CASE STUDY
RE-ENGINEERING THE PHARMACY: ONE SYSTEM'S APPROACH TO SVP PRODUCTION

Baxa

HEALTH SYSTEM OVERVIEW[1]

- The health system profiled consists of five hospitals in a suburban metropolitan area in the eastern United States.
- One facility is a community teaching hospital with a 420-bed average daily census (ADC); the other four are community hospitals ranging from 30- to 200-bed ADC.
- System average daily census is approximately 850 patients.
- The system has a heavy managed-care influence at about 60%.
- Location near other metropolitan areas creates competition for patients and retention issues for healthcare professionals.

DEVELOPMENT OF THE INTEGRATED SYSTEM

Three of the four hospitals merged in the early 1990s to form the health system. Pharmacy services began standardizing its information systems program in 1992. This program was subsequently implemented system-wide.

The main site implemented Pyxis and syringe infusion in the mid-1990's. The system soon recognized the benefits of operating as a collective pharmacy unit and appointed a system Director of Pharmacy. Following this appointment, the system completed an IV integration program, demonstrating the economies of scale available to collective activities. The lessons learned from the syringe infusion/IV integration program were then applied to other programs across the system.

Operational efficiencies allowed the hospitals to implement a system-wide residency program in 2000. The subsequent addition of seven FTEs across the system allowed a dramatic clinical expansion, including specialists in all of the intensive care areas. This clinical focus continues at the health system today.

This case study summarizes the major initiatives resulting from this unique health system program to take advantage of true system integration.

VALUE ANALYSIS

The drive towards system thinking goes back to an original value analysis initiative dating from the mid-1990's. At the time, the goal was to cut more than half a million dollars in non-salary expenses, with priority given to work-redesign projects that reduced costs and improved patient and employee satisfaction. Several value analysis groups were formed, including a pharmacy team.

High-expense areas were initial targets of the initiative. Small volume parenterals (SVPs) quickly stood out for greater attention. SVPs were only 10% of system volume, but 30% of expenses – in excess of $3 million per year. The team felt drug costs had already been minimized through

therapeutic interchange programs, IV-to-oral programs, clinical programs and other activities. Turning to delivery costs, significant savings could be realized by shifting from a proprietary drug vial system to syringe infusion. At the time, their proprietary system cost $1.50 a dose, versus about 35 cents for syringe infusion.

This proposal presented a significant obstacle. Their contract agreement for solutions demanded 95% utilization, or at least 85% standardization to a single source for products. However, their contract didn't offer a syringe infusion alternative at the time. This forced the health system to find a way to take advantage of syringe infusion cost savings without violating the their existing contract, which would have resulted in increasing solution pricing.

The answer was a strategic partnership between the system's Group Purchasing Organization and their solutions provider that resulted in an analysis of the impact of syringe infusion programs on the third-party contracts for solutions and equipment. The GPO was interested in determining how to implement cost-savings programs such as syringe infusion without violating their members' current agreements for other products. Analysis identified an additional $120,000 in annual purchases that the health system would need to make to meet contractual obligations.

A close look at all pharmacy costs was the first step. At this system, complete conversion to syringe infusion wasn't possible for logistical reasons in ancillary areas. Lack of refrigerated storage, for example, was the biggest obstacle. Expansion of the proprietary drug vial system to some of these areas such as the ER, GI labs, etc. helped increase the system's overall sales to fulfill the annual agreement.

Taking a global look at the business allowed the health system to find additional applications for available products that helped them meet both their strategic iniatives and the dollar volume necessary to maintain favorable contract pricing.

SYRINGE INFUSION PILOT

Next, the system undertook a syringe infusion pilot program. An independent accounting firm performed an objective study on the impact of syringe infusion at the system facilities. The one-month pilot studied two nursing units with enough SVP's for a good sampling. These were a 40-bed med-surg floor and a critical care area – the burn treatment center.

All available data were analyzed in the study, including inflationary costs, storage costs, pharmacy labor and nursing labor, in addition to the usual material costs. Representatives followed people with stopwatches to look at administration times. Employee satisfaction was surveyed in both the pharmacy and nursing departments. The result was a comprehensive and objective study with validated results.

RESULTS

The study concluded that no pharmacy labor was added in implementing syringe infusion at the health system. Pharmacy labor shifted from handling proprietary drug vials to making syringes. The small incremental labor increase didn't require any additional FTEs (full time equivalents).

Converting to syringe infusion provided the health system with significant dollar savings over their previous program. The five-year net present value for the savings was $432,000. The capital outlay for syringe infusers was paid back in less than a year, with five-year cash flow at $655,000.

Surveys indicated high nursing satisfaction with syringe infusion. The original plan was to use syringe infusers only for pharmacy-prepared doses, but nursing quickly identified the benefit of using them for slow IV pushes. Phenytoin, and other slow IV push drugs, could be drawn up, hung and slowly infused to save nurses time standing at the bedside. The infusers were well accepted because they're simple to use, reliable and effective.

Other benefits were realized from additional applications and potential cost savings. For example, the system did not always have enough full-size pumps to meet their delivery needs. Using their syringe pump "power" for other antibiotic applications freed up full-size pumps for other uses while using lower-cost disposables. While significant, these additional savings didn't compromise the system's best-tier supplier contract pricing.

The health system has seen no increases in adverse drug events with syringe infusion. Initial concerns about phlebitis from concentrated antibiotics have not been borne out. On the contrary, nursing surveys indicate that because the syringe infusers alarm after completed doses, nurses respond faster than with patients on minibags or other IV pumps.

CATALYST FOR SYSTEM CHANGE

Because of its success, syringe infusion became a catalyst for system-wide change. The monetary savings and improved nurses' satisfaction without impacting pharmacy workload led to widespread support to investigate similar initiatives across the system.

Teams were formed to address the goals of improving drug safety and increasing staff and patient satisfaction. First, they benchmarked critical activities and their associated costs. System thinking resulted in a number of changes that re-engineered processes to achieve cost savings and best practices throughout their facilities.

IMPLEMENTATION OF SYRINGE INFUSION

The health system augmented their initial cost savings by expanding syringe infusion system-wide. Syringe pumps became the primary SVP delivery method, with proprietary drug vials and premixed solutions for floor stock where they made sense. This product mix template was ultimately applied throughout the system.

IV ADMIXTURE CENTRALIZATION

The focus of project activities was on identifying best practices, then standardizing. Implementing best practices allowed this health system to eliminate outdated procedures and reduce opportunities for medication errors. By taking individual hospital strengths and using them across the five-hospital system, they were able to build on their successes.

Another opportunity that stood out was centralizing IV admixture. This allowed efficient batch volumes and reduced the learning curve for syringe implementation at other sites nurse training. IV admixture standardization evolved into other objectives. The obvious economies of scale contributed to big cost reductions. The exercise led the system to address practices such as storing concentrated potassium electrolytes, and other dangerous IV drugs, on the nursing units.

CLEANROOM PROJECT

When the health system centralized, cleanroom technology was uncommon in hospital pharmacies. With the passage of sterile preparation requirements under USP <797>, the system felt the need to address their compliance gaps. The large dollar savings realized from implementing syringe infusion system-wide provided the system with the ability to justify building a Class 10,000 (ISO 7) cleanroom. Benefits of the new cleanroom ultimately went beyond just providing higher-quality compounded sterile preparations (CSPs).

QA PROCESSES

The health system knew they needed to formalize quality assurance procedures. It was critical to the success of the IV program that sister hospitals had confidence in the quality of the centralized pharmacy.

IV CQI (continuous quality improvement) was a pharmacy function with a team including the IV supervisor, pharmacists and technicians. They found their technicians were primary initiators of ideas on efficiency, yet the committee was steered by pharmacists.

Technician involvement was key to the committee's success. The system moved to biweekly meetings designing and implementing change as a team. The same process continues today on an ad hoc basis to address new concerns and opportunities for new efficiencies.

Pharmacy and Therapeutics Committees

Thirteen years after the formation of the health system, Pharmacy and Therapeutic (P & T) subcommittees are an ongoing challenge. The pharmacy department is integrated, but three separate P & T committees and three Medical-Executive committees still exist across the five hospitals.

The pharmacy attempts to have the same outcome at every hospital. In many cases, management holds up improvements at one site and waits for the other sites to align themselves to maintain standardization efficiencies.

TPN ORDER FORMS

Across the system, they found six or seven different TPN ordering methods in use, each with its stakeholders. The solution to standardizing the process was to design a form consistent with ASPEN (Association of Parenteral and Enteral Nutrition) guidelines regarding TPN ordering and labeling. Again, the biggest challenge was gaining approval from three different P & T committees, three different Medical-Executive committees and three different nutrition committees.

LABELING

The health system's centralized pharmacy operations were challenged to interpret different labels from each of their remote sites. By listening and negotiating, the system was able to standardize IV labeling, minimizing the opportunity for errors. Different label colors identified individual hopsitals. The central IV admixture facilities has a bank of printers loaded with the correct color label stock for each facility. Data entry is coordinated with the originating facility and the resulting printed labels are easily understood.

Through listening, negotiating and incorporating the strengths of individual systems, the system was also able to standardize auxiliary labeling to a format that worked across the system.

ANTINEOPLASTIC DRUG HANDLING

With most of the admixture services centralized, the system began to evaluate whether similar benefits were possible with antineoplastic ("chemo") doses. Chemo mixing was complicated by the risks of handling hazardous substances, high drug costs, last-minute dose changes and handling new starts.

The system decided to continue mixing chemo at the individual sites. Each site already had vertical flow hoods in place. However, they standardized their mixing procedure and developed a comprehensive four-level check system prior to chemo dispensing. The procedural standardization met their goal of minimizing chemo production medication errors.

OTHER WORK FLOW IMPROVEMENTS

The technicians identified a critical weakness in staff scheduling. The most experienced techs were working the same weekend – and sometimes day – shifts. The suggestion was made to distribute experienced staff throughout the available shifts.

Besides improving work flow and minimizing shift-to-shift quality variances, there were other benefits realized. Employees were invigorated about the project and the opportunity to make improvements and create a better workplace. Turning to job efficiency, the technicians increased recycling and began working cross-functionally (vs. task oriented). The team approach led to other suggestions for process flow and efficiency improvements, even with the pharmacists, such as communicating order discontinuations immediately to minimize waste.

IV CERTIFICATION PROGRAM

One site alone had 65 technicians. These IV Room technicians led a project to certify technicians who then became the trainers for the rest of the staff. A comprehensive program was structured around the ASHP template, including a written exam based on the IV Technician Handbook and a practicum.

RESULTS

The overall result of these initiatives at the health system was a safer IV preparation service with higher quality at a lower-cost.

Financial Results
Standardization efforts resulted in documented savings of more than $250,000 systemwide through decreased supply costs, minimized drug waste and redefining FTEs (full-time equivalents). Most of the labor savings came from decreased overtime, sick time and reduced satellite pharmacist FTEs.

The system started this initiative with three technicians and two pharmacists seven days a week. Today their production volume is doubled, with just four technicians Monday through Friday, three technicians on the weekend and two pharmacists seven days a week. The one extra technician allowed them to reduce three or four FTEs across the system.

HYPERALIMENTATION

The other significant dollar savings came from re-engineering the system's hyperalimentation process. Originally, they had three automated TPN Compounders operating at the different sites, with a fourth site mixing manually.

Centralizing their TPN mixing allowed the system to implement an integrated automated compounder from Baxa Corporation. The system went from using three tube sets a day to one and significantly increased labor productivity. The resulting savings was more than $60,000 a year, while at the same time improving the practice safety through automation and bar code checking.

PATIENT BENEFITS

The biggest benefit that the health system saw through the re-engineering process was the sterility that comes from a higher-quality compounding environment. By focusing on best practices and medication error prevention, the system significantly improved patient safety through standardizing labeling and complex processes such as TPN preparation.

THE FUTURE

At this leading health system, the learning from their 1990's initiatives has helped prepare them for the challenges ahead. Always on the lookout for new ideas, they've adopted a couple of new technologies that enhance SVP production.

The first is SmartPak® bags from Samson Technologies. These bulk bags contain up to 300 grams of drug powder. Add water, spike the bag and start preparing batch syringes with your pharmacy pump. Using SmartPak provides benefits for both syringe infusion and minibag preparation. Production time decreased by 30%, compared to reconstituting up to 30 ten-gram individual vials. Storage requirements decreased dramatically. The SmartPak closed system also dramatically reduces the opportunity for touch contamination.

A second new SVP production technology is the Baxa RapidFill™ Automated Syringe Filler (ASF). This system automates the process of batch syringe preparation using proprietary syringes and tip caps supplied in banded strips. With minimal data entry, the machine automatically fills, labels and caps the sterile syringes in a single step. Now, technicians typically prepare two-gram and non-standard doses while the ASF completes the one-gram batch fills. The equipment eliminates the rate-limiting step of hand-labeling syringes, and removal of the operation bottleneck saved time and was very positive for the technicians. The system's software gives the option of including a bar code, when that feature can be used by other technologies.

The current healthcare environment presents this system and others with challenges across the board. Medication safety is on everyone's mind, and the industry continues to struggle with how to implement barcode technologies. Drug expenses are rising at staggering rates, increasing the costs pressures on pharmacy. Healthcare personnel shortages are epidemic, and to add to that, The Joint Commission (TJC) created new medication management standards. The system operates under the model of 'continuous improvement,' continually looking for ways to re-engineer processes to improve the way they manage safety, spending and associate issues.

[1] Author's note: Employees of the health system actively participated in the research and development of this case study. However, system marketing representatives would not allow the open representation of the facility for publication. Therefore, specific details have been masked to present a more generalized "story" of the system integration and the development process and steps taken to improve their pharmacy operations in order that other pharmacies could share in their findings and learn more about the process they took to reduce costs and improve delivery efficiencies.