

Maximizing Implementation and Adherence with Your Intravenous Medication Safety System:

A Study in Success

INTRODUCTION

As is the case in all acute care facilities, a Midwestern U.S. medical center with a capacity of approximately 200 beds has taken multiple steps to enhance patient safety, including attempts to reduce the frequency and severity of medication errors. Since many of the most potentially dangerous errors involve potent high-risk medications delivered intravenously (IV), the purchase of an IV medication safety system (IVMSS) utilizing "intelligent" infusion pumps was a high priority.

The following plan outlines how one site was able to maximize "buy-in" by the nursing staff, facilitating implementation of a novel drug delivery system with high rates of adherence to the system's safety software over the long-term.

results were summarized with regard to each individual's overall assessment of each system as well as the potential of each system to meet the special needs of the patient population in her/his unit. After completion of the onsite evaluation, all questions were answered and final pricing was obtained. The chair of the IVMSS project team assembled a fact sheet comparing the two "finalist" systems and made a presentation to hospital administration and the Nursing Leadership team. In the end, the Hospira MedNet® Software using Plum A+® Infusion Pumps was selected. Qualities that led to the selection of the Hospira System were the following: (1) The availability of a second line for administration of IV additives which also has the ability to use the safety software; (2) The alerts to prevent IV medication delays/omissions due to the roller clamp on the secondary line being closed off and the fact that there is no head height dependency for the IV bags; and (3) The ease of repairs, which was a key element for our Clinical Engineering Department.

KEY SUCCESS FACTORS

- Process involvement of the end-user from the beginning
- Training with mandatory "hands-on" in-services
- Hospital Administration and Nursing Leadership team involvement
- Development of an IV medication safety software project team
- "Pump Specialist" designated in each nursing unit
- Inclusion of a question in the medication error reporting system regarding whether or not the safety software was in use at the time the error occurred
- Daily audits to identify non-use of the IVMSS
- Continuous reinforcement of the importance of adherence to using the IVMSS
- Regular downloading and analysis of IVMSS data

LIBRARY PREPARATION

The next step in the process was customization of the software to the facility. As an initial step, each nursing unit designated a "pump specialist" to lead in the writing of that unit's drug library. A pharmacist was also part of the team and was responsible for building and maintaining the drug libraries in the software system. Clinical Engineering was also involved from the start, learning the uploading process to program the libraries and downloading process to retrieve data. "Pump specialists" were also intimately involved in the implementation process. "Pump specialists" formed a task force whose initial task was to attend a demonstration of the system and a discussion of how the unit-specific drug libraries/rule sets should function. Several meetings were held to identify the options available for listing each medication, dosing parameters, and arrangements within the libraries. Each "pump specialist" was responsible for disseminating information to the rest of her/his unit staff and soliciting their input. Finally, initial drug libraries were completed for every unit. Each library was loaded onto a single pump in each unit which was left with instructions for staff to review the format and content of the library. Following staff input, each library was revised. Then, the same process was repeated. In addition, the task force members worked one-on-one with staff and demonstrated how the libraries were to be used. A six month post-implementation review of each library was also planned, with modifications being made if necessary.

SYSTEM SELECTION

One of the major keys to successful change, as it applies to essential medical devices, is the involvement of the end-user in the process from the beginning. Initially, the IVMSS project began with on-site evaluations of the systems that were being considered for purchase. Each manufacturer was asked to provide a one day demonstration of their system. Actual systems were available for nursing staff to "practice upon." Manufacturer representatives were also available onsite to answer questions throughout the day (i.e., all shifts). Key users were solicited from every section of the facility to make sure that nursing staff from all units where the IVMSS could be used had the opportunity to "practice upon" each system.

All nursing staff were asked to complete a survey evaluating the two IVMSS selected as "finalists." Survey

This Clinical Perspective has been underwritten by Hospira. The article was provided by a clinical professional from a United States midwestern medical center; the contents reflect her personal opinions and expertise. The information contained herein may not be typical of all institutions.

Initially, hard limits were not set for any medication. This allowed staff to override warnings early in the implementation phase until a confidence level was met that all pump settings were correct. This also ensured that there were no delays in receipt of essential medications. Soft limits were set on several medications, especially those on the restricted IV or high-risk IV medication lists.

TRAINING

Training is obviously an essential element in successful system implementation. All nursing staff were required to attend a mandatory "hands-on" in-service on using the IVSS. Nursing Unit Directors/Managers scheduled all staff to attend one session. "Pump specialists" wrote many of the patient scenarios used in the training sessions. After these formal training sessions had been completed, any staff member who had not attended was not allowed to work. The facility believed that an IV infusion pump (especially one including IVSS software) is an essential device that every working nurse must know how to safely operate. Additional trainees included city and private ambulance staff since they utilize hospital equipment when transporting patients. Also, nursing instructors training nursing students in the facility were asked to attend. Staff members could attend multiple sessions if reinforcement was desired. Each training session was two hours in duration and multiple sessions were conducted each day. Each attendee was assigned to her/his own device in order that competence in the actual skills being taught could be witnessed. When more than 8 to 10 staff members were undergoing training in a single session, a second trainer was added in order to keep all trainees "on task" towards successful completion of all skills in the training curriculum. Written materials were also provided to staff members plus tip cards were attached to all pumps as a ready reference. Although the training was realistic, a fun atmosphere was generated by providing snacks, catchy slogans on all materials advertising the program, and a casual, non-judgmental environment that would invite questions. It was emphasized that use of the IVSS after completion of training was mandatory for all drugs in the library. This was codified in the hospital IV therapy policies and procedures.

IMPLEMENTATION


Infusion pumps were changed over by paired teams, each comprising of a manufacturer's representative and a facility nurse. Pump settings were double-checked by each patient's primary nurse. Following the changeover, the manufacturer's representative stayed in the facility for four days and was readily available by phone or pager for the next several days. The chair of the IVSS project team was also available for "troubleshooting" and education for several weeks. The entire employee body and community were informed of this new change by a presentation of the IVSS to the facility Board of Directors and articles placed in the facility newsletter, physician staff newsletter, and local newspaper.

FOLLOW-UP

To reinforce the training, about 6 weeks after implementation, the regular nursing "Skills Fair" included a station to ask questions about the device. About 6 months after implementation, a need was identified to re-teach some of the advanced functions so that all available features would be used. In-services were held on the topics of changing pressure settings, multiple dose functions, stand by, and call back features.

Some of the modifications that have been made over time to the drug libraries may appear minor but they have led to much increased nursing

satisfaction and "ownership" by nursing staff of their particular unit library. Examples include using "IV fluids" as a label rather than a specific fluid name with no admixtures. Also, antimicrobials administered by syringe or IV piggyback were given one label. This allowed the most frequently-used IV drugs to be listed on page 1 of the library for faster access. For safety reasons, medications that should only be given in special care areas or by staff with special credentialing were not placed in the Med-Surg library. "Tall Man" lettering was used in the libraries for drugs with "look alike, sound alike" names.

After system implementation, the Clinical Engineering Department began downloading information for review from 5 devices/unit/month (50 units/month). Reports were analyzed by the IVSS project team and shared with Nursing Leadership and Administration. The IVSS project team now reports on a regular basis to the standing Medication Use Committee so as to link the ongoing needs for library revision to a standing committee. After evaluating reports generated by the system software that showed overrides of soft alarm limits, accurate hard limits were set. The Online Occurrence Reporting system was amended to include in the medication error reporting system a question regarding whether or not the IVSS was used and, if so, the pump identification. This allowed immediate review of pump data in order to see what caused the error. Unit Secretaries have been trained to do daily audits on their units to see whether or not the IVSS software is being used. Identification of nonuse of the software is made much easier by the display of a cautionary symbol () is displayed to warn the user that the pump is being operated without rule sets or limits. Such information is then provided to the Unit Nursing Manager who works with individual staff members to stress the importance of adherence to use of the IVSS.

RESULTS

From the beginning, it was stressed that the new IVSS could only prevent medication errors if it was used. Sampling continues on a quarterly basis of the IV pumps in all clinical care areas to evaluate adherence to the IVSS, assess the need for drug library revisions, and evaluate "near miss" medication errors. The initial adherence rate for use of the IVSS was 74% overall. Over time, the overall adherence rate has stabilized at approximately 72%. The time periods of the day where non-adherence has been a bit of an issue include 0800-1100 h (#1) and 1500-1700 h (#2). These are also the times of day when most medications are given. Most of the non-adherence has occurred in the context of IV fluids without admixtures where the nurse did not feel that the IVSS was needed. Multiple instances have been identified where soft limits were not overridden (e.g., decimal point errors were made or incorrect doses were entered that were not given). Overall, we have been pleased by the ability of the IVSS to prevent medication errors by adding another level of safety in not allowing incorrect dosing or dosing rates of IV fluids and drugs to occur.

CONCLUSIONS

The key success factors described in this paper have resulted in strong adherence to use of the IVSS over the long-term. There is no reason to believe that these results (70-75% pooled across units) are achievable in only one acute care facility. This paper provides the blueprint to achieving similar, if not greater, success in your facility.

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