Intravenous Therapy Documentation: Improving Communication and Patient Safety

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NUR 7920: DNP Project

August 2023

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The use of intravenous (IV) therapy has become an increasingly popular mechanism to treat and prevent multiple illnesses. Hospital organizations have been using this therapy for not only hydration but electrolyte replacement, antibiotics, blood transfusions, and sedation or pain control. Recently, IV therapy use has spiked in the ambulatory and outpatient setting. There has been an upsurge of infusion centers and urgent care organizations to provide accessible, quick and efficient care to patients. According to IBISWorld (2022), there has been a 7.9% yearly increase of urgent care centers in the United States over the past five years. Whether intravenous therapy is provided in an acute or ambulatory care outpatient setting, there are many complications that may arise during and after having an IV administration. Many times, these complications are related to the therapy being infused, such as an allergic reaction however, site errors such as phlebitis or infiltration are also common findings. Increases in IV therapy trends then increases the potential for complications, pressing the importance of patient safety which can be improved through appropriate documentation and communication practices. In the larger hospital corporations, there are multiple teams working on chart auditing and overlooking the documentation provided on interventions and outcomes. Performing internal chart audits are vital to maintaining organizational objectives and reviewing the quality of clinical care provided (Azzolini et al., 2019). Examining the aspects of using IV therapy in an outpatient setting, such as an urgent care, emerges the areas of documentation improvement that exist behind the scenes. This quality improvement project entailed a SWOT review of the current IV therapy documentation processes along with current evidence from informed practices to develop a documentation template in the current EHR system at Emcura. This project focused on the

concepts of IV therapy administration along with associated complications, patient safety, risks, and provider documentation in the outpatient setting.

Background/Significance

Emcura Immediate Care is a privately owned group of urgent and primary care centers located in southeast Michigan. Currently there are four locations in Bloomfield Hills, Grosse Pointe, Northville, and Royal Oak. The practice is owned and operated by two physicians and is further staffed with nurse practitioners, physician assistants, naturopathic doctors, medical assistants, and administrative personnel. The providers prefer to bring a patient centered, holistic, integrative, and natural approach to medicine. Many times, the team of providers are ordering IV infusion therapies for their chronically or acutely ill patients that could use hydration or a boost in electrolytes/vitamins/minerals. Patients with acute symptoms such as vomiting and diarrhea often are offered IV therapies such as hydration infusions while being cared for in the urgent care. Patients who have chronic illness or electrolyte/vitamin/mineral deficiencies are directed to schedule an IV infusion therapy appointment to receive their infusions.

For this project, the two IV therapy categories were separated into hydration vs. non-hydration infusions. Groski et al. (2021) explains the standard practice of what trained professional can insert, infuse, and monitor IVs. Specifically at Emcura, the nurse practitioners administer and monitor all the IV infusion therapies. According to the Scope of Practice for Health Professionals in the State of Michigan (2023), advance practice nurses (APNs) are able but not limited to order laboratory studies, perform physical exams, prescribe medications, perform minor procedures, and use and order medical devices/equipment. Individuals with chronic illnesses traditionally receive more than one IV infusion throughout their treatment duration.

Intravenous therapy has the potential to reach exponential levels as healthcare organizations explore the different ways these therapies can benefit overall health. “According to QY Research Medical, the Intravenous therapy and vein access market size was accounted at $22.8 billion in 2020 and is expected to reach $37.5 billion by 2030” (QY Research, 2022). Intravenous infusion therapy is a service that is expanding basic health care services to render improved health outcomes but also has its own unfavorable outcomes. As the population ages, there is an increase in “chronic diseases such as dementias, heart disease, type 2 diabetes, arthritis, and cancer (CDC, 2022). This rise of chronic illness correlates to the increase in outpatient IV infusions centers and IV therapy uses. However, with an increase in IV therapy uses comes an increased risk of complications secondary to the level of invasiveness of these therapies.

As with any peripheral intravenous catheter site, infection, phlebitis, infiltration, and extravasation are all potential complications (Dychter et al. 2012). Chaudhary et al. (2020) conducted a study and identified the following IV access complications: infiltration, phlebitis, hematoma, thrombophlebitis, abscess, cellulitis, bleeding, arterial bleed, extravasation, allergy, and skin necrosis. Typically for hydration IVs, a short peripheral IV catheter is placed into the vein in a hand or arm. A short peripheral IV can be defined as “an over-the-needle catheter with a hollow metal stylet positioned inside the catheter; generally inserted in superficial veins” (Groski et al., 2021, p. 220) and the IV therapy is hooked up and infused.

The usual duration of hydration IVs at Emcura ranges from 30-90 minutes. From the study by Chaudhary et al. (2020), the duration of cannulation had a positive relationship with the number of complications. Due to the short duration of infusion at Emcura, there would be a decrease in expected complications. As stated by Gorski et al. (2021), inserting the IV into the

forearm increases the likelihood of the IV lasting the full duration, decreases pain, and prevents accidental removal or occlusions, along with decreased dwell time.

Gorski et al. (2021) went on to discuss that educating the patient about adverse events along with using tools to identify, document, and track these adverse events are all standard practice recommendations for infusions. Prior to this SWOT analysis and project, Emcura lacked a standardized way of documenting and reporting adverse events. Creating a more in-depth electronic documentation template may assist in future data collection of IV therapies, adverse events, and safety outcomes. Future use of the template may also serve as a legal ground for recording of documentation requirements and communication between providers.

While administering IV infusions, there are documentation guidelines that need to be followed according to the Medicaid and Medicare Coverage Database (CMS, 2020). Aside from coding the visit with certain current procedural terminology (CPT) codes based on duration of infusion times (96360 and 96361), the Center for Medicare and Medicaid Services (CMS) also outlines certain documentation specifications, such as an assessment, vital signs, history, and medical necessity for therapy (CMS, 2020). Since non-hydration IVs are not covered by insurance, they are directly billed to the patient at time of service and pre-paid prior to infusion. For purposes of record keeping, they are still documented and coded as if they were being billed to insurance. Unfortunately, Emcura did not have a consistent approach to documenting and billing these visits. Because these infusions are typically being paid for out of pocket by the patient, coding and billing becomes insignificant, but aids with safety and monitoring. Nevertheless, there are also IVs delivered to urgent care patients where billing and coding are crucial to reimbursement. Whether processing through insurance or out of pocket expenses, documentation remains crucial for legal purposes, communication between providers, and patient safety.

According to the billing department, approximately 34 hydration IVs were administered between January 1st and December 31st, 2021. This number was found by running a chart audit on the billing code 96360 'Intravenous infusion, hydration; initial 31 minutes to 1 hour'. Due to the majority of infusions being reported as cash pay, the MindBody application was also reviewed. Approximately 132 non-hydration IVs were administered between January 2021 and December 2021, during the COVID19 pandemic. This creates an estimated total of 166 IVs administered at Emcura during 2021. The data from 2021 was used to demonstrate the frequency of IVs administered. Chart 1 depicts the month to month IV administrations at Emcura for 2021.

Chart 1

2021 IV Administration at Emcura by Month

Month of 2021	**Hydration**	**Non-hydration**	**Total IVs**
January	0	3	**3**
February	0	4	**4**
March	2	3	**5**
April	5	0	**5**
May	6	17	**23**
June	8	13	**21**
July	8	17	**25**
August	2	20	**22**
September	0	10	**10**
October	0	17	**17**
November	2	22	**24**
December	1	6	**7**

	34	**132**	**166**

Problems have been identified when trying to find IV infusion information such as when and what the patient received previously, their pre/post-IV infusion vital signs and blood glucose, descriptions of the IV site, administration, monitoring, discontinuation, and patient education given at Emcura. There are no standardized documentation procedures or policies for IV infusion therapies. An anticipated outcome of this project was to increase communication between providers leading to improved patient safety and mitigate data tracking by creating an easy-to-use electronic IV documentation template. The IV documentation template ensured the required points of IV documentation are completed for billing while tracking the patient's history of infusions all in one area. Using AllScripts, the electronic health record (EHR) used by Emcura, a template was created to load in the patient chart at every visit for an IV infusion therapy.

Problem

IV therapy is a growing intervention for many health-related illnesses. Emcura Immediate Care is a health care facility utilizing IV therapies to help with common and complex illnesses. As the business continued to expand, so did the number of IV therapies administered. The lack of a standardized IV documentation template led to a decrease in staff communication via charting that in turn puts patient safety in danger and no avenue for data tracking. This also placed the providers legal safety in danger. Weaknesses in the IV documentation and monitoring of outcomes at Emcura have been identified. Whether the IV is for hydration or non-hydration therapy, there is a necessity for quality improvement of documentation. Without expansive supporting literature, it was necessary to create a documentation template for Emcura and to

assess its effectiveness in preventing IV therapy complications and the impacts of communication.

Clinical Question

When exploring the current IV policies of Emcura and the potential for IV related adverse events without proper documentation, the following question can be addressed: In patients receiving IV therapy at Emcura (P), what is the effect of an electronic documentation template (I) on communication and patient safety outcomes (O) compared to baseline data within a 2-month period (C)?

Literature Review

A literature review was conducted to find necessary documentation points for intravenous therapy. This review was not limited to the outpatient urgent care setting but to IV infusions in general. The search was organized on PubMed and CINAHL for free full text articles from 2005 to present using the following terms: intravenous infusion/administration/therapy, urgent care/ambulatory care, documentation, and/or quality improvement/care coordination/productivity. Unfortunately, there were an extremely limited number of articles that fit the search criteria regarding urgent care clinics. By expanding the date range outside of the usual five-to-seven-years, two more articles were obtained to emphasize the importance of documentation and quality improvement. The following themes were identified during the literature review: efficiency, documentation requirements, and patient satisfaction. There were seven articles reviewed.

Efficiency

Several studies suggest that infusion therapy administered in an outpatient clinic saves the patient significant time and money when compared to the traditional hospital or emergency

department setting (Dohse, 2007; Reese et al., 2021). According to Reese et al. (2021), receiving standard migraine therapy infusion treatments in an outpatient clinic versus a hospital, the mean duration of the visit was reduced from 6.24 hours to 2.51 hours, along with the average cost of the visit being reduced from $10,375 to $962. A portion of the variation can be attributed to the outpatient infusion clinic having an established protocol for the patient with a diagnosis of migraine. While in the hospital (emergency) setting, other causes of migraines must be evaluated with further diagnostics (ex. lab work and imaging) which extends the length of stay and increases costs.

Dohse (2007), discussed a list of ways to improve efficiency in ambulatory infusion centers. Their primary focus was having the center run 'efficiently, profitably and effectively'. The article further dove into the nine diverse ways and gave examples of how it would impact the office. A pertinent suggestion was to prepare for the patients by obtaining copies of their records and having all important information readily available (Dohse, 2007). This information can be easily stored in an electronic medical record, which increases efficiency, helps with billing purposes and outcomes monitoring, and makes the patients' health information easily obtainable (Dohse, 2007). Obtaining and keeping track of all necessary information for appointments increases communication between providers while maintaining an accurate patient record. Preparation and making appointments vs having walk-ins also decreases the amount of time between check-in and check-out times for the patient.

Documentation requirements

The literature supports that proper documentation is vital in providing safe and efficient care to patients (Dychter et a., 2012; Trentadue et al., 2020). The legally required documentation points are also linked to reimbursement and outcomes. Further research revealed the National

Infusion Center Association (NICA) minimum standards for outpatient infusion (2019). NICA is a 'nonprofit trade association' that advocates for outpatient and ambulatory infusion centers who can offer safer and less costly IV administrations (NICA, 2019). Aside from a policy regarding intravenous and injectable medications, obtaining consent and assessing the patient must also be documented (NICA, 2019). NICA also stated the following must be collected and documented pre- and post-infusion: "Temperature, blood pressure, heart rate, oxygen saturation, respiratory rate" (2019). Additional coding and documentation requirements set forth by the Center for Medicare and Medicaid Services (CMS) can be found in article A54635 'Billing and Coding: Hydration Services' (2022), using the CPT codes 96360 and 96361 based on the duration of the intravenous hydration infusion. These codes are strictly used for hydration purposes and would not be used for infusions prepared with vitamins and minerals. However, reflecting the guidelines from NICA, CMS also requires a clinical assessment of the patient and a diagnostic reason indicating necessity of hydration IV therapy (CMS, 2020).

Proper documentation helps track IV therapies and related information such as insertion size/gauge/location of needle along with possible complications and medication or additives the patient is receiving. Complications of peripheral intravenous catheter site locations include infection, phlebitis, infiltration, and extravasation (Dychter et al. (2012). The IV site would be documented from insertion to discontinuation and any events that occurred in between. The article by Trentadue et al. (2020) stated, "The EHR template and tip sheet were developed to support and outline documentation requirements" (pg. 355) and further went on to explain the use of flow sheets for documentation with an avatar to depict the type and location of the catheter to keep communication and care smooth/safe between settings. This type of avatar documentation is common in large organizations and hospital systems. The EHR is also where information on the medication/fluids and additives being administered along with orders from

other physicians are located. Typically, there are separate flowsheets for the monitoring and descriptors of the IV catheter information. While this may not be possible on Allscripts, descriptors associated with the site such as location, catheter size, skin condition, and time inserted may be electronically documented in the patient's chart.

Patient Satisfaction

Several articles focused on patient satisfaction related to infusion therapy in the outpatient setting. Patients identify duration length of IV infusions as the greatest benefit (Hu et al., 2022; Reese et al., 2021). According to Wheeler et al. (2020), patients have positive thoughts about IV therapies in outpatient settings. Conversely, Hu et al. (2022) identified several downfalls to outpatient clinics such as lack of parking availability, lack of privacy, accessibility to clinic via public transport and appointment scheduling.

Limited literature on IV infusion therapies in an urgent care setting creates an opportunity for innovation and development of best practices. While barriers exist regarding electronic health record capability along with legal regulations, this literature review has shown how important documentation is for IV therapies. Without proper documentation for IV therapies, the project leader created their own user-friendly system that could allow for further research and leading to sustainability and dissemination for other health care settings to utilize.

Organizational Assessment

A macrosystem SWOT analysis was performed at Emcura Immediate Care to distinguish key strategies for the quality improvement project of creating a standardized electronic-documentation template for intravenous therapies to improve documentation and communication. Emcura Immediate Care has many strengths including having multiple locations throughout Southeast Michigan in the following cities: Bloomfield Hills, Grosse Pointe, Royal

Oak, and Northville. With multiple locations, Emcura can provide care to a larger population in different areas of Southeast Michigan. Most of the population are insured while there are a few cash-pay visits. The age of patients ranges from 6 months to 95 years old. However, the age for IV therapies ranges from 16 to approximately 75 years old. Emcura lacks a specific IV policy and the providers are not familiar with starting IV lines in pediatrics, therefore only patients over the age of 16 are eligible for IV therapy.

However, with expansion of business comes new employees and new providers. While some providers come with IV therapy experience, others may be limited or have recently graduated. All providers and staff are trained on the job in creating the non-hydration IV bags and the general rules to follow regarding IV administration. However, the rapid expansion and addition of new employees as well as the lack of standardized documentation at Emcura has created a gap in communication between the health care providers and patients receiving IV therapies.

The offices are owned by two physicians, one specialized in internal medicine and the other in family medicine. The two physicians are actively involved in their practices and collaboration on the cases that are seen by the advanced practice providers (Nurse Practitioners [NP] and Physician Assistants [PA]) (APP) and are always available for collaboration, questions, or concerns. The APPs practice autonomously while treating urgent care and primary care patients. They have multiple ways of communicating with their staff, including telephone and apps like GroupMe and text messaging. Use of these technologies allows mass messages to reach all employees, or only those selected, in the system. Often, the owners are educating with new research and evidence-based practices using electronic communication. The owners also provide feedback on documentation, prescribing, and follow-ups with patients to their providers so that they can provide everyone with the highest quality care.

Emcura providers take multiple approaches to treating illnesses and providing disease prevention. They always try to incorporate integrative and more natural approaches when creating plans of care. Due to the variety of providers (MD, ND, NP, and PA) and collaboration, Emcura can offer IV infusions and holistic approaches for a well-rounded mind-body-spirit health care experience. While holistic medicine can provide comprehensive health care, some patients prefer a more traditional approach. Also, with access to the internet, patients are now creating their own ideas about health and requesting specific treatments based on their findings.

Emcura accepts many insurances for treatment depending on urgent care vs primary care patient status. Payors range from commercial to private to government entities and self-pay. Regarding IV therapy, while most insurances cover hydration IVs, there is low reimbursement for the time and monitoring needed/given to these patients. As for non-hydration IVs, insurance does not cover these costs. Therefore, these IV infusions are paid for solely out of pocket by the patient. These costs were established by the owning physicians based on cost of supplies, staffing, liability, and time of infusions.

Overall, the number of urgent care facility locations are on the rise. Urgent care facilities can be a place for fast health care without long wait times and the expense of an emergency room visit. As more urgent cares open, Emcura will have the threat of losing their business to surrounding privately owned and hospital owned urgent care facilities. They could also lose customers because of their reviews or even their business hours. Emcura must constantly strive to stay up to date with health and medical sciences and services, technologies and interventions to compete. Emcura competes with surrounding urgent care facilities by offering IV therapies. One way to increase Emcura's competitive edge is by implementing an IV documentation template in the systems EHR for faster, safer, and more organized documentation of IV infusion therapies.

Emcura provides IV therapies for all qualifying individuals seeking hydration and non-hydration purposes. IV administration happens multiple times a week with patients usually returning more than once for similar prescribed therapies. However, the organization previously lacked a standardized electronic documentation template to track which IVs are being administered, ordering provider, pre-/post-administration vitals, infusion monitoring, and IV site description which in turn led to decreased communication between providers and risks to patient safety.

Purpose, Scope, Goals & Objectives

Maintaining proper and adequate documentation is crucial to ensure adequacy of communicating information between team members, coordinating care, decision making, and improving data tracking, along with patient safety and outcomes (Mathioudakis et al., 2016). This process improvement project focused on implementing a standardized, evidence-informed electronic documentation template for IV therapies at Emcura Immediate Care. The driving factor was to improve EHR documentation and increase communication between providers leading to increase patient safety and outcomes.

The initial scope of the implementation was to collect data from the organizational SWOT analysis as well as the literature review to apply and create a functional electronic documentation template for IV infusion therapies in the current electronic health record at Emcura. For this project, the focus remained on documentation for patients receiving IV infusions for non-hydration and hydration purposes. Restricting the scope to one specific population receiving IV therapy would have substantially limited the number of charts being accessed and audited. To create calculated data of IVs administered at Emcura, the encounters in the AllScripts EHR along with the MindBody application were reviewed. The MindBody

application is a system used to purchase supplements and supplies along with tracking point of sales for these products and services, including IV therapies.

The goal of this intervention was to implement and evaluate the use of an evidence-based standardized electronic documentation template for patients receiving IV infusions and its impact on provider communication and patient safety. The main objectives for establishing and implementing the template are to:

- Improved communication of IV administrations between providers
- To meet a 75% compliance rate using the documentation template for IV therapies by staff at the end of implementation phase
- Improved documentation points including the following: physical assessment, vitals, IV location, IV-gauge, insertion attempts, IV site description, adverse events and use of the template

Conceptual/Theoretical Framework

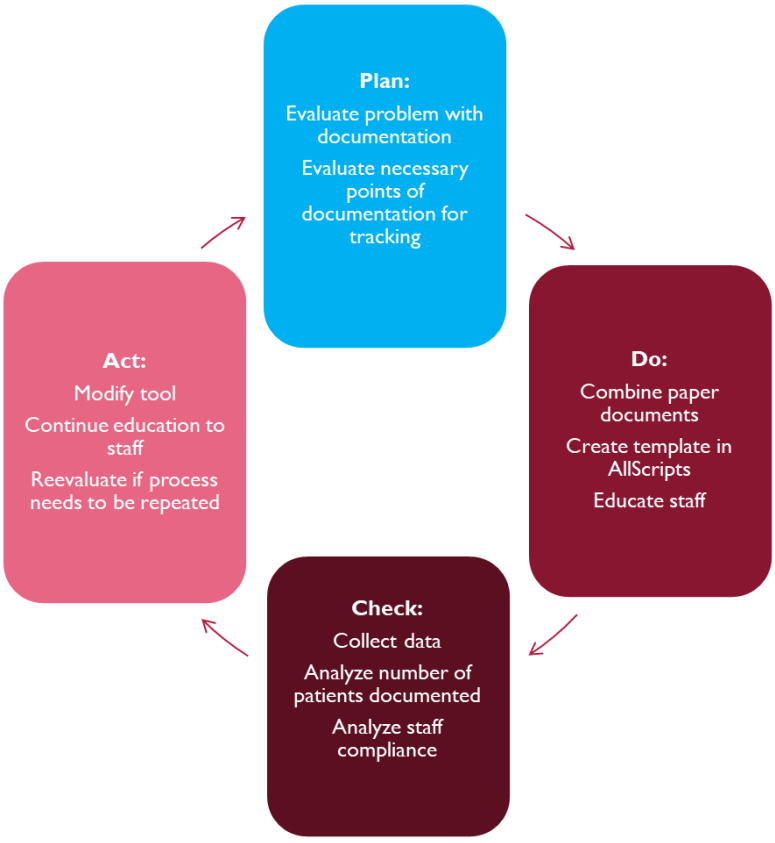
The Plan Do Check Act (PDCA) cycle guided the implementation of this process improvement project. Originally created by Walter A. Shewhart in the 1920's, PDCA established steps for utilizing the new electronic documentation template and processes along with evaluating its increase in safety and communication. The PDCA is commonly used to improve planning and processes in the field of quality management (Butts & Rich, 2018). It is often referred to as the 'rapid improvement cycle' because of how frequently it is used to instill quick change. The following discusses the steps in the PDCA cycle: Plan - studying a process and deciding how to improve it; Do - tests the change by trial and data collection; Check - evaluate change and modify if necessary; Act - change is implemented to improve process (Butts & Rich, 2018), the process is iterative.

The Plan-Do-Check-Act cycle can also be analyzed within the Institute for Healthcare Improvement (IHI) Model for Improvement. This model encompasses the three fundamental questions followed by the PDCA cycle correlating to the project outcomes, goals, and clinical question: “What are we trying to accomplish? How will we know that a change is an improvement? What change can we make that will result in improvement?” (IHI, n.d.).

The following flow figure depicts the Plan-Do-Check-Act cycle that guided this project:

Figure 1

PDCA cycle for IV Documentation at Emcura



Assessing the known problem of IV documentation and researching requirements and current evidence helped construct a template in the EHR. While there were paper documents for individual IV therapies, combining them into one, easy-to-use electronic template allowed for consistent documentation and communication between providers regardless of clinic location. Once the template was created in the AllScripts EHR, an educational intervention was provided to staff on how to properly use the template and the reason for change. Once this was created and the project had been approved through IRB, the template was implemented into practice and data collection began. There was also a provider perception survey sent out to gauge their perception on IV administration documentation and communication. It was planned that required IV documentation points would be 'free-texted' into the template that way with one click of the mouse the entire chart was nearly completed. However, 'free-text' does not save when creating a template in Allscripts. Therefore, the template was completed using a 'dot' phrase to ensure required documentation points were addressed in charting.

Methodology

Design and Human Subjects Consideration

The purpose of this quality improvement project was to bring a new way to electronically document IV therapies to increase patient safety and communication between providers. This project was approved by the Institutional Review Board (IRB) at the University of Detroit Mercy. Additional approval was obtained from the owners of Emcura Immediate Care. There was neither direct nor indirect risk to staff or the patients who will have documentation of their IV therapy in the EHR with this intervention. Provider survey responses were anonymous and completed using the software of surveymonkey.com and Google forms. The surveys were sent out via GroupMe chat.

Setting and Stakeholders

The project was implemented at all locations of Emcura Immediate Care that provide IV therapies. The leader of this project was employed here and part of the project team having access to EHR records. The billers and owners of Emcura were also involved in this project and the data collection process. At Emcura, the MindBody application was one system utilized for data collection as this was their way of capturing point of sales for non-hydration IVs. The EHR established at Emcura, Allscripts, was used for this project along with Allscripts technical assistants via telephone. This project included data mining of the provider's EHR documentation on IV therapies administered at Emcura, both hydration and non-hydration. During the project, evidence-informed education was administered to the providers who completed IV therapies that included the developed standardized EHR documentation template and its use. There were no exclusion factors.

Cycle 1: Plan

IV Documentation Template

Using the already in-place Allscripts EHR software in combination with the current literature evidence, a template was created for IV documentation. To do this, a combination of the already created paper documentation sheets for IV's was used to create a template in the current AllScripts EHR. Consultation with AllScripts IT team was done to determine the best process for creating a template in the current EHR. After attempting to create the template with auto filled documentation points in the assessment/plan, it was discovered that 'free text' is not saved into templates. To navigate this, a 'dot' phrase was created. A 'dot' phrase is a quick-text feature of AllScripts that allows individuals to create and save commonly used free-text that is proceeded by a '.'. The project team and organizational expert deemed adding 'dot' phrases to

the template would be the best route of action to ensure all documentation points are accounted for. The template that was created was reviewed and analyzed by bringing together the team of providers administering the IVs, the owner(s) of Emcura, along with the chair of this project.

The requirements set forth by NICA and CMS were followed when developing the documentation template. Therefore, a clinical assessment of the patient, diagnostic reason for IV therapy, and IV site details and monitoring were included in the documentation template (CMS, 2020; NICA 2019). The template included a brief description regarding the reason for the visit, the review of systems (ROS), physical exam (PE), and assessment/plan with proper billing codes. The PE documentation includes a brief patient discussion physical exam. Any other findings outside the normal limits on ROS or PE had to be manually inserted specific to each patient. History and vitals also had to be entered individually on a patient-to-patient basis. While the non-hydration IVs do not typically contain billing codes, these were to be included to help with data tracking. A visualization of the template can be viewed in Appendix A.

Once final approval of the template was obtained from the overseeing physicians and organizational expert, implementation began March 2023. This IV documentation template was then accessible to all providers using the EHR. Providers could access this by clicking on the lightning bolt icon at the top of the screen once in a patient's chart. This icon pulls up all available templates created by every provider. Once the correct template is chosen, modifications and additions can be made on a patient-to-patient basis without altering the main template.

Pre and Post Provider Survey

Knowledge of and provider perception of communication impacts regarding IV therapy documentation were measured using a pre and post intervention survey (Appendix B). The surveys were created using generalized statements and questions, asking the providers to use the

provided five-point Likert scale to complete the survey. The pre- and post-implementation surveys were identical questions. This survey was anonymous and completed on surveymonkey.com for the pre-implementation survey and on Google forms for the post-implementation survey. It was completed on two different platforms due to surveymonkey.com requiring a subscription of $70 to access over 10 responses. This was paid for the pre-implementation survey but due to lack of funding for the project, the free Google forms platform was used for the post-implementation survey.

The provider survey asked questions regarding their familiarity and confidence with IV documentation. It also addressed if they used a template for IV documentation charting, if they felt like one is easily accessible, and if there is sufficient information in IV documentation to provide adequate communication between providers. Communication between providers via charting/documentation was also ranked. Finally, providers were asked to rate their overall satisfaction with the IV documentation practices on the 5-point Likert scale with varying answer scales as follows:

1. Extremely familiar/Extremely confident/Strongly agree/Always/Far above average/Very satisfied.
2. Very Familiar/Very confident/Usually/Agree/Above average/Satisfied.
3. Somewhat familiar/Somewhat confident/Neither agree nor disagree/Sometimes/Average/Neither satisfied nor dissatisfied.
4. Not so familiar/Not so confident/Disagree/Usually/Below average/Dissatisfied.
5. Not at all familiar/Strongly disagree/Not at all confident/Never/Far below average/Very dissatisfied.

The survey also had a fill in the blank question that asked the providers to create a unique 4-digit code. This was then asked to be inputted during the post implementation survey so that their individual responses could be compared while keeping all results anonymous.

Staff Education

Prior to implementation of the template, there was education and training provided to the providers at Emcura. Corroborating with staff on the significance of consistent IV documentation for provider communication and patient safety assisted in establishing the reason for change and potentially increase compliance. The template is designed to be user-friendly and succinct while ensuring all necessary documentation points are addressed every IV administration. Since staff meetings are difficult to construct due to multiple locations, the information was sent out via GroupMe. This included a proper step-by-step instruction guide on how to use the IV template and what key documentation points must be included (Appendix C). The instructions were also then printed off and a copy kept by the nursing stations for providers to reference while documenting these encounters.

Chart Audits

Pre- and post-implementation chart audits were conducted on the encounters involving IV administrations. A chart audit tool was created and conducted by the project leader. The chart audit tool was a word document table that had encounters listed on the y-axis and the necessary documentation points listed on the x-axis. Each individual chart was then examined, and it was recorded whether the points were completed with the values of ‘yes’ or ‘no’. Refer to Appendix D for the corresponding chart audit data and tool used.

Cycle 1: Do

Data Collection

Data collection included a chart audit pre- and post-implementation along with the pre- and post-provider perception survey at the end of two months. The project leader then conducted a thorough documentation review focusing on use of the template along with an audit tool created with the documentation requirements stated below (Appendix D). Multiple sets of data were collected based on the required documentation points as stated by Gorski (2021): vital signs, blood glucose (if applicable), IV start time/end time, number of attempts, gauge of IV inserted, location of placement, description of site (i.e., phlebitis, leaking, infiltration etc.), infusion received (i.e., hydration vs. non-hydration, then specify which non-hydration received), and adverse events (patient toleration). These documentation points were part of the template, which included the 'dot' phrase.

IV *Documentation Template*

During the implementation phase the IV documentation template was utilized for two months. The implementation of the template was March 2023. When providers were administering IV therapy, the template should have been used for their documentation. This was done by clicking on the template button in the AllScripts EHR and filling in the appropriate categories. The dot phrase (.iv) should also have been added to the assessment and plan portion.

Pre and Post Provider Survey

The pre-implementation survey assessing provider IV documentation knowledge and perception of communication via documentation on IV therapies was sent to all providers. The survey was conducted on surveymonkey.com. This data was stored in the survyemonkey.com database and in the pdf downloaded from the site on a drive maintained by the project leader. The post-implementation provider perception survey was sent out using Google forms. This

second set of data was kept on Google forms and Excel on a drive maintained by the project leader.

The pre and post survey data was kept by the project leader and later shared with the chair of the project. Survey links were sent via GroupMe to approximately 22 providers with brief instructions of how to complete them and the necessity of the individual 4-digit code. This provider group includes contingent employees and providers who do not perform IV therapies. The surveys were conducted for approximately one week at a time, pre and post. There were multiple reminders sent out during that week to encourage participation. No personal information was accessed or shared. All responses were kept anonymous.

Staff Education

Prior to implementation of the template, education was provided via messaging and print offs at each clinic (Appendix C). Multiple reminder messages of the new electronic template were sent out during the implementation phase. There were also multiple conversations with the organization expert as well to ensure a successful implementation. There was no feedback or questions regarding the template expressed by the providers.

Chart Audits

Pre and post implementation documentation data was audited using the chart audit tool (Appendix D). Pre implementation chart audit data was conducted and stored for future analyzing. Two months after implementation, a post chart audit was conducted assessing the same documentation points and use of the template. The data was stored with the project lead on a personal computer via Microsoft Word and shared with the chair of this project. The billers were assigned to assist with filtering encounters with IV administrations but were unresponsive

after multiple attempts. The project lead had to individually access all appointments to find the encounters for IV administrations during the applicable time periods.

Chart documentation data collection began for pre-implementation two months prior to the implementation date. Once chart audits were completed and data was collected, it was placed onto a dual axis bar chart visualized in the next section. This chart was a visual depiction of how many IVs completed in each month along with documentation completion. This data was collected and audited by the project team. The post-implementation data was then added to the Microsoft Excel sheet. No patient identifiers were used. The pre and post provider survey results were then analyzed. Comparing the two data sets allowed for visualization in documentation goals. The data from chart audits along with provider perception surveys was kept confidential to the project team.

Cycle 1: Check

Results

IV Documentation Chart Audit.

The raw data collected from the two chart audits are displayed below in a bar chart (Figure 2). The bar charts were broken down into key documentation points required for IV administrations. The total number of IV administrations were collected for the two-month periods listed pre-implementation n= 29, and post-implementation n=46.

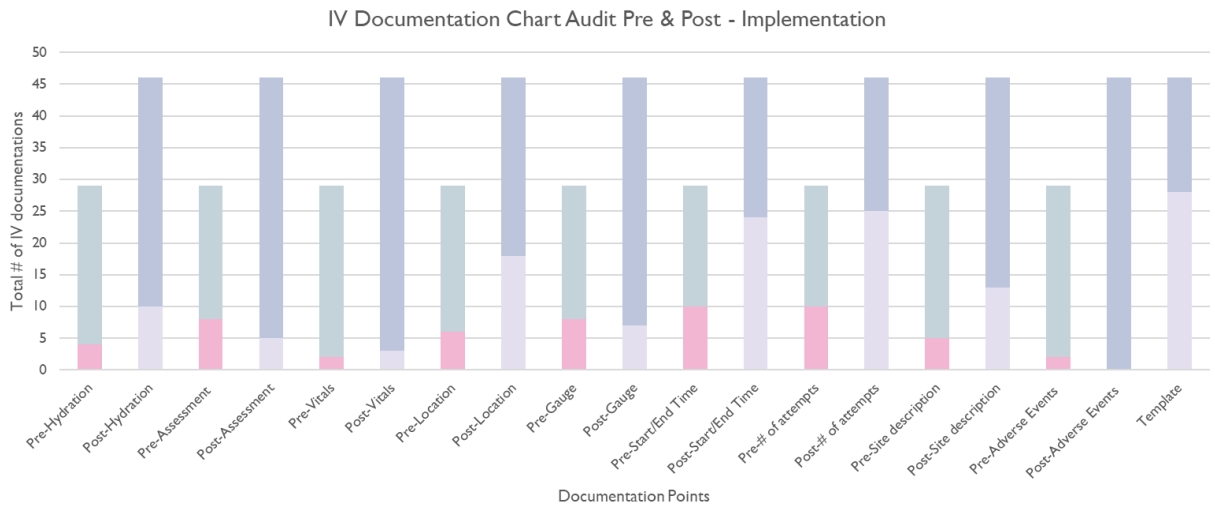
For pre-implementation data (Dec. ‘22 to Jan. ’23), the following data was obtained for the documentation points: 21 assessments documented, 27 sets of vitals documented, 23 IV locations documented, 21 IV gauges documented, 19 start/end times documented, 19 number of attempts documented 24 site descriptions documented, and 27 adverse events documented. Out of the 29 documented IVs, four were hydration IVs.

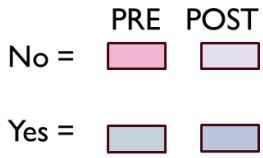
For post-implementation, March ’23 to April ’23, the following data was obtained for the documentation points: 41 assessments documented, 43 sets of vitals documented, 28 IV locations documented, 39 IV gauges documented, 22 start/end times documented, 21 number of attempts documented, 33 site descriptions documented, and 46 adverse events documented. Out of the 46 charts audited, the dot phrase template was used 18 times and 10 encounters were for hydration IVs.

Figure 2 is the data collected from the pre- and post-implementation chart audit. The term ‘yes’ was used if the documentation point was written in the encounter. The term ‘no’ was used if the documentation point was missing in the encounter. To note, there was a large difference in the total number of IV encounters when comparing pre and post, this caused the data to be skewed. The template was used 40% of the time after implementation.

Figure 2

IV Documentation Chart Audit, Pre- and Post-Implementation





Provider Survey Results.

The pre- and post-implementation provider survey data was obtained. The total number of responses (n) for pre-implementation was 13, whereas the total number of responses (n) for post-implementation was 8. Table 1 depicts the percentages of responses for each question on the 5-point Likert scale. As noted, the total number of responses also varied from pre-implementation being 13 and post-implementation being 8. There was an additional question at first that asked for a unique 4-digit code to allow for comparing pre and post surveys from individual responses, however, due to lack of participation this was unable to be performed. Therefore, the data analyzed was generalized totals for each question. The decrease in responses along with the lack of compliance changed how this data was expected to be analyzed.

Table 1

Provider Survey Results

Question	Response	Pre-Implementation Frequency (*n* = 13)	Post-Implementation Frequency (*n* = 8)
How familiar are you with the required points for IV documentation?	• Not at all familiar • Not so familiar • Somewhat familiar • Very familiar • Extremely familiar	0% 23% 31% 46% =77% 0%	0% 0% 12.5% 50% **=100%** 37.5%
How confident are you in charting IV administrations in the AllScripts electronic health record?	• Not at all confident • Not so confident • Somewhat confident • Very confident	0% 31% 31% 31% =69% 7%	0% 0% 12.5% 50% **=100%** 37.5%

	• Extremely confident		
Do you feel there is a documentation tool easily accessible and utilized for IV administrations?	• Strongly disagree • Disagree • Neither agree nor disagree • Agree • Strongly agree	0% 54% 23% 23% =23% 0%	0% 0% 12.5% 50% **=87.5%** 37.5%
How often do you use a template for IV documentation?	• Never • Rarely • Sometimes • Usually • Always	32% 15% 15% 15% =53% 23%	12.5% 0% 12.5% 25% **=87.5%** 50%
Do you feel there is sufficient information in IV documentation to provide adequate communication between providers?	• Strongly disagree • Disagree • Neither agree nor disagree • Agree • Strongly agree	0% 31% 31% 31% =38% 7%	0% 0% 12.5% 37.5% =**87.5%** 50%
Rate the communication between providers via chart documentation on IV administrations.	• Far below average • Below average • Average • Above average • Far above average	0% 15% 54% 23% =85% 8%	0% 12.5% 0% 62.5% **=87.5%** 25%
How would you rate your overall satisfaction with current IV documentation practices?	• Very dissatisfied • Dissatisfied • Neither satisfied nor dissatisfied • Satisfied • Very satisfied	0% 8% 62% 30% =30% 0%	0% 0% 25% 25% **=75%** 50%

Cycle 1: Act

Analysis

Chart Audits.

The documentation point data was then analyzed after conducting the chart audits. Analyzing this data showed that the following categories have an increase in percentage:

assessment (72 to 89), IV gauge (75 to 85), and adverse events (93 to 100). Vitals stayed the same percentage (93). And the following decreased in percentage of completion: total number of non-hydration IVs (86 to 78), location of IV (79 to 61), start/end time (66 to 52), number of attempts (66 to 46), and site description (83 to 72). When analyzing these raw percentages, one must take into consideration the large variance in total encounters for the total *n* for pre and post. A comparison of equitable numbers of pre and post percentages was expected regarding documentation of IV therapies. The large variance in total *n* was not an expected influencing factor. Provider education and template usage may have been factors that could have contributed to the increase in completion. Whether there is a correlation to template use versus completion cannot be determined at this time. However, it can be said that once the implementation of the template was conducted, the documentation points completion increased for multiple points.

Figure 3 depicts each variable measured during the chart audit and the frequency of completion. The term ‘yes’ was used if the documentation point was completed and documented in the encounter. Based on the chart audit, the following points were documented over 50% of the time in the post-implementation phase: assessment, vitals, location, gauge, start/end time, description, and adverse events. This data correlates to the goal of assessing the necessary documentation points.

The goal for reaching 75% compliance of using the electronic template was not met. The template was used 40% of the time post-implementation. This could be related to the IV encounters being paid for out of pocket and providers not understanding the importance of documentation regardless of being billed to insurance for communication. This quality improvement project was performed as a preventative measure, so adherence was not influenced by a past adverse event. Having a senior provider or overseeing physician require these documentation points may have increased compliance. Placing the education into the provider

resource book at Emcura may increase template usage. Continuing the research and data collection along with education for the providers may show to increase the completion of documentation points even further. Stressing the importance of these documentation points from a legality standpoint may increase compliance as well.

Figure 3

Chart Audit Pre and Post – Frequencies

Pre-implementation total *n* = 29

Post-implementation total *n* = 46

Variable	*n*	%	Variable	*n*	%
Pre-Assessment			Pre-Vitals		
Yes	21	72.41	Yes	27	93.10
No	8	27.59	No	2	6.90
Post-Assessment			Post-Vitals		
Yes	41	**89.13**	Yes	43	**93.48**
No	5	10.87	No	3	6.52
Pre-Location of IV			Pre-Gauge of IV		
Yes	23	79.31	Yes	21	72.41
No	6	20.69	No	8	27.59
Post-Location of IV			Post-Gauge of IV		
Yes	28	60.87	Yes	39	**84.78**
No	18	39.13	No	7	15.22
Pre-Start/end time			Pre- # of attempts		
Yes	19	65.52	Yes	19	65.52
No	10	34.48	No	10	34.48
Post-Start/end time			Post- # of attempts		
Yes	24	52.17	Yes	21	45.66
No	22	47.83	No	25	54.34
Pre-Site description			Pre- Adverse event		
Yes	24	82.76	Yes	27	93.10
No	5	17.24	No	2	6.90
Post- Site description			Post Adverse event		
Yes	33	71.74	Yes	46	**100.00**
No	13	28.26	No	0	0

Provider Surveys.

Analyzing the provider survey results based on group data showed a positive increase. Providers were more familiar with required documentation points, they also felt like communication between providers increased via documentation and felt like there was an easy electronic template to be utilized. Creating the electronic template and making it accessible to all providers allowed for the project goal to be met. Question five and six showed there was improved communication on IV administration between providers. There was an increase in provider responses for question five in the 'agree' and 'strongly agree' categories from 38% to 87.5%. As for question six, the responses in the 'average' to 'far above average' categories increased from 85% to 87.5%. All questions in the provider survey had an increase in their Likert scale response that helped support this which is depicted in table 1. The provider education, repeat reminders, available resources, and electronic template helped reach this goal and objective.

Cost/Sustainability

The AllScripts EHR was already in place and established. There were no extra costs or purchasing of software to create this template besides time of development, including IT collaboration. The electronic template created was automatically implemented alongside the previously made paper templates. The electronic template will be sustainable if Emcura continues to use the AllScripts EHR.

There was a $70 cost for using surveymonkey.com for the pre-implementation survey. This was due to the 'free' survey only allowing for 10 responses to be viewed. There was a total of 13 responses which caused the project leader to have to pay for the subscription to be able to

access all responses. This resulted in Google forms being used for the post-implementation survey.

Time for providers to complete documentation on IV visits using this template would decrease total amount time spent charting as templates quicken this process. If the current required documentation points remain the same, this template will remain crucial. Monitoring the use of the template and documentation will occur quarterly to ensure proper documentation requirements are met, likely done by the organizational expert and biller. There is the possibility of furthering this project to examine reimbursement and total revenue earned from IV administrations in the future. Comparing the revenue to time spent monitoring and administering IVs and outcomes may also be evaluated.

Discussion

This project answered the study question of determining the effect of an electronic documentation template on communication and patient safety outcomes at Emcura in a two-month period. The use of the created EHR IV template documentation of these administrations did not reach the expected goal of 75%. Respectively, conclusions were unable to be drawn on whether the template had a direct correlation to the increased documentation point completion. There were increases in multiple documentation points per the post chart audit data, which could have been related to the education provided in this quality improvement project. However, there were multiple decreases in completion for documentation points for which the cause is unknown. The decrease may have been impacted by the IV encounters not being billed through insurance decreasing the precepted importance of documentation from the providers. The decrease may also have been related to multiple encounters with Mediport access and providers not understanding the importance of documenting them the same as peripheral IV insertions.

Providers did feel there was an increase in communication via charting and that there was an easy to navigate electronic template for IV encounters based on the survey results after implementation which met the first project goal.

With this template being created, it could be used for further research on insurance reimbursement for the qualifying administrations. For encounters that are being billed to insurance, the documentation points are essential for reimbursement. The template created may be beneficial for these specific encounters. Based on the results from the provider survey and its impact on communication between providers, this template may be considered in other outpatient infusion settings, especially if those infusions are being billed to insurance or being monitored for quality assurance. While the EHR may differ, it would lay a foundation of required documentation points for billing, provider communication and patient safety. This project was one revolution of the PDCA cycle. Using this framework, another cycle could be performed increasing provider education and stressing the importance of proper documentation in an effort to increase compliance. Since the PDCA cycle is iterative, the cycle may be repeated to reach the desired goals and outcomes. The cycle may also be altered to include different EHRs and focus on different analytics for insurance reimbursement purposes.

While this project allowed completion of all DNP (Doctor of Nursing Practice) Essentials (AACN, 2006) in a small way, Essentials II, III, and IV were the focus. As indicated by their titles, these three Essentials focused on quality improvement in health care along with using evidence-based practice and information systems/technology to transform health care.

•Essential II: Organizational and Systems Leadership for Quality Improvement and Systems Thinking

•Essential III: Clinical Scholarship and Analytical Methods for Evidence-Based Practice

•Essential IV: Information Systems/Technology and Patient Care Technology for the Improvement and Transformation of Health Care

Limitations/Bias

This project had potential bias and limitations. The project leader was also a provider documenting IV administrations during entire project timeline, along with providing continuous education and guidance to all providers on the project. Also, there was a substantial difference in *n* for the pre- and post-implementation chart audit data. Increasing the data collection timeframe to increase the total *n* may lead to more accurate comparisons. The variance in totals resulted in descriptive statistics being used and skewed pre-implementation data as the necessary documentation points were already discovered. The template created was used 18 out of 46 times which showed suboptimal participation. To increase participation in the next cycle, having a senior provider or overseeing physician require proper documentation may increase compliance and use of the template. Another limitation would be linked to the billers being unavailable. This caused an increase in difficulty for the chart auditing process and could have led to an inaccuracy to the exact number of IV documented charts audited. Next cycle it would be imperative to have the billers more involved, especially if focusing on reimbursement from insurances. Finally, the post-implementation provider survey responses decreased to eight from the original 13 and were not matched, as formally planned. Sending more reminders or increasing the window for responses may gain more feedback. Due to these limitations, the results may have been influenced.

Conclusion

In conclusion, the quality improvement project at Emcura Immediate Care regarding IV documentation was meant to increase communication between providers via charting and in turn

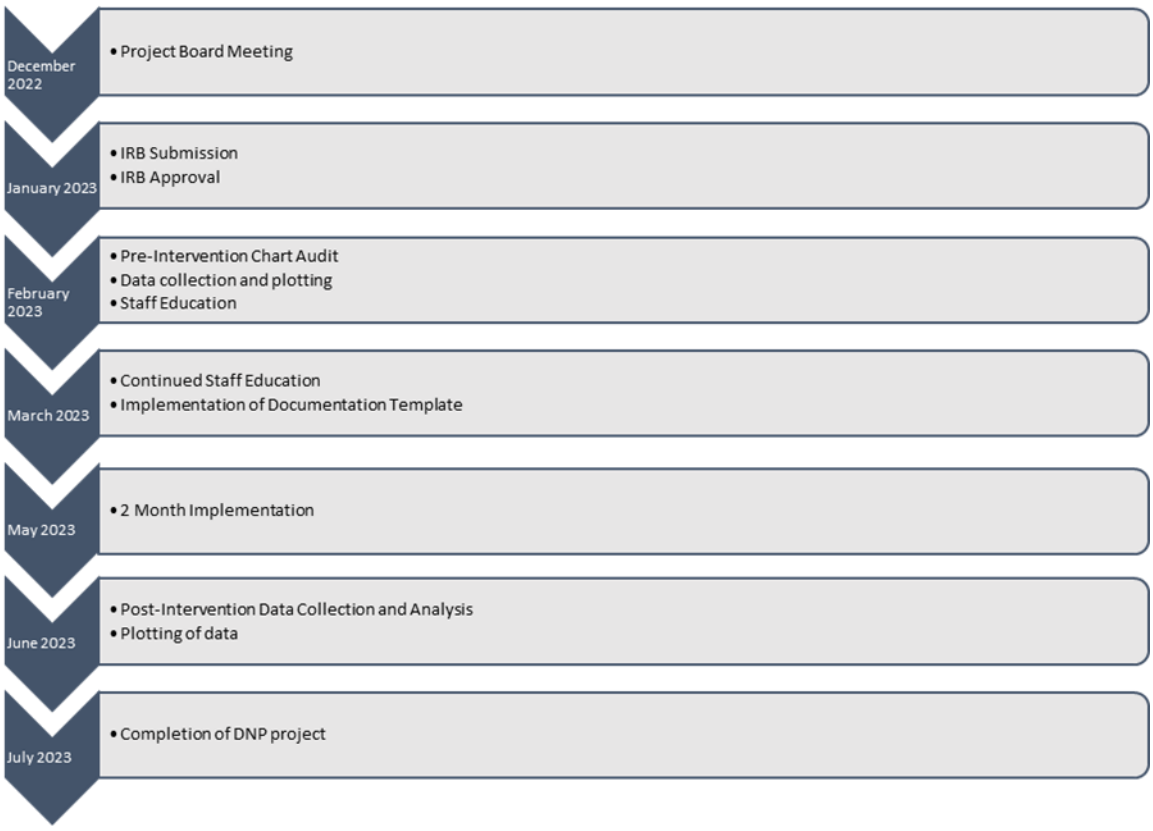
increase patient safety. The project was based around the PDCA cycle framework. One cycle was run to determine the final implementation phase. During this implementation phase, education was presented to the providers and data was collected on the encounters regarding IV documentation pre- and post-implementation of the template created in the EHR. Based on data analysis, it was inconclusive on whether the template correlated to increased charting of the necessary documentation points. However, there were multiple increases in completion on select points. Regarding the provider survey, it was concluded this quality improvement project increased provider perception/knowledge of patient safety and communication via charting regarding IV documentation. The documentation points necessary for IV charting are important to allow for sufficient communication via charting, which in turn increases patient safety. Overall, this was a successful quality improvement project that can continue to be used while the AllScripts EHR is utilized at Emcura. Others may adapt this template for their specific institution and EHR.

Project Timeline

The figure below depicts an estimated timeline with specific milestones needed for a successful implementation for this quality improvement project.

Figure 4

Project Timeline



Dissemination

Submitting this project for publication is the goal for dissemination. A goal of submission would be to complete publication within the next year after graduation. This would be completed with the aid of Dr. Ruel at the University of Detroit Mercy.

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Appendix A

Template in EHR (.iv)

Patient gave verbal consent to place IV and give hydration. Under sterile conditions, tourniquet was applied to patient's arm. Vein was found in area was cleansed with alcohol pad. Needle was inserted, a flash of blood was obtained and the catheter was inserted into the vein successfully.

Blood was drawn back to ensure vein placement. Tourniquet was removed from patient arm. IV fluids were hooked up to the catheter. IV fluids running without complication. Patient tolerated procedure well.

Gauge of IV inserted:

Location of IV inserted:

# of attempts:

Infusion received (ex. NS, Vit C 25 G, Immune Booster, etc.):

IV start time:

Blood glucose pre-infusion (if applicable):

Site description:

IV end time:

Blood glucose post-infusion (if applicable):

Patient tolerated well.

Appendix B

Provider Survey - Pre and Post Implementation

1. **How familiar are you with the required points for IV documentation?**

   Not at all familiar, Not so familiar, Somewhat familiar, Very Familiar, Extremely Familiar

2. **How confident are you in charting on IV administrations in the AllScripts electronic health record?**

   Not at all confident, Not so confident, Somewhat confident, Very confident, Extremely confident

3. **Do you feel there is a documentation tool easily accessible and utilized for IV administrations?**

   Strongly disagree, Disagree, Neither agree nor disagree, Agree, Strongly Agree

4. **How often do you use a template for IV documentation?**

   Never, Rarely, Sometimes, Usually, Always

5. **Do you feel there is sufficient information in IV documentation to provide adequate communication between providers?**

   Strongly disagree, Disagree, Neither agree nor disagree, Agree, Strongly agree

6. **Rate the communication between providers via chart documentation on IV administrations.**

   Far below average, Below average, Average, Above average, Far above average

7. **How would you rate your overall satisfaction with current IV documentation practices?**

   Very dissatisfied, Dissatisfied, Neither satisfied nor dissatisfied, Satisfied, Very Satisfied

8. **Please list any comments or questions regarding IV documentation. If none, please write N/A.**

Appendix C

Step-by-step Instructions to Use IV Template- Staff Education

1. Open the patients' chart for correct encounter.
2. Click the template button (chart with lightning bolt inside) at top right corner of screen.

3. Scroll down to ‘Kane, Kayla FNP -C’ – click > to drop down template
4. Click ‘IV Therapy’ template. Click OK.
5. Type patients’ reason for visit. Ensure all data auto-filled into the Review of Systems (ROS) and Physical Exam (PE) are accurate for patient.
6. Make sure MA filled out History and Vitals (Blood glucose taken if applicable).
7. In the Assessment/Plan tab, use ‘Dehydration, Moderate E86.0’ with procedure code ‘Intravenous infusion, hydration; initial, 31 minutes to 1 hour 96360’ for all IV administrations. (Even if paid for out of pocket, using these codes for chart auditing).
8. When typing up Plan, use the dot phrase .iv (not capitalized)
    a. Please scroll down and ensure all sections are filled out to best of ability.
9. Click OK and exit chart.

Appendix D

Chart Audit Tool for Pre- and Post-Implementation

IV type (N vs NH)	Assessment	Vitals	Location of IV	Gauge of IV	Start/end time	# of attempts	Site description	Adverse events	Template