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Improving Prolonged Antibiotics Education in a Pediatric Unit

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School of Nursing and Health Professions, University of San Francisco

N670 ME-MSN Internship

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April 28, 2024
**Abstract**

**Problem** Children’s Hospital A's incidence report tool, iCares, demonstrates that 50% of the issues related to prolonged intravenous (IV) antibiotics are categorized as administration issues. This leads to the medication being delivered at the wrong time or rate. Having these issues increases patient length of stay, increasing hospital costs. **Context** The microsystems for this quality improvement project include inpatient pediatric patient care units (PCU) 300, 360, and 400. Children’s Hospital A is a 361-bed San Francisco Bay Area hospital. **Interventions** The Clinical Nurse Leader students implemented a presentation defining prolonged IV antibiotics, their rationale, and a video demonstrating the correct pump setup. This presentation was shown at an in-person staff meeting on April 11, 2024, to 90 nurses and nurse managers. **Measures** To assess nurses’ baseline knowledge, a pre-video quiz was deployed before the intervention was presented. A post-video quiz was utilized to assess the impact of the video on nurses’ knowledge. **Results** When comparing baseline knowledge to post-intervention knowledge, the results went from 86.9% to 95.5%, reflecting an 8.6% improvement. **Conclusions** This project comprehensively assessed the microsystem using a needs assessment tool, identified the problem, and conducted a root-cause analysis. The students analyzed data to implement an educational tool that increased nurse knowledge regarding prolonged IV antibiotics. The tool is cost-effective, and easily attained ensuring sustainability. The video will be evaluated biannually utilizing iCares data to assess long-term impacts.
Improving Prolonged Antibiotics Education in a Pediatric Unit

Accurate administration of medications is imperative to a patient’s treatment, especially pediatric patients. It is the nurse’s responsibility to verify the medication rights of each patient to reduce the number of errors. Medication errors impact patients, staff, and the hospital overall. These errors affect patient safety, which is critical to avoid adverse consequences (Coelho et al., 2023). Medication administration errors are highly associated with hospitalizations and increased healthcare costs (Giri et al., 2023).

According to Children’s Hospital A medication error data, noted by a program known internally as iCares, there have been many administration issues related to the setup of prolonged intravenous antibiotics. Research demonstrates that prolonged infusion of antibiotics decreases mortality in patients going through challenging infections and conditions (Li et al., 2023). As a result of this research, it is crucial that this topic be evaluated for improvement. The Clinical Practice Quality Specialist (CPQS), Karen Belanger, in the Acute Care Unit at this hospital launched this quality improvement (QI) project for a group of Student Clinical Nurse Leaders (CNL) to assess the current data, research evidence-based practices, and implement an effective re-education intervention on their unit.

Problem description

The incidence report tool that this hospital utilizes is named iCares, which is accessed by registered nurses (RN), providers, pharmacy, educators, managers, and medication administration teams. The microsystem of focus for this project is composed of the pediatric acute care units which include sub-units Patient Care Unit (PCU) 300, 360, and 400. The current data, according to iCares reported by the CPQS at this hospital, reports medication errors in the setup and administration of prolonged antibiotics in acute care units at Children’s Hospital A.
After thorough data analysis and synthesis of iCares from November 2021 to February 2024, the group analyzed that most reports came from PCU 300. This unit had 31.8% of the errors reported, with 31.8% from PCU 400 and 18.2% from PCU 360. According to data, 4.5% of errors were reported from the in-patient pharmacy (Appendix J). The current education method regarding prolonged antibiotics setup is tip sheets that are emailed to the nursing staff, accessible through an employee website, and discussed at staff meetings. In the Needs Assessment survey deployed to the acute care units, RNs were asked about their understanding of prolonged intravenous (IV) antibiotics (Appendix I). Through this survey, 41.8% of nurses reported that they had never seen the Extended Infusion of Antibiotics tip sheet (Appendix M). Furthermore, 26 out of 55 nurses surveyed reported that they feel confident in the setup and administration of prolonged IV antibiotics (Appendix L). However, data reports that 50% of the errors come from administration issues (Appendix K). This is crucial data to focus on to reinforce and improve the current education provided to RNs. Among other errors, 31.8% stem from IV access issues, while 9.1% are due to adverse drug reactions, and a further 9.1% result from dispensing/pharmacy issues. (Appendix K).

Available knowledge

**PICOT Question**

As part of a quality improvement project at Children’s Hospital A, data has been disclosed on medication errors regarding the setup and administration of continuous infusion of antibiotics. Population, Intervention, Comparison, Outcome, and Time (PICOT) questions that aid in guiding a research project. This led the CNL student group to develop the following PICOT question: In inpatient pediatric registered nurses (P), how does nurse education (I) affect
the number of medication errors related to the setup and administration of prolonged IV
antibiotics (O) over four months (T)?

Search Methodology

Through an extensive literature review during March 2024, the CNL group searched
current evidence and existing literature regarding the QI topic. Various methodology scholarly
articles were discovered on the databases provided by the University of San Francisco (USF):
Cumulative Index to Nursing and Allied Health (CINAHL) and PubMed. Publication results
were limited to the last 10 years. Ten relevant articles were selected for strengths appraisal
utilizing the tool Johns Hopkins Research Evidence Appraisal Table to evaluate quality and
evidence level, as demonstrated in Appendix A (Dang et al., 2022). Of these ten articles, one was
a high-quality Level I meta-analysis coinciding with a systematic review, using randomized
clinical trials (RCTs), three studies were systematic reviews with meta-analysis (Level II), five
studies were found to be Level III (cross-sectional study, systematic review, retrospective cohort
study, systematic review with meta-analysis) and one was an integrative review (Level V). The
following keywords were used in the search: prolonged antibiotics, continuous infusion of
antibiotics, pediatric IV prolonged antibiotics, nursing education video, intravenous antibiotics,
extended infusion of antibiotics, prolonged IV antibiotics, and β-lactam antibiotics intravenous.

Literature Review

The CNL students conducted a comprehensive literature review to determine the
importance of effective video education for pediatric registered nurses (RN) in support of this
quality improvement project.
In a meta-analysis coinciding with a systematic review, Budai along with colleagues (2023) developed a major claim of proving that prolonged infusion of β-lactams relates to higher levels of microbiological elimination and lower mortality. This study followed randomized controlled trials (RCT) and non-RCTs, utilizing 4,195 patients under the age of 18 to evaluate adverse events, mortality, and plasma concentrations of β-lactams. Comparing continuous infusion to short, intermittent infusion of antibiotics in pediatric patients is important to determine the benefits of using β-lactams in various infections (Budai et al., 2023). The findings of this article prove that the use of prolonged antibiotics at Children’s Hospital A is a beneficial treatment option for critically ill children. This is important information to include in the education intervention for pediatric RNs.

Four separate studies conducted by Kondo and colleagues (2020), Li and colleagues (2023), Luo and colleagues (2019), and Wu and colleagues (2021), supported the claim that extended infusion of antibiotics was found to increase clinical cure. Through a meta-analysis coinciding with a systematic review of 13 RCTs, Kondo and colleagues argue that using β-lactam antibiotics through prolonged infusion greatly enhances clinical cure and targets plasma concentrations in septic shock patients (2020). The results of evaluating the efficacy of these types of antibiotics support the need to incorporate the aforementioned benefits of prolonged antibiotics in the evidence-based intervention that will be provided in the project. A meta-analysis that coincides with a systematic review conducted by Luo and colleagues (2019) investigated whether prolonged infusion affected mortality and outcomes compared to intermittent infusion in patients who were critically ill. Through a meta-analysis coinciding with a systematic review and trial sequential analysis, Li and colleagues included 1,762 patients from nine different studies, which included patients receiving β-lactam antibiotics, septic shock.
patients, and other criteria and compared intermittent IV infusion versus prolonged infusion to assess benefits regarding hospital mortality and clinical cure (2023). In an investigative article, Wu and the authors (2021) performed a meta-analysis coinciding with a systematic review and meta-regression analysis including 18 RCT studies and 13 non-RCT studies to investigate associations between extended infusions and clinical cure, hospital mortality, and length of stay in the Intensive Care Unit (ICU). These studies highlight the importance of utilizing this treatment strategy and further support the need for Children’s Hospital A nurses to understand the rationale behind the use of prolonged antibiotics. The findings of these articles relate to the project as crucial educational information to include in the video intervention for the QI project.

Another article written by Yu and colleagues (2018) further supports the claim that prolonged infusion of antibiotics improves clinical rate and lowers mortality. This systematic review with meta-analysis explored patients with severe infections through 6 RCTs and 4 observational studies (Yu et al., 2018). The findings expressed that the group with prolonged infusion showed an increased success rate clinically than those with intermittent bolus, which is vital information for RNs to have in their re-education of prolonged antibiotics.

Regarding the education methods that nurses benefit from and what sites need, Fawaz and authors (2020) prove that critical care nurses have enough knowledge regarding the topic and they approve the use of continuous infusion of antibiotics to be implemented, however, Kuitunen and other authors (2021) assert the need to increase focus on medication safety, including prescriptions, preparations, and administration of intravenous (IV) medications. Fawaz and colleagues deployed a 21-question survey for nurses to self-administer regarding their knowledge, perceptions, comfort, and experience regarding prolonged antibiotics. In this cross-sectional study, they evaluated the knowledge critical care nurses had regarding prolonged
antibiotics to lower antimicrobial resistance using a specific dosing strategy and though the nurses in this study expressed sufficient understanding regarding prolonged infusion of antibiotics, the results still indicated a need for further education regarding the topic (Fawaz et al., 2020). Kuitunen and colleagues utilized a systematic review of eleven studies from six different countries, which included the neonatal and oncology units, to determine why IV medication errors happen, in order to contribute to improvements made in healthcare organizations regarding this type of medication treatment (2021). The results of this study magnify the importance of medication safety to be implemented in the project’s intervention at Children’s Hospital A. In another study regarding education methods, Vazouras and colleagues (2020) explored the use of stewardship and monitor protocols regarding prolonged use of IV antibiotics. They utilized a retrospective cohort study, with neonates, infants and toddlers, and children up to 18 years of age and found that to reduce errors, it is imperative to incorporate a monitoring protocol, which will be expressed through the intervention of this QI project. Results of the Needs Assessment for the project indicated that most Pediatric RNs at Children’s Hospital A Acute Care units feel confident in the understanding of the rationale behind the use of prolonged IV antibiotics. However, iCares data reflects there are many medication errors regarding prolonged antibiotics. In connection with this QI initiative, this article emphasizes the significance of conducting surveys among nurses to identify inconsistencies in knowledge, as evidenced in the problem description. In exploring the education intervention to be utilized as part of this improvement project, Coyne and colleagues (2018) used an integrative review to examine experimental and non-experimental studies using various education methods and their outcomes and assessed the effectiveness of different teaching methods for nursing students and found that a blended learning style, including video resources, is a useful teaching tool in the
healthcare field. As voted by the RNs from Children’s Hospital A Acute Care units through the Needs Assessment, the education intervention that will be provided in this project will be a video resource.

With a significant amount of medication errors being reported to the data for Children’s Hospital A Acute Care units, evidence supports the importance of surveying nurses to find out where knowledge gaps exist relating to prolonged IV antibiotic administration. The literature also suggests that multi-media interventions for training are useful, such as video education interventions. In conclusion, the literature has proven the efficacy and rationale required to use Evidence-Based Practice (EBP) in this QI project.

**Rationale**

Change theories provide a model for a leader to use when implementing a change in a system. Having a framework to follow increases the chance the implementation will work (Mitchell, 2013). Therefore, it is important to choose a framework that fits the proposed project, including the type of leadership, and the staff and environment it will affect. Children’s Hospital A’s Pediatric Acute Care unit has had many errors due to the administration and setup of antibiotics therefore, utilizing a theory model that identifies the problem, assesses people and the environment, implements change, and evaluates the outcomes will ensure these errors are successfully reduced. It would be most appropriate to utilize the Ottawa Model of Health Care Research Use because it utilizes various phases and considers the environment, evidence-based practice, who will be involved, how the evidence will be used, the proposed action, and the results (Shojania et al., 2004). As CNL students, we will assess the issue by first evaluating the evidence-based recommendations of prolonged IV antibiotics while including and supporting
patients. With options for strategies, including giving educational support, we will be able to educate the nurses involved to reduce errors. With a structured training program, this project can reduce medication errors of IV antibiotics (Giri et al., 2023).

**Ethical Considerations**

Ethical considerations in the development of this QI project include nonmaleficence and privacy. When evaluating data to collect incidence errors, the CNL students worked with the CPQS to take measures to exclude protected health information (PHI). The CPQS provided this data through her work computer and appropriately disposed of the incident reports. Surveys deployed to RNs did not collect any personal data, including emails. Due to the measures implemented, this project abides by federal guidelines for QI review and is approved by the USF School of Nursing and Health Professions, as it was conducted under faculty guidance. This project aims to improve patient outcomes by improving nurses’ knowledge and education, which encompasses consideration for the mind, body, and spirit, a USF Jesuit value. The Provision 7.1 in the American Nurse Association Code of Ethics (ANA COE) states the profession is advanced through research by a nurse in all settings and roles (2015). This is done through evaluation, dissemination, and knowledge development. A review from the Institutional Review Board (IRB) was not required for this project. A form with a statement of non-research determination (SONRD) validates the initiative for this project (Appendix B). Students performing this QI project declare no conflict of interest and state there was no funding received for this project.

**Project AIM**

For this project, the CNL student group determined that by April 2024, 95% of pediatric registered nurses who administer prolonged IV antibiotics in Children’s Hospital A’s acute care
units will report a 5% increased knowledge of the correct setup and administration of prolonged IV antibiotics following the receipt of comprehensive 5-minute and 40-second video education. The intervention will be creating an easily accessible educational video and updating the current tip sheet. A desired change in practice is for nurses to utilize the easily accessible educational video and tip sheet, which will lead to decreased medication errors. Our expected outcomes include self-report increases in nurses’ knowledge regarding the setup and administration of prolonged IV antibiotics which will result in the reduction of medication errors.

Methods

Context

A microsystem assessment was conducted utilizing the “5 Ps” method, which identifies the following within the pediatric acute care unit at Children’s Hospital A: purpose, patients, professionals, processes, and patterns. The purpose of this unit is to enhance the health and well-being of pediatric patients. The patients encompassed in this microsystem are pediatric patients, their families, and caregivers. The professionals comprising this microsystem include a diverse array of staff, such as registered nurses, doctors (including interns, residents, fellows, and attending physicians), nurse practitioners, respiratory therapists, phlebotomists, unit secretaries, child life specialists, sitters, nurse managers, nursing assistants, CNLs, and students.

The processes implemented within this microsystem to provide care and services include QI meetings, ethics committees, volunteer programs aimed at educating caregivers and patients, as well as the decision-making process regarding prolonged antibiotic use for specific conditions. Patterns identified include various aspects, such as the types of tubing utilized for prolonged antibiotics, reactions and benefits associated with prolonged antibiotic use, shift huddles, proper
documentation practices for prolonged antibiotic administration based on prescription, and proper setup for antibiotics and their run times.

The team employed various tools to ensure the effectiveness of the QI project. Utilizing the GANTT Chart, the CNL group effectively met deadlines and optimized time allocation for the development and implementation of the intervention (see Appendix C). The timeline lasted from January to April 2024. A comprehensive fishbone analysis was conducted to identify potential causes of the issues at Children’s Hospital A. Appendix D identifies several factors, noting the inadequate training of pediatric RNs and the lack of the necessary equipment for administering these antibiotics properly.

Through a Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis, the team identified internal and external weaknesses and threats within the acute care units. However, it was noted in Appendix E that nurses at this hospital benefit from adequate staffing to have support from resource RNs, team leaders, and flex RNs, enabling them to provide high-acuity care to their patients.

To ensure the CNL student group’s intervention would yield benefits for nurses, patients, and the hospital, a budget analysis was conducted. Though the project focuses on increased knowledge for RNs, a secondary outcome of the intervention would be reduced length of stay which was utilized to calculate cost savings. The overall project costs and savings for year one of implementation were calculated to project a decrease in length of stay, and hourly pay rates for RNs and CNLs at this hospital. Patients have an average length of stay of seven days at Children’s Hospital A. However, medication errors can increase the length of stay by one and a half days to 4 and a half days (Da Silva & Krishnamurthy, 2016). The team utilized two days for budget purposes to estimate the least amount of cost saving this would mean for Children’s
Hospital A. Despite a significant project cost, Appendix F demonstrates the project would make a significant impact by reducing costs by $72,436.45 (Appendix F). Should this implementation continue to be successful, the implementation cost is anticipated to be reduced because the educational video will already be created. Furthermore, the video would just need to be presented during the new hire orientation.

**Intervention**

To create an effective intervention for this QI project, various tools including a Needs Assessment survey, pre-quiz, and post-quiz were employed. To gain insight into the culture and staff dynamics at Children’s Hospital A, the CNL students devised a Needs Assessment survey consisting of 12 questions. The survey utilized Likert scales, yes/no options, and an open-ended question (refer to Appendix H). This tool facilitated the identification of the most beneficial intervention based on staff preferences while ensuring adherence to evidence-based practice supported by research.

The group developed a concise five-minute educational video demonstrating the proper procedures for administering prolonged antibiotics. The video accommodates diverse learning styles encompassing visual, auditory, and captioned formats. The dissemination of this educational material was completed at the April 11, 2024 all-staff meeting, attended by over 90 acute care RNs. To address the PICOT question and attain the AIM statement, the students needed to measure baseline knowledge prior to the intervention and subsequently reassess comprehension after the education was delivered. The post-quiz was combined with a few questions from the post-survey to assess the confidence levels of nurses regarding prolonged IV antibiotic therapy.

**Study of the Intervention**
By utilizing the Plan-Do-Study-Act (PDSA) cycle tool, the team was able to develop an effective intervention. Initially, the group created a plan outlining the evaluation for the proposed change in the ‘Plan’ phase. Through the ‘Do’ phase of the cycle, the team executed the plan by implementing a test, that was then followed by observation. The observation piece was rigorously analyzed during the ‘Study’ phase of the cycle to assess implications and efficacy. Finally, in the ‘Act’ phase, the team came up with strategies to refine the test for future improvements.

In the context of Children’s Hospital A, during the ‘Plan’ stage, CNL students collaborated closely with the leadership team to synthesize the PICOT question and AIM statement. This involved the meticulous analysis of current incidence data and a comprehensive needs assessment to evaluate Pediatric RNs’ knowledge regarding prolonged IV antibiotic therapy. Subsequently, the group developed an educational video tailored to address the identified gaps as part of the ‘Do’ part of the cycle. The Needs Assessment survey data collection occurred over two weeks and included RNs from all sub-units of acute care, including both day and night shifts. The video was presented during an all-staff meeting specifically for Acute Care RNs, as outlined in the Intervention strategy. The video was strategically integrated into the meeting to ensure maximum exposure. To gauge the video’s effectiveness in knowledge improvement, RNs underwent a knowledge assessment quiz before and after being presented the educational video.

As part of the ‘Study’ stage, the group analyzed the quiz results to compare them to the AIM statement and decide if the intervention would be beneficial. Following a favorable evaluation, the CNL students propose to integrate the educational video into acute care RN training orientations as part of the ‘Act’ stage of the PDSA cycle. Given the encouraging
assessment of the intervention’s efficacy, the team recommends evaluating the intervention every six months and making necessary changes. Please refer to Appendix G for further details.

**Outcome Measures**

The evaluation of Children’s Hospital A’s current protocol for administering prolonged IV antibiotics employed comprehensive methodology including observations within the microsystem, a Needs Assessment survey, and pre- and post-quiz assessments as primary outcome measures. The needs assessment gathered both quantitative and qualitative data, using close-ended questions and Likert scales for quantitative data collection, and incorporating one open-ended question to inquire about perceived barriers from the perspectives of RNs. The pre-quiz established baseline levels of knowledge, while the post-quiz assessed increased knowledge after the intervention.

Following the implementation of the intervention, the CNL students administered the post-quiz, utilizing two identical questions from the needs assessment to reassess confidence levels. The group received positive feedback following the presentation through comments by acute care RNs.

**Results**

The pre-intervention survey, used as a needs assessment tool, was distributed to acute care RNs across PCUs 300, 360, and 400, yielding responses 55 out of a total of 187 nurses. The survey, comprising twelve questions, focused on assessing the educational tools currently employed at Children’s Hospital A, while other questions inquired about the confidence levels of RNs regarding the setup and administration of prolonged IV antibiotics (Appendix I). When asked about the utilization of these sheets, an average of 40.9% of respondents answered they had never seen the Extended Infusion of Antibiotics Tip Sheet nor the Extended Antibiotic
Infusions M.E.O.W Sheet. Qualitative responses regarding barriers to the correct setup and administration of prolonged IV antibiotics encompassed themes, such as insufficient education/training, limited experience/practice, staff turnover, and carelessness. Regarding suggested interventions, nurses identified an education video (34.5%) as the preferred tool for mitigating errors related to the setup and administration of prolonged IV antibiotics. The second tool nurses chose was an educational video with a checklist (29.1%).

Prior to the presentation of the video, a pre-quiz was administered during the meeting attended by 90 nurses, with 69 nurses participating (76.6% response rate). Following the implementation of the educational video, nurses' knowledge regarding the setup of prolonged IV antibiotics was assessed through a post-quiz, with 66 out of 90 nurses participating (73% response rate). These quizzes comprised four questions aimed at evaluating knowledge levels, revealing an overall 33.8% increase in knowledge of all questions. When comparing baseline knowledge to post-intervention knowledge, the results went from 86.9% to 95.5%, reflecting an 8.6% improvement, surpassing the CNL students’ expectations and AIM statement. Refer to Appendix N for further information.

**Discussion**

**Summary**

Children’s Hospital A’s CPQS identified medication errors associated with prolonged IV antibiotic administration. CNL students collaborated to investigate the root causes of these errors by analyzing survey data. This was assessed using the 5 Ps model, Needs Assessment Survey, SWOT analysis, and budget considerations using the PDSA cycle.

The results of this QI project demonstrate the imperative need for consistent education among Acute Care RNs to standardize the setup of prolonged IV antibiotic protocols. Nurses
reported a lack of education and training on this subject, along with staff turnover, as significant barriers. The video intervention implementation would address these challenges to increase knowledge, leading to reduced length of stay as a secondary outcome. An increased understanding of the rationale for the use of prolonged IV antibiotics will empower nurses with confidence when setting up these antibiotics.

Current policies and procedures in the tip sheets regarding these antibiotics are inconsistent and challenging for nurses to locate on their education website. To address this, CNL students collaborated with CPQS and a Team Lead to develop the proper steps, integrating them into the presentation, which will be distributed to nurses via email and embedded in the education website. This video will minimize inconsistencies in the setup of prolonged IV antibiotics, establishing a standardized protocol.

Additionally, the team recommends this educational video be presented during new hire orientations, new graduate residency program training, and an annual refresher training. Increased frequency of the material would aim to reduce medication errors leading to increased hospital stays, solicit post-training feedback, and increase confidence in nurses administering these types of therapies.

**Limitations**

Limitations for this QI project included challenges with the collection of iCares data, the limited number of nurses at the all-staff meeting, and time constraints. When collecting iCares data, the students only had three hours to review four years' worth of all incidents to get only prolonged IV antibiotic-related issues. At the meeting, only 90 nurses were present out of 187 total Acute Care nurses, and the team received less than 70% response rates. The CNL group had
about three months to assess the needs assessment data, create the intervention, educate the nurses, and assess the effectiveness of the project.

Conclusion

The QI project effectively addressed the initial concerns of the CPQS, by increasing the knowledge of Acute Care RNs at Children’s Hospital A to decrease medication errors. In turn, the hospital is able to reduce costs by decreasing the length of stay. Medication errors are responsible for increased length of stay and financial burden for hospitals. This project aimed to increase the knowledge of Children’s Hospital A’s RNs regarding prolonged IV antibiotic administration by implementing an effective educational tool. Using a presentation and educational video that will be embedded on the nurses’ website ensures sustainability as there will not be any added costs. The student group fulfilled educational goals to increase CNL knowledge of microsystem assessment, data collection and analysis, and presentation of educational intervention to hospital management and staff. The project highlighted the importance of evidence-based practice projects to improve quality within healthcare.
References


Appendix A

Johns Hopkins Evidence Appraisal Table

<table>
<thead>
<tr>
<th>Journal #</th>
<th>Citation</th>
<th>Evidence Type</th>
<th>Sample, Sample Size, Setting</th>
<th>How Does Article Address Problem?</th>
<th>Quality of Evidence</th>
<th>Other Highlights from Article (consider including limitations &amp; outcomes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Budai, K. A., Timár, Á. É., Obeidat, M., Máté, V., Nagy, R., Harnos, A., Kiss-Dala, S., Hegyi, P., Garami, M., Hankó, B., &amp; Lódi, C. (2023). Extended infusion of β-lactams significantly reduces mortality and enhances microbiological eradication in paediatric patients: a systematic review and meta-analysis. <em>EClinicalMedicine, 65</em>, 102293.</td>
<td>Syste matic revie w and meta-analys is of RCT and non-RCTs</td>
<td>Budapest, Hungary</td>
<td>19 studies out of 19,980 articles screened. There were 4,195 patients under 18 years of age</td>
<td>The findings suggest that prolonged infusion of β-lactams was related to higher levels of microbiological elimination and lower mortality. This will be helpful information to include in the education intervention.</td>
<td>Level II - Good Quality</td>
</tr>
<tr>
<td>Article ID</td>
<td>Authors</td>
<td>Study Design</td>
<td>Inclusion Criteria</td>
<td>Findings</td>
<td>Level</td>
<td>Limitations</td>
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<td>2</td>
<td>Coyne, E., Rands, H., Frommolt, V., Kain, V., Plugge, M., &amp; Mitchell, M. (2018).</td>
<td>Integrative review</td>
<td>Ten articles met all the inclusion criteria and were included in this review. The studies were conducted within a variety of countries including India, the United Kingdom, Ireland, China, Germany, Korea, Australia, and the USA.</td>
<td>The findings suggest that video-assisted online resources are beneficial for health students' clinical skill learning. To create an effective education intervention for healthcare workers.</td>
<td>Level V</td>
<td>Limitations: There was no use of a comparison group. Another limitation was that students performed self-assessments for most of the studies. This can mean the results from the self-assessments included bias.</td>
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<td></td>
<td>Cite</td>
<td>Study Type</td>
<td>Setting</td>
<td>Findings</td>
<td>Level</td>
<td>Limitations</td>
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<td>3</td>
<td>Fawaz, S., Barton, S., Whitney, L., &amp; Nabhani-G ebara, S. (2020).</td>
<td>Cross-sectional study</td>
<td>The setting was St. George’s Hospital. N = 52 critical care nurses. All critical care nurses from three ICU neuro, cardiac, and general wards were encouraged to participate. It included day-shift nurses, part-time and full-time. Investigator-developed, self-administered survey that included open- and closed-ended questions.</td>
<td>The findings suggest that more education/training for critical care nurses would be beneficial, especially in administering these types of antibiotics. Nurses advocate for prolonged infusion treatment protocol in critical care settings. This relates to further research regarding prolonged antibiotic use in critical care and will be beneficial when receiving survey results about prolonged antibiotic knowledge from nurses at Children’s Hospital A.</td>
<td>Level III - Good Quality</td>
<td>Because the survey was deployed in person, it limited the participants. Another limitation is that the study included only day-shift nurses. Outcomes: Nurses' views regarding antibiotic therapy in critical care were represented in the survey. It also included a diverse sample because three Intensive Care Units were sampled. The findings suggested that nurses have good knowledge and confidence regarding continuous infusion of antibiotics.</td>
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<tr>
<td>4</td>
<td>Kondo, Y., Ota, K., Imura, H., Hara, N., &amp; Shime, N.</td>
<td>Systematic review with 13 studies were included. Types of studies: RCT</td>
<td>The findings suggest that prolonged infusion of β-lactam antibiotics significantly improved upon attaining the</td>
<td></td>
<td>Level I - High-Quality</td>
<td>A limited number of RCTs were available for several secondary outcomes,</td>
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<tr>
<td>Study</td>
<td>Methodology</td>
<td>Findings</td>
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<td>Kuitunen, S., Niittynen, I., Airaksinen, M., &amp; Holmström, A. R.</td>
<td>Systematic review</td>
<td>Eleven studies were included. The settings for these studies were in the neonatal unit and the oncology unit.</td>
<td>Outcome: Knowing what factors might affect medication errors. Errors in preparing IV medications.</td>
<td></td>
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<td>(2020). Prolonged versus intermittent β-lactam antibiotics intravenous infusion strategy in sepsis or septic shock patients: a systematic review with meta-analysis and trial sequential analysis of randomized trials. Journal of Intensive Care, 8, 77. <a href="https://doi.org/10.1186/s40560-020-00490-z">https://doi.org/10.1186/s40560-020-00490-z</a></td>
<td>meta-analysis</td>
<td>Target plasma concentration and clinical cure. Prolonged infusion could not improve hospital mortality although an improvement was shown for studies published in or after 2015. This will be helpful information to include in the education intervention.</td>
<td>Another limitation was that the subgroup analysis was conducted retrospectively based on publication year, possibly influencing results if performed prospectively. Another limitation that could have created bias was that for some RCTs, participants were aware of the group assignments. This could have also lowered the certainty of evidence. Outcome: Prolonged infusion improved clinical cure rates without raising the levels of antibiotic-resistant bacteria.</td>
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The studies were from six different countries.

medication safety to Children's Hospital A nurses.

<p>| 6 | Li, X., Long, Y., Wu, G., Li, R., Zhou, M., He, A., &amp; Jiang, Z. (2023). Prolonged vs intermittent intravenous infusion of β-lactam antibiotics for patients with sepsis: a systematic review of randomized clinical trials with meta-analysis and trial sequential analysis. <em>Annals of Intensive Care</em>, | Nine studies had 1762 patients. | The findings suggest that prolonged infusion of antibiotics lowered the mortality in patients with septic shock. There was an addition of two high-quality RCTs in the review. The findings also showed that there was a decrease in ICU mortality, hospital mortality, and higher clinical cures. This will be helpful information to include in the education intervention for lateral integration of the intervention. | Level II - High-Quality | Limitations: It was suggested that more studies are necessary. The definition of sepsis was not consistent throughout the studies. Outcomes: Extended infusion was beneficial in lowering mortality and increasing clinical cures. |</p>
<table>
<thead>
<tr>
<th>7</th>
<th>Luo, J., Liao, J., Cai, R., Liu, J., Huang, Z., Cheng, Y., Yang, Z., &amp; Liu, Z. (2019). Prolonged versus intermittent infusion of antibiotic in acute and severe infections: a meta-analysis. <em>Archives of Iranian Medicine (AIM)</em>, 22(10), 612-626.</th>
<th>Syste\n\nmatic Revi\n\nw with meta-\nanalys\nis</th>
<th>The setting was China. There were forty-three studies, including 30 RCTs, five prospective observational studies, and eight retrospective observational studies. N = 3,610 patients between 1977 and 2018.</th>
<th>This study showed an increase in clinical cure and lower mortality with extended infusion versus intermittent antibiotic use. This will be helpful information to include in the education intervention.</th>
<th>Level III - High-Quality</th>
<th>Limitations: There could have been highly resistant organisms in the older studies because there may not have been as precise organism detection resources. This could result in higher mortality rates. Outcomes: All-cause mortality and clinical cure in patients. Other outcomes were evaluating adverse effects and nephrotoxicity. Critically ill patients benefit greatly from the extended antibiotic infusion.</th>
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<tr>
<td>8</td>
<td>Vazouras, K., Velali, K., Tassiou, I., Anastasiou-Katsiardani, A., Athanasopoulos, K., Barbouni, A., Jackson, C., Folgori, L.,</td>
<td>Retro\n\nspecti\n\nve cohort study</td>
<td>N= 230 patients in Achillopouleio General Hospital of Volos in Central Greece. Patients included neonates, infants and</td>
<td>The study concluded that prolonged use of IV antibiotics needs to be continuously monitored due to possible resistance against common bacteria in pediatric patients, such as E. coli. When comparing oral antibiotic use versus</td>
<td>Level III</td>
<td>Limitations: The study did not specify the length of prolonged IV antibiotic use and at which point it became beneficial for the patient. Outcome: Use stewardship and monitor protocols to reduce errors in</td>
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<td>toddlers, and older children (birth to 18 years of age)</td>
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<td>prolonged IV antibiotic use for urinary tract infections (UTIs), prolonged IV infusions were as effective as IV therapy with oral therapy. This will be helpful information to include in the education intervention.</td>
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<td>Level II - High-Quality</td>
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<td>Limitations: Antibiotic resistance was not explored because pathogens were not always identified. The severity of illnesses is dependent on the site of infection and the drug concentrations at the site of infection were unknown. Outcomes: Clinical cure, length of stay in the ICU and hospital mortality were all associated with the use of</td>
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| It included 18 randomized controlled trials (RCTs) and 13 non-RCTs |
| The findings suggest the loading dose significantly raised the clinical cure rate, including sepsis patients who were critically ill. This will be helpful information to include in the education intervention. |
| Level II - High-Quality |
| Limitations: Antibiotic resistance was not explored because pathogens were not always identified. The severity of illnesses is dependent on the site of infection and the drug concentrations at the site of infection were unknown. Outcomes: Clinical cure, length of stay in the ICU and hospital mortality were all associated with the use of |
| 10 | **Yu, Z., Pang, X., Wu, X., Shan, C., & Jiang, S. (2018).** Clinical outcomes of prolonged infusion (extended infusion or continuous infusion) versus intermittent bolus of meropenem in severe infection: A meta-analysis. *PLOS ONE, 13*(7), e0201667. https://doi.org/10.1371/jctp.13301 | **Systematic review with meta-analysis.** Included six RCTs and 4 observational studies. | Findings suggest the prolonged infusion of meropenem showed improvement in clinical rate and lower mortality for patients with severe infections. It shows that extended intravenous therapy of antibiotics is beneficial. This will be helpful information to include in the education intervention. | **Level III - Good Quality** | Limitations: Small sample size. Unclear use of other antibiotics. No report on the site of infection or the type of infection. Outcomes: The clinical success rate of the group with prolonged infusion was higher than those with intermittent bolus. This group also had lower mortality. |
Appendix B

Statement of Non Research Determination

Project: Statement of Determination and Non-Research Determination Form

Student Name: Zerena Silva Villamonte

Title of Project: Improving the Education of Pediatric Registered Nurses on the Setup and Administration of Prolonged IV Antibiotics in Pediatric Units

Errors with the setup and administration of prolonged IV antibiotics have resulted in pediatric patients not receiving the full, correct doses of their prescribed medication which leads to poor health outcomes, increased length of hospital stays, antibiotic resistance, and delayed healing. By April 2024, 95% of pediatric registered nurses who administer prolonged IV antibiotics in LPCH acute care units will report

% increased knowledge of the correct setup and administration of prolonged IV antibiotics following the receipt of comprehensive 10-minute video education. The intervention will be creating an easily accessible educational video and updating the current tip sheet. A desired change in practice is for nurses to utilize the easily accessible educational video and tip sheet, which will lead to a reduction in medication errors. Our expected outcomes include self-report increases in nurses’ knowledge in the setup and administration of prolonged IV antibiotics which will result in the reduction of medication errors.

To qualify as an Evidence-based Change in Practice Project, rather than a Research Project, the criteria outlined in federal guidelines will be used:
(http://answers.hhs.gov/ohrp/categories/1569)

☑ This project meets the guidelines for an Evidence-based Change in Practice Project as outlined in the Project Checklist (attached). Student may proceed with implementation.

☑ This project involves research with human subjects and must be submitted for IRB approval before project activity can commence.

Comments:

EVIDENCE-BASED CHANGE OF PRACTICE PROJECT CHECKLIST *
### Instructions: Answer YES or NO to each of the following statements:

<table>
<thead>
<tr>
<th>Project Title: Improving the Education of Pediatric Registered Nurses on the Setup and Administration of Prolonged IV Antibiotics in Pediatric Units</th>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>The aim of the project is to improve the process or delivery of care with established/accepted standards, or to implement evidence-based change. There is no intention of using the data for research purposes.</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>The specific aim is to improve performance on a specific service or program and is a part of usual care. ALL participants will receive standard of care.</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>The project is NOT designed to follow a research design, e.g., hypothesis testing or group comparison, randomization, control groups, prospective comparison groups, cross-sectional, case control. The project does NOT follow a protocol that overrides clinical decision-making.</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>The project involves implementation of established and tested quality standards and/or systematic monitoring, assessment or evaluation of the organization to ensure that existing quality standards are being met. The project does NOT develop paradigms or untested methods or new untested standards.</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>The project involves implementation of care practices and interventions that are consensus-based or evidence-based. The project does NOT seek to test an intervention that is beyond current science and experience.</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>The project is conducted by staff where the project will take place and involves staff who are working at an agency that has an agreement with USF SONHP. The project has NO funding from federal agencies or research-focused organizations and is not receiving funding for implementation research.</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>The agency or clinical practice unit agrees that this is a project that will be implemented to improve the process or delivery of care, i.e., not a personal research project that is dependent upon the voluntary participation of colleagues, students and/or patients.</td>
<td>Yes</td>
<td></td>
</tr>
</tbody>
</table>

If there is an intent to, or possibility of publishing your work, you and supervising faculty and the agency oversight committee are comfortable with the following statement in your methods section: "This project was undertaken as an Evidence-based change of practice project at X hospital or agency and as such was not formally supervised by the Institutional Review Board."

**ANSWER KEY:** If the answer to ALL of these items is yes, the project can be considered an Evidence-based activity that does NOT meet the definition of research. **IRB review is not required. Keep a copy of this checklist in your files.** If the answer
to ANY of these questions is NO, you must submit for IRB approval.

*Adapted with permission of Elizabeth L. Hohmann, MD, Director and Chair, Partners Human Research Committee, Partners Health System, Boston, MA.

UNIVERSITY OF SCHOOL OF NURSING AND SAN FRANCISCO HEALTH PROFESSIONS

STUDENT NAME (Please print):
Zorina Silva Villarorte

Signature of Student:
Zerona Silva Villamonte DATE: 03/05/2024

SUPERVISING FACULTY MEMBER NAME (Please print):
Nicole Baamish, DNP, PHN, FNP-BC, BC-ADM, CNL

Signature of Supervising Faculty Member
DATE: 3/14/2024
## Appendix C

### GANTT Chart

<table>
<thead>
<tr>
<th>TASK NAME</th>
<th>START DATE</th>
<th>END DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Project Conception</strong></td>
<td></td>
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</tr>
<tr>
<td>Determination of Change Theory</td>
<td>1/23</td>
<td>1/28</td>
</tr>
<tr>
<td>Define Project/PICOT Question</td>
<td>1/28</td>
<td>2/7</td>
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<tr>
<td>Microsystem assessment/5 P's</td>
<td>2/4</td>
<td>2/11</td>
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<tr>
<td>Develop AIM statement</td>
<td>2/4</td>
<td>2/11</td>
</tr>
<tr>
<td>Literature Review</td>
<td>3/28</td>
<td>2/16</td>
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<tr>
<td>Meeting with medication administration</td>
<td>2/21</td>
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<tr>
<td><strong>Project Planning</strong></td>
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<tr>
<td>Develop needs assessment survey</td>
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<td>2/29</td>
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<tr>
<td>Deploy needs assessment survey</td>
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<tr>
<td>Analyze needs assessment survey</td>
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<td>3/14</td>
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<tr>
<td>Draft 1 due</td>
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</tr>
<tr>
<td>Create pre- and post-intervention survey</td>
<td>4/1</td>
<td>4/11</td>
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<tr>
<td>Create educational video &amp; presentation</td>
<td>4/1</td>
<td>4/11</td>
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<tr>
<td><strong>Project Implementation</strong></td>
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<tr>
<td>Present video &amp; presentation to nurses</td>
<td>4/11</td>
<td>4/11</td>
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<tr>
<td>Deploy pre- and post-intervention survey</td>
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<tr>
<td><strong>Project Evaluation and Synthesis</strong></td>
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<td>Evidence-based poster creation</td>
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<td>Paper due</td>
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<td>In-class project presentation</td>
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<tr>
<td>Submission to USF Scholarship Repository</td>
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Appendix D

Fishbone Analysis

- Pediatric HCP using wrong wording on EPIC, prolonged IV antibiotic order.
- Pediatric RNs are not properly trained due to lack of awareness of and easy access to educational resources.
- Nurse educators are not providing requested individual hands-on training to the RNs.
- Tip sheets are not easily accessible for the RNs - not updated and not succinct.
- icares data is not easily accessible.
- Inconsistencies between physical preparation and administration steps of antibiotics.
- The microsystem consists of three units with different training, applications of policies, materials inventory, and processes.
- Each unit has a different patient population. Some of these acute care units do not always have patients who need prolonged IV antibiotics, therefore, some RNs have less practice.
- When a mistake is made, the process for reporting and fixing these errors is unclear.
- Straight set IV tubing with blue occlusion ball is inconsistent throughout units.
- Inconsistency between antibiotic syringe vs. bag.
- Inconsistency with antibiotic flush volume.
Appendix E

SWOT Analysis

**Strengths**
- Ability to access tip sheets
- Training programs
- Support: resource RNs, flex RNs, team leaders, CNAs, and sitters available
- Commitment to patient safety and quality care
- Adequate staffing

**Weaknesses**
- Nurse educators not providing requested individual hands-on training for RNs
- Three acute care units with different trainings, applications of policies, materials, and processes
- Various trainings, or lack of, for float RNs and travel RNs

**Opportunities**
- Continually striving to improve existing protocols
- Ability to provide high acuity care to patients
- Teaching hospital
- Incident report tool
- Magnet-recognized hospital
- Values evidence-based research

**Threats**
- Time constraints to educate nurses
- Staff survey fatigue due to large academic facility
- Staff resistance to policy adherence
# Appendix F

## Budget Analysis

### Educating RNs on Prolonged IV Antibiotics to Reduce Medication Errors

Aim Statement: By April 29th, 2024, of pediatric registered nurses who administer prolonged IV antibiotics in the hospital's acute care units, there will be an overall 5% increase in self-reported knowledge of the correct setup and administration of prolonged IV antibiotics following the receipt and intervention of a comprehensive educational video demonstration, ultimately decreasing length of stay.

<table>
<thead>
<tr>
<th>Current State</th>
<th>Length of Stay</th>
<th>Cost of 1 day in the hospital</th>
<th>Annual cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients on Prolonged IV Antibiotics</td>
<td>11</td>
<td>8 days</td>
<td>$6,071.05</td>
</tr>
<tr>
<td>Improved State</td>
<td>Patients on Prolonged IV Antibiotics</td>
<td>Average Length of Stay</td>
<td>Cost of 1 day in the hospital</td>
</tr>
<tr>
<td>Reduce length of stay</td>
<td>11</td>
<td>7 days</td>
<td>$6,071.05</td>
</tr>
</tbody>
</table>

**Cost Avoidance** $133,563.10

<table>
<thead>
<tr>
<th>Implementation Cost</th>
<th>Hourly rate ($)/ 0.35% benefit</th>
<th>Number of hours needed</th>
<th>Number of nurses</th>
<th>Annual cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>CNL conducts video and implements project</td>
<td>117* 40.95</td>
<td>200</td>
<td>1</td>
<td>$31,580.00</td>
</tr>
<tr>
<td>RN receives education</td>
<td>117* 40.95</td>
<td>1</td>
<td>187</td>
<td>$29,536.65</td>
</tr>
</tbody>
</table>

**Total Cost to Hospital** $61,126.65

**Project Savings** $72,416.45
Appendix G

PDSA Worksheet

**PDSA Cycle**

**Plan**
- Collaborate with hospital's leadership team.
- Synthesize PICOT question and AIM statement.
- Analyze current practice through iCares data.
- Conduct needs assessment/gap analysis with RN surveys via QR codes.

**Act**
- RNs will adapt, and the educational video will be integrated into all RN training orientations.
- Evaluate intervention every six months and make changes as needed.

**Do**
- Create an educational video.
- Prior to showing the video to RNs, the RNs will take a knowledge assessment quiz. They will take the same quiz before and after video education to assess increases in knowledge.

**Study**
- Analyze pre- and post-video quiz results.
- Compare results to AIM statement.
Appendix H

Needs Assessment QR Code

We care about what you think.

As part of a USF Quality Improvement project for Master’s Prepared Clinical Nurse Leader (CNL) students, we would like to understand your current knowledge, as pediatric registered nurses at LPCH, of prolonged antibiotics. This survey will include knowledge about the use, setup, and administration of these antibiotics. Your response will help us develop better education regarding this topic.

Thanks from USF Master’s-Prepared CNL students: Kiara Hayden, Kasandra Rezler, & Zerena Silva Villamonte

*No personal information/identifiers will be collected*
Appendix I

Needs Assessment Survey

Prolonged IV Antibiotics Survey for RNs

As part of a USF Quality Improvement project, we would like to understand your current knowledge, as pediatric registered nurses at LPCH, of prolonged IV antibiotics. This survey will include knowledge about the use, setup, and administration of these antibiotics. Your response will help us better understand this topic.

*No personal information/identifiers will be collected*

zssilravillamonte@donors.usfca.edu Switch account
Not shared

* Indicates required question

How many total years of experience do you have as an RN? *

- 0-5 years
- 6-10 years
- 11-15 years
- 16+ years

What unit do you work on? *

- PCU 300
- PCU 360
- PCU 400
- Float Pool
- Other: _______________________

Which shift do you work? *

- AM
- PM
- Other: _______________________

What type of training did you receive on the setup and administration of prolonged IV antibiotics?

- In person hands-on training
- M.E.O.W. or tip sheet
- I did not receive training
- Other: _______________________
### I understand the rationale behind the use of prolonged IV antibiotics. *

<table>
<thead>
<tr>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐</td>
<td>☒</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
</tr>
</tbody>
</table>

Please indicate your level of agreement with this statement.

### I feel confident in setting up and administering prolonged IV antibiotics. *

<table>
<thead>
<tr>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐</td>
<td>☒</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
</tr>
</tbody>
</table>

Please indicate your level of agreement with this statement.
Tip Sheets

How often do you utilize tip sheets in your practice? *

<table>
<thead>
<tr>
<th>Always</th>
<th>Usually</th>
<th>About half the time</th>
<th>Seldom</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Please indicate how often...

Do you find tip sheets helpful in your practice? *

<table>
<thead>
<tr>
<th>Not helpful at all</th>
<th>A little helpful</th>
<th>Neutral</th>
<th>Very helpful</th>
<th>Absolutely essential</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Please indicate how helpful...

Have you ever used the Extended Infusion of Antibiotics Tip Sheet? *

Center for Professional Excellence and Inquiry
Stanford Children’s Health
Lucille Packard Children’s Hospital Stanford

Extended Infusion of Antibiotics

Audience: Healthcare providers who administer antibiotics via extended infusion
Objective(s): To ensure accurate and timely administration of antibiotics via extended infusion

Overview Statement

Extended infusions of antibiotics are often necessary in certain clinical scenarios. This tip sheet aims to provide guidance on the administration of extended infusions to optimize patient outcomes.

Definitions

Extended Infusion: Administration of antibiotics over 3-4 hours
Standard Infusion: Administration over 60 minutes

Key Educational Points

- Extended infusions require careful monitoring and titration of antibiotics to maintain effective concentrations over time.
- It is important to consider patient factors, such as renal function, in determining the appropriate duration of extended infusions.
- Regular documentation of infusions is essential for tracking antibiotic exposures and ensuring patient safety.

References

Antimicrobial Stewardship Program: [Link]

Confidential. Protected Under California Evidence Code Section 1157
Have you ever used the Extended Antibiotic Infusions M.E.O.W sheet?

M.E.O.W.

(Medication Education & Outreach Workgroup)

TOPIC: Extended Antibiotic Infusions (Over 3-4 hours) Date: 4/11/2023

1.) Spike Antibiotic bag with primary tubing and prime antibiotic to end of the line (sterile prime and use a filter if being infused through a central line)
2.) Bring Antibiotic primed line into room, scan patient and medication
3.) On Alaris Pump, Click "Channel Select"-> "Guardrail Drugs" and Program according to order (Antibiotic name, dosage, volume, and time infused)
4.) Connect primary line directly to patient’s PV or Central Line. Press start and check for your drip
5.) After RN observes a drip confirming that the line is unlumped, press PAUSE
6.) Change volume on pump to NEW VOLUME (New Volume - Ordered Volume = 25 ml)
7.) Press START, methods for drip
8.) Pump will beep once NEW VOLUME (ordered volume - 25ml) is completed. 
9.) Once pump beeps, the medication bag should be empty and your volume left should be zero. Spike a 50 ml NS bag and add 25 ml to your volume of zero. If there is still medication left in antibiotic bag, squeeze remaining medication into tubing chamber. Press “restart”
10.) After the 25ml is complete, pump will beep off “infusion complete”. At this point, patient has received full dose of medication. Tubing can be disconnected and thrown in sharps. New tubing is required for each dose.

RATIONAL FOR PRIMING: Extended Antibiotics are typically ran over a SLOW rate. If they were ran as IVF’s then it would take a long time before medication reached patient’s line.

RATIONAL: for NEW VOLUME: 25ml is the approximate length of primary tubing. When the pump beeps off as “infusion complete” and a volume of zero, the IV Antibiotic fluid bag should be empty and the primary tubing should be filled with 25ml of medication.

April 2023 M.E.O.W Med Administration

Learn More:
- File an Occurrence Report: file all issues related to Medication Administration - please use: SMS format
- Speak to your SubCommittee leads & members
- Check out the Adult Care SharePoint on our intranet

What would you like to see as an educational tool to help reduce errors related to the setup and administration of prolonged IV antibiotics?

- Educational video
- Educational video with checklist
- Step-by-step posterboard
- Updated Tip Sheet
What would you like to see as an educational tool to help reduce errors related to the setup and administration of prolonged IV antibiotics?

- Educational video
- Educational video with checklist
- Step-by-step posterboard
- Updated Tip Sheet

What do you think is the biggest contributor to incorrect setup and administration of prolonged IV antibiotics?

Your answer
Appendix J

iCares Unit Data Results
Appendix K

iCares Classification of Issue Data Results

Count of Classification of event

- Administration issue: 50.0%
- IV access issue: 31.8%
- Dispensing/Pharmacy issue: 9.1%
- Adverse drug reaction: 9.1%
Appendix L

Needs Assessment Results

I feel confident in setting up and administering prolonged IV antibiotics.

Please indicate your level of agreement with this statement.
Appendix M

Needs Assessment Results

Have you ever used the Extended Infusion of Antibiotics Tip Sheet?

- 55 responses

- 50.9% Yes
- 41.8% No, I have not seen this before
- 7.3% No
Appendix N

Pre & Post Quiz Results

Pre

Can prolonged IV antibiotics be "Y'ed" with another compatible antibiotic?
69 responses

Post

Can prolonged IV antibiotics be "Y'ed" with another compatible antibiotic?
62 / 66 correct responses

Overall, 25.8% increase in knowledge
Pre

When infusing prolonged IV antibiotics through a PIV, which tubing is appropriate to use?
69 responses

- 94.2% Primary (straight set) tubing without ports
- 5.8% Secondary (IVPB) tubing
- 0% Tubing of personal preference

Post

When infusing prolonged IV antibiotics through a PIV, which tubing is appropriate to use?
65 / 66 correct responses

- 66 (100%) Primary (straight set) tubing without ports
- 0 (0%) Secondary (IVPB) tubing
- 0 (0%) Tubing of personal preference

Overall, a 5.8% increase
Pre

When is it appropriate to check the medication bag?
69 responses

Post

When is it appropriate to check the medication bag?
61 / 66 correct responses

- Every hour during PIV assessments: 61 (92.4%)
- When the pump beeps off: 2 (3%)
- When the bag, drip chamber, and line are empty/run dry: 3 (4.5%)

Overall, a 0.9% increase
Pre

When the medication bag is near empty, what are the next steps?
69 responses

Post

When the medication bag is near empty, what are the next steps?
63 / 66 correct responses

Overall, a 1.3% increase