

Bar codes

for a more dynamic O.R. inventory system

By Donna Prokopczak, R.N., B.Sc.N., M.Ed.

Harnessing and taming the rampant high cost of an operating room inventory is the dream of most O.R. nursing administrators. Much of the operating room budget is consumed by the bottomless pit created by the need for constant replenishment of surgical products. Tracking their usage and ensuring rapid replenishment is a monumental task, especially if the inventory stock is scattered throughout the department in various holding areas.

The hectic pace of O.R. nursing or support staff allows little time or no time to stop and record the items removed from inventory. This information is quickly forgotten, as other priorities of the surgical day take precedence.

Streamlining the process

A convenient method of capturing the information at the point of use, without the need of a keyboard data entering system or the necessity of writing down what has been taken, would certainly streamline the process of replenishment.

Accountability for this inventory motivated one major operating room to seek new ways of controlling this "direct buy" inventory by incorporating computer technology. By taking a look at the service sector of our society, we saw how the use of bar code

technology touched our everyday lives. Why not apply this technology to the operating room?

The following is a description of the experience of the operating room at the University of Alberta Hospitals in Edmonton. This account will describe how this operating room found ways to successfully implement the "wonderful world of wandables" in order to automate the department's direct buy inventory, consisting mainly of implants and prosthesis.

Bar coding not universal

In considering this technology, the first concern that comes to mind is that, although many manufacturers are producing inventory with universal bar codes, what do we do about those manufacturers who do not furnish them? Unless a system is implemented with a lot of "exceptions," it will be necessary to generate our own bar codes for each inventory item.

In view of the fact that the University of Alberta Hospitals already had a computerized inventory catalogue in place (on the hospital's central computing facility), including a nine-digit system assigned catalogue number identifying each inventory item, it seemed only logical to transform this nine-digit number into a bar code format.

The next concern was how to generate and attach a

bar code to each inventory item so the usage could be conveniently captured through an infra-red pen scanner or wand.

It was decided that a dedicated thermal transfer bar code printer be purchased to generate labels to be attached to each inventory item. Probably the key item in the success of this system was the selection of a suitable bar code label. Because all O.R. inventory is not of a uniform size, it was imperative to choose as compact a label as possible - one that would be scannable and contain as much information as deemed essential.

Replenishment record

One of our major concerns was how to attach a label to those inventory items that were detachable when the supply item was used. To accomplish this, a double ply adhesive, peelable label was selected. Initially, the adhesive backing adheres to the inventory item package or, in the event that the item does not have packaging, it may be placed into a suitable size plastic bag for labelling purposes.

At the point of usage, the top layer of label containing the bar code and descriptive information is detached and affixed to a "replenishment record form." These forms are conveniently placed in the storage locations. The forms are collected daily by the O.R. supply clerk who wands the usage into the automated inventory system. This system, designed on the hospital's central computing facility and involving the co-ordinated efforts of the purchasing, ac-

counting and information systems departments, in collaboration with the operating room department, became a reality. (See conceptual diagram #1)

How the system works

All O.R. inventory items are catalogued according to their respective surgical service, such as neurosurgery, cardiovascular, orthopaedics, and so on. The catalogue consists of information including:

- a description (condensable to fit available space)
- size dimensions
- unit of issue (eg., each, box of 10)
- cost per unit
- vendor
- manufacturer/vendor catalogue (product) number
- storage location (coded description)

Inventory volumes are controlled by quota levels determined by the operating room nursing supervisor in each surgical service. This is a three-point quota level consisting of a high level (indicating the upper volume of inventory to be stocked), low level (point at which replenishment is to be initiated), and a warning level (point at which the inventory stock is at or near depletion).

As each inventory item is catalogued, it is assigned (by the computer system) a hospital nine-digit ID number which can be transformed into a bar code.

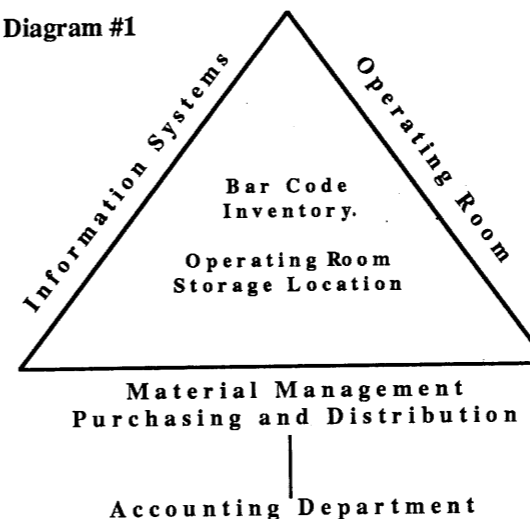
The inventory is loaded into the computer identifying the initial stock-on-hand, based on the actual inventory count. With each entry by wand (or keyboard entry of the nine digit number if necessary), the system decrements the stock-on-hand quantity and identifies items needing replenishment. An ideal enhancement to this system would be the availability of a hand held portable scanner to wand usage on site (storage locations) and then upload the information into the central computer.

A trek through the system

Following the inventory cataloguing and entering the inventory supply count into the central computer, the life cycle of an O.R. inventory supply item begins with its bar coded label affixed and placed on the designated shelf location in the operating room. The existence of this item is recorded in the "stock-on-hand" category within the computerized inventory. As the item becomes required for use, the label is detached by either an operating room

An Interdepartmental Venture

Diagram #1



nurse or one of the O.R. support personnel and affixed to the available "Replenishment Record Form." The O.R. supply clerk enters the usage into the central computer at a terminal, using an infra-red, light pen or keyboard, if the label is damaged or unscannable by the wand.

When the "Stock-on-Hand" level reaches the pre-established low level (re-order point), the system generates a print-out list of items requiring replenishment at the command of the purchasing personnel. This last process (re-ordering point) requires human intervention as a print-out is not automatic.

Inventory replenishment

Replenishment becomes the responsibility of the purchasing department and system-generated purchase orders can be either telephone-faxed or forwarded to the appropriate vendor. The purchase order can be viewed through the computer terminal by the O.R. personnel. When the supply items are shipped to the hospital receiving department, the purchase order is called up on a system terminal and receipt is documented. This activates the dedicated bar code printer in the O.R. to generate a label for each item as it is received. Checking the labels produced by the bar code printer informs the O.R. of the availability of inventory just received. This is valuable as it may be urgently required.

As the inventory is delivered to the O.R., the labels are matched and attached appropriately to the new inventory. This also acts as a double check on the

system. If insufficient labels are received for the inventory, then a data entry error can be detected. The arriving inventory is then placed in the designated storage location awaiting the next usage. Through careful co-ordination, turnaround time can be as little a 24-48 hours for some high usage, high cost inventory items. (See diagram #2)

Labels - the key ingredient

It was deemed essential for this system that the bar code labels be printed on site rather than be custom produced by an outside printer. The rationale for this is the number of items to be labeled. There are over 3000 inventory items in our O.R. catalogue.

A quiet, dedicated, thermal transfer bar code label printer was selected. The hospital's Information Systems Department was required to program the printer to communicate with the central computer and produce labels as defined by the operating room. With the assistance of Information Systems, the following specifications were developed for our labels.

The desired information contained on each bar coded label, in addition to the bar code, includes:

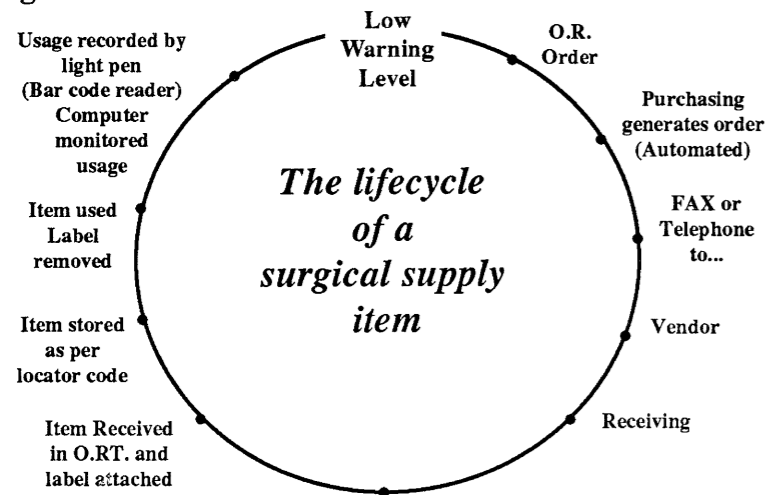
- the catalogue number (from which the bar code was derived)
- unit of issue
- vendor (a code was developed to condense names into a three-character field)
- vendor catalogue (product) number
- catalogue description (a 30 character field);

- the optional code for 'CN' to designate consignment inventory. (See illustration of bar code, page 13)

Consignment inventory

One of the big hurdles in the planning process was the method by which the accounting department could best accommodate the consignment inventory. This inventory is not purchased until after it is used, so modifications to the issues/returns processing had to be developed to allow for this exception, and for the operating room to proceed with implementing the new concept. In addition to the "CN" designation, the high-low and warning levels are all set the same or equal for con-

Diagram #2



Documentation - Enter into Computer
- Match Invoice to Purchase Order
(Label automatically prints in O.R.)

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* Journal of Clinical Microbiology, November 1985, p. 735 - 739

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Specifications for Inventory Bar Code Labels

1. Width: - 4.33" (110mm) media as backing on two 2" labels
2. Length: - each label repeats at 1" (forms control of 6lines per inch)
3. Thickness: - between 0.0023" (0.06mm) and 0.010" (0.25mm)
4. Type: - either continuous media, fan-folded labels, or, if roll, role capacity 9" (230mm), maximum outside diameter X 3" (76mm) core diameter
5. Material: - thermal transfer, light weight design, smudge proof, high resolution (no fading with time)
6. Operation: - labelling of inventory items
- must have an easily removable barcode with adhesive backing
- barcode readable by infra-red scanner.

signment inventory so that replenishment is initiated with each usage. As each consignment item is used, the system communicates the need for payment to the accounting department, plus the need for replacement through Purchasing.

The benefits

There are many benefits to be derived from a computer automated inventory control system, including:

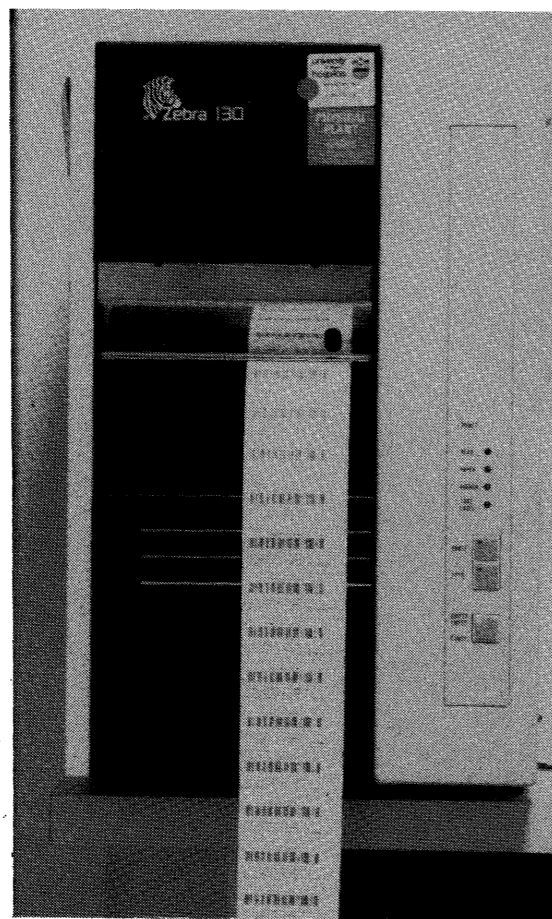
1. Convenience to the O.R. nurses or support staff who use the inventory items and who cannot stop to type or write things down. All that's required is the removal of a label and its attachment to a replenishment record sheet.
2. The accuracy of bar code wand reading eliminates data entry errors in transcribing issues to computer.
3. Computer monitoring of inventory stock levels automatically generate purchase orders when levels

reach the reorder point. Although human intervention is currently required to actually send out the purchase order, the need for manual stock counting (except for periodic checking) and manual production of purchase orders is eliminated.

4. Inventory stock levels can be kept at a minimum as the system monitors the need for replenishment and turn-a-round time can be reduced. Some of the supply item replenishment for items such as consignment inventory (e.g., total hip components) can be restocked within 24-48 hours through rapid co-ordination between the usage entry, automated purchase order generation, telephone-fax communication and vendor response.

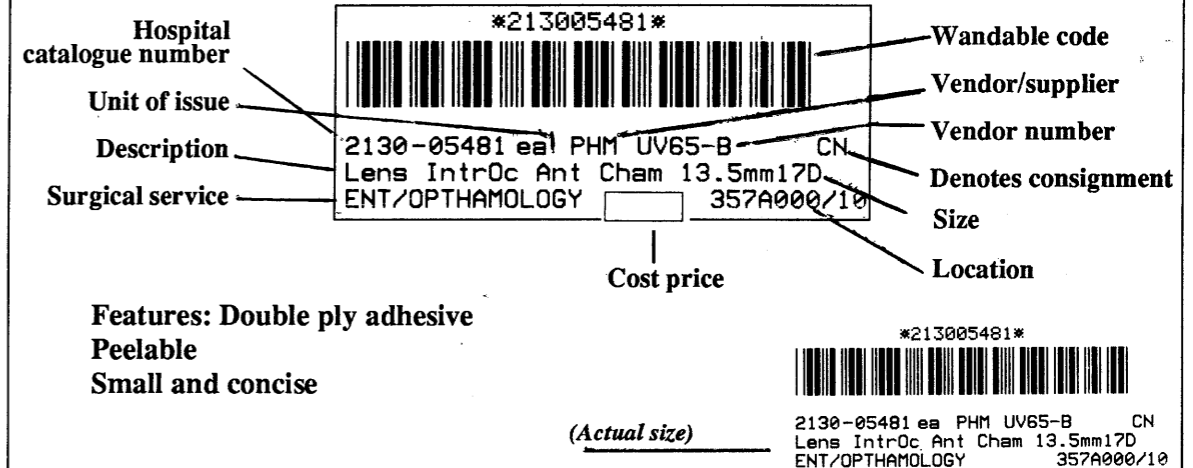
5. Stock out situations can be reduced, unless the problem is a result of vendor backorder.

6. Authorized operating room personnel can use the



A dedicated printer in the OR automatically generates labels for received inventory as it is documented in the Hospital's Receiving Department

Anatomy of the bar code label



system to view the status of any of their inventory items, including retrieval of the purchase order number with date and purchase order information.

7. The system compiles a monthly usage of each item for a period of one year, plus an average daily use calculation. This information becomes quite valuable when resetting quota levels, changing product lines or negotiating new contracts. It will also provide information identifying slow moving or items not used over the past 12 months.

8. There are a variety of reports that can be generated by the system in addition to the usage reports mentioned previously: cost consumption, or stock lists (sorted by service, location or catalogue number), inventory catalogue and year end inventory lists.

Implementing the system

Aside from the interdepartmental collaborative efforts of those developing the system, it is important to involve all staff who will determine the success of the system. Educating the staff and involving them in the various phases of implementation will facilitate a sense of "ownership," or identity with the system.

The program has been introduced and phased in service-by-service over a span of time. Initially, the first surgical service to pilot the system was Orthopaedics, with its massive and dynamic inventory. It was believed that if the system could be tested successfully in Orthopaedics, then it would be beneficial throughout the operating room. There is a lot

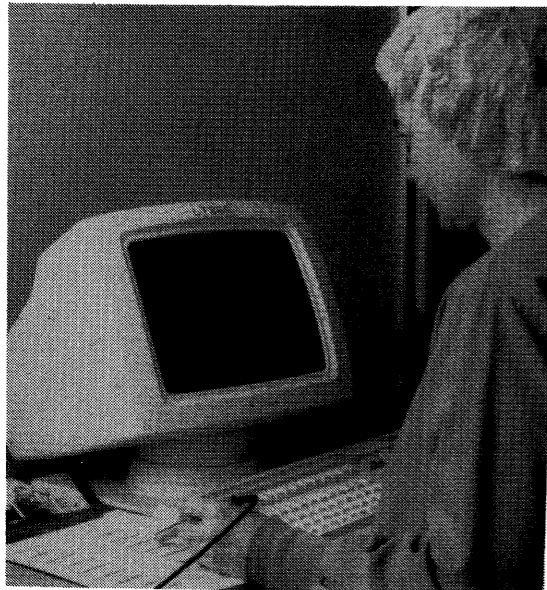
of dedication required in order to ensure that catalogues are current, that inventory levels are set properly, that packaging, labelling and counting of each inventory item is done thoroughly; there is then the entering of the exact count into the computer so that "wandering" may begin.

Those involved must be meticulous in monitoring and entering the count of any manually-placed inventory arriving after the implementation. These inventory items are easily detected as the system does not generate bar code labels for items not on a system-generated purchase order.

Although the process of replenishing inventory through the wand becomes less labour intensive (almost a pleasure), a downside remains in the necessity to maintain the system by keeping the catalogue current and up-to-date through creating new inventory and editing or deleting as necessary. It may be necessary to revert back to the old standby, manual system when new products are on trial.

Changing an orthopaedics line may involve one or two hundred items and suppressing out just as many existing in the catalogue. This would require a lot of manpower if the new product line is only temporary. Once the decision has been made to implement a new line, the process of cataloguing, packaging, labelling and counting begins. Initially, the Purchasing Department must be involved in and kept informed of changes in the catalogue, such as product additions or deletions. Many of our products are secured through negotiated vendor contracts.

The history of product usage on the system will provide valuable information to support future con-



Inventory usage is recorded by wanding the label attached to a replenishment sheet.

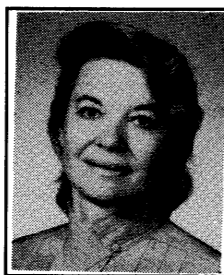
tract negotiations between our Purchasing Department and supply vendors.

The implementing of this system was an exciting step in inventory control for the operating room. It provided O.R. nursing administration with control

and access to information that was humanly impossible through a manual system. As well, it was a convenient way of processing inventory.

Although the system was designed on a central computing facility, other systems such as micro computers are being developed to provide a similar concept. The potential for further development in this application is monumental, considering the rapid expansion of the technology. ■

About the author



Donna Prokopczak, R.N., B.Sc.N., M.Ed., is clinical Nurse Specialist in the Surgical Suite of the University of Alberta Hospitals in Edmonton. She holds a joint appointment with the Faculty of Nursing at the University of Alberta, and is currently involved in the evaluation,

selection, development and implementation of computer programs within her healthcare setting. She is a graduate of the Royal Alexandra Hospital School of Nursing in Edmonton, and has a post basic Baccalaureate in Nursing and Master of Educational Administration from the University of Alberta.

Special laser surgery issue to be published by the Journal in December

The *Canadian Operating Room Nursing Journal* is planning to publish a special edition on laser surgery for distribution in December. This special issue, which will be sent to all paid subscribers, will be available on request as a single copy order. Details of exact cost will be announced later.

Clinical laser applications

The issue will consist of an up-date of clinical applications and future trends in laser surgery. Topics will include: Lasers in surgery - the current status of laser surgery in the following areas: gynecology,

ENT, cardiovascular, dermatology, general surgery, podiatry, urology, neurosurgery, etc.

Laser regulations and standards for hospitals and clinics will be dealt with, as will laser surgery credentialing and privileges.

There will also be a number of pages devoted to laser training for nurses/technicians, and a discussion about the opportunities available for laser education for nurses, technicians and doctors in Canada and the United States.

The issue will also contain a directory of laser products (lasers and ancillary laser devices and products), their manufacturers and distributors. ■

Notice to subscribers...

The Canadian Operating Room Nursing Journal, which has published six issues per year for the past 8 years, is obliged to reduce its frequency to five issues in 1990 due to a reduction in advertising.

Readers will note the volume number and date on this issue reads Volume 8, Numbers 2 and 3, March/April, May/June, 1990. It is presented in this manner to ensure that subscribers are aware that they are not missing an issue from their set.

We will be publishing a "Special Issue on Laser Surgery" later this year.

Thank you for your continuing loyalty and support.

Ron Forster, Publisher

Medico-Legal Issues

Legal implications of high tech surgery

By L.E. and F.A. Rozovsky

Canadians are enthralled with technology. This is true for the average consumer as it is for hospitals and health care professionals. New diagnostic machines, surgical procedures and equipment, as well as intraoperative support devices put hospitals under constant pressure to improve and "keep up" with technology.

From a legal perspective, high tech procedures are sometimes akin to the tail wagging the dog. The fact that new technology is available does not mean that a health care facility must go out and get it. Indeed, a decision to hold back may be more of a public service and a more legally prudent choice than trying to "keep up with the Jones."

Laser surgery - a case in point

Hospitals jumping into new technology could find themselves on the receiving end of unpleasant surprises. For example, hospitals which permit laser surgery could be held responsible for injuries stemming from such high tech procedures. How is this possible? Consider the following:

1. A surgeon is permitted to perform laser surgery based on the current privileges he/she enjoys from the hospital. The hospital makes no additional inquiries regarding qualifications to perform the surgery. It turns out the surgeon is not qualified to use the device and injures the patient. Because the hospital knew or should have known that the surgeon was not qualified, the facility could be liable for the patient's injuries, along with, or separately from, the surgeon.

2. An operating room nurse suffers permanent ocular damage while assisting in laser surgery. Inadequate precautions were taken to prevent laser beams from bouncing off certain surfaces in the O.R. resulting in harm to the staff.

3. An operating room nurse, not qualified to assist in laser surgery, performs in a substandard fashion resulting in harm to the patient. The nurse could be held negligent in such a circumstance. The nurse's employer (the hospital/health facility) could also be deemed responsible for assigning someone that supervisory staff knew, or should have known, was not qualified to participate in the operation.

4. A patient claims that he did not give a valid consent to laser surgery since he was not informed of the material risks associated with the procedure. Further more, the patient indicates that he was not told of reasonable treatment options such as the medical management of his condition. The fact that a known risk materializes could give rise to a consent lawsuit.

5. A patient experiences a serious burn when oxygen leaking from the side of the anaesthetic mask is ignited by a laser beam. The injury would not have occurred had the operating room supervisor ordered fire-resistant surgical draping materials.

Legal and public fall-out

Health facilities could also find themselves the subject of other significant legal proceedings. Statutory inquiries, commissions, and in the case of