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Short Communication

# Streamlining a Simulation Center's Inventory Management

**Amy Nagle, MSN, RN, CNE, CHSE[a,*], Susan Fisher, RN[a], Shree Frazier, MS[b], Sara McComb, PhD, PE[c]**

[a]*Purdue University School of Nursing, West Lafayette, IN 47907, USA*
[b]*Purdue University School of Industrial Engineering, West Lafayette, IN 47907, USA*
[c]*Purdue University Schools of Nursing and Industrial Engineering, West Lafayette, IN 47907, USA*

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**Abstract:** Use of simulation in undergraduate nursing education is increasing. Although research results indicate it is an effective teaching—learning strategy, little is published about how to sustainably manage the infrastructure necessary to effectively run a simulation laboratory. This article describes a collaboration with industrial engineers to develop an inventory control system that minimizes the burden on available resources, accommodates fluctuations in simulation utilization, and does not require inventory management software. The new system reduced space requirements for inventory storage by 68%, time to manage inventory by 53%, and carrying costs by 38% even with increased center utilization. Taking time to design a structured approach to inventory storage and a pull system to manage inventory reordering may be extremely beneficial to simulation centers. Our improvements highlight the potential for reducing the amount of time and money dedicated to inventory-related activities and the benefit of partnering with colleagues, such as industrial engineers, whose expertise can facilitate process redesign. More importantly in an academic setting, the time and money saved allows faculty and staff to engage in value-added activities that will enhance student learning.

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## Interprofessional Collaboration to Streamline a Simulation Center's Inventory Management

Undergraduate nursing schools across the United States are moving toward increasing simulation-based experiences to compensate for limited clinical sites and provide opportunities for skill development. The literature has focused on important issues regarding the efficacy of simulation in replacing clinical time (Doolen et al., 2016). Yet, little if any literature is available describing how to manage, and more importantly make sustainable, the infrastructure necessary to support increased simulation utilization. The purpose of this process improvement project was to design and implement an inventory system that minimized the burden on available resources,

* Corresponding author: nagle0@purdue.edu (A. Nagle).

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accommodated fluctuations in simulation utilization, and did not require inventory management software.

A key component in the design of simulation-based experiences is the physical fidelity of the environment to help replicate an actual health care context (International Nursing Association for Clinical Simulation and Learning Standards Committee, 2016). This fidelity requires that participants have access to realistic equipment and disposable supplies. These resources use valuable physical space in a simulation laboratory and budget. Demand, for both space and supplies, increases as the number of participants and simulation-based learning experiences increase. Moreover, the demand may not be predictable or constant over the course of a semester. Therefore, inventory management is needed to keep costs low, minimize space utilization for inventory, and ensure the right inventory items are available at the right times. Options to manage inventory in simulation centers include spreadsheets, databases with barcodes, or a scheduling system that includes inventory as a component (Engum & Dongilli, 2014). Many commercially available software systems (e.g., ASAP Inventory Systems [www.asap-systems.com], EZOfficeInventory by EZ Web Enterprises, Inc., Carson City, NV, Clear Spider [www.clearspider.com]) are available. These systems, however, require a financial investment in, for example, software acquisition, equipment (e.g., barcode readers), staff training, and technical support, which may make them infeasible for many smaller programs.

**Key Points**

- Simluation centers need a streamlined process for managing inventory.
- A pull system is an efficient approach for managing inventory.
- A pull system can be tailored to meet the needs of any simulation program.

This improvement project was undertaken as a School of Nursing in the Midwest, which currently enrolls 400 students in their undergraduate Bachelor of Science program and is projected to double enrollment during the next four years. In 2015, the School's Center for Nursing Education and Simulation (CNES) increased the number of simulation rooms from three to six. This renovation facilitated incorporating simulation more broadly into the undergraduate curriculum, resulted in an increase in center utilization, and lays the groundwork for the School's anticipated growth. The number of students per week participating in simulation-based experiences increased from an average of 36 students per week in spring 2015 to an average of 55 students per week for the 2015 to 2016 academic year. Simultaneously, the average number of simulation hours increased from 10 to 15 hours per week.

Nursing faculty, in collaboration with the CNES director hired to manage the simulation center, quickly discovered that the past approaches to inventory storage and management were insufficient to ensure that the right supplies were available to adequately stock simulations. Issues included a lack of storage space, disorganization of supplies, and struggles obtaining supply lists from faculty. The result was valuable time wasted locating needed supplies and over ordering because of inaccurate information about current inventory levels and anticipated demand.

The CNES director collaborated with two industrial engineers to devise a sustainable inventory control system that did not require software. The industrial engineers provided insights into inventory storage, such as deciding where specific supplies should be located in the supply closet, and when orders should be placed to ensure that supplies were always available.

## Inventory Storage

Often the first step in inventory control is to understand space constraints and how items move through the facility. The CNES has a small amount of space available for storage onsite and access to a larger storage room on another floor in the building. Given these space constraints, a three-tiered storage approach was established to facilitate the flow of inventory through the CNES: point of use, active storage, and main storage (Figure 1).

Point-of-use inventory is stored in each simulation room, including common nursing supplies used in most simulations (e.g., IV start kits, syringes), which are stored in rolling carts. Student workers replenish the point-of-use supplies daily by drawing from active storage. Active storage contains items used regularly in simulations (e.g., all point-of-use inventory, medications, Foley catheters). Storage is organized by skill; for example, supplies needed for IV insertion are placed together (e.g., supplies related to dressing change, gauze, tape, and Tegaderm are placed in bins on one shelf). Medications are placed in alphabetical order in a large cabinet with syringes and alcohol preparation pads placed nearby. When items in the active storage area are depleted, stock is replenished by drawing from the main storage. The main storage contains all nonroutine items (e.g., isolation supplies) and all overstock of active storage items. Supplies are organized according to skill (e.g., primary IV tubing, secondary IV tubing, and normal saline bags are grouped together). When items in the main storage area reach low levels, the director places an order to replenish the stock.

## Inventory Ordering

Inventory management systems are often identified as push or pull systems. Before this inventory restructuring effort, the CNES director used a push system, and through the project described herein, converted to a pull system. A push inventory system requires predicting the specific quantities of items necessary to fulfill user demand (Davis, 2016). Items are ordered in anticipation of being used, not actual usage. Inaccurate predictions of item usage in a dynamic environment are a disadvantage because they may lead to