that expectations are clear.
- Maintain the change through communication, feedback, and group coordination.
- Gradually terminate from the helping relationship. The change agent should gradually withdraw from their role over time.

Given the recent switch from two different PCA pump systems, the hospital system was not able to provide adequate training. As such, the initial problem was provided by the hospital, while giving us the freedom to establish our project goals and implementation plan. Following the diagnosis of the problem, we conducted a microsystem assessment to assess the motivation and capacity for change, as well as the resources and motivation for the available to implement the change. Communication was established, and approval for all phases of the project were requested prior to starting each phase. Ideally, after we finished the project, nurses would be efficient at the

use of the Sapphire PCA pump, and we would gradually withdraw from educating the nursing staff.

Microsystem Assessment

We conducted a microsystem assessment on one unit that was utilizing the Sapphire PCA pump. We analyzed the units “5 P’s”, or its purpose, patients, professionals, processes, and patterns in order to better understand the environment of the unit and create a plan that would be appropriate to best implement changes to the environment (King & Gerard, 2016).

Purpose. The Oncology Pulmonary Acute Care Inpatient Department treats patients presenting with various conditions including for oncology, pulmonary (pneumonia, COPD, asthma) cellulitis, diabetes, and wound care needs. This unit is dedicated to improving the health of the community through quality care and compassion.

Patients.

There are 8 private rooms and 22 semi-private rooms for a total of 30 beds. There are 8 remote telemetry boxes available, and the nurse ratio is 1:4, unless there are no patients on telemetry, in which case the ratio may be 1:5. The top diagnosis are oncology, pulmonary (pneumonia, COPD, asthma) cellulitis, and diabetes/ wound.

Professionals.

The oncology pulmonary unit consists of several professional roles on its staff which includes registered nurses (RNs), certified nurse assistants (CNAs), and a unit secretary as its core. Support staff includes therapy services – physical therapists, occupational therapists, and speech therapists – as well as respiratory therapists, spiritual services, case manager, social worker, lift team, phlebotomy, a Skin Wound Assessment Team (SWAT), and a lines team.

Processes.

Currently, the unit has PDS support for the Sapphire PCA pump and had unit based in-services during the fall of 2019 which included a departmental orientation process, but as previously stated, the training for the Sapphire PCA pump was not mandatory, leading to members of the nursing staff not receiving any formal training.

Patterns. Metrics measured on the Oncology Pulmonary unit includes falls, HAPI, CLABSI, CAUTI, C-Diff, hand hygiene, opioid pre/post assessment, mislabeled specimen, RN communication, patient experience, length of stay, and readmissions. Currently, there are no definitive numbers for metrics regarding PCA pump frequency.

Root Cause Analysis

We conducted a root cause analysis (see appendix A) to determine any causative factors that contributed to the issue at hand. Our RCA indicated that a combination of newly introduced equipment with complicated user interface and infrequency of use and lack of training led to the knowledge and exposure deficits, leading to potential delays of pain management and an overall impact on patient safety.

Timeline / Gantt Chart

After our initial analysis, we created a Gantt Chart (See appendix B) to establish hard deadlines and ensure our progress was on track.

Implementation

Utilizing the information we gathered from the microsystem assessment and RCA, we developed a plan to assess the comfort level that the RN staff had with utilizing the PCA pump in order to move forward with our project. Our implementation plan was conducted in three parts. First, we conducted an initial survey to establish a baseline on RN staff confidence and competence

with the Sapphire PCA pump. Following our initial survey, we implemented an in-service on the units utilizing the Sapphire PCA pump, followed by a post in-service survey to evaluate learning outcomes and confidence in using the Sapphire PCA pump.

Initial Survey

We created an initial survey (see Appendix C) to establish a baseline on the nurses comfort level with operating and utilizing the Sapphire PCA pump. The initial survey was conducted throughout various units of the two hospital campuses. We met our minimum benchmark of 55% of each unit's staff being surveyed. The survey was based on a 5-point comfort level scale. A selection of:

1 = 20% comfort level

2 = 40% comfort level

3 = 60% comfort level

4 = 80% comfort level

5 = 100% comfort level

Intervention

We developed a script (see Appendix D) to conduct an in-service on various units of our hospital system. Our proposed intervention included a one-on-one in-service with nurses during their shift, followed by a post in-service survey to evaluate their learning and confidence in the PCA pump. The standardized in-service education script was created to ensure proper Sapphire PCA use according to hospital competency standards. The intervention plan was for hands on in-service to be provided on each unit until at least 60% of the unit staff had received the education. Unfortunately, shortly after the intervention was initiated, training operations were halted due to the COVID-19 pandemic.

Study of the Intervention

In order to evaluate overall success and learning of the implemented in-service, we conducted a survey post in-service (See Appendix E). Our aim was to assess the degree of improvement in the nursing staff's understanding and competency level of the Sapphire PCA pump operation. The post in-service survey had nine questions that were the same as the pre-survey in order to evaluate the effectiveness of the in-service, utilizing the same grading metrics.

Results

During our initial survey, we conducted 286 surveys, meeting our 55% benchmark and creating a baseline of confidence and comfort level amongst the staff on utilizing the Sapphire PCA Pump. The overall average comfort level was 2.6 on a scale of 5, or 52% comfortable, across the nine questions that we used for both the pre in-service survey and the post in-service survey. 40.2% of nurses surveyed (115 nurses) had no previous exposure to the Sapphire PCA pump. 65% of nurses surveyed (186 nurses) never received formal training, meaning 71 nurses that we surveyed had utilized or been exposed to the Sapphire PCA pump prior to receiving any formal training. Of those that have used the Sapphire PCA pump, 62% had difficulty operating the pump and 50.5% felt uncomfortable or unclear on how to properly document and clear shift totals. Overall, only 44% of nurses surveyed felt at least 80% confident (selected "4" or "5" on the survey) in utilizing the Sapphire PCA pump.

After participating in the in-service, nurses were surveyed to assess their comfort level with the Sapphire PCA pump. We conducted 99 surveys prior to abruptly halting our project. We saw an increase from 44% to 80% of nurses who were at least 80% confident across the nine-question survey metric. Comfort level of documenting and clearing shift totals increased from 50.5% to

88%. Overall, 98% of nurses surveyed felt that the in-service was helpful to better understand and operate the Sapphire PCA pump.

Evaluation of Learning

During our in-service, nurses were able to receive hands-on training and guidance as they operated the Sapphire PCA pump through the educational checklist that we had with our script. If nurses were uncomfortable or unable to navigate a certain function or procedure, they were able to go through the steps as many times as needed to gain competence in that specific function or procedure.

Discussion

This project initially met resistance in gathering surveys to develop our baseline. A handful of nurses were ecstatic about the idea of receiving a form of training for the Sapphire PCA pump, as they have had difficulty utilizing it in the past. After the initial survey, development of the script and implementing the in-service was successful and much better received by the nursing staff. Due to the variable schedules of the nurses, and limited number of project members, it was difficult finding the most appropriate times to implement the in-services on the different units. Additionally, with the onset of the COVID-19 pandemic, our project was halted relatively early in the in-service phase. This led to a diminished number of surveys available for our data comparison, which could lead to a skewed result. To mitigate the possibility of nurses not receiving training who may need it, we developed an instructional video which highlights all the points that our in-person in-service had. Overall, our preliminary results show overall success of the intervention. We were able to educate nurses on the effective use of the Sapphire pump and it was a great learning experience for both nurses and students.

Nursing Relevance

Our project directly relates to, and impacts, patient care, making it relevant to nursing. PCA use is important in pain management while offering more autonomy to the patients and allowing nurses to perform other tasks. However, proper training and understanding of the equipment is crucial and training (in this case, the form of an in-service) is necessary to maintain skills, competence, and confidence in the equipment.

Clinical Nurse Leader Relevance

Although this project spanned over multiple microsystems, the focus was relevant to any microsystem that may use a PCA pump. The planning and implementation of the project allowed the nursing students to conduct a change and improvement across the microsystems. Working as a team, each student partook in numerous roles that define a CNL, such as clinician, outcomes manager, client advocate, educator, information manager, and systems analyst/risk anticipator (King & Gerard, 2016).

Future Directions

Based on the data we received, the in-service proved to be substantial in the knowledge and confidence of nurses utilizing the Sapphire PCA pump. Moving forward, we recommend nurses maintain their competency with the Sapphire PCA pump by attending an in-service every two years and completing a medication calculation check-off more frequently. The creation of a training video can help supplement the in-service and can assist any nurse that has questions pertaining to the Sapphire PCA pump, as long as they have access to the video. Additionally, in order to further improve on data collection, an online assessment survey can be incorporated. Ultimately, future CNL students can continue the in-service education, and the best measure to

determine success will be with the evaluation of improved patient outcomes which will include decreased medication errors, improved pain management, and increased patient satisfaction.

Conclusion

Overall, the Sapphire Infusion Pump in-service was well received with almost 100 nurses utilizing the in-service and training on the sapphire pump during the period of this project. As previously stated, there was a significant improvement in the percentage of nurses who were more confident, as well as the overall comfort levels of the nurses after completing the in-service. However, due to the nature of the COVID-19 pandemic, there were limitations to continuing the in-service and we were not able to conduct any further assessments, leading to possible skewed data. Ultimately, nurses who did attend the in-service found it helpful to their understanding and confidence for future use of the Sapphire PCA pump.

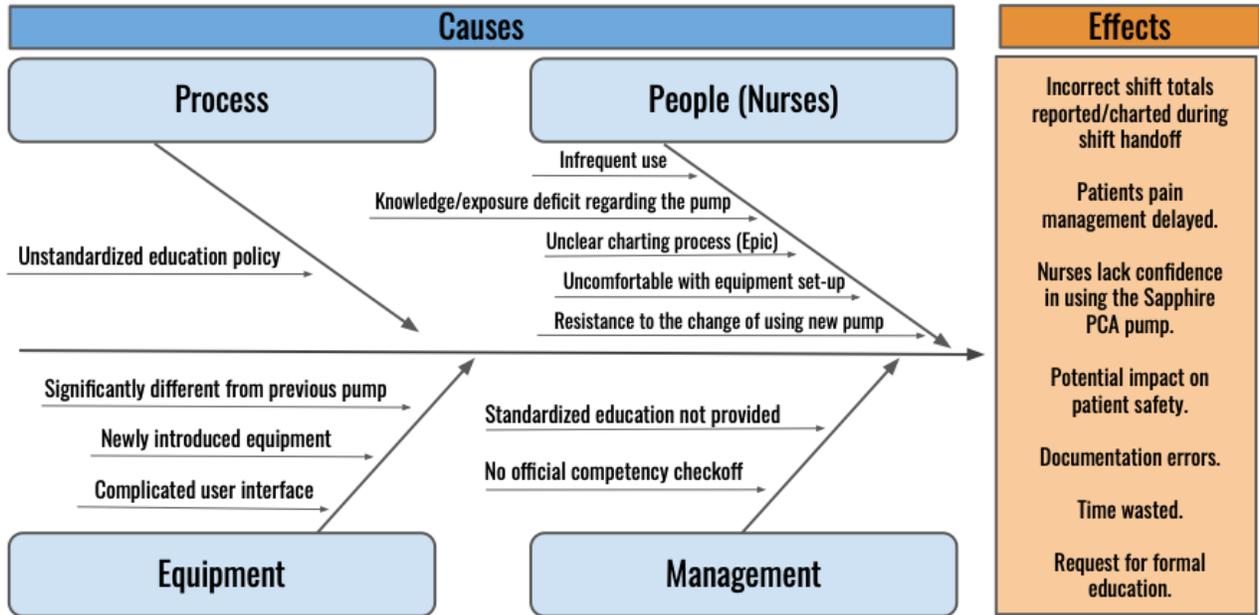
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Appendix A

Root Cause Analysis



Appendix C

Initial Survey

Sapphire Infusion Pump Questionnaire



Interviewer: _____ Campus: _____ Unit: _____ RN Name: _____

1. Have you used the Sapphire Infusion Pump before?

- Yes
- No

If no, have you heard anything about it?

2. Have you ever attended a Sapphire PCA Pump training session?

- Yes
- No

3. On a scale from 1-5, how comfortable are you with:

- | | | | | | | | |
|--|-------|---|---|---|---|---|------|
| a) Priming the Sapphire Infusion Pump? | Least | 1 | 2 | 3 | 4 | 5 | Most |
| Which method of priming do you use? | | | | | | | |
| <input type="checkbox"/> Manual | | | | | | | |
| <input type="checkbox"/> With the device | | | | | | | |
| b) Loading the cassette? | Least | 1 | 2 | 3 | 4 | 5 | Most |
| c) Programming an infusion? | Least | 1 | 2 | 3 | 4 | 5 | Most |
| d) Updating infusion parameters? | Least | 1 | 2 | 3 | 4 | 5 | Most |
| e) Administering clinician bolus? | Least | 1 | 2 | 3 | 4 | 5 | Most |
| f) Documenting/clearing shift totals? | Least | 1 | 2 | 3 | 4 | 5 | Most |

4. Have you had any difficulties operating the Sapphire Infusion Pump?

- Yes
- No

5. What safety issues or concerns have you noticed while using the Sapphire Infusion Pump?
Please explain:

Initial Survey

6. Where/how do you chart your shift totals for the Sapphire Infusion Pump?

Please specify:

7. Have you found any workarounds related to any of these reasons while using the Sapphire Infusion Pump?

- Securing the pump to a pole
- Opening the side compartment
- Programming the pump
- Switching to continuous infusion
- Pausing the pump
- Calculating shift totals
- Clearing shift totals
- Administrating clinician bolus
- Other: _____

8. How confident are you in performing manual medication calculations and calculating a dosage given in milliliters if need be?

Least 1 2 3 4 5 Most

9. How user-friendly do you find the tip sheet layout attached to the Sapphire Infusion Pump?

Least 1 2 3 4 5 Most

10. On a scale from 1-5, in your opinion, how effective is the Sapphire Infusion Pump in general?

Least 1 2 3 4 5 Most

Appendix D

Sapphire Pump Script

Sapphire Pump Educational Video Script

“Hello, I am a nursing student with the University of San Francisco, and today I will be reviewing how to use the Sapphire PCA pump as well as discussing some of the common issues that nurses have come across while operating the Sapphire PCA pump in the clinical setting.”

Sapphire Education Checklist

Required Elements:

PRIME MANUALLY

- Open all clamps on the administration set.
- To allow free flow, open the AFFV by pushing it in and down, towards the center of the Q Core administration set.
- Fill the entire administration set with fluid, so that fluid displaces all air in the administration set.
- To block free flow, close the AFFV by pushing it in and away from the center of the cassette.
- Be sure to prime the side port before attaching to the patient.

LOADING A CASSETTE

- Open the safety door by using your thumb (over ridges) and pressing the door outwards.
- While maintaining pressure, swing the door outwards.
- **[Unclamp AFFV]** Insert the administration cassette at an angle, by placing the saddle on the round metal anchor in the cassette housing. *Make sure the arrow on the cassette is pointing towards the bottom of the device.
- Push the upper end of the administration cassette into the metal lock.
- Make sure the bottom flange is inside the cassette housing.
- Close the safety door over the administration cassette. Ensure that the safety door clicks upon closure. NOTE: Do not operate the device with safety door open.
- Hang bag on hook and close plastic casing and lock medication.

PRIMING A SET USING THE DEVICE

- Turn On the device by pressing the [ON/OFF] hard key, at the lower right corner of the device.
- Ensure all clamps are open on the administration set.
- From the toolbar of the Start Up, press [Prime]
- From the Attention screen, press [Prime] and priming begins.
- From the toolbar, press [Finish Prime].
- Alternatively, at the bottom of the device, press the [STOP] hard key.
- Be sure to prime side port before attaching to patient.

PROGRAMMING AN INFUSION

- From the Start Up screen, select [New Infusion].
- When New Patient screen appears press [Yes].
- From the Drug Name screen, using the keypad press [Find]. **(lower right corner)**
- From the Drug List screen, select Morphine.
 - o Select the appropriate drug profile 50 MG/50ML.
 - o Using the keypad, enter the VTBI: 40 mL, press [OK]. **(so as to not run the bag dry)**
 - o Using the keypad, enter the Continuous Rate: 2 mg/h, press [OK].
 - o Using the keypad, enter the Demand Bolus: 0.5 mg, press [OK].
 - o Using the keypad, enter the Bolus Lockout: 10 minutes press [OK].
 - o On the Dose Limit Type screen, Set a dose limit: 20 mg, Press [OK]. **(total dose per 4 hr)**
 - o Add Loading Dose? Press [Yes].
 - o Using the keypad, enter a Loading Dose of 1 mg, press [OK].
- Review the parameters displayed on the Confirm screen [Next].
- Verify that the parameters reflect the correct treatment according to the order. Press [OK].
- Before starting infusion double check with another RN and co-sign in Epic/MAR.
- To begin the infusion, make sure that the clamps on the administration set are open then press [Start].

Appendix D (Continued)

Sapphire Pump Script

CONFIRMING BOLUS HANDLE

- Use Bolus Handle? Press [Yes].
- Press handle button to proceed. Provide bolus handle to patient and review operation. *NOTE: Handle will beep when button is pressed whether patient receives a dose or not.

ADMINISTERING A CLINICIAN BOLUS

- Unlock the device. (press to unlock pt) (password 5150)
- From the toolbar of the Running screen, press [View/Edit].
- Select [Clinician Bolus].
- Using the keypad, enter the appropriate password. Press [OK].
- Using the numeric keypad, enter a Clinician Bolus of _1_ mg, press [OK].
- Before starting bolus double check with another RN and co-sign in Epic/MAR.
- To start the bolus, from the Attention screen, press [OK].

UPDATING INFUSION ORDERS

- Unlock the device.
- From the toolbar, press [Request Pause]. Press [OK].
- Press [View/Edit]
- Make setting changes and review program:
 - o Using the keypad, enter the Continuous Rate: __3__ mg/h, press [OK]. NOTE: Order is high alert level. Confirm order and OK to proceed.
 - o Using the keypad, enter the Demand Bolus: _0.5_ mg, press [OK]. (pump will ask to re-enter all parameters when one parameter is changed)
- Press [OK]
- From the toolbar, press [Request Continue].
- To resume the infusion, press [OK].

CALCULATING DRUG SHIFT TOTALS

[Let's do a quick medcalc example. As you saw, this pump only operates with morphine and dilaudid. Morphine is straightforward since its concentration is 1mg/ml, so if the pt received 50mL of drug, it means that she got 50mg. Let's practice with dilaudid.]

Important: for the purposes of accurate total dose administered, multiply accumulated volume (ml) by concentration (mg/ml)]

- For accurate documentation use accumulated volume
- Calculate total dose received during shift:
 - o Medication: Dilaudid (10mg/50ml)
 - o Concentration: 10mg/50ml = 0.2mg/ml
 - o Accumulation Volume: 10.2 ml
 - o What is total dose: 2.04 mg

DOCUMENTING/CLEARING SHIFT TOTALS

-(Press to unlock screen)

- Press [View/Edit] (Note: delivery history does not clear, only accumulated volume is cleared)
- From toolbar press [Delivery History]
- To review delivery history for last 8 hours:
 - o Press [Bolus History Period]
 - o Enter 8 hrs press [OK] Press [Exit]
 - § Document Number of Doses Given
 - § Number of Attempts
 - § Shift Dose (mg)
 - § Volume Infused
- Clear shift totals:
 - o From toolbar press [View/Edit]
 - o Press [Clear Accum. VI>]
 - o Press [Yes] Press [OK]
 - o NOTE: Only able to clear volume infused.

Important: if a nurse has a 12h shift, the hospital's policy is that the shift totals must be charted at the 8h mark and then at the end of shift.

Appendix E

Post In-service Survey

Sapphire Infusion Pump Questionnaire



Interviewer: _____ Campus: _____ Unit: _____ RN Name: _____

- 1. Have you used the Sapphire Infusion Pump prior to this in-service?
 - Yes
 - No

- 2. Have you had any difficulties operating the Sapphire Infusion Pump during this in-service?
 - Yes
 - No

- 3. Now that you have been introduced to the steps to using the pump, do you feel comfortable using it on your own?
 - Yes
 - No

If no, please explain: _____

- 4. On a scale from 1-5, how comfortable are you with:
 - a) Priming the Sapphire Infusion Pump? Least 1 2 3 4 5 Most

After the in-service, which method of priming are you more likely to use?

 - Manual
 - With the device

 - b) Loading the cassette? Least 1 2 3 4 5 Most

 - c) Programming an infusion? Least 1 2 3 4 5 Most

 - d) Updating infusion parameters? Least 1 2 3 4 5 Most

 - e) Administering clinician bolus? Least 1 2 3 4 5 Most

 - f) Documenting/clearing shift totals? Least 1 2 3 4 5 Most

PLEASE SEE OTHER SIDE →

Appendix E (Continued)

Post In-service Survey

5. What safety issues or concerns are you still having post-in-service?

Please explain:

6. Following in-service, is the hospital policy on when/where to document PCA shift totals clear?

- Yes
- No

If no, please specify:

7. How confident are you in performing manual medication calculations and calculating a dosage given in milliliters if need be?

Least 1 2 3 4 5 Most

8. How user-friendly do you find the tip sheet layout attached to the Sapphire Infusion Pump?

Least 1 2 3 4 5 Most

9. On a scale from 1-5, in your opinion, how effective is the Sapphire Infusion Pump in general?

Least 1 2 3 4 5 Most

10. Do you think the in-service provided was helpful towards your understanding of the Sapphire pump?

- Yes
- No

11. Please specify any additional questions/concerns regarding the use of the Sapphire pump: (include official [redacted] email)

Appendix F

Results Bar Graph

Campus Wide Pre- and Post- Survey Averages

