Canadian Operating Room Nursing Journal

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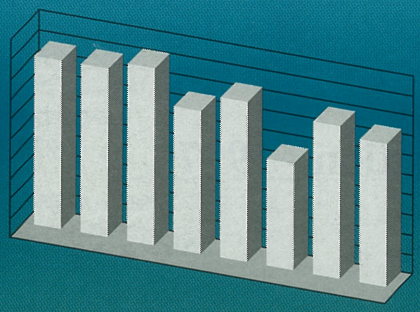
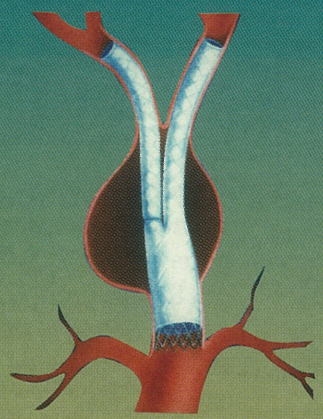


OR Case Costing Means Measuring and Managing



Is it Safe To Reuse Disposables ?

Endovascular Repair of AAA

Shortage of RNs Predicted by CNA

Preventing Neoplastic Seeding

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Editorial Contents

Looking Back to the Future

By Donna Farid, RN, PGOR, CPN(C)

During World War II, Army and Navy nurses taught theory "including not only how to function in the scrub and circulating roles, but also how to serve as an anesthetist and first assistant" (Groah, 1990).

The above quotation refers to an historical perspective of the perioperative role and was excerpted from a text written on periopertive practice. The time frame refers to the period between 1941 and 1945, when Registered Nurses joined the armed forces and those assigned to surgery needed additional training to meet the demands of the field and evacuation hospitals.

Isn't it interesting that some fifty years later, we are once again identifying a need to realize these advanced roles and are developing programs to implement them.

The expanding role of Registered nurse (Advanced Practice) was the second key issue identified by the perioperative nursing audience at the National Conference last April in Ottawa. I will attempt to address this issue, although numerous excellent articles have been written by Grace Groetch, entitled RN First Assisting - 1997 Update. (*See Canadian Operating Room Nursing Journal.* Vol. 14, No.3, March/April, 1997).

To avoid redundancy, it will suffice to say that the surgical assist role is in varying stages of development in most provinces. I would like to add that Nova Scotia has also come on stream with a hospital-based pilot [project for the surgical assist role in Cardiovascular surgery at the QE II Health Sciences Centre in Halifax. The first student started in October, 1997.

The Anesthetist's Assistant role is moving more slowly. A joint project by the Operating Room Nurses Association of Canada, the Canadian Anaesthetists Society and the Canadian Society of Respiratory Therapists has been to develop a national analysis and competency profile for Anethestist's Assistants. Co-funding has been sought through Human Resources Development Canada, and has been refused. A second proposal to lobby the IIRDC is in progress.

ORNAC has been instrumental in supporting these roles, and in 1995, developed a *Blueprint for Curricula Development for the Role of Perioperative Nurse Anesthesia (PNA) and Surgery (PNS)*. Copies of this blueprint have been sent to colleges and universities around the country.

It has been a long hard struggle at times, and there have been pioneers - nurses who at great expense and commitment, enrolled in recognized RNFA programs in the U.S., only to to meet with obstacles on returning to Canada, either to compete their internship components, or to find employment as RNFA/PNS. However, at present, recognition of both roles is improving and will continue to do so as programs progress. I agree with Groetch when she stated..."ORNAC needs to continue to not only promote the role, but also influence the manner in which the role is being implemented." Since each curriculum is different, and many of the programs are hospital and specialty

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based, it is important to endeavor to move toward offering these programs through recognized educational facilities and coordinating more standardized curriculae to allow to unity, compensation and movement.

I would like to add that not every perioperative nurse is interested in these advanced roles, nor will there be sufficiently large numbers of opportunities to everyone to fill them. However, each perioperative nurse should be committed to enhancing their curent practice as much as possible. As acuity of hospitalized patients increases, advanced knowledge is necessary to provide them with the safest care possible. As CNA's study predicts, a severe nursing shortage is looming in the future, (See page 13). Take this opportunity to be the expert in your speciality. Add to your credentials by furthering your education through certification, post-basic courses, degree programs and self-learning. Determine your own destiny and the destiny of your patients.

While we must show gratitude to those pioneers, both in the 40's and in the 90's, we must also determine the future of perioperative nursing, and ensure that it is valued and promoted. ■

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Endovascular Repair of Abdominal Aortic Aneurysm:

An Alternative to Conventional Surgery

By Shari Jones, RN, BScN, CPN(C) & Regina Ludwa, RN, CPN(C)

New technology has been developed to allow the vascular surgeon to insert a vascular graft into the abdominal aortic aneurysm (AAA) sac via a femoral arteriotomy, much the same as an angioplasty is performed. The endovascular prosthesis is an alternative to the traditional vascular graft, which requires major abdominal surgery.

Aneurysms may occur in any section of the aorta with approximately 80% occurring in the abdominal segment (Fellows, 1995). The majority of AAA's are infra-renal, and may extend into the common iliac arteries (Meeker & Rothrock, 1995.

The most common cause of AAA's is atherosclerosis. Other causes are classified as inflammatory, mechanical, pseudoaneurysms, and congenital. The incidence of AAA is reported at approximately 2% of elderly persons in North America, occurring more often in men (Hatswell, 1994). The majority of patients will have medical conditions such a hyperlipidemia, hypertension and arteriosclerosis, which will compromise the cardiovascular system.

Abstract

The majority of aortic aneurysms occur in the abdominal segment. Aneurysms above 5 cm are at higher risk for rupture, and have traditionally been treated with surgical intervention. Conventional surgical treatment involves major abdominal surgery with associated complications. The endovascular prosthesis is a newly developed vascular graft which is inserted into the abdominal aortic aneurysm sac via a femoral arteriotomy. The procedure is less invasive for the patient, which is a significant benefit considering many patients with an abdominal aortic aneurysm are medically compromised. Thorough preoperative planning by the surgical and radiological teams is critical to ensure a successful patient outcome.

Abdominal aortic aneurysms may be managed medically or surgically. The average abdominal aorta is approximately 2cm in diameter. Aneurysms under 5 cm, with low risk of rupture, may be treated medically. This includes life-style changes, antihypertensive medications, and frequent follow up with ultrasound to detect further growth of the aneurysm. Aneurysms above 5cm are considered at a higher risk for rupture and will generally be considered for surgical intervention, particularly in the presence of symptoms (Hatswell, 1994).

Abdominal aortic aneurysms have traditionally been surgically repaired using a knitted or woven double velour vascular graft. The repair involves major abdominal surgery, associated complications, and a length of stay of 8 -10 days. The mortality rate for surgical intervention is reported at 4% (Blum et al., 1997).

Endovascular Prosthesis

The endovascular prosthesis was developed in Germany, with the first reported use in a patient in

Authors

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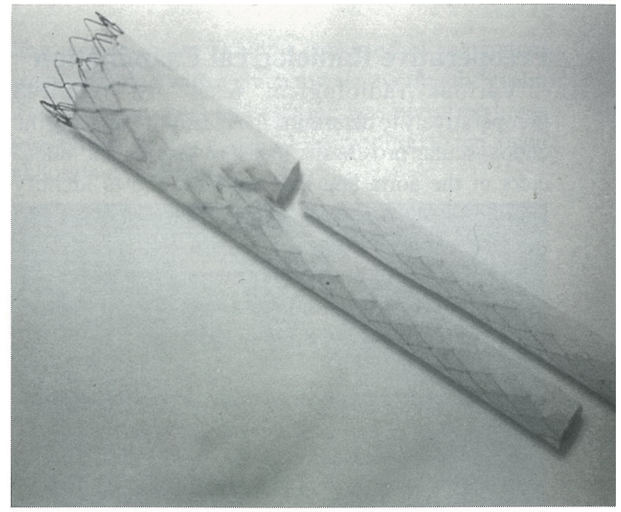
1991 (Blum et al., 1997). The endovascular prosthesis is a self-expanding vascular graft consisting of a woven polyester fabric sheath covering a nitinol wire stent. Anchoring barbs on the proximal portion of the graft facilitate adherence of the graft to the aortic wall. It is produced in various diameters and lengths, and is either straight or bifurcated. The bifurcated graft is manufactured with only one iliac leg; a tapered iliac extension is inserted into the opposite leg of the graft after the main graft is positioned in the aneurysm sac *(Meadox Medicals, Inc., 1997)*.

The endovascular prosthesis is enclosed in a flexible 21 Fr introducer system. Prior to insertion, the introducer system must be chilled in iced saline slush solution. This will make the introducer system rigid and the nitinol wire stent flexible. Once the prosthesis is expelled from the introducer, the nitinol wire stent will expand when exposed to body temperature. The prosthesis is moulded to the configuration of the aorta with a balloon located inside the introducer system. Other features of the endovascular prosthesis include low water permeability and platinum markers for alignment of the prothesis.

The endovascular prosthesis is generally used for infra-renal abdominal aortic and aortoiliac aneurysms. However, it has been used for repair of thoracic aortic aneurysms (Blum et al., 1997). The diameter of the selected prosthesis must be slightly larger than the diameter of the aorta, to ensure adequate occlusion. Radiological techniques are employed to insert the prosthesis into the aortic aneurysm sac through a femoral arteriotomy. This is a significant advantage considering many patients with an AAA have medical conditions that classify them at high risk for major abdominal surgery.



Bifurcated Graft

Patient Selection

Appropriate patient selection for the endovascular prothesis procedure is essential. The AAA must be infra-renal or in the aorto-iliac segment. The aneurysm must be at least 4 cm in diameter (Meadox Medicals, Inc., 1997). Contraindications for the use of the endovascular prosthesis are listed in **Table 1.**

Table 1

Contraindicated for the use of Endovascular Prosthesis

- ruptured aneurysm
- creatine level higher than 1.7 mg/dl indicating renal dysfunction
- life expectance less than one year
- compromised inferior mesenteric artery flow
- presence of an aortic or iliac vascular prosthesis or stent
- pregnancy
- coagulopathy or chronic anticoagulant therapy
- systemic or groin infection
- allergy to contrast media
- obesity which would interfere with incision site access or visualization
- patient unable to adhere to follow-up regime
- aneurysm related to Marfan's syndrome
- known or suspected mycotic aneurysm; or other infection
- current participation in medical rials
- horseshoe kidney
- <1.5cm normal aorta below renal arteries
- proximal aortic attachment site is tapered
- proximal aortic attachment site is <20mm or >25mm
- <1.5cm normal common iliac artery
- distal ilias attachment site >13mm in diameter

Preoperative Radiological Examination

Various radiological tests are required preoperatively to determine the feasibility of using the endovascular prosthesis, measure lengths and diameters of the aorta and iliac arteries, and to identify anomalies that may complicate the procedure. The radiological test performed include:

- ultrasound - for initial screening;
- CT scan - for initial screening;
- spiral CT - if patient is an appropriate candidate for surgery;
- multiplanar reconstruction - for reconstruction images of the aorta and iliac arteries;
- angiography; and
- pull - back measurements - to measure distance from the renal arteries to the aortic bifurcation. (Meadox Medicals, Inc., 1997)

Informed Consent

The endovascular prosthesis is a new surgical device with government approval for research only. A special informed consent must be obtained along with the routine informed consent for surgery.

Procedural Considerations

The procedure is ideally performed in an O.R. equipped with specialized radiological equipment, and a radiolucent O.R. table. The ideal radiological system includes:

- ceiling mounted C-arm & 12" image intensifier;
- digital subtraction angiography & replay facility;
- facility for arterial road mapping
- variable fluoroscopy doses and/or pulse fluoroscopy
- ability for hard copies
- appropriate room protection (Meadox Medicals, Inc., 1997)

Case Study

Mr. A. is a 71 year old male diagnosed with an infra-renal AAA, admitted for endovascular placement of an abdominal aortic graft. His medical history includes an MI in 1996, and a duodenal ulcer. He was classified as a Grade IV ventricle at high surgical risk. Mr. A. has an automated pacemaker/defibrillator to regulate his heart rate. Previous surgery includes a cholecystectomy.

Preoperative Preparation

Patient Preparation

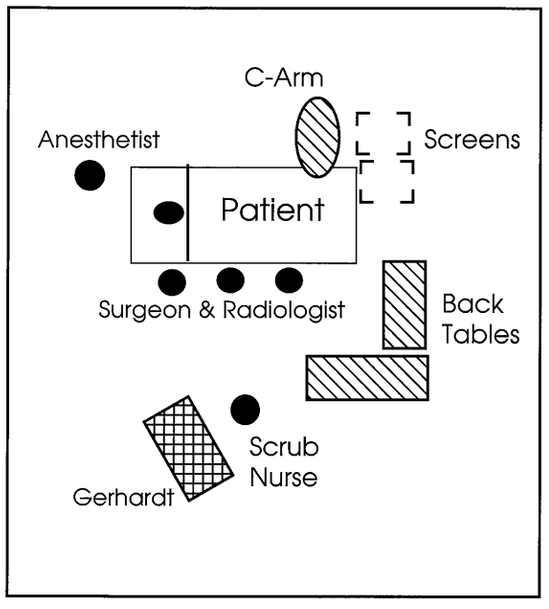
A CT scan and abdominal ultrasound were performed prior to the procedure to ensure the aneurysm was infra-renal and for measurements of the aorta and iliac arteries. Other radiological tests performed included an angiogram, chest x-ray and spiral CT scan.

Mr. A. was admitted two days prior to surgery. Preoperative preparation included an ECG, 2 D echo doppler, CBC, electrolytes, BUN, creatinine, IVR, PTT, blood sugar, baseline serum lactate, and a C&T for 4 units of packed cells. A routine informed consent and a special procedures consent were obtained.

Procedure Preparation

Our O.R. was not equipped with the ideal radiological equipment, therefore, the procedure was performed in the Special Procedures Room in Radiology. The layout of the Special Procedures Room provided adequate space for the sterile set-up, the surgical team, and would allow for proper traffic control. Thorough planning by the radiology and perioperative teams, and the endovascular prosthesis company representative, was critical to ensure all necessary supplies and equipment were available, and to anticipate untoward events. A diagram of the room set-up is illustrated in the graph below.

Figure 1. *Procedure Room Set-Up*



The standard case cart for an open AAA repair was used, which included a major vascular tray. The use of a major vascular tray was a precaution in the event of converting to an open procedure. The initial count consisted of sponges, needles, blades, reels, vessel loops, liga clip cartridges and bovie tip. The instrumentation was not counted; in the event of the surgery being converted to an open procedure, the imaging equipment was present to perform a postoperative x-ray of the abdomen.

Two back tables were used to assemble the radiology supplies and immerse the endovascular prosthesis in iced saline slush. The challenge was to obtain a container long enough to accommodate the introducer system without coiling or bending it. An appropriate sized container could not be located, therefore a long sterile peel package pouch was used. The package was sealed at both ends and incised down the centre to create a "boat". This allowed the iced saline slush to be contained within the package and the introducer system to lie flat.

Special Radiology supplies included various guidewires (J-tip and angled), pigtail angiographic catheter, various imager catheters, and a wire snare loop. Routine supplies used for angiography procedures were also made available, including a long ruler with radiopaque markings.

Intraoperative

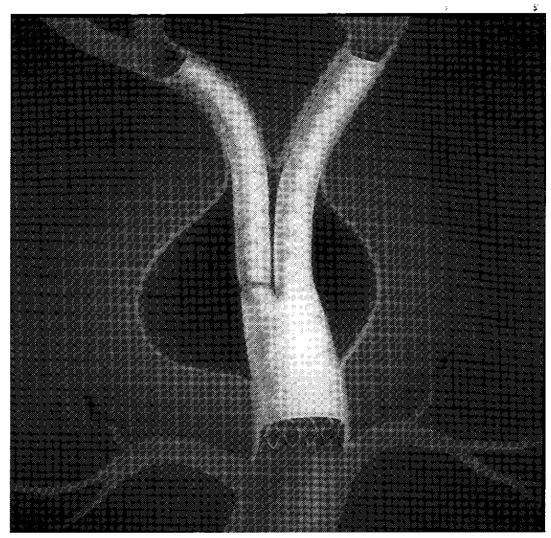
Anesthetic

A general anaesthetic was used for Mr. A. Routine monitors, BP, 5 lead ECG, temperature probe and pulse oximeter, were applied. An arterial line and a CVP were inserted to monitor hemodynamic stability. A foley catheter was inserted to monitor urine output. Mr. A.'s automatic pacemaker/defibrillator was turned off during the procedure and external pacing pads were applied. The defibrillator/external pacing machine remained in the room during the procedure.

Positioning, Prepping and Draping

Mr. A. was placed in the supine position on the radiolucent table, with a long ruler containing radiopaque markers under the back and slightly to the right of the spine. The ruler was used to determine the patient's position in comparison with the imaging equipment. Pressure points were padded, and the ESU pad was placed.

The betadine prep extended from above the nipple line to mid thigh. Draping consisted of a standard square draping with a green towel covering the groin. The extensive prep and draping was performed as a precaution in the event of converting to an open abdominal procedure.



Bifurcated Prothesis in place.

Endovascular Prosthesis Procedure

The endovascular prosthesis used was a 22 x 12 x 165 mm bifurcated graft with a left iliac extension of 12 x 60 mm. The iliac extension is the second leg of the prosthesis which is inserted into the stump of the aortic graft. All personnel in the procedure room must wear lead aprons and thyroid collars for protection against radiation exposure. The personnel involved in the procedure included the vascular surgeon and Fellow, two radiologists, an anaesthetist and RT, a circulating and scrub nurse, the radiology nurse. The placement of the bifurcated endovascular prosthesis proceeded as follows:

1. The vascular surgeon performed the femoral arteriotomy while the radiologist prepared the introducer system by immersing it in iced saline slush. The radiologist performed the placement of the introducer system and prosthesis.

2. The introducer system was inserted over a guidewire to the level of the renal arteries.

3. The prosthesis was released from the introducer system. The nitinol wire stent of the prosthesis expands and becomes rigid when exposed to body temperature. The balloon portion of the introducer was inflated to mould the aortic and iliac segments to the aortic wall, and allow the anchoring barbs to adhere to the aortic wall. The introducer system was removed.

4. On the opposite limb, a femoral arteriotomy was performed to pass a second introducer system into the stump of the aortic bifurcated graft.

5. The iliac limb prosthesis was placed; the balloon of the introducer was inflated to provide a seal with the aortic prosthesis.

6. An angiogram was performed to ensure that the aneurysm was completely occluded. Once this was confirmed, all guidewires and sheaths were removed.

7. Both femoral arteriotomy sites were closed. Standard dressings were applied. *(Meadox Medicals, Inc., 1997)*

The total procedure time, including anaesthetic induction and emergence, was 4 hours 40 minutes. The estimated blood loss was 150 ml. The right femoral artery was clamped for a total of two hours. Mr. A. was extubated prior to the transfer to ICU.

Potential intraoperative complications associated with the endovascular prosthesis include:

- intraoperative rupture of the AAA;
- inadvertent perforation of the artery wall with the guidewire or catheter;
- thrombosis, either within the catheter or the artery;
- embolism of thrombosis or plaque to the renal arteries, iliac arteries, or lower extremities;
- perforation of the AAA site;
- iliac perforation;
- vascular spasm; and
- hemodynamic instability related to clamping of the femoral artery and increased pressure within the aorta. (Meadox Medicals, Inc., 1997)

Postoperative

During the postoperative phase, Mr. A. was monitored for the following complications that may occur related to the use of an endovascular prothesis:

- hemorrhage related to aneurysm rupture, femoral artery bleeding or the use of heparin;
- embolism;
- paralytic ileus related to compromise in inferior mesenteric blood flow;
- graft occlusion;
- perigraft leakage;
- graft migration;
- continued aneurysm perfusion and enlargement;
- wound infection. (Blum et al., 1997; Meadox Medicals, Inc., 1997)

Upon discharge from the Radiology Special Procedure Room, Mr. A. was transferred to ICU. In ICU, Mr. A. was monitored for his hemodynamic and cardiac status, signs of endovascular prosthesis failure, and the effects of prolonged clamping of the femoral arteries. Prosthesis failure would present as hemodynamic changes, abdominal pain related to bleeding, and renal failure. Lower limb pulses were monitored for signs of thrombus formation, and urine output was evaluated as an indicator of adequate kidney perfusion. Mr. A.'s ICU stay was uneventful.

Mr. A. remained in ICU for 24 hours, then transferred to a surgical unit. His recovery continued to progress rapidly and without incidence. Mr. A. was discharged the following day, approximately 51 hours after his procedure. He was scheduled for his first follow-up appointment two days after discharge. The appointment consisted of a physician visit, a CT scan and abdominal ultrasound to evaluate the position of the graft. The second follow-up was scheduled for two weeks post procedure. At that visit an abdominal ultrasound and CT scan were performed. Mr. A.'s recuperation had been excellent and without incident.

Patient Follow-up

The patient with an endovascular prosthesis will have regular follow-up after discharge for 12 to 18 months. At one, three, six and 12 month periods, the patient will have an abdominal ultrasound, routine flat plate x-ray and a CT scan to evaluate the position of the graft and detect increase size of the aneurysm sac (Meadox Medicals, Inc., 1997). Studies have revealed that the aneurysm sac will decrease in size within 12 months of the procedure (Blum et al., 1997).

Endovascular Prosthesis Outcomes

The endovascular prosthesis is a relatively new procedure and technology. Long term outcomes of the procedure are currently being researched. One study involving straight and bifurcated grafts for infra-renal AAA reports a success rate of 87% (n=l 54). Success was defined as "complete exclusion of the abdominal aortic aneurysm from the circulation, with restoration of normal blood flow" (Blum et al., 1997). Minor complications (embolism, femoral artery damage, groin hematoma, graft occlusion and renal insufficiency) were reported at 8%. Major complications (rupture of the iliac artery, embolic graft occlusion requiring amputation of the foot, acute hepatic failure) were reported at 2%. The periopertive mortality rate was 0. 6%. Other reported complications include minor persistent leaks and graft migration. This study reported patient data obtained for a 26 month period (Blum et al., 1997).

Conclusion

Use of the endovascular prosthesis may prove to be an effective alternative to major abdominal repair of aortic aneurysms. This would be beneficial to those patients who are classified at high risk for major abdominal surgery. Although the current research has presented the endovascular prosthesis as a feasible, safe technique (Blum et al., 1997), the results are based on a limited follow-up period. Further research into the effectiveness of the endovascular prosthesis and long term implications needs to be conducted. As well, case costing of the endovascular prosthesis compared to conventional surgery needs to be completed, to demonstrate the cost effectiveness of either technique. ■

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(Photographs courtesy of Boston Scientific Ltd.)

Shortage of RNs expected in early part of new century

A shortage of registered nurses is expected early in the new century, a recent study shows.

Canadian Nurses Association (CNA), in releasing the study in early November, warned there may be a need for as many as 113,000 more nurses to deal with an aging population by the year 2011.

Exodus of nurses

The CNA met with Health Minister Allan Rock to seek the federal government's help in stemming the exodus of nurses out of the country and in attracting more male and younger recruits to the profession.

The CNA, which represents over 275,000 nurses in Canada, acknowledged that the looming shortage may appear bizarre in light of the number of hospital closures. However, Dr. Mary Allen Jeans, Executive Director of the CNA said that, although there is a current glut, many Canadian nurses are all heading for retirement around the same time.

"It may seem like a long time," Jeans explained, "but it means that when your five-year-old is 20, that will be the situation."

Reasons for shortage

The association mentioned four key reasons for the impending shortage:

- Aging nurses - The current nurses' workforce means there are five times as many nurses between 45 and 54 years of age than in 1967;
- Fewer student nurses - Fewer young people are entering the profession, with recruiting largely limited to females;
- Population increase - The Canadian population, according to Statistics Canada, will increase 20% by 2011;
- Population aging - Canada's aging population will need more health care.

Dr. Jeans also released figures showing that 6000 Canadian-trained nurses are now working in the United States, up from 2000 RNs in 1994. ■

Case Costing Means, Measuring and Managing Now!

The Journey Traveled by A Community Hospital

By Coleen McCarthy, MEd, RN, & Judy Chadwick, BScN(C) , RN

Health care is in chaos as organizations try to balance mergers, closures, downsizing, and funding reductions, with provision of care that is timely, appropriate, effective, current and valued by consumers.

Abstract

Funding for health care in Ontario is moving from global funding to equity funding. In the future, hospitals will be reimbursed for how efficiently they care for their various patient populations. The Ontario Case Costing Project (OCCP) was a joint venture by the Ontario Hospital Association and the Ministry of Health. Incentive for participation in this project was based on the need to assess efficiencies in caring for patient populations in surgical suites and to obtain Canadian data. Case Costing has the potential to forecast budgets, identify variances and highlight areas for cost savings. Case Costing can also determine cost per surgeon, cost per service, cost per procedure. The nurses at Markham Stouffville Hospital are empowered to enhance the focus of their practice to include managing human resources, processes and materials. This enhanced focus in the Operating Room maximizes efficiency and effectiveness of processes, and allows the organization to provide better service. This article documents the journey and growth of perioperative nurses toward the destination of case costing. Key to this journey is not only the destination, but the growth and change that occurred and enabled perioperative nurses to effectively champion initiatives such as case costing. Opportunities and Threats, a One Page Plan and our recommended learnings will be shared.

The conceptual framework in which health care provision has existed for the past century has been challenged. Advanced technology, the knowledge explosion, new drugs, new treatments and new roles have contributed to the expectation of constant change in health care. Health care institutions are organizations that are dependent on the effectiveness of systems and processes, the ability to develop capabilities of people and the ability to create value for the customer in order to exist. Nurses can play a central role in health care delivery by enabling changes that allow the system to offer better service and quality. Nurses who have the capabilities to actively participate in change can create processes that improve outcomes, are value added and reduce cost.

Nurses at Markham Stouffville Hospital are empowered to enhance the focus of their practice to include managing human resources, processes and materials. This enhanced focus in the Operating Room can maximize the efficiency and effectiveness of our processes, and allow our organization to provide better service.

Perioperative nurses have experienced many different systems of health care delivery in their training and their worklife. This article documents the journey and growth of nurses to the destination of case costing. Key to this journey is not only the destination, but the growth and change that occurred to enable perioperative nurses to effectively champion initiatives such as case costing.

Authors

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The History

Less then ten years ago, health care organizations were viewed as the place to receive health care that was directed and controlled by physicians. Health care organizations were bureaucratized, orderly and routinized to create efficiency. There were functional departments, precisely defined jobs, and multiple policies and procedures to direct processes. The majority of perioperative nurses were trained and spent many years working in this environrnent. Nurses were told what to do and if they were not told or unsure, there was a policy and procedure to direct them. The necessity of orderly, routinized, precisely defined processes in the perioperative area nurtured the concept of a bureaucratic organization.

Markham Stouffville Hospital is a comrnunity hospital that received of the Excellence in Quality Award presented by the National Institute for Quality and was awarded a Four Year Accreditation Award. The hospital opened its doors eight years ago based on a philosophy of hiring only the best people and then teaching them the best way to do the job. These people were then tested and certified on their ability to follow prescribed methods to complete job related tasks. The organization ensured there were extensive policies and procedures in place before opening, so no one would have to rely on thinking or decision making to determine the best process. The long range plan was to test all nurses once a year to validate that they had not forgotten what they were told to do. This bureaucratic organization works well when tasks are straightforward, and the environment is stable. There is a need to produce the exact same product; precision is necessary, and people in the organization are compliant and behave as they have been designed [educated] to do. This environment no longer exists and bureaucratic organizations cannot keep up with health care reforms.

The Culture Change

In 1992, Markham Stouffville Hospital moved from a traditional bureaucratic organization to a Program Management Structure. Structural changes included a delayering of the levels of hierarchy. Abolishment of initial certification and yearly recertification was implemented. Policies and procedures were reduced to only the essential process and structure standards. Cultural changes that occurred began with the new mission statement of "Make it Great!" The new mission was implemented with much discussion of sharing the meaning and interpretation of the mission. Over the next three years organizational beliefs and values were reinforced in the language and activities of the organization. The culture of Markham Stouffville Hospital encourages empowerment, autonomy, accountability, patient focused care and involvement in strategic planning. Professionals felt they were truly empowered and internalized the responsibility to achieve the mission and maintain the culture. Professionals thrived in this new culture where they were empowered to do their jobs to the full capacity of their practice.

Ontario Case Costing Project

The Ontario Case Costing Project (OCCP) was a joint venture by the Ontario Hospital Association and the Ministry of Health. The incentive for participation in this project was based on the need to assess efficiencies and to obtain Canadian data. The goals of OCCP were:

- To use patient specific data to create Ontario Case Weights.
- To measure and manage financial information.
- To add value to management decision making process.

Funding for health care in Ontario is moving from global funding to equity funding. Hospitals will be reimbursed for how efficiently they care for their various patient populations. Case Costing has the potential to forecast budgets, identify variances and highlight areas for cost savings. Case Costing can also determine cost per surgeon, cost per service, cost per procedure. Markham Stouffville Hospital was interested in supporting the information collection involved in case costing. However, for this information to be of value to Markham Stouffville Hospital and the Surgical System it was necessary to do micro case costing. Since OCCP only documents costs greater than two hundred dollars, we decided to cost supplies to the penny. Obtaining information that details costs would allow us to analyze any variances in cost between procedures, between surgeons and between services. This detailed information would also provide opportunity to review practice patterns and adjust case supplies.

Immediate outcomes of participation in the OCCP included reports that can be used to accurately forecast budgets by identifying variances and areas for cost savings. OCCP information can be used to determine internal best practices and improvement opportunities. There is also an opportunity to compare and benchmark best practices beyond our walls, among

the collective of hospitals participating in this project. Finally, the case costing project can demonstrate a fiscal responsibility that allows the organization to maintain a wide range of general services and excellent quality patient care.

One benefit for perioperative nurses participating in case costing is the opportunity to identify areas for cost savings and improvements. Perioperative nurses have knowledge of perioperative practices, standards of care, surgeon preferences and expected clinical outcomes. Perioperative nurses at Markham Stouffville Hospital function with expertise in perioperative care, and with a knowledge of cost and resource management. These capabilities enable the perioperative nurses to actively participate in change. The learning opportunity was to enhance the role of perioperative nurse to include micro-costing of supplies and equipment, and to apply comparative analysis to the generated reports.

Implementation of the Ontario Case Costing Project

Implementation of this project required an organizational commitment, a project team, financial information systems, an OR information system (HBOC's Surgi Server), automated materials management system, workload measurement system interfaces and dollars. Potential opportunities and threats in implementing case costing in the Operating Room are presented in **Appendix A**.

Success of this project was dependent on Senior Management's commitment in principle and in funding for a workload system, an automated materials management system, system interfaces between the Surgi System and the hospital computer system, and adequate human resources. The Strategic Plan of the organization, and the beliefs and values of the hospital had to be supported for effective implementation of this project. The case costing project promoted the values and beliefs of our organization. That is, case costing requires empowerment, a focus on quality improvement, improved service and a customer focus.

An essential starter kit for the Ontario Case Costing Project requires: HBOC Surgi-Server System (or other software capable of supply management), Meditech Supply Management Module, a Surgical Case Cart System, Workload Measurement System and a Data Flow Model. The Surgi-Server System was a major improvement as it has the capabilities to monitor, evaluate and adjust many of the necessary processes of surgery. The components of the HBOC Surgi-Server include: Patient Scheduling System, Supply Management Module that tracks and uploads supply/implant data, Surgeon preference cards, Pick lists for case carts and Case Costing reports.

Case Costing provides a language based on facts and numbers, a very specific language. However, this language is clearly not reflective of our culture of "Making it Great!" In presenting this project to the staff in the Operating Room we had to ensure that the Case Costing Project fit with the organizational culture. The fit became apparent when controlling costs allowed the system to reinvest saved dollars to increase surgical volumes and decrease waiting lists for surgery. It was very important for staff to hear that we were not just trying to cut costs, but were we trying to improve service with a positive result for our patients. The ability to increase the number of elective surgeries and decrease our patient's wait for surgery was the way we would "Make it Great".

Implementation issues involved increased human resources, information systems, finance support and an excellent relationship with Materials Management. The human resource component of implementation required staff meetings and a communication network to discuss the goals, issues and concerns related to this project. Job loss is always a concern. This project however, had the potential to create more employment opportunities when the volumes of surgeries were increased. Staff input was imperative for success. The perioperative nurses are the experts in surgical preferences and they needed to know the impact on their role and responsibilities in order to keep the system current. The influence the staff can have on the budget was discussed by explaining the process, the effects of variance and the possibilities for improvement. The nursing staff were given the opportunity to identify areas for cost savings and propose changes to physicians.

The supply and cost information is being collated to specific procedures, to individual patient cases and to individual surgeons. Surprisingly, the doctors were not adverse to the information being used for comparative purposes or for discussion. This information enabled nurses to talk to the doctors in the language of facts and numbers. The doctors were responsive to the data and interested in discussing variance pattems. The variance pattern found in procedures such as Abdominal Hysterectomy showed *some* variance in the different supply costs between doctors **(Figure 1).** However, in life *some* variance is to be expected. Therefore, a variance pattern such as this is not of great concern. However, variances that are significantly over or under the average are definitely worth further discussion. The supply cost for Anterior Cruciate Ligament Repair **(Figure 2)** presents a very different variance pattern. Further information should be obtained when variances such as this pattern is observed.

A note of caution: all of this information must be analyzed within the context of clinical outcome and post operative processes. That is, more expensive surgical procedures may have better clinical outcomes and they may also reduce length of stay. Finally, this detailed cost information based on surgical procedures can also be used to predict the cost of a new surgeon based on his case mix. To summarize the implementation process we have included a One Page Plan for implementing case costing **(Appendix B).**

The Evaluation

Presently, the staff are acutely aware of the budget, and methods of cost saving. The staff can also discuss cost savings in a credible and creative way. The nurses have internalized their expanded role related to managing resources, both human and material.

One outcome that was very quickly achieved was the ability to report case costs. Some of the improvements that were implemented and reflected large cost savings included suture utilization and the change from disposable to reusables. The savings found equaled twenty-five percent of the salary of a full-time nurse or surgery for five arthroplasty patients. The more challenging outcomes have been accurate utilization of supplies, appropriate utilization of staff resources and eliminating waste. Some of our ongoing issues are the cost updates and the case cart requisitions. There is also an ongoing effort to obtain user friendly reports.

The future of the Case Costing Project at Markham Stouffville Hospital is to continue participation in order to benchmark best practices externally. Simultaneously, we will continue to micro-cost for our internal benchmarking of best processes and practices. This project did require a significant commitment of the organization to human and material resources, and costs. The benefit has been the opportunity for perioperative nurses to enhance their scope of practice and to have data to support practice changes that result in positive clinical outcomes, and a cost effective and efficient service. The indicator of quality care in perioperative nursing is when patient needs and expectations are met by a cost effective and efficient service of care that results in an expected outcome.

Appendix A

Opportunities	Threats
• Expanded role for nurses	• More Work
• Practice guidelines for surgical procedures	• Cook book medicine
• Identify and reduce waste	• More Cuts
• Increase efficiency	• Are you saying we aren't efficient
• Increase cost savings	• No end to the penny pinching
• Increase numbers of surgical procedures done	• More work

Appendix B

Implementation: The One Page Plan

What Does It Take ?

- ✓ Organizational commitment
- ✓ Committed project implementation team
- ✓ Financial information system
- ✓ Automated materials management system
- ✓ Workload measurement system
- ✓ System interfaces
- ✓ Dollars !!!!

Who Does It Take ?

- * PCC - Project Leader
- * Cost Accountant
- * IS Support
- * SPD/Materiels Management Expert
- * OR Staff
- * Vendors

Our Starter Kit:

- Surgi-Server System
- Meditech Case Costing Module
- OR Workload Measurement System
- Data Flow Model

SUPPLY REQUISITION

Procedure: KNEE ARTO KNEE ARTHROPLASTY, TOTAL REPLACEMENT Surgeon:_____
Last Supply List Update: 20/06/97

Number Req	Iss	Item Code	H	Description	Location	Charge	Total
1		00001083		HOWARTH ELEVATOR	*SPD		0.00
1		00001408		CEMENT MIXEVACII20610	*SPD	52.50	52.50
1		00003777		ORTHO CEMENT SIMPLEX 6191-0-000	*SPD	34.20	34.20
2		4150022		GARBAGE BAG BLACK 26"X 36" CRB-26300	*SPD	0.18	0.36
2		4150023		BAG GARBAGE RED 36" X 40 "	*SPD	0.16	0.32
1		4600158		DRAIN WOUNDEVAC 1/8"	*SPD	13.00	13.00
1		4600191		STOCKINETTE IMPERVIOUSSMALL	*SPD	9.07	9.07
1		4600194		CAUTERY SCRATCH PAD	*SPD	0.92	0.92
1		4601277T		TONGUE DEPRESSORS	*SPD	0.01	0.01
1		4601321		BLADE SCALPEL STERILE #15	*SPD	0.28	0.28
1		4601322		BLADE SCALPEL STERILE #20	*SPD	0.28	0.56
1		4601430		SUCTION YANKAUER TIP	*SPD	1.00	1.00
1		4602345		GLOVE ANSELL NO POWDER 8.0	*SPD	1.03	1.03
1		4602788		DRESSING TELFA PAD 20CM X 7 LARGE	*SPD	0.33	0.33
2		4603446		SUCTION LINER 1500CC	*SPD	1.75	3.50
1		4603790		SOLUTION NORMAL SALINE POUR BOTTLE 500ML	*SPD	1.08	1.08
1		4604293		CAUTERY PENCIL VALLEY LAB	*SPD	5.50	5.50
1		4604587		FILTER ANAESTHETIC CIRCUIT I281942-T	*SPD	5.80	5.80
1		4604599		GLOVE ANSELL NO POWDER 7.5	*SPD	1.03	1.03
2		4606138		SPONGE LAP STERILE 18 X 18	*SPD	0.46	0.92
1		4606148		DRAPE BACK TABLE COVER	*SPD	4.76	4.76
1		46590004		PACK TOTAL KNEE BAXTER SOP30TKMKB	*SPD	48.93	48.93
2		46600017		DRESSING GAUZE 8 X 4 STERILE	*SPD	0.09	0.18
1		ANMAS		ANESTHETIC MASK ADULT	*SPD		0.00
2		BASINS		STAINLESS STEEL BASIN	*SPD		0.00
1		GOWN		GOWN PACK DOUBLE	*SPD	4.44	4.44
1		GOWNS		GOWN PACK SINGLE	*SPD	2.70	2.70
1		INST0073		RAKES 4-PRONG SHARP	*SPD		0.00
1		KNET		TOTAL KNEE INSTRUMENT PANS X 4	*SPD		0.00
1		ORTHO01		MAJOR BONE # 1	*SPD		0.00
1		ORTH002		MAJOR BONE # 2	*SPD		0.00
1		ORTH042		STRYKER REAMER	*SPD		0.00
1		ORTH046		STRYKER SAG.SAW BATTERY & BLADES NEW	*SPD		0.00
1		ORTH064		DRILL BITS	*SPD		0.00
1		ORTH065		VICE GRIPS	*SPD		0.00
1		ORTH068		COBB ELEVATORS	*SPD		0.00
1		ORTH069		SMALL MALLET	*SPD		0.00
1		ORTH098		RIBBON OSTEOTOMES	*SPD		0.00
1		TOWELS		TOWELS (2 PER PACKAGE)	*SPD	2.70	2.70
1		00010342		BLADE SAGGITAL SAW 2108-385	OR	45.00	45.00
1		4601492		NEEDLE ANGIOCATH 20GA X 2"	OR	0.98	0.98
2		4602057		SUTURE VICRYL 2-0 J259H	OR	2.04	4.08
2		4602461		SUTURE VICRYL 1-0 J281H	OR	2.04	4.08
2		4602753		DRESSING FLANNEL 6"	OR	1.78	3.56
1		4603780		SOLUTION IV 0.9%NoRM SALINE 100ML	OR	1.05	1.05
1		4604145		IV ANESTHESIA PIGGYBACK SET	OR	4.89	4.89
1		4604291		CAUTERY PAD ADULT	OR	3.60	3.60
1		4604382		TUBE ENDOTRACHEAL 7.5 W/CUFF SHERIDAN	OR	1.62	1.62
1		46540019		STAPLE SKIN DISPOSABLE PTW35	OR	6.83	6.83
1		LAUND		LINEN BAGS	OR	0.22	0.22
1		4601420		GYPSONA SLAB 12.5CM x 75	ORCASTCT	0.58	0.58
							$271.63

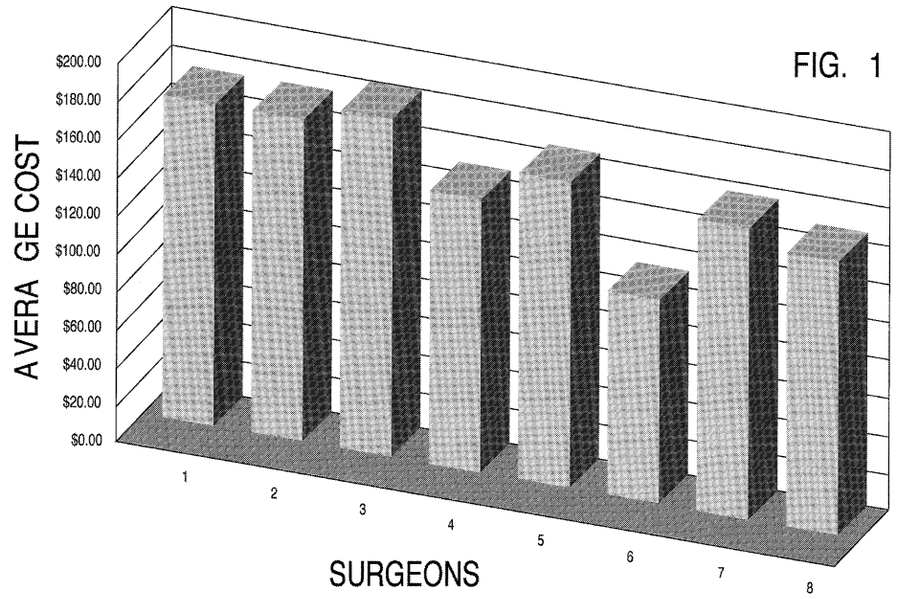

FIG. 1

Average Supply Cost - Abdominal Hysterectomy

Why Bother ?

Quick and Easy Outcomes:

- → **suture utilization**
- → **disposables to reusables**
- → **reports**

Not as Quick /Not So easy Outcome:

- → **accurate utilization of supplies**
- → **appropriate utilization of staff resources**

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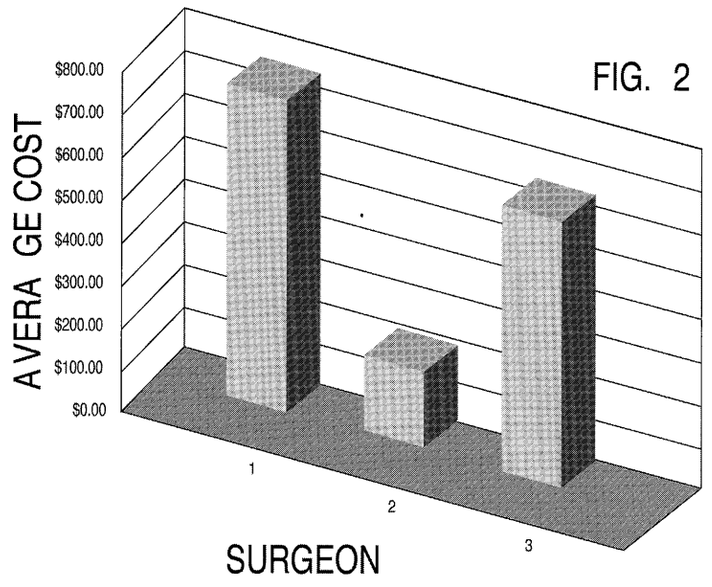

FIG. 2

Figure 2
Average Supply Cost of Anterior Cruciate Ligament Repair

Prevention of Neoplastic Seeding During Surgery:

An Investigation into OR Protocols and Practice in Canada

By Se Uk Walling, BA, RN, DPHN

Abstract

A review in the *Medical Post* (Wysong, 1996) discussed the merit of glove and instrument changes during cancer surgery with a view to reducing the incidence of neoplastic seeding. This review stimulated the author to investigate current practices in this regard adopted by surgical staff across Canada. The author believes that a valid comparison exists between practices utilized in infection control and those which can be used to limit the problem of neoplastic seeding at the time of surgery. Results indicated a considerable interest in adopting a protocol utilizing glove and instrument changes at critical points during surgery, such as reconstruction and closure.

Introduction

This article presents the findings of an investigation into surgical team attitudes and opinions towards certain protocols which may reduce the likelihood of neoplastic seeding during cancer surgery. Numerous authors have expressed concerns about the inadvertent spread of cancer, and especially of what has become termed "neoplastic seeding" at the time of surgery. They have suggested that specific measures, if taken intraoperatively, may reduce recurrence rates. "Neoplastic seeding," or the incidental implantation of cancer cells during surgery, defines both mechanical disruption and spread of tumor cells into normal healthy tissue.

It is well known that most tumors invade by one or more different mechanisms. These include (1) lymphatic metastasis; (2) local implantation or direct seeding (Cotran et al 1994: 250-52); (3) extension of contiguity (Thomas et al 1996); (4) putative cancer cell implantation transported on surgical knives, gloves, gowns, drapes, or during wound washing, and wound drainage or seromas (Collins 1993), and (5) haematogenous spread which relates to intraoperative tumour cell spillage into the blood stream during manipulation of a primary tumor (Oefelein et al 1996). It has also been shown that tumor cells may have a predilection for areas of tissue injury, or "oncotaxis" (Collins 1993). Much research literature has shown that techniques and measures may be undertaken to decrease the likelihood of disseminating and implanting cancer cells in a patient's wounds during surgery.

Several authors (Basha and Penninckx 1996; Brodsky and Cohen 1991) suggested the use of intraluminal cytotoxic solutions (i.e. sodium hypochlorite, povidone - iodine 5 - 10% sol.), intraperitoneal chemotherapy and intraoperative pre-resectional bowel washout with a cytotoxic agent, to reduce the viability of exfoliated cancer cells. Adherence to what is called the "no touch isolation technique," involving avoidance of manipulation of a tumor, combined with early division of the vascular supply and, in the case of colon cancer surgery, the removal of the lymphatic drainage of the tumor-bearing segment of the colon before mobilizing and resecting the tumor segment is recommended (Basha et al 1996, Fengler 1994; Turnbull et al 1967; Wiggers et al 1988). In the latter case, adoption of a special technique of colon anastomosis is also strongly encouraged, such as employing staples or monofilament sutures, instead of using protein-based (i.e. collagen-based and multifilament sutures (Basha and Penninckx 1996; Stebbing and Mortensen 1995; Uff et al 1993).

It is also important to avoid re-use of instruments and gloves which come into direct contact with cancer cells (Clayman et al 1993; Curran et al 1996). During laparoscopic surgery for malignant conditions the excised specimen should be enclosed in a nonporous bag for removal through the abdominal wall (Nally and Preshaw 1996). Elderman et al (1996) mention that using a R.C. 400 leukocyte depletion filter reduces the risk of reintroducing tumour cells during surgery, which incorporates the intraoperative blood salvage technique. As soon as the incision is made, the edge of the wound should be protected with a plastic drape to prevent tumor cell contamination. The cut surface of the tumor must be cauterized with electrocautery and isolated from the remainder of the wound. It is important to avoid using the basin of saline in which the surgeon's gloved hands have been dipped, as it may be contaminated with cancer cells. There may also be a need for dissection of much wider margins around certain tumours (Schwartz et al 1989). During head and neck surgery, a "sticky-drape" is placed over the tracheotomy site with adhesion by Benzoin or Mastisol, which is a simple way to decrease the likelihood of implantation of cancer cells intraoperatively (Collins 1993). Hensen et al (1995) suggested, moreover, that intraoperative autotransfusion in tumor surgery should be contraindicated.

Increased awareness of operating room staff to such dangers of contamination is possibly the first step towards establishing and implementing protocols and practice capable of reducing the likelihood of neoplastic seeding. Although the outcome of the disease may be determined at the moment of diagnosis, it is anticipated that prognosis during surgery may still be optimized with adoption of the above-mentioned preventive techniques. Since it seems obvious that members of the perioperative nursing profession, in particular, have a crucial role to play in facilitating the prevention of neoplastic seeding at the time of surgery, every effort should be made to ensure that they are familiar with such methods and techniques.

Author

Se Uk Walling, BA, RN, DPHN, has more than 30 years' experience as a RN and public health nurse, and has been working in the operating room for 23 years. She took her basic nursing education at Pusan National University in Korea, her public health nursing and BA at Dalhousie University. She presently is in the Ophthalmology Department of the Queen Elizabeth II Health Sciences Centre, Halifax, Nova Scotia.

Purpose of Study

The aims of this study were twofold: first, to stimulate interest in the subject of neoplastic seeding at the time of cancer surgery and, second, to suggest a protocol to reduce to a minimum, the possibility of neoplastic seeding in the operating room. It proposed to examine the practices of nurses and surgeons in the surgical management of cancer within the established protocol of infection control practice. An analogy may be drawn between infection control and neoplastic seeding, since neoplastic seeding is the incidental implantation during surgery of cancer cells in healthy tissue.

The author's interest was stimulated by a commentary in the *Medical Post* by Pippa Wysong (1996) which discussed a paper by A. J. Curran and his colleagues entitled "Exfoliated malignant cells in gloves and instrument washing," presented at an international conference pertaining to head and neck cancer held in Toronto in 1996 (Curran et al 1996). Curran and his research team claimed that malignant cells adhere to gloves and instruments during cancer surgery. By adopting a special washing technique, these researchers found that in 9 instances out of a total of 15 cases investigated by them, used gloves and instruments revealed malignant cells. In two additional cases malignant cells were found on gloves only. This meant that malignant cells were revealed in 11 out of 15 cases investigated, or in 71% of the total cases.

On the basis of these findings, Curran and his colleagues recommended "that all surgeons change gloves and instruments following removal of the main tumor specimen and prior to irrigation of the operating field with tumorcidal agent."(Curran et al 1996: 281).

Methodology

In the beginning stages of the project, the investigator contacted several hospitals to gain some idea of the kind of responses her survey might elicit. Approval was gained for the study from the Medical Research Ethics Committee of the Queen Elizabeth II Health Sciences Centre in Halifax, Nova Scotia. Questions on the questionnaire sheet were numbered and coded **(See Appendix A)** to facilitate analysis. Three hundred thirty five questionnaire forms were distributed to 24 selected hospitals across Canada.

Questionnaires were returned by 89 persons. Since the exact number of recipients were unknown, it was estimated that this number constituted approximately 27% of the total number of questionnaires

originally distributed. Following tabulation of the survey results, a brief report was prepared on the findings.

Findings and Discussion

Of the eighty nine persons who returned the questionnaires, 44 were surgeons, and 45 nurses and technicians. All respondents were presented with sixteen questions. Questions 1 to 4 inquired generally about each respondent's work setting, location and training, and questions 5 to 16 related more specifically to the aims of the study.

Question 1: In response to Question 1, which asked about work setting, 82% stated that they were on the staff at a metropolitan hospital, while only 8% worked at a rural or regional hospital.

Question 2: Question 2 asked respondents to state in which province they worked. Forty three percent of the respondents worked in the Maritime area. Details drawn from responses to this particular question are shown in the Table 1.

Question 3: In Question 3, 48% of the respondents reported that they operated on over 250 cancer patients per year.

Question 4: 87% of the respondents replied that they worked at a teaching hospital.

Question 5: The most common form of cancer treatment reported by respondents is colon cancer. Complete findings are presented in Figure 1.

Question 6: The number of respondents representing each of the eight different professional categories is presented in Figure 2.

Question 7: Sixty nine out of the 89 respondents were female.

Question 8: Over 60% of respondents reported that they have been practising in the operating room for more than 15 years. Forty three per cent of respondents with experience of over 15 years indicated they were in favor of using more than one set of instruments in reconstruction and closure.

Question 9: Seventy eight respondents were trained in the teaching hospital environment, and 7 respondents were trained at a cancer centre and teaching hospital. Others were trained at regional or general hospitals, or at a RNA college and research facility.

Question 10: Fifty five out of 89 respondents (62%) reported that it was worthwhile to use more than one set of sterile surgical instruments during a cancer operation. These stated that a second set of instruments should be used for reconstruction or anastomosis, or wound closure, or before a skin graft. Twenty five out of the 44 surgeons (55.6%), and 9 out of the 45 nurses (20%) who responded were not in favour of using more than one set of instruments during cancer surgery. Reasons given by these respondents varied, as may be seen by the following comments extracted from the questionnaire sheet:

- "It depends on whether isolation of instruments used on the tumor occurs with spillage etc."
- "No evidence to suggest benefit."
- "Cost implication" [should be examined].
- "Changing instruments will not prevent tumour shedding."
- "Never a part of training."
- In case of nurses, there is a need to... "depend on the practice and technique of the surgeon."
- "Viability of cancer cells extraordinarily minimal."
- "Insufficient knowledge to make an informed decision."

Question 11: Approximately 57% of respondents reported that they did not change gloves after the removal of a cancerous tumor during cancer surgery. However, 42.7% changed gloves after removal of a lesion prior to reconstruction or wound closure, before skin graft, before anastomosis or if the tumor cell spilled during cancer surgery.

Question 12: More than 49% of respondents reported that they change gloves and instruments following section, intersection, violation of a tumor, or during or after the procedure of frozen section. The reasons given for not changing gloves and instruments for the procedure of frozen section already have been mentioned in Question 10.

Question 13: Only 3.4% of respondents reported to have used intraoperative luminal instillation cytotoxic agent at their hospital.

Question 14: More than 90% of respondents reported that they have never used intraperitoneal chemotherapy at their hospital.

Appendix A - **Questionnaire**

General information:

1. Description of workplace
001. metropolitan hospital
002. rural hospital
003. other
2. Location of workplace
004. the Maritimes
005. Ontario
006. Québec
007. Manitoba
008. Saskatchewan
009. Alberta
010. British Columbia
011. Newfoundland/Labrador
012. Yukon Territory
3. How many patients with cancer do you operate on per year?
013. 00 - 50
014 51-100
015. 101-150
016. 151-200
017. 201-250
018. 251-300
019. over 300
4. Is your institution a teaching hospital?
020. yes
021. no
5. The most common form of cancer treated at your institution is
022. lung
023. breast
024. colon
025. larynx
026. other

Respondent profile:

6. Are you -
047. an operating room nurse?
048. a general surgeon?
049. a cancer specialist?
050. other ? If other, please specify
a. If you answered no to question 6 please explain why.
b. If *you answered yes to question 6. please explain why.*
7. Are You -
051. ☐ male?
052. ☐ female?
8. How long have you been practising in your field?
053 under 5 years
054 5 to 10 years
055 10 to 15 years
056 15 to 20 years
057 over 20 years
9. Where did you do your training?
058 teaching hospital
059 cancer treatment centre
060 other

Questions Relating Specifically to Operational Procedures:

10. Based on your training and experience, do you think it worthwhile to use more than one set of sterile surgical instruments during a cancer operation? (e.g. one set for the removal of the tumor, and another for closure and/or reconstruction work.
027 ☐ no 028 ☐ yes

11. Would you routinely change gloves during an operation on a cancerous tumor?
029. ☐ yes 030. ☐ no

a. If *you answered **no** to question 11, please proceed to 11b.*
*If you answered **yes**. at what point, or points, in the operation would you change gloves?*
***b.** If you answered **no** to question 11, please give your reasons.*
12. Would you change gloves and instruments during the procedure of frozen section with regard to cancer surgery?
031. ☐ no
032. ☐ yes. State at what point.
033. ☐ perhaps, but it would depend upon
13. How often have you used intraoperative luminal instillation cytotoxic agent in your present institution with regard to cancer surgery?
034. never
035. occasionally
036. frequently
037. always
14. How often have you used intraperitoneal chemotherapy in your present institution with regard to cancer surgery?
038. never
039. occasionally
040. frequently
041. always
15. Have you ever used any of the following agents or procedures at any other institution?
042. yes, intraoperative luminal instillation cytotoxic agent
043. yes, intraperitoneal chemo therapy
044. (yes, have used both
045. (no, have used neither
046. (no, have used neither. but instead used the following agent:
16. What specific procedures do you think must definitely be taught in nursing and medical schools in order to ensure a future high quality of perioperative nursing practice during cancer surgery?

Thank you for your participation.

Table 1 Number of Questionnaires and Survey Responses. Numbers and Percentages of Nurses and Surgeons who Responded to the Survey, by Province (questionnaire item codes 004 - 012)

Canada	Sample	Nurses		Surgeons	
Provinces	**#Distributed**	**#Responses**	**%of Sample**	**#Responses**	**%of Sample**
Maritimes	116	20	17.2	30	25.9
Quebec	93	3	3.2	4	4.3
Ontario	22	2	9.1	2	9.1
Manitoba	17	3	17.6	1	5.9
Saskatchewan	9	5	55.6	2	22.0
Alberta	21.0	1	4.8	1	4.8
B.C.	25.0	6	24.0	2	8.0
Newfoundland	32.0	5	15.6	2	6.3
Yukon	0.0	0	0.0	0.0	0.0

Question 15: Seven per cent of respondents reported that they have used intraoperative luminal instillation of cytotoxic agent and 5.6% of respondents have used intraperitoneal chemotherapy. Two point three per cent of respondents have used both, but at a hospital other than the one at which they currently work.

Question 16: With regard to question 16, the majority of respondents recommended education at the nursing and medical school level in order to ensure a future of high quality of perioperative care during cancer surgery. In their own words they stated:

- [There should be stress on] "importance of using isolation techniques for contaminated surgical instruments, gloves, etc."
- "Immaculate sterile techniques" [should be employed].
- "No touch technique" [should be employed].
- "Good aseptic techniques" [should be practised].
- [What is needed is a] "Research based practice of isolating instruments and changing gloves."
- "Cross contamination" [should be investigated].
- "ORNAC could develop some standards for this area."
- [There should be a focus] "on operating room details."
- [Schools should focus on] "the concept of microtumor, and how biopsy and surgical intervention should be accomplished."
- [There is a need for] "gentle handling of tumor."
- [Are the suggested practices] "evidence-based?
- Have studies shown [that] this evidence based data [will show] difference[s] in outcome and [warrant additional] financial expenditures?"
- "Principles of surgical oncology and biology of various types of tumors" [should be stressed in medical and nursing schools].
- "Evidence-based medicine should be the standard against which perioperative practice is judged".
- "Minimal handling of equipment, drapes and instruments is important, as is minimal handling of tissue".

A Commentary on What Reviewers have Perceived as Possible Sources of Bias

At the recent World Conference of Operating Room Nurses, held in Toronto, September, 1997, nurses from many countries expressed considerable interest in these research findings. This was most encouraging. Some reviewers, however, noted two areas which to them appeared to be possible sources of bias. The first of these concerned the overabundance of successfully completed questionnaires from the Maritime Provinces (56% of the returned questionnaires). To this, the author replies that while the preponderance of responses from the Maritime undoubtedly did sway the overall results of the study in favour of attitudes held in the eastern region, the expense of repeatedly mailing out packets of questionnaires precluded the strenuous elicitation of responses from geographic regions where responses were far less readily forthcoming, even though ample questionnaire sheets were originally sent. The need to keep mailing costs within budget was important since to date, the author's work has been entirely self-funded.

The second perceived source of bias concerned the results which showed a far larger proportion of nurses than surgeons (80% of nurse respondents as contrasted with 44% of surgeons) felt that standards should be implemented and upheld. Certain reviewers felt this fact should be addressed further in the study since the attitudes of the two subgroups differed in such a statistically significant way. To this the author replies that her main initial goal was to survey the entire operating room staff, not independent subgroups. The breakdown into significant subgroups arose from the findings, and should be viewed as heuristic. Especially valued is one reviewer's comment that, despite this problem, the study "does focus important attention to the dilemmas faced by OR personnel in optimal handling of equipment in a tumor resection." The author looks forward to pursuing the subject in greater depth and hopes that other researchers will follow her lead, especially with relation to the two important subgroups, and the implications which may arise from related research findings.

Summary and Conclusions

This study elicited 89 respondents' opinion of their practices and techniques of cancer surgery. Respondents reported (62%) in favour of using more than one set of sterile instruments, and 49% stated that they avoided reusing gloves and instruments during the procedure of frozen section to reduce the likelihood of neoplastic seeding. Neoplastic seeding is not always avoidable, but it is heartening to find that over half the respondents considered the measures, suggested by numerous research articles, as well as the techniques many themselves used, effective enough to prohibit them from reusing instruments and gloves during cancer surgery. When we consider the effort taken to avoid bacterial infection at the time of sur-

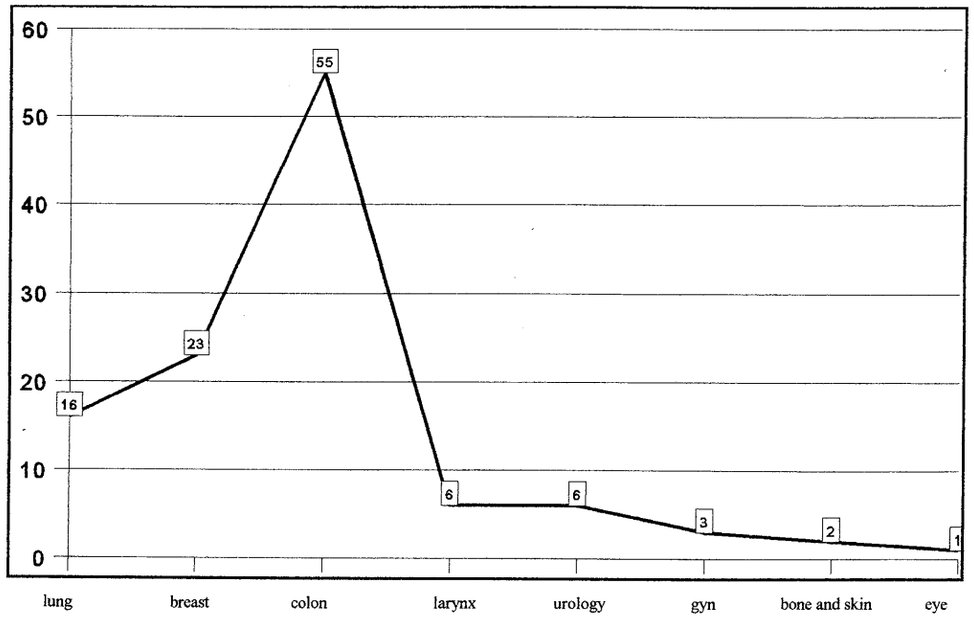

Figure 1. *(Questionnaire code items 022 to 026).*

Number of respondents

2	under 5 years experience
8	5-10 years experience
25	10-15 yrs experience
26	15-20 yrs experience
28	over 20 yrs experience

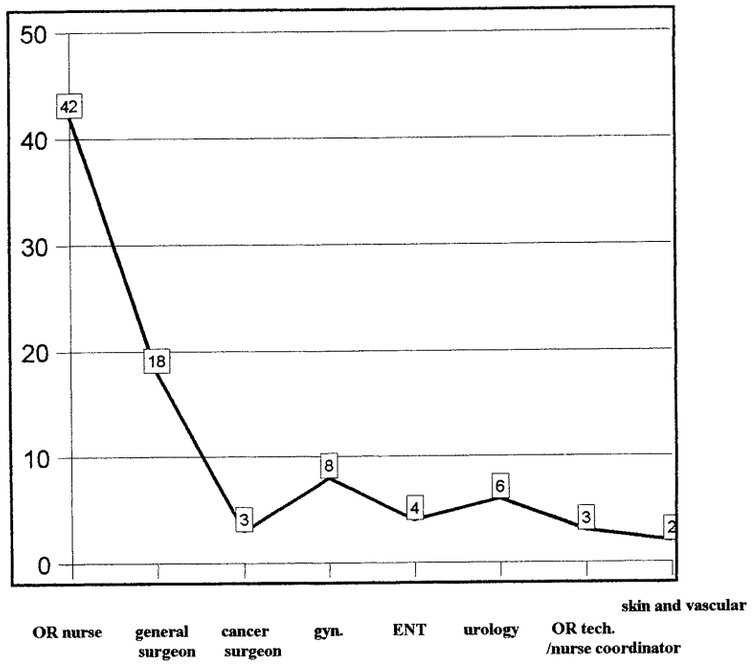

Figure 2. *(Questionnaire code items 047 to 050).*

gery, the inevitable conclusion would seem to be that a comparable parallel effort should be made to reduce to a minimum the chance of neoplastic contamination.

The author wishes to express her appreciation of all participants in this study, especially those who took the time to fill out and return questionnaires. (It might be added that 28% of those who returned questionnaires requested to receive findings deriving from this research survey.)

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Reuse of Disposables: Is It Worth The Risk?

By Gloria Spanton, RN, CPN(C)

Abstract

The main reason institutions reuse single use medical devices is to save money. Most hospitals are reusing disposables in varying degrees, but few have thoroughly investigated the issues surrounding reuse. Are there true savings to be realized? What are the risks to patients and coworkers? What are the legal and liability hazards to our employers and to ourselves?

Professional nurses have a responsibility as patient advocates and employees to question the validity of the reuse of medical devices which are manufactured to be used only once. By reusing disposables are we really cutting costs, or are we cutting corners?

The economic pressure on healthcare institutions has driven the current trend to reusing single use medical devices. The increasing number of expensive disposables has created a climate in which the financial lure of reuse may overshadow the risks involved. However, the protection of the patient's safety demands that institutions adopt a cautious and well planned approach to reuse. The prospect of significant savings merits skeptism and thorough analysis to prove that real savings are worth the risk to patient safety. Hospitals must evaluate the costs directly involved in reuse by utilizing five cost categories according to the guidelines published by the Canadian Hospital Association in 1996.

1. Direct labour: Wages and benefits for employees who prepare, deliver, clean, package and process the device. Also include the time spent gathering information, attending meetings, developing policies and processing procedure protocols, testing the product and developing quality assurance programs for reuse.

2. Testing: Costs involved in validating the efficiency of the cleaning and sterilizing process. Include in this area devices for testing integrity of the devices to be sure that they are still functional and safe to use.

3. Expendable or consumer products: Cleaning agents, brushes, protective apparel, packaging, labels, monitors, and sterilants.

4. Education: Wages and benefits for the time spent creating, presenting and participating in training programs and in verifying worker competence.

5. Other: Indirect costs, i.e. overhead, maintenance, amortization of capital equipment and disposal costs (financial and environmental).

We must also remember that savings are dependant on the number of times a disposable can be reused. In-house or independent lab tests can help estimate the maximum number of uses. Most savings are achieved in the first recycle with diminishing subsequent savings. Reports on reuse suggest that reuse of disposables is economical only if the device is costly and is used in high volumes. Even high ticket items may not be worth reprocessing in low volumes, because efficiency and quality control would be difficult to achieve. Cost justification is a never-ending process

A thorough review of the other issues surrounding reuse must also be evaluated before commencing a reuse program.

Author

Gloria Spanton, RN, CPN(C) has worked as staff a nurse in several hospitals in Ontario in the past 31 years, including Toronto Western, St. Joseph's Hospital, London, and St. Thomas-Elgin General Hospital, St. Thomas, Ontario. She was Clinical Instructor, St. Thomas Hospital, and is presently a staff nurse at The Queensway General Hospital in Toronto, Ontario.

Ethical

How much risk should an individual patient have to assume in order to benefit the larger society through an optimized use of health care finance resources? Which patient should receive a new device and which a reused device? Should the patient give informed consent? The health care professional has an obligation to avoid harm to patients. Is the health care provider fulfilling that obligation?

Integrity of Function

The physical and chemical effects of cleaning and sterilization on disposable materials is poorly documented. Various changes that can occur include weak spots, increasing brittleness, reduced performance and accumulation of biological debris. Sterilization processes vary among hospitals and make it impossible for manufacturer's guidelines to be duplicated exactly. Chemical treatments and detergents may remove some of the plastic's non-polymer components and may alter polymer. The cumulative stress effects of reuse will vary with clinical scenarios which may have implications when determining the optimal number of reuses of a device.

Patient Risk of Infection

Both patient to patient and environmental contamination in reused products have been documented as leading to outbreaks of infection. A preliminary FDA study in the United States has reported dozens of infections, chemical injuries and mechanical failures from reusing devices designed to be used only once. Difficulty with cleaning may leave a biofilm which can interfere with the effectiveness of disinfection or sterilization.

Endotoxic Reaction and Other Non-Infectious Risks

Certain types of bacteria contain endotoxins. They survive sterilization by both steam and EtO, needing dry heat to be deactivated. Endotoxins can come from growth of bacteria in residual moisture after the cleaning process and before the instrument is dried and sterilized. They can cause symptoms of fever, chills and hypotension in a patient. Toxicity is also thought to accrue from residues of detergents, disinfectants, and EtO accumulation during the cleaning and sterilizing process. EtO can combine with aqueous residues to produce ethylene glycol or react with saline solution to form ethylene chlorhydrin, both toxic substances.

Safety of Health Care Workers

Reuse of medical devices creates additional opportunities for health care workers to be exposed to body fluids, although universal precautions have been established to minimize risks of acquisition of patient-originated infections. It also creates exposure to toxic chemicals. Glutaraldehyde vapours may cause pulmonary edema, pneumonia, and even death at high concentrations,and irritation of mucous membranes and skin as well as long term hypersensitivity at low concentrations. EtO exposure can cause eye and respiratory tract irritation, headaches, nausea and vomiting, dermal irritation and burns from direct contact. It is suspected to be a human carcinogen.

Federal Regulations of Medical Devices

Canada's Food and Drug Act regulates medical devices but hasn't any regulatory authority over hospitals reusing disposables.

Legal and Liability Issues

The federal government regulates manufacturers of medical devices. However, manufacturers contend that reprocessing a device is creating a new product and thereby the reprocessor becomes the manufacturer, thereby responsible for the product. The law is not clear as to who is responsible for the reused device. It could even be the end user.

Conclusion

Reuse of single use medical devices is a very controversial subject with sound reasoning from both sides. There is evidence to support and arguments that caution against reuse. Facilities that decide to reuse should not do so on a casual basis. If cost effectiveness can be demonstrated, reuse must be used in association with clear guidelines, an institution-specific policy, stringent procedures and evaluation of quality assurance, after thorough examination of all the issues. If cost effectiveness cannot be demonstrated, then the other issues are irrelevant. ■

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If health care practitioners were more concerned about nutritional therapy than about drugs, many patients would live better and longer.

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- *coronary heart disease (men)*
  - United States: 189 per 100,000
  - Greece: 33 per 100,000
  - Japan: 34 per 100,000

- *female breast cancer rates*
  - United States: 22 per 100,000
  - Greece: 8 per 100,000
  - Japan: 4 per 100,000

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April 23 - 25, 1998
16th Biennial Conference - B.C. Operating Room Nurses Group. Harrison Hot Springs, Harrison, B.C.
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October 22 - 24, 1998
Operating Room Nurses of Alberta Association - 18th Provincial Conference - Red Deer, Alberta. Theme - "Stepping Out of the '90s"

October 16 - 18, 1998
Saskatchewan Operating Room Nurses Group 2-day Workshop - Temple Gardens Mioneral Spa, Moose Jaw, Sask.

April 20 - 22, 1998
Operating Room Nurses Association of Ontairo - 5th Provincial Conference. Sheraton Fallsview, Niagara Falls, Ont. *"Images & Influence '98"* Increase your Confidence & Credibility. Prepare for the 21st Century. For more information contact: Publicity Chairperson - Audrey Macdonald (905) 878-2383 Ext. 2310, or Exhibitor Chairperson - Alaine Young (905) 521 - 2100 Ext. 3030.

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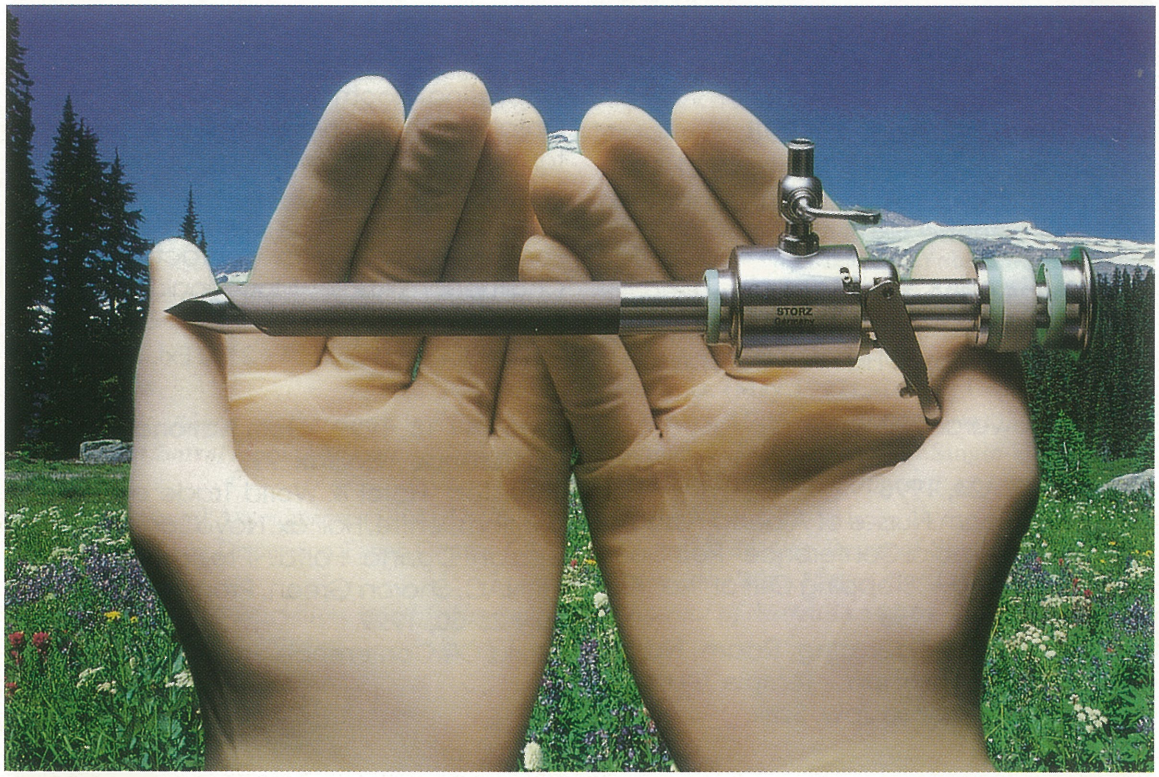

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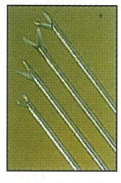

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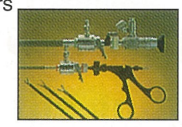

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