



Driving Patient Safety and Pharmacy Efficiency

Sterile Compounding, Error Reduction and Workflow Management at Indiana University Health Bloomington Hospital

“I am totally sold on the benefits of this technology. It should become standard practice in all IV rooms.”

Steve Speth (RPh, MS)
Inpatient Pharmacy Manager
IU Health Bloomington Hospital

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OVERVIEW

Established in 1905, Indiana University Health Bloomington Hospital is a \$600 million organization serving nearly half a million people in a 10-county catchment area. A not-for-profit organization, IU Health Bloomington Hospital is part of the renowned Indiana University Health system (formerly Clarian Health). IU Health Bloomington Hospital provides regional specialty offerings for Heart and Vascular, Behavioral Health, Cancer, Women and Children, Neurology and Orthopedic services. The hospital achieved Magnet status in 2010, which is among the highest honors in nursing; only 7% of US hospitals achieve magnet designation.

IUHB's mission is to improve the health of our patients and community through innovation and excellence in care, education, research and service. The system is staffed for 317 beds, with an average daily census of 170 – excluding newborns – and an average length of stay of 4.3 days.

The IU Health Bloomington Hospital Pharmacy Department supports inpatient and outpatient units, ambulatory clinics, primary care and home infusion patients from three licensed pharmacies. The inpatient pharmacy employs 20 pharmacists and 27 technicians for round-the-clock services.

CHALLENGE

Inpatient Pharmacy Manager Steve Speth (RPh, MS) formerly led the Patient Safety Committee at IU Health Bloomington Hospital. While improving safety is fundamental to any new technology implementation at IU Health Bloomington Hospital, five additional objectives also drove this initiative:

1. **Eliminate IV compounding and dispensing errors**
2. **Standardize IV compounding processes**
3. **Streamline IV room workflow**
4. **Improve dose status tracking through the pharmacy**
5. **Reduce waste**

The **DoseEdge** Pharmacy Workflow Manager is designed to help reduce opportunities for medication preparation errors and manage workflow for sterile and non-sterile dose preparation. After seeing the **DoseEdge** System demonstration at the unSUMMIT Conference in 2009, Speth evaluated the system's capabilities for addressing IU Health Bloomington Hospital's identified project objectives. He discovered that the **DoseEdge** System barcode scans drugs, diluents and IV fluids to improve accuracy before compounding. The system provides user instructions to standardize and streamline compounding workflow and captures digital images of dose ingredients for pharmacist verification. Dose status is tracked from order through preparation and verification to distribution and that status is displayed to any system user. Additionally, the **DoseEdge** System may help reduce drug waste by enabling the recycling of unused doses.

Prior to their introduction to the **DoseEdge** System, the pharmacy staff at IU Health Bloomington Hospital felt they had done everything they could from a physical plant and process standpoint to ensure safe and compliant doses. Their due diligence on the **DoseEdge** System included evaluations of competitive software and hardware, and they selected the **DoseEdge** System as the best candidate for the project's success and positive impact on pharmacy operations.

“I am totally sold on the benefits of this technology,” summarizes Speth of the IU Health Bloomington Hospital experience, “It should become standard practice in all IV rooms.”

IU Health Bloomington Hospital implemented the **DoseEdge** System on November 16, 2010. Three dose-processing workstations were installed – one each for chemotherapy, sterile doses and premixed doses. Doses processed include compounded sterile products, premixed piggybacks and LVPs, parenteral syringes and chemotherapy. Steve Speth, as well as a lead technician and the Pharmacy IT coordinator, were the primary architects of the project, which took less than a year from desire to implementation.

Once the selection process was complete, the entire IU Health Bloomington Hospital pharmacy staff was oriented to the **DoseEdge** System – including dose preparation, verification and sorting steps and workflow monitoring. Staff pharmacists' training focused on dose verification, while technicians were trained on dose preparation activities.

Unfortunately, no formal baseline had been established prior to implementation for comparison purposes. However, looking at 20-weeks of data, starting in November 2011, the **DoseEdge** System identified 162 Compounded Sterile Preparation (CSP) errors – which may have been wasted prior to implementing the **DoseEdge** System.

IMPLEMENTATION

Speth acknowledges the **DoseEdge** System implementation process is very thorough. However, as with any new process, management's approach to managing the change is as important to its success as the implementation process itself. Initially, IU Health Bloomington Hospital users attempted to bypass the **DoseEdge** System, as they were not comfortable with the technology. These bypassed doses decreased significantly once people became familiar with the system and realized the benefit. He also acknowledges that the implementation team didn't adequately prepare their nursing staff in advance that dose turnaround times would temporarily increase until the pharmacy staff had come up to speed on the new technology.

DoseEdge System Workflow

Three Steps for all Doses

1. Prepare - workstation
2. Verify - website
3. Sort - workstation

Chemo Checking

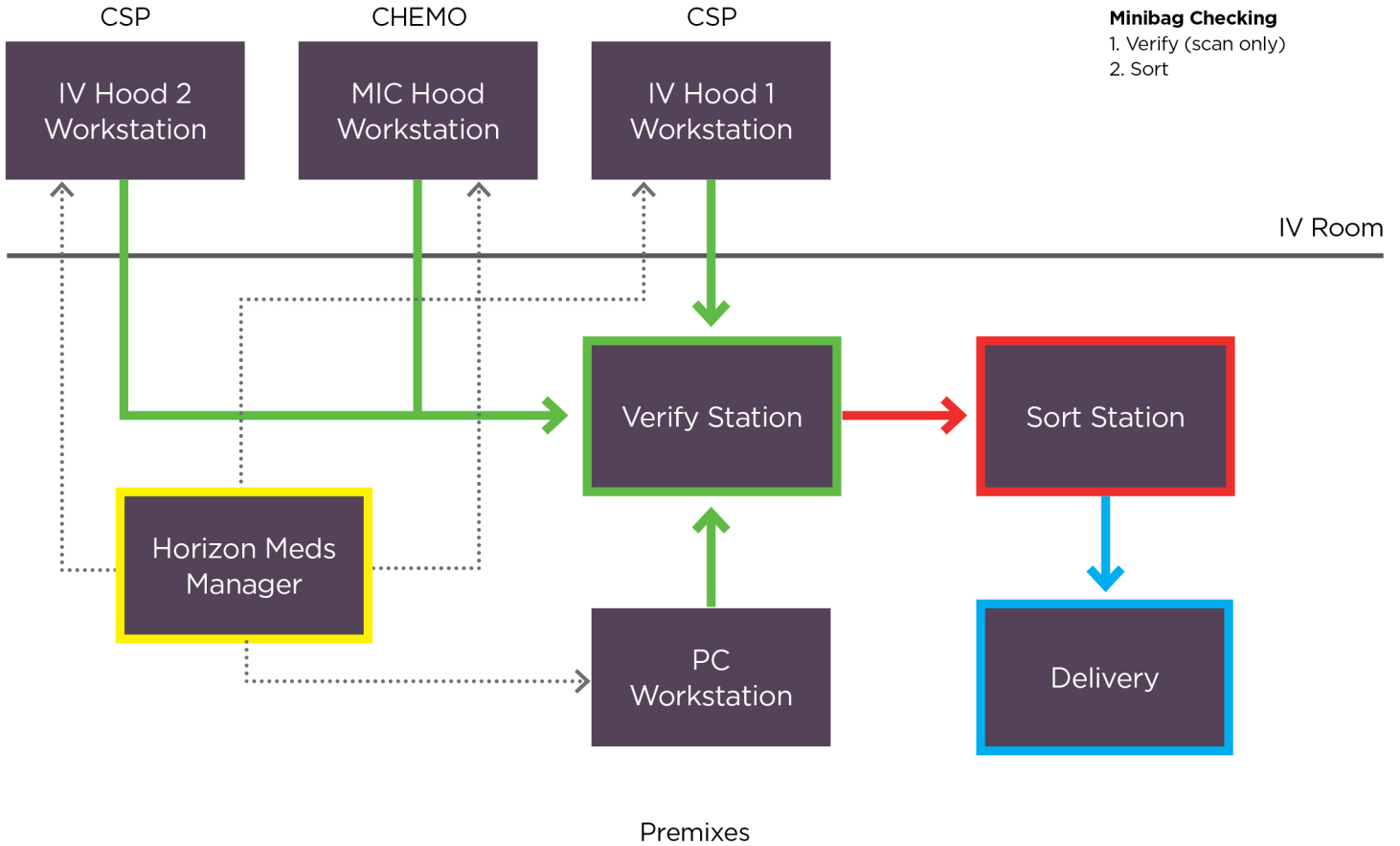
1. In-line Verify (scan & image)
2. Final Verify (scan & image)
3. Sort (in MIC)

CSP Checking

1. Verify (scan & image)
2. Sort

Minibag Checking

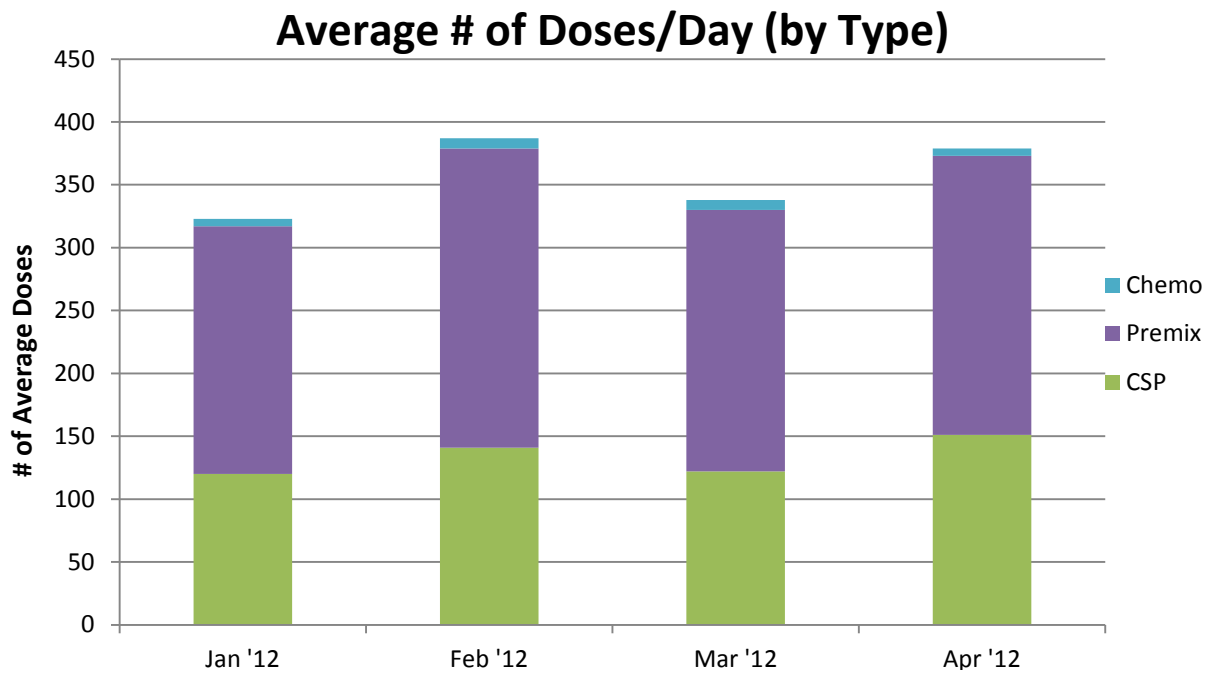
1. Verify (scan only)
2. Sort



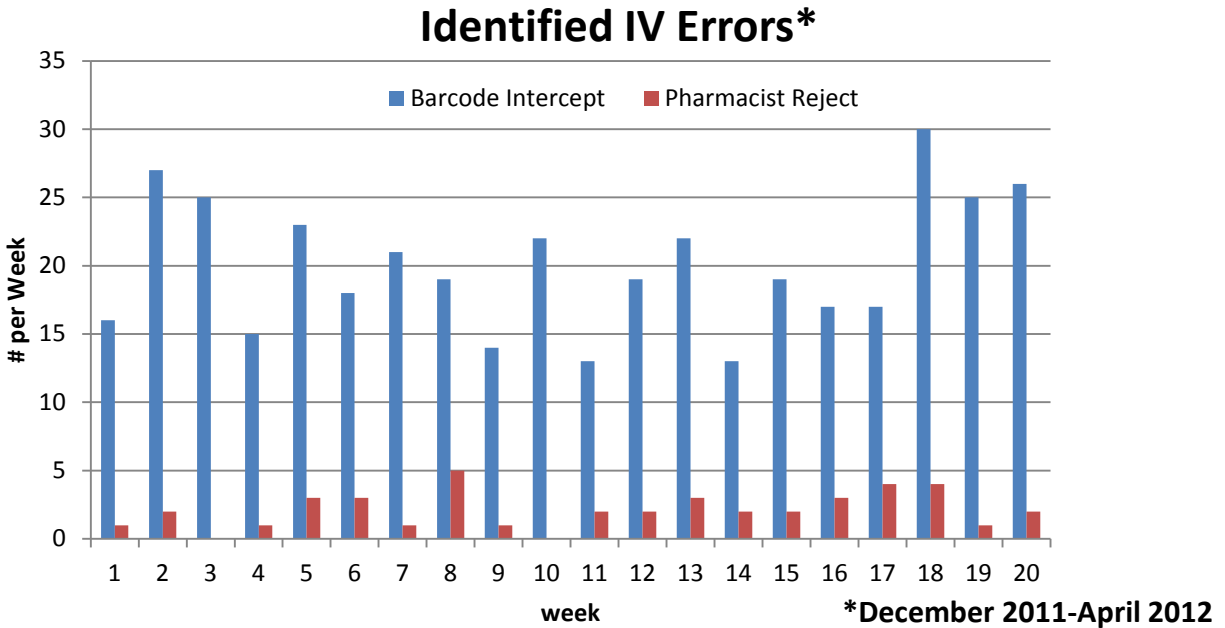
Although IU Health Bloomington Hospital initially considered implementing the **DoseEdge** System only for high-risk doses, they decided to go-live on all doses to provide the same layer of verification for CSPs and premixes. Speth notes they saw a dramatic reduction in dose preparation time from week one to week three.

Accurate pre-implementation data on compounding and dispensing errors were not available. Post-implementation data were collected specific to turnaround time, workload, prevented errors, rejected doses and user compliance.

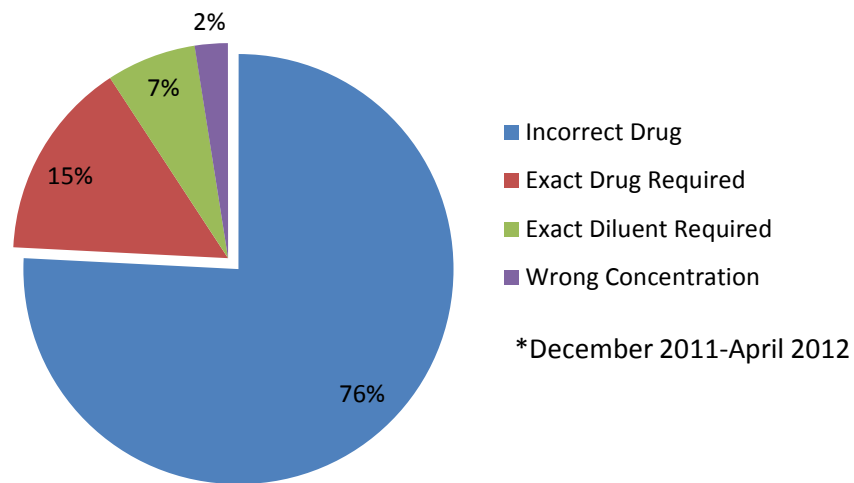
Between January and April 2012, IU Health Bloomington Hospital processed an average of 356 doses (216 premix, 133 CSP, 7 chemotherapy) a day through the **DoseEdge** System.



In general, the majority of prevented errors occurred during barcode scanning. Two thirds of identified errors involved premix doses and one third involved CSPs. Between December 2011 and April 2012, the bar-code intercepted error rate averaged 0.8%. Analysis of error data have led to several system and user changes.



Barcode Identified Errors by Type*

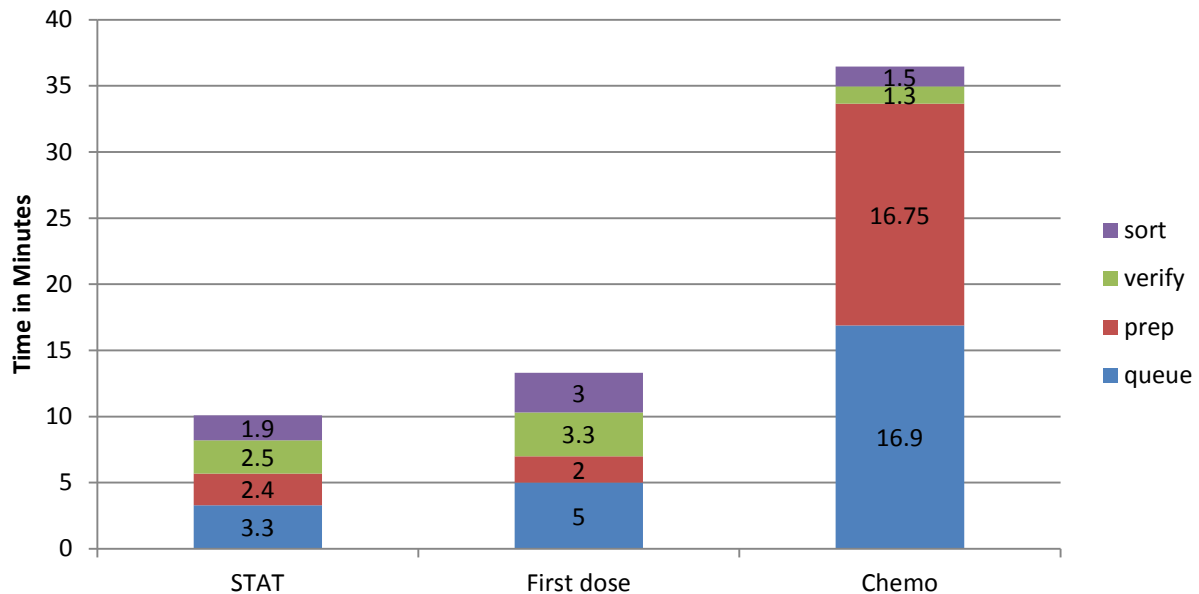


Workflow Improvements

Significant workflow modifications were made at IU Health Bloomington Hospital to optimize the DoseEdge System, including new technician and pharmacist assignments and hardware relocation. A prominent Status Board displays real-time dose tracking information for workflow and staffing management. IV dose turnaround time – from order entry to dose completion – averaged 13.3 minutes (excluded STAT and chemo dose preparation).

Remote dose verification means that IU Health Bloomington Hospital pharmacists can focus on clinical and patient-centered activities, verifying doses from any available workstation when necessary – eliminating the need to gown up and enter the IV room.

Average IV Processing Times by Dose Type



Waste Reduction

Over 20 weeks of data capture, 106 compounding errors were identified, valued at an estimated \$10,500.

Dose Type	Total (12/18/2011-4/29/2012)	Estimated Cost
CSP	102	\$714
Chemo	4	\$9800
TOTAL	106	\$10,514

Workflow Improvements

Reviewing their 2012 **DoseEdge** System data, IU Health Bloomington Hospital observed that they identified an average of about 20 dose preparation errors per week. Speth states, “I’d like to think that our pharmacists were catching most of these errors, but as we didn’t do any benchmarking prior to implementation, we have no way of knowing.”

The **DoseEdge** System has helped drive safety and workflow improvements in the IU Health Bloomington Hospital IV room, and helped identify compounding and dispensing errors. The **DoseEdge** System status board and workstation allow IU Health Bloomington Hospital management to anticipate workload and make any necessary staffing modifications. With the DoseEdge System, pharmacy staff can identify easily the preparation status of each dose in the system. The reporting tool provides management with data designed to identify opportunities for process improvement and to make informed training, staffing and workflow decisions.

For more information on the **DoseEdge** System, visit <http://baxtermedicationdeliveryproducts.com/pharmacy-workflow/doseedge.html>

The **DoseEdge** System is not intended to replace the knowledge, judgment or expertise of pharmacist and pharmacy technicians in the preparation of IV admixtures or oral liquid doses.

For safe and proper use of the **DoseEdge** System, refer to the appropriate manual.

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