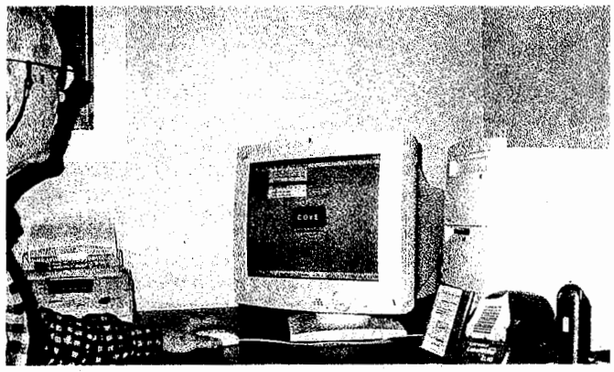
UCSF Medical Center: A Case Study in Managing Inventory

Sarah Schmelling

Managing your inventory properly is not exactly a life-or-death process. But inefficient inventory management can lead to increased costs, storage problems, and too much—or not enough—of what you need. It was exactly this situation that led the Clinical Laboratories at the University of California at San Francisco (UCSF) Medical Center to look into creating an inventory management system.

"We didn't have a very clear idea of how many of which item we had on hand, and whether or not items were going to expire before we used them," says Tom McHugh, technical director, Clinical Laboratories, UCSF Medical Center. "So we decided to come up with a computerized solution for it."

The lab considered several management programs that McHugh says were "generic," or customizable by the vendor for a particular user. These programs, he says, had "some strong features ... but we found that most of the products didn't fit our setting very well, and were relatively expensive."



Cove Laboratory Software's inventory management software is used across UCSF Medical Center's laboratory system.

The solution was to develop the software themselves. McHugh contacted two computer programmers who had previously created custom programs for the lab's instruments, and discussed the possibility of a new inventory management system. "When I told them what we wanted to do with material management and inventory management, we decided it was worthwhile to try and develop it as a commercial product, and not just a custom product for that one clinical lab," he explains. So McHugh and the programmers created Cove Laboratory Software, a small company that would focus on the inventory system as its core product.

McHugh, who now works both for UCSF Medical Center and for Cove, helped install the system at the lab in 1996 in a "small way." By 2001, he says, when the software had become much more robust, it began to be used across the medical center's laboratory system.

The Challenge of Counting

The UCSF Medical Center Clinical Labs system is large—about 350 employees—and it runs about 5 million tests a year. Managing such a system takes much more than a regular database can handle. "The clinical laboratory uses hundreds or thousands of different supplies from many different vendors," explains John Chapman, director, Clinical Services, UCSF Medical Center, who works in the immunology lab. "To be able to perform patient testing in a timely fashion, the laboratory must have sufficient volume of each supply."

The problem, he says, was keeping enough supplies on hand without overwhelming the lab's storage space, while also reducing the chance of reagents expiring before they were used—and, in effect, wasting money. In addition, many of the labs within the system "provide supplies to off-site locations, such as phlebotomy stations and clinics, and tracking these supplies and the rate at which they are consumed is important," Chapman says.

A database system, such as a Microsoft Excel spreadsheet, is useful to keep track of the supply name, catalog number, vendor, and associated information, but it cannot "provide for analysis and the other functions needed in material management of the clinical laboratory," Chapman says. "Since a significant portion of the operating budget for the laboratory is associated with supply costs–estimates range from 20% to 50%–it makes sense to focus efforts on managing these supplies and costs. Additionally, the time it takes to produce a purchase order and to receive supplies against that purchase order is significant and, unfortunately, often unorganized."

For all of these reasons, the laboratory implemented Cove Laboratory Software's computerized material management application, InvMan. Chapman says the software has helped the medical center better control its inventory by physically counting items, tracking lot numbers with expiration dates, generating purchase orders combined with the receipt of shipments, maintaining equipment inventory, and producing a multitude of reports.

Finding Through Function

The key to the software's latest version is its ability to run on a network server, thereby allowing multiple users access to the program simultaneously. "Then they can access it on any PC in a laboratory, no matter where they are—even if they're at a remote site such as an outpatient clinic location," McHugh says. "They can figure out how many boxes of tubes or gloves they have, and they can order from there; and then the main laboratory can access it."

But the program's primary function is simply inventory: keeping track of what you have in stock, and what you need. "Laboratories that use it now put in how many supplies they have, and how many they want to have on hand. They put into the software the quantity they need to order, and then at some periodic interval, they count how many they have on hand—and there's a portable bar code scanner to do that," McHugh explains. "So the software keeps track of all the supplies the lab uses, knows when to order, and generates the purchase orders."

Within the lab, the staff counts inventory once a week by using the bar code labels and scanner. "The scanned label data is uploaded to the software program, and we have the choice of using this new in-stock value, or subtracting this from or adding it to our in-stock levels," Chapman says. "While a complete replacement of the in-stock number is our typical process, having the ability to deduct supplies as used is a convenient alternative."

The program can also track all equipment in the laboratory—helping to determine whether an instrument is due for service and who will service it. Chapman uses a report application to list all equipment and instrumentation in the lab with model and serial numbers; hospital property numbers; vendors; dates purchased; locations; and whether it is owned, leased, or rented. "This report alone has been used multiple times when providing an up-to-date listing for audits and for reporting the instrumentation used by the laboratory to regulatory agencies," he says.

Another key feature of the software is its ability to track lot numbers and expiration dates. This information, he explains, is entered whenever a supply is received. The program then warns users each time they log in about supplies that are going to expire within a user-defined number of days.

"While we have rarely needed the program to remind us that a supply was going to expire, the lot number and expiration data is now organized, easily retrieved, and viewed," Chapman says.

This tracking mechanism also helps when the lab is notified by a vendor that a previous lot had performance problems, letting them review and report on whether or not they received that lot, how many they received, and when.

The program's ability to generate purchase orders is also very helpful, Chapman says, explaining that a reorder point (ROP)—or the quantity at which the lab routinely reorders—is entered into the program for all supplies. The ROP, along with the "quantity on hand" number from the physical count of the inventory and the desired quantity on hand, allows the program to automatically produce purchase orders.

He adds that the ability to add or delete items from the purchase orders streamlines the process.

McHugh points out that there are many other helpful reporting functions within the program. "A user can determine over time how many purchase orders they have generated," he says. "They can ask with a very simple report how much from a particular vendor they have on hand and what its value is, so they can figure out if they have way too much money tied up in their inventory."

A drawback of a manual or in-house database system is the inability to easily and rapidly analyze inventory, Chapman says. "The software package provides more than 25 reports as well as a query wizard. We have found utility in searches such as, 'list all items which cost more than $500, are in stock in a quantity of more than 5, and are from a particular vendor.' All queries can be saved and run anytime to analyze the data."

Table 1.

Material Management Function	Manual (non-InvMan) System Costs Per Year	InvMan System Costs Per Year
Physical count of the in-stock inventory	$7,800 (260 hours)	$3,120 (104 hours)
Generation of purchase orders	$10,920 (based on 936 purchase orders per year at 20 minutes per purchase order)	$3,640 (936 purchase orders per year at 7 minutes per purchase order)
Receiving shipments, matching with originating POs, and stocking supplies	$7,020 (234 hours)	$3,991 (133 hours)
Retrieval of data related to supplies, vendors, and equipment	$900 (36 hours)	$550 (22 hours)
Setup costs for training (one time cost does not recur each year)	0 (already in place)	$900 (30 hours)
Costs for inventory management tools (one time cost does not recur each year)	0 (already in place)	$4,700 ($3,500 InvMan, $1000 scanner/station, $200 label printer)
Cost of first year includes all costs and training time for the computerized system	$22,640	$16,901
Subsequent annual operating costs	$22,640	$12,201

The Overall Difference

McHugh says that within UCSF the program has made a big difference; and through Cove, he's seen it help many other laboratories as well. "It clearly makes counting the inventory and counting the purchase orders more efficient," he says. Though users do have to enter information upfront, he adds, "It really organizes all the processes of counting how much you've got, generating a purchase order, and then trying to analyze it."

He says many labs have reported that the software has helped them reduce the amount of supplies they have at any one time, so extra money isn't "tied up" in the inventory; and that they've also saved money by not having items expire before they are used. Some labs have also saved money since they can avoid ordering supplies in an emergency, which could mean requiring a vendor to overnight necessary supplies and paying that extra cost for shipping, he says.

Chapman conducted a time-and-cost study to determine the amount of money saved through the InvMan system within the immunology section of the lab (see Table 1). The calculations were based on hands-on time studies for the major tasks involved in the management of inventory and purchase orders. "We assumed that half of the tasks were performed by a medical technologist using an hourly rate of $35, and half of the tasks were performed by a laboratory technician using an hourly rate of $25," he says.

From the study, the lab has "calculated our annual cost in personnel time to be $26,640 using a manual system, versus $12,201 for the computerized system," he says, adding that $4,700 is also needed for hardware. This shows an annual savings of more than $10,000 in personnel time alone.

Though the amount saved through avoiding actions such as incurring emergency order costs and running out of supplies were not calculated, those savings are also probably significant, Chapman says. In addition, "These cost savings are from a relatively small section of our clinical laboratories, suggesting that total savings are probably greater," he says.

Other benefits of the computerized system have been more difficult to quantify, but are important as well. These advantages include, "the ability to rapidly and accurately report on the inventory, to provide data to inspectors or auditors of the laboratory, and to have complete information and analysis when negotiating with vendors," he says.

McHugh says that more than 50 other clinical laboratories—both nationally and internationally—are currently using the InvMan program, and that clients include the United States Navy. He says that though UCSF Medical Center's clinical lab system is particularly large, many smaller facilities—down to a five-person lab in a small hospital—have found the system useful. The software is available in two versions: one for five simultaneous users, and one for 10.

"I think it is beneficial for almost any size lab," Chapman says.

The management of supplies, purchase orders, and equipment is of critical importance to the operation of the medical lab; and this system has provided an organized, efficient way for completing these tasks. It's helped the lab save time and money, and "respond more rapidly and accurately to requests for information related to our inventory," Chapman says.

It would be difficult to find a spreadsheet that could do all of that.

Sarah Schmelling is a contributing writer for Clinical Lab Products.