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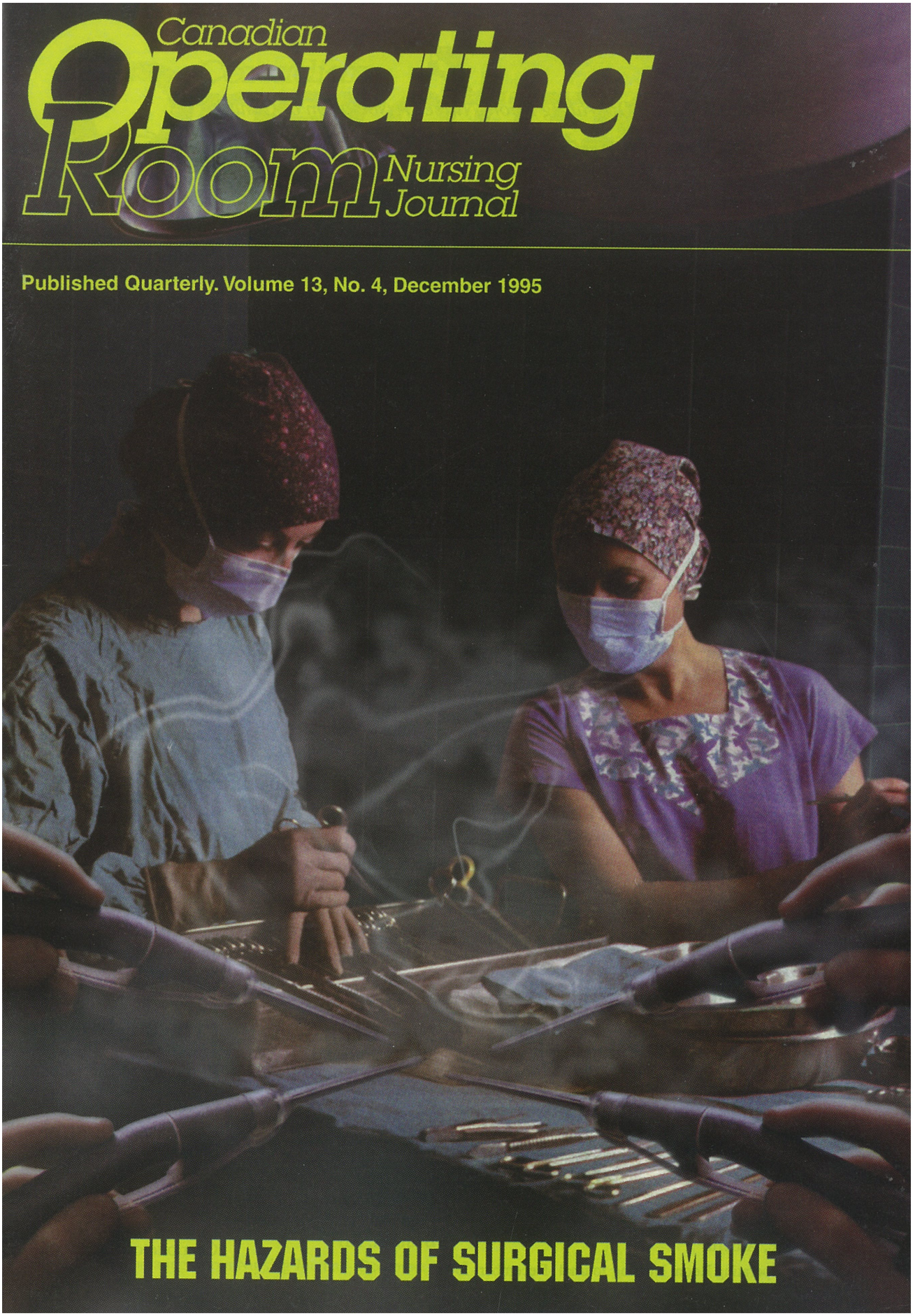

THE HAZARDS OF SURGICAL SMOKE

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ORNAC's Standards Under Review

By Vija Hay, RN, CPN (C)

In this issue of the Journal there is an article by one of the many excellent speakers at the May, 1995 ORNAC National Conference in Vancouver. The author expresses concern for the operating room nurse as she lists the numerous and potentially dangerous contents of surgical smoke.

Just how serious is the effect of surgical smoke, are we required to evacuate surgical smoke, and do we in fact take measures to evacuate smoke? To find answers to practice issues such as these, we look for guidance in ORNAC's Recommended Clinical Practice Standards for Perioperative Nursing.

Clinical Standard on Laser Safety 9.101 states: "Laser Smoke (plume) shall be evacuated by appropriate systems." The laser plume may pose a health hazard. Clinical Standard on Electrosurgery does not make reference to smoke.

The American Operating Room Nurses 1995 Recommended Practice Standard on Electrosurgery states: "Patients and Operating Room Personnel should be protected from inhaling the smoke generated during electrosurgery". If the laser smoke and electrosurgical smoke are indeed of the same risk, as many people suggest, then the Standard for Laser Surgery could be applied to all electrosurgical procedures.

A new revised edition of the ORNAC Practice Standards is planned for 1998. The ORNAC Standards/Education Committee is aware that to keep current with advances in technology and research, a review process and update of standards has to take place now, and on an on-going basis. For that purpose the Standards/Education Committee at the November, 1995 Board meeting distributed sections of the Clinical Practice Standards for each province to review and comment. Our experts across the country now have an opportunity to contribute to the Standards document. The comments will be collated, distributed for review, and published as insertions/additions to the 1993 Standards.

Standards are an important component in Perioperative Nursing Certification. The document is a recommended text for exam preparation.

ORNAC is also instrumental in the development of CSA Healthcare Standards. ORNAC members with expertise may be asked to join as working group members on a specific project. Also, you may see familiar ORNAC names listed in the CSA Standards Editions as members of a Technical Committee or a Subcommittee.

In the preface of ORNAC's Recommended Standards, Gloria Stephens writes: " Standards guide nursing practice and facilitate the provision of high quality patient care". It is the Standards/Education Committee's mandate to ensure that the Standards are updated periodically.

To maintain accountability to the consumers, and in keeping with ORNAC's mission statement of being dedicated to the ..."promotion and advancement in perioperative patient care", the Standards/Education Committee is undertaking our Practice Standards review.

Vija Hay, RN, CPN (C), is President of the Operating Room Nurses Association of Canada. She is Director of Nursing Services, Queensway Carleton Hospital, Nepean, Ont.

Visual Laser Ablation of the Prostate (VLAP)

By Doreen Bird, R.N. and Susan Smith, R.N.

Abstract

Benign Prostatic Hyperplasia is a condition which occurs commonly in men as they age. The degree of impedence of the flow of urine from the bladder due to prostate gland enlargement varies from a slight slowing of the stream to complete urinary retention. Transurethral Resection of the Prostate (TURP) has historically been the most common treatment of this condition. While other alternative treatments are available, the use of lasers to perform Visual Laser Ablation of the Prostate (VLAP) is moving to the forefront as a treatment of choice for many Urologists.

The first Visual Laser Ablation of the Prostate (VLAP) to be carried out in Canada was performed on September 23, 1992 at the Hamilton Civic Hospitals - Henderson Division, Hamilton, Ontario. Dr. Ian Davis, representing the Hamilton Civic Hospitals carried out the procedure as part of a study set up in association with Dr. Sullivan of the Vancouver General Hospital, Vancouver, B.C.; and Dr. Belitsky of the Victoria Hospital, Halifax, N.S.

The prostate is a walnut-sized gland that forms part of the male reproductive system. It is comprised of two lateral lobes, an anterior lobe, posterior lobe and median lobe, and is enclosed by an outer layer of tissue called the prostatic capsule. The gland is located just in front of the rectum and below the bladder and surrounds the urethra.

Benign Prostatic Hyperplasia (BPH) is a condition which occurs commonly in men as they age. It involves enlargement of the prostate gland which impedes the flow of urine from the bladder. The degree of impedance may vary from a slight slowing of the stream to complete urinary retention. Symptoms may include frequency, nocturia, urgency, incontinence, intermittency, hesitancy, terminal dribbling and decreased urinary flow.

In the past Transurethral Resection of the Prostate (TURP) has been the most common treatment of this condition This procedure involves carving away the enlarged portion of the prostate through a resectoscope inserted through the urethra. A loop or knife electrode is used. A 10 - 18% morbidity rate, possible extensive blood loss, impotency, retrograde ejaculation, urethral stricture and incontinence have lead to a constant search for a more effective way of treating BPH.

Alternative treatments for BPH include Balloon Dilatation, Transurethral Thermal Therapy, Focussed Ultrasound, medical treatment and Radio Frequency Ablation. Prostate glands that are very large must be treated with surgical intervention - open prostatectomy.

Lasers have been used in many areas of surgery over the past decade. In the early 1990's Britain and the United States began to study the effects of Neodymium:YAG laser on prostate tissue. It was discovered that laser prostate therapy achieved comparable results to TURP's but with a decreased morbidity rate. Laser fibers used to treat prostate obstruction include interstitial fibers to reduce prostate bulk, side-firing fibers for ablation and contact (bare) fibers for the cutting or ablation of the bladder neck.

Lasers convert light energy into thermal energy to produce tissue effect through continuous wave energy. Vaporization of tissue beneath the epithelial layer will cause a "popcorn" effect - when this happens formation of a cavity will occur. The ND:YAG causes coagulation necrosis of the prostatic tissue.

Authors

Both Doreen Bird R.N., and Susan Smith R.N., work at the Hamilton Civic Hospital, Henderson Division in Hamilton, Ontario. Doreen is a Laser Nurse and the Resource Nurse for Urology in the Operating Room for the past several years. Susan has just recently left her role as Laser Safety Officer and Resource Nurse for Gynecology, Laser and Oncology in the Operating Room to become Director of Women's Health for the Civic Hospitals.

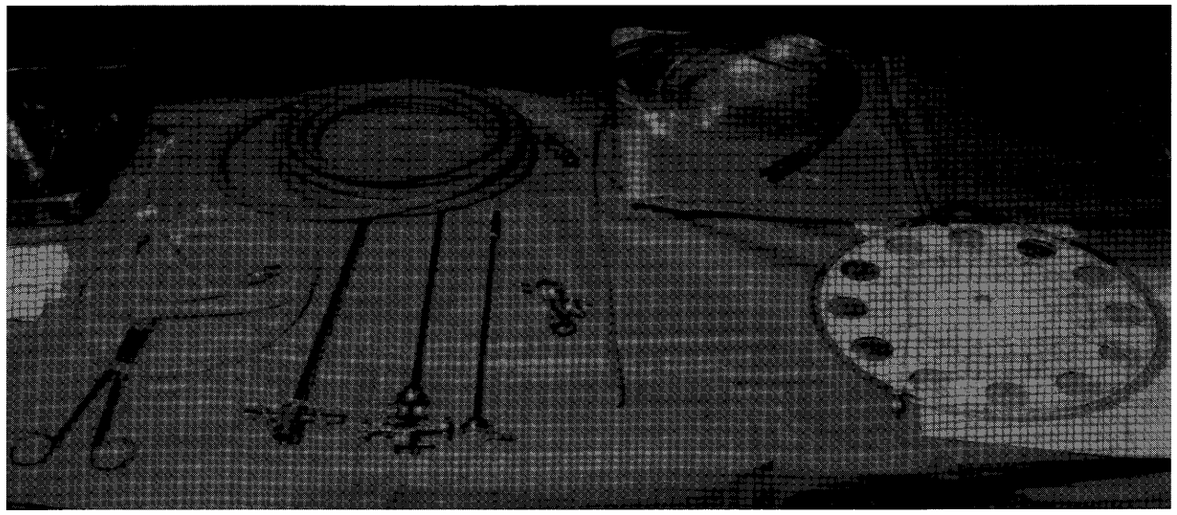

Figure 1 - VLAP Table Set-Up

Pre-Op Evaluation

The standard pre-op evaluation includes physical examination with digital rectal examination, urinalysis, ultrasound evaluation of upper tracts and prostatic specific antigen levels. An outpatient cystoscopy is performed prior to surgery to eliminate the question of pathology involving the urethra and bladder. If the PSA level or rectal examination are abnormal a transrectal ultrasound guided biopsy to rule out cancer is done prior to surgery because no tissue will be available for pathological evaluation postoperatively.

Procedure

The following equipment is used for VLAP procedures:

#23 continuous flow cystoscope with a
#19 catheter deflector
light and water cord
3000cc Sterile Water
30 degree telescope
hydrogen peroxide
stainless steelware
2 applicators
camera cover
urinary leg bag
suction tubing
2-way #18 foley catheter
Stopwatch
Catheter introducer
Bard Urolase Fiber
N.D. YAG laser machine
Bare fiber (may be added for incision of bladder neck)
Video monitor, light source and camera.

Figure 2 - Monitor Set-Up

The cysto suite is set up in compliance with laser safety standards to include appropriate eyewear for both the patient and the staff, masks, window coverings and laser warning lights and signs outside the room. A basin of water and a Type B/C fire extinguisher should be available in the room.

The patient is usually given a general anaesthetic unless physical condition warrants a spinal anaesthetic. The patient is placed in medium lithotomy position and the penis, scrotum and perineum are prepped. Draping is in a routine fashion.

The cystoscope with camera attachment is inserted into the urethra by the surgeon. Sterile water irrigation, suction, light and water cords are put into place. A visual assessment of the lateral and medial lobes including the bladder neck is carried out prior to the laser procedure. The Urolase-Bard 90 degree sidefiring reflective fiber is positioned into the Laserscope and should protrude about 5mm beyond the end of the instrument. It is important to position the fiber proximal to the verumontanum above the external urethral sphincter. The lasing is done at the 2, 4, 8 and 10 o'clock positions on the prostate gland. Continuous sterile water irrigation cools the gold-plated fiber tip throughout the procedure.

See Figure 2 for Monitor Set-Up, and Figure 3 for view of prostate before lasing.

Settings for the YAG laser may vary according to the laser manufacturer. Our early VLAP's were carried out using a Medilas II laser set at 60 watts with 60 second firings to each of four positions. Since the spring of 1993 we have used the laser set at 40 watts with 90 second firings. Additional firings and firing time depends upon prostate size and surgeon's preference. ***See Figure 3 for view of Post Lasing.***

Bladder neck incision may be carried out with the bare fiber set at Fibertom 3 and 40 watts. The laser nurse is responsible for the operation of the laser and footpedal under the direction of the surgeon.

The laser fiber tip is directed by the surgeon and should be cleaned after each firing, using hydrogen peroxide and a wooden applicator.

After removal of the cystoscope and fiber, a two-way foley catheter is inserted into the urethra and attached to a leg bag. There is no need to hook up irrigation. The patient is transferred to PARR and discharged from the hospital later in the day with post-VLAP instructions. Prescription for antibiotic and anti-inflammatory medications are given to each patient.

Home Care

The catheter remains in the patient for 5 days after which the patient will remove his own catheter. Voiding may be slow for the first 2 - 3 weeks until the necrosed tissue begins to slough away. Approximately ten percent of patients may find it necessary to return to Emergency for re-catheterization due to urinary retention.

Comparison TURP to VLAP

1. Hospitalization / Operative Time

A TURP requires 4 - 5 days hospital stay whereas the VLAP is booked as a same day surgery. This is not only attractive to the patient but also helps reduce hospital stay costs.

2. Anaesthetic

The preference for this procedure seems to be general anaesthesia, however this procedure may be carried out under spinal anaesthesia and is the anaesthetic of choice for TURP's. There is potential to use local anaesthetics.

3. Blood Loss / Fluid absorption

There is no blood loss or fluid absorption with VLAP as tissue ablation is by means of vaporization necrosis with no disruption of prostatic venous sinuses as there are during TURP's.

4. Catheterization

Post-TURP patients have an indwelling with irrigation for 1 - 4 days. Patients having VLAP are sent home with a catheter draining to a leg bag. Irrigation is not necessary and the catheter is removed by the patient after 5 days.

5. Bladder Irritability

Results of the study conducted showed that in a one month post-op period TURP patients indicated 30 - 50% irritability while VLAP patients experienced 10 - 50% irritability. Since the time of this study, slight technical adjustments during lasing can reduce this percentage of irritability significantly for VLAP patients.

6. Retrograde Ejaculation

Retrograde ejaculation involves the backward movement of semen into the bladder. This occurs in 50% of post-TURP cases while post-VLAP cases show an incidence of 10 - 40%.

7. Incontinence

TURP's show a 1 - 2% incidence of urinary incontinence compared to an occurrence of less than 1% in VLAP patients.

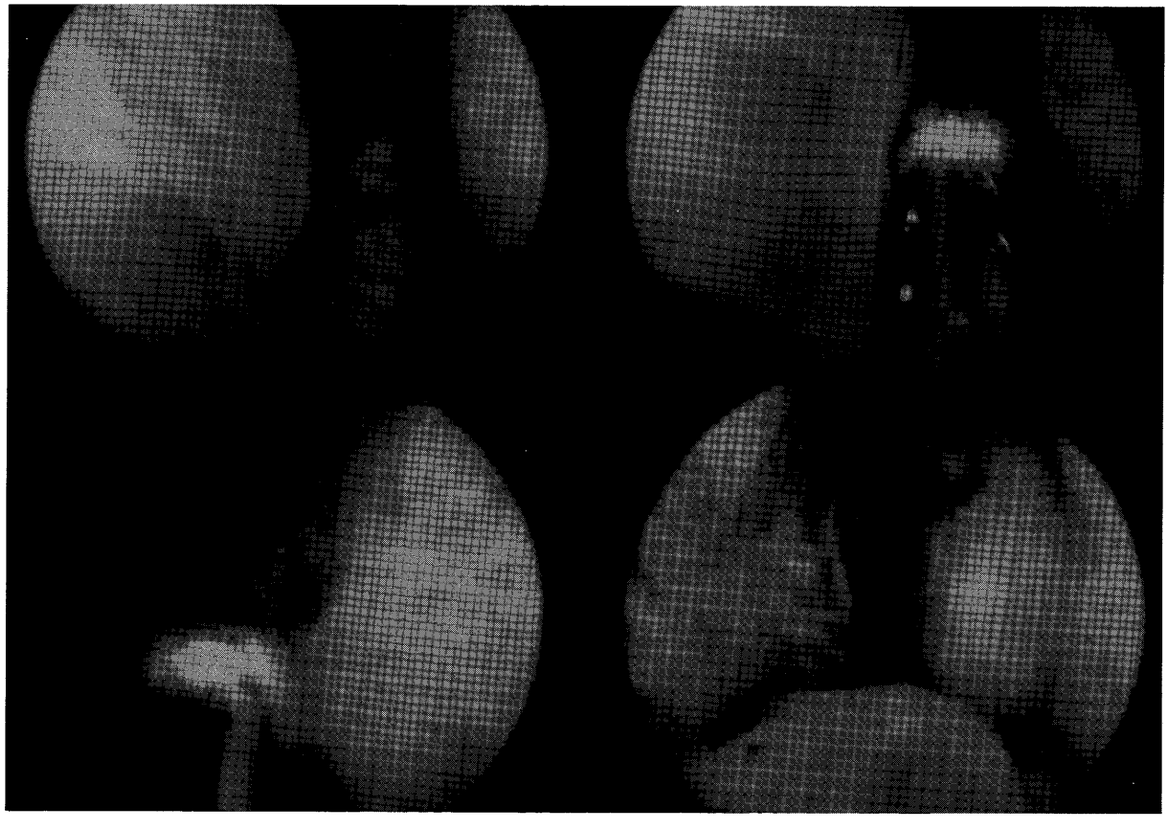

Figure 3 - Four Views - **Upper Left Quadrant** shows prostate before lasing. **Upper Right:** Laser Fiber in place (8 o'clock position). **Lower Right Quadrant** shows prostate after lasing.

8. Return to Normal Activity

The expected recovery to normal activity for the TURP patient is 28 to 42 days, whereas VLAP patients are able to return to normal activities after seven days.

Conclusion

If a patient meets all criteria, results have shown that VLAP is a safer procedure with decreased morbidity and blood loss. The hospital stay is significantly reduced decreasing costs to the hospital while at the same time offering additional benefit to the patient. Return to work within a one week period is a point of further encouragement for many people in this economic climate.

As the procedure has only been in existence worldwide since the early 1990's long term results are unobtainable. It is clear that further study with this exciting new alternative will be necessary.

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Potential Hazards from Electrosurgery Plume

Recommendations for Surgical Smoke Evacuation

By Marlys Hoglan, RN, CNOR

Most hospitals today are "non smoking" hospitals. Where is the one place in the hospital that smoking occurs on a daily basis and nobody objects? That's right, the operating room, and who is breathing it? The perioperative nursing staff, anesthesia personnel, surgeons, and the patient. What you see in the OR every day is the steam and what you are breathing is the vaporized tissue.

The cancer society took a long time to convince us that cigarette smoke caused lung cancer. Think about the years and years of research that went into their findings before they said "yes, we have proven it, cigarette smoking is hazardous to your health." Perhaps research will eventually tell us that breathing electrosurgery (ES) smoke is also hazardous to our health.

Laser Smoke Evacuation

Is there any difference between the smoke plume that is created from electrosurgery and that created from the use of a laser? No, there is no difference. The thermal action on the tissue is the same regardless of the energy source that is used. It was always recommended that we evacuate the smoke generated from laser usage and recent research is supporting the fact that we should be removing all surgical smoke, regardless of the energy source that creates the smoke.

The Emergency Care Research Institute (ECRI) is an agency in the U.S. that monitors medical devices. It is an independent agency that is not affiliated with any manufacturer of surgical products. They investigate health care issues and make recommendations that relate to safety for our patients and employees. Most of your BioMeds or clinical engineers are familiar with ECRI publications. The ECRI has stated that they are concerned that we have overlooked the fact that electrosurgery smoke is the same as laser smoke and this could be hazardous to our health.

Spectral Content of Surgical Smoke

What is the potential risk of exposure? What are the recommendations? How can we protect ourselves? Is evacuation the answer, and if so, what components should the system contain to provide the kind of filtration efficiency required to make it effective.

Contents of Surgical Smoke

The smoke created during electrosurgery contains three primary components.

The first is particulate matter which consists of the carbonized tissue, blood, and potentially infectious viruses and bacteria.

The second product is steam, and of course, that is what you see. If your hand is placed over the steam, you will see moisture on your glove. Since cells are

Author

Marlys Hoglan has worked in operating rooms for over 25 years and has held positions of Staff Nurse, Educator and Director of Surgical Services. She is Past President of the St. Louis AORN and Past President of the National Certification Board: Perioperative Nurses Inc. She is currently a clinical educator for Valleylab Inc.

This article is an edited version of her taped presentation to the 14th National Conference of the Operating Room Nurses Association of Canada's in Vancouver, B.C. in May, 1995.

primarily water, the cellular explosion caused by electrosurgery releases the steam.

The third component is the various toxins or the potentially hazardous chemicals. Research has shown these to be carcinogenic. The toxins include acrolein, benzene, formaldehyde, toluene, and polycyclic aromatic hydrocarbons (PAH) (Sawchuk, 1989). The PAH is the same in surgical smoke and your backyard barbecue. It smells wonderful coming from your neighbors yard especially if you are hungry, but it is not good for us to breath this smoke.

"Carbonized tissue, the toxic gases, the possible microorganisms are all contained in surgical smoke."

A perioperative nurse came up to me following one of these educational programs and said: "

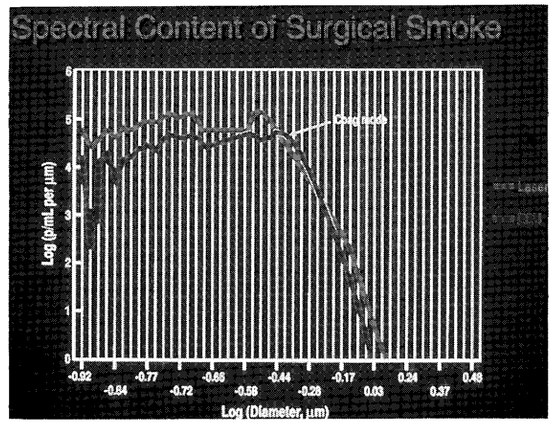
"You know, I have an allergic reaction to surgical smoke. Since I went to work in the operating room two or three years ago, I have had some respiratory problems and when I was tested, they discovered that I am allergic to formaldehyde. Every time I scrub on a case that is real smokey I get this same allergic response. Might it be the formaldehyde in the smoke causing it?"

The formaldehyde could very well be the irritant, since it is one of the chemicals in surgical smoke.

Toluene is also an irritant to us. For example, a few months ago in St. Louis, Missouri, a railroad car containing toluene was derailed and turned over in the downtown area where major highways merge. The highway was closed to traffic and a six block area was evacuated until the spill could be cleaned up. The people who were in the area stated that is was "difficult to breath and their eyes and mucous membranes burned." We know that it is an irritant, and it is also a carcinogen.

Universal Precautions

One of the research findings that I find disturbing, is that HIV proviral DNA was cultured from laser smoke for at least 14 days (Baggish, 1991). Remember that there is very little difference



Printed with Permission from ECRI's evaluation on "Laser Smoke Evacuators", from *Health Devices,* Vol. 19, No. 1, Jan., 1990.

between laser and electrosurgical smoke. This points out the fact that we should be using universal precautions when handling the equipment used to evacuate the surgical smoke.

I remember using the wall suction to evacuate smoke, especially on an augmentation mammoplasty. As the pocket was created for the implant, a lot of smoke was produced. The Yankauer suction tip was placed into the pocket and the smoke was evacuated into the wall vacuum system. We would have used universal precautions for the tubing, because it was the same tubing that was used for suctioning blood and other fluids, but we were not concerned that the smoke was entering the wall vacuum. This smoke was going into the filter of the wall vacuum system. Who is changing those filters? Probably your maintenance or housekeeping staff. Are they using Universal Precautions when they change the filters? I would doubt it. The practice of using hospital vacuum lines is not recommended for two reasons according to ECRI. (1) the particulate matter in the smoke can deteriorate hospital vacuum systems, and (2) the flow generated by wall suction may not be strong enough to capture the smoke. We have had maintenance reports that filters are needing to be changed more frequently than they used to, and they wonder why this is occurring.

Another research study (Gatti, 1992) showed that the smoke generated from the use of electrosurgery during reduction mammaplasty procedures was found to be mutagenic. This could prove to have far reaching effects.

I equate the smoke issue to an issue that concerned us many years ago and that was anesthesia waste gases. Perioperative nurses said "We don't think we

should be breathing this waste gas, we get headaches, and we don't feel good." The reply was often "You nurses are always complaining about something." Well, after enough documentation and research, it was discovered that this waste gas should be evacuated. I believe this will happen with surgical smoke.

Why have we not been concerned about this before now? I think there are at least a couple of reasons. One is that we didn't use electrosurgery on almost every case as we do now. Today it is an automatic part of the preoperative preparation for surgery to place the dispersive electrode (grounding pad) on the patient and have an electrosurgical (ESU) unit in the room. Nearly all surgeons use the ESU. We estimate 90% of all surgical procedures use electrosurgery.

Do you remember when we had "dirty cases" and the only "dirty cases" were those that had visible pus? Many of us in the operating room said, "wait a minute, this doesn't make good sense to us, we think we should treat all cases alike, because there might be harmful organisms we can't see. The reply often was "oh no, we'll only treat the cases we know are "dirty". Well, we know in the U.S. that the Center for Disease Control (CDC) and AORN have said we must use universal precautions on all invasive procedures. Many years ago we didn't have some of the viruses we have today and there may be additional viruses in the future. This means precautions against the risk of exposure to infectious materials must be taken by all health care workers.

We know surgical smoke is not sterile. Proviral DNA and carcinogens have been identified in the smoke plume, but we have not seen any research, as yet, that directly documents this plume has caused any infections. In this situation should we be proactive or reactive? Do you want to wait until somebody proves there is a problem and then wish we had been evacuating the smoke a long time ago?

What about the smoke generated during a transurethral resection of the prostate (TURP)? I have been told that if you can smell the plume, it is present. We all know how it smells when a TURP is performed. The plume is contained in liquid in this procedure, so whether that liquid is filtering out the particles and carcinogens, I don't know. Perhaps this would be a good research project.

Live Viral DNA is Present in Smoke

The results obtained and reported by Sawchuk et al, indicated that although this viral DNA was present in the vapors when treating infectious Papillomavirus, they did not determine if it was infectious. What about the bacteria that is present in plume? I have not seen any research papers on that particular issue.

The chronic irritation to the skin, lungs, and mucous membranes due to inhaling the surgical smoke has been reported. It has also been reported that smoke is absorbed by soft contact lenses. Has anyone had a problem with their eyes as a result of this absorption? Not that I know about.

Who is absorbing most of the smoke? The scrub person, surgeon, and assistant. Most surgeons are not very concerned about the smoke issue, however. This may be because they do their procedure and then they leave. That is not the case for the OR personnel because they stay and do cases for their entire shift which may be 8, 10, or 12 hours depending on the schedule and call time required. Perioperative nurses, anesthesiologists, and anesthetists are breathing this smoke day in and day out. Surgeons, however may operate only two or three days a week and for just a few hours on those days, so this may explain their indifference with this issue.

Plastic Surgeons Concerned

We have experienced some concern from plastic surgeons who perform reduction mammoplasties. Many of the other surgeons consider the use of a smoke evacuator as bothersome. They have heard that there are carcinogens present, but they don't want an extra hand in their way trying to evacuate the smoke during the procedure.

One of the functions of my job has been to assist with physician Large Loop Excision of the Transformation Zone (LLETZ) seminars and workshops. I know some of the gynecologists in Canada are doing this procedure, perhaps not in the hospitals, but in the clinics, outpatient centers, or offices. They can remove cervical tissue to treat cervicitis, dysplasia, and carcinoma in situ with this procedure. The removal is done with a wire loop and electrosurgery. It works extremely well and is very quick, but the smoke generated is overwhelming. I did one workshop when we had twelve generators set up and approximately 200 surgeons practicing this procedure on beef tongue. Beef tongue is used because it responds much like cervical tissue. The smell in the room was dreadful. Even though we were trying to evacuate the smoke, we were unable to capture all of it. This workshop was a few years ago and there were not as many good smoke evacuators on the market then as there are now. My clothes reeked with the putrid odor, so I had them cleaned before I could pack them in the suitcase to come home. My eyes watered and the mucous membranes of my nose and throat burned and itched. I know that smoke was a severe irritant.

Recommendations: Evacuate Laser and Electrosurgical Smoke

What are the current recommendations regarding surgical smoke? The National Institute for Occupational Safety and Health (NIOSH) in the U.S. has determined that there is a potential hazard from exposure to smoke generated by the use of electrocautery. NIOSH does research. It is, however, the Occupational Safety and Health Administration (OSHA) that mandate job safety and health standards and enforce them. So far, they have not made smoke evacuation a mandate, but since NIOSH has recommended evacuation of laser smoke, it only makes good sense that electrosurgery smoke should also be evacuated.

After one of these educational programs was presented to a group of perioperative nurses, one of the OR managers who attended the program called OSHA and asked what their policy was concerning electrosurgery smoke. Their reply was that they hadn't made one, but they would send someone to her facility to check it out. They sent an inspector into her hospital and they are waiting for the report. She is extremely distressed, because she feels that she reported her own facility and that was not her intention at all, she simply wanted some information. If they are cited they will be charged a very large fine and this manager will be blamed. Needless to say she is very concerned and I would feel the same way in her position.

AORN Recommended Practice

In the 1994 AORN Recommended Practices for Electrosurgery (RPE) it is recommended that patients and perioperative personnel should be protected from inhaling the smoke generated during electrosurgery. The Recommended Practice Committee studies issues very carefully before they publish their recommendations. This RP has a very lengthy bibliography to support their recommendations.

Reducing Exposure to Smoke

What methods can we use to reduce our exposure to the ES smoke? We could try to reduce the production of smoke, but how are we going to do that? I don't think we want to tell our surgeons they can't use electrosurgery anymore. Well then, what can we do to minimize the amount of smoke plume we are forced to inhale? The obvious answer is to evacuate the plume through a filter system that will remove the hazardous materials.

Masks as Protection From Plume

Do the masks we wear provide protection from potentially harmful plume? Our standard masks filter up to O.5 microns and viruses are smaller than this, so they have the ability to pass through the mask. When doing laser cases, we often wear a high filtration mask. They are very thick and make breathing difficult. They only filter up to 0.1 microns and most of the potentially harmful particles are smaller than 0.1 microns, so they really aren't doing much good at all. One day I was circulating for a laser case that produced a major amount of smoke and lasted for hours. The smell was penetrating my mask, so I tried putting on two of the heavy duty masks. I don't recommend trying this! I could not breath at all, it was as if someone had placed a plastic bag on my head.

A Capture Device is Needed

To effectively evacuate plume we need three components in the evacuation system. There must be a capture device, a vacuum source, and an efficient filter. I will address each of these components separately.

The capture device must be large enough and close enough to the surgical site to capture the volume of smoke plume that is being generated. Some of the research states that it will be most effective if it is placed within six inches of the operative site. Will the surgeons like this? Probably not. Who is going to hold the capture device? Our scrub person can't grow a third arm and we rarely have additional staff to provide another person at the sterile field. Even if we can provide someone to hold the device, many surgeons feel that it is in their way. The most logical solution is to have the evacuation occur on the ES pencil so that it can evacuate the smoke as it is generated. A second

option is to use a capture device that has a large diameter tubing. It can be positioned so that when it is clipped to the surgical drape, it is in a stable position throughout the procedure. The disadvantage of this is that it may not be within six inches of the surgical site.

Vacuum Systems

The vacuum source needs to be portable and easily moved. Nobody told me when I went to nursing school how much time I would spend moving furniture and equipment. Since we will probably be moving the evacuator from room to room it must be easy to transport.

If you use your wall suction, it may interfere with other vacuum requirements such as the suction power required at the surgical site or the suction the anesthesiologist may need to have available.

Wall suction traditionally removes three cubic feet per minute (3 CFM) and we have been told that proper removal of the plume requires 50 CFM. A separate smoke evacuation unit will be the only way to obtain 50 CFM.

There are many smoke evacuation units available, so to obtain the appropriate system for your facility, the OR staff will need to do some evaluations. Establish the criteria you will use to select your evacuation unit. It may be helpful to use the criteria suggested for selection of a smoke evacuator in the AORN RP for Laser Safety in the Practice Setting.

Filter requirement

A triple filter system should be used in an evacuation unit. The first portion is a prefilter. The prefilter is a single use, disposable filter. This pre-filter is disposed of using Universal Precautions at the conclusion of the procedure. The purpose of the pre-filter is to collect the largest particles and the moisture from the steam. We have observed that this pre-filter resembles a cigarette filter when it is removed. It is often a dirty yellow color.

The second portion of the filter should be an Ultra Low Penetration Air (ULPA) filter. High Efficiency Particulate Air (HEPA) filters are being used as in line filters when wall suction is being used. The HEPA filter is not as efficient as the ULPA filter. Evacuation units should have ULPA filters. An ULPA filter removes 99.9999% or 1 in 1,000,000 particles get through the filter.

The third portion of the filter is charcoal. The charcoal removes the odor and absorbs the gas.

Noise Level of evacuators

The noise level is one of the major objections by surgeons. These are vacuums and they will make some noise. Have you ever heard a silent vacuum? As you prepare to evaluate smoke evacuators, you should consider doing side by side evaluations in the same circumstances. The noise level will sound entirely different in the lounge than it will in an operating room with all of the other noises. Assess them in the same way, side-by-side, so your ears don't trick you.

Endosurgical Smoke Considerations

When doing laparoscopic procedures, we often need to remove the smoke because it interferes with visibility for the surgeon. The smoke is created by the use of either a laser or electrosurgery in the peritoneal cavity. According to Beebe, et al a hazard for the patient may be created when the carbon dioxide and surgical smoke are mixed. This mixture becomes carbon monoxide. Dr. Ott from Macon, Georgia has studied the effect on the physiology of patients when this occurs during laparoscopic procedures. An elevation in the methemoglobin occurs in these patients. When methemoglobin is formed by the red blood cells, it renders the hemoglobin incapable of carrying oxygen. When I have discussed this with some anesthesiologists, they have said that this may be the reason patients take longer to wake up after a prolonged laparoscopic case. These patients also complain of more headaches and nausea, which are early symptoms of carbon monoxide poisoning.

This information suggests that we should be evacuating the plume from the abdominal cavity through a smoke evacuator periodically during the procedure. We should definitely evacuate the pneumoperitoneum at the conclusion of the procedure through a smoke evacuation unit rather than allowing the aerosol containing hazardous particles to pollute the air we are breathing.

Nursing Considerations

As I stated earlier, use the AORN criteria for selecting a smoke evacuator. Manufacturers will talk to you about the performance of their systems. Questions you want to have answered are: is it easy to use; is the filter life event-related or time-related (10 hours use on a smokey case is not the same as 10 hours use when minimal smoke is produced); and what is the cost per procedure.

Ensure that there are enough evacuation systems available to use for cases that produce large volumes of smoke. Test the filter prior to use, so that you know it will effectively remove the plume. The evacuator selected should have a mechanism to test the filter.

Examples of High Volume Smoke Procedures

- Modified Mastectomy
- Reduction Mammoplasty
- Total Joint Replacement
- Spinal Reconstruction
- Liver Resection
- Abdominal Incision for Laparotomy
- LLETZ /Cervical Loop Excision
- Condylomata Removal
- Radical Prostatectomy
- Thoracotomy/Sternotomy

Conclusion

Not enough research has been done to provide us with the ammunition we need to make smoke evacuation a priority in our operating rooms.

One research project I would like to see undertaken would be to track the number of upper respiratory infections of the OR staff. How many sick days were attributed to OR nurses who were exposed to large amounts of surgical smoke versus the staff exposed to small amounts. I am not a researcher and I wouldn't know how to account for all the variables, but this could be a very important study.

If this data demonstrated that nurses exposed to high amounts of surgical smoke had more sick days than those exposed to minimal amounts, it would support the need for evacuation units. An OR Director in the U.S. did her own study and based on her findings, installed smoke evacuators. Her study, however, does not fit the criteria for a valid research project.

The available research is sufficient to tell us we probably should evacuate this smoke plume. We should use universal precautions when disposing of the filter and tubing. Our traditional masks do not offer us the protection we need.

If we can "suck up!' the smoke, and filter it properly, then we will be able to say:

" Thank You for Not Allowing Second Hand Smoke in Our Operating Room".

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Key Terms

Adsorption: The adhesion of gas or liquid molecules to the surface of a solid (Van der Waals adsorption). As applied to activated carbon, the "surface" is that of the interior pore structure, and in magnitude is in the order of six million square feet per pound of charcoal.
Airborne Contaminants: A substance carried by or through the air that contaminates (infects, pollutes, defiles) another substance.
Bronchitis: Inflammation of the bronchial tubes due to exposure to cold, to the breathing of irritant substances and to acute general diseases.
Carcinogen: Any cancer-producing substance.
CFM: Cubic Feet per Minute/ volumetric air flow.
Charcoal Filter: This filter is for odor and gas adsorption. It may or may not be combined with a depth media filter for capture of gross particulate. Odor-control efficiency is related to the CTC (Carbon Tetrachloride) rating. The CTC rating is the percent by weight of carbon tetrachloride vapor the charcoal can adsorb—1.0 lb. of CTC-60 charcoal can adsorb up to 60% of its weight or 0.6 lb. of carbon tetrachloride vapor.
Dimensions: 1 meter = 1^3 millimeters (mm)
= 10^6 micrometers (microns, µm)
= 10^9 nanometers (nm)
= 10^{10} angstroms (A)
DNA: See Nucleic acid.
Filtration: To remove or separate solid particles, gases, etc. from a liquid or air by means of a filter.
Flow Velocity: This is the measure of the speed of air flow. It is a function of the diameter of the tubing or orifice and the cfm. Intake velocity at the nozzle orifice is the most important parameter in relation to smoke plume capture.
HEPA Filter: High Efficiency Particulate Air filters are used as particulate filters in smoke evacuators. The industry minimum standard, as defined by the Institute of Environmental Sciences (I.E.S.) for HEPA filters, is 99.97% efficiency in capturing particles of 0.3 micron and larger. The efficiency percentage is required for the rating to be meaningful.
Micron: A unit of length equal to one-thousandth of a millimeter, or one-millionth of a meter. Important particle sizes include:
Hepatitis B = 0.042 micron
Human Papilloma Virus (HPV) = 0.045 micron
Human Immodefcy.Virus (HIV) = 0.18 micron
Mutagenicity: The occurrence of a sudden variation in some inheritable characteristic in a germ cell of an individual animal or plant.
Nucleic Acid: The genetic information of the virus is carried on nucleic acid, without which it cannot replicate. It may be deoxyribonucleic acid (DNA) or ribonucleic acid (RNA). It may be single- or double-stranded, in a single piece or several (segmented or multi-partite genome). For each virus the nature, size, strandedness and number of pieces are constant features.
Pathogen: Any disease-producing agent or microorganism.
Smoke Plume Capture: The purpose of all electrosurgical and laser smoke filtration systems. Plume capture effectiveness is a function primarily of suction velocity.
ULPA Filter: Ultra Low Penetration Air filters are used for the capture of sub-micron particles. The I.E.S definition of ULPA filters specifies an efficiency of 99.999% for particle diameters of 0.12 micron and larger. The efficiency percentage is required for the rating to be meaningful.
Virion, Virus Particle: These terms are virtually synonymous and refer to the complete virus as seen in the electron microscope. The terms also refer to fully infective particles. Virion is more strictly correct for the complete virus, virus particle being coined at a time when methods were less refined and virus structure less established.

Survey of Physicians Attitudes Toward Surgical Smoke

A recent survey of 4,500 Canadian physicians and surgeons indicates the more involved physicians are with electrosurgery, the more concerned they are with the hazards of surgical smoke. The survey analyzed by Progressive Marketing Group in Kitchener, Ontario had a return rate of 17.5% (800 responding).

The concern rate changes from 59.4% (less than five times per week exposure) to 82.5% (more than ten times per week).

The survey received responses from 322 anesthetists, 180 orthopaedic surgeons, 102 gynaecologists, 101 plastic surgeons and 73 other and general surgeons. The hazards of surgical smoke has an overall national awareness level of 39.6%. This shows that the education on the hazards of surgical smoke, both laser plume and electrosurgical smoke, has not been greatly effective.

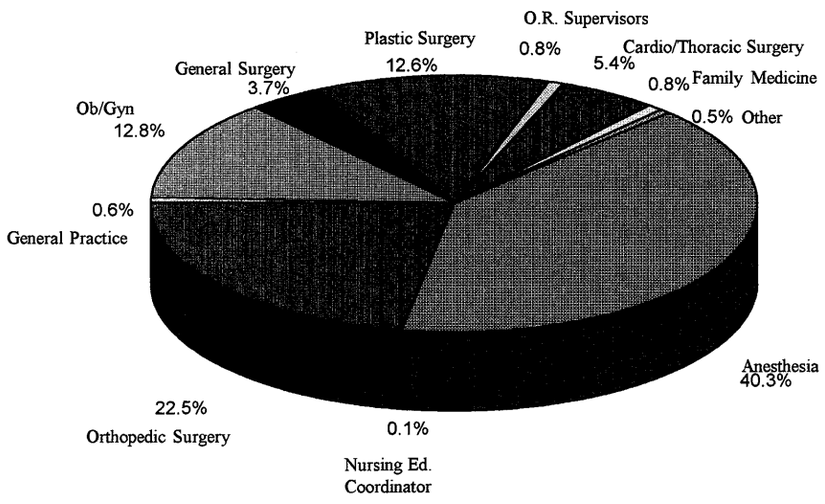
The survey shows that there is a direct relationship between awareness and concern of surgical smoke. The more aware a surgeon or professional is to the hazards of surgical smoke, the more concerned they are with those hazards. 62.6% of unaware respondents are concerned with the hazards of surgical smoke. This is compared to 85.5% of aware surgeons and professionals are concerned with surgical smoke.

Plastic Surgeons and anesthesiologists have the highest levels of awareness at 80% and 76.6% respectively. Anesthesiologists and plastic surgeons are involved in the most electrosurgery per week compared to other specialties surveyed. These two specialists are involved in electrosurgery more than ten times per week at 56.8% and 25.3% respectively. This further illustrates the argument that the more involved a surgeon or professional is with electrosurgery , the more concerned they are with the potential hazards.

The following charts illustrate returns.

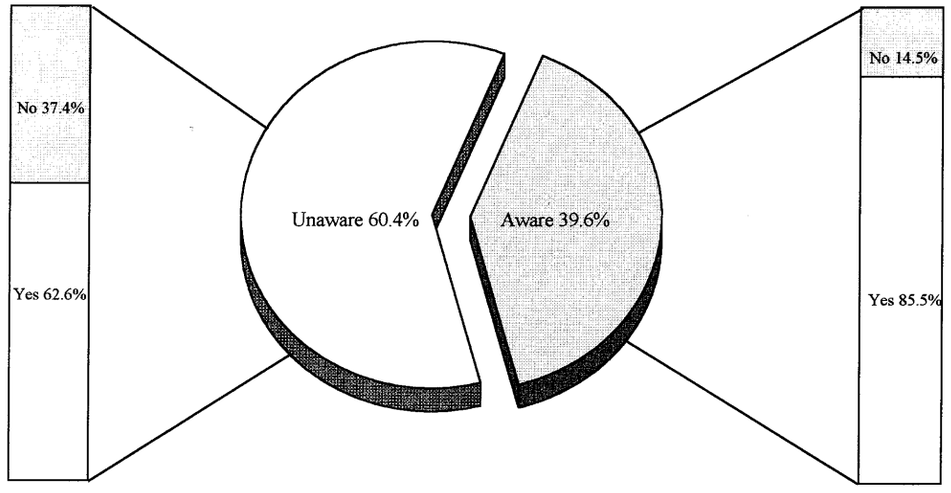
SPECIALTIES SURVEYED

OVERALL



AWARENESS RELATED TO CONCERN WITH SURGICAL SMOKE

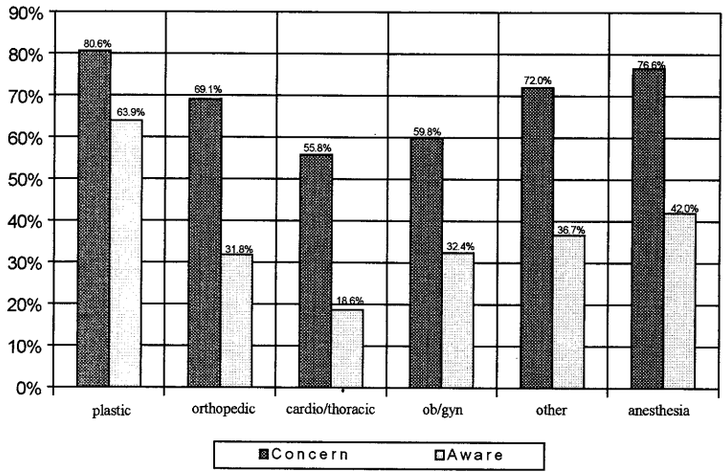
OVERALL



This graph illustrates that there is a direct relationship between the level of awareness and concern surgeons and professionals have to the hazards associated with surgical smoke. The more educated the person is to the hazards, the more concerned that person is to the risk.

AWARENESS AND CONCERN OF SURGICAL SMOKE

BROKEN DOWN BY SPECIALTY

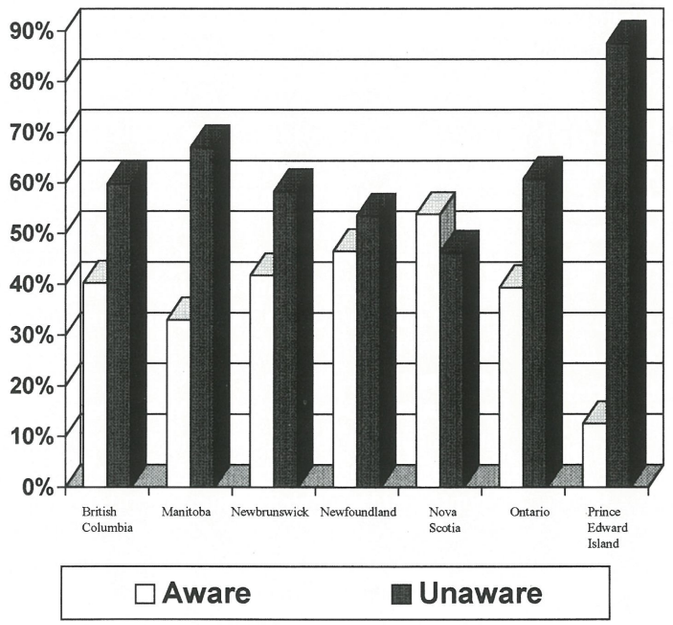


- Plastic surgeons have the highest level of concern(80.6%) and awareness(63.9%) of the hazards of surgical smoke.
- Anesthesia has the second highest level of concern and awareness as indicated by 76.6% and 42.0% respectively.
- It is interesting to note that the more aware a surgeon becomes to the hazards of surgical smoke, the more concerned they are of the hazards. This indicates that the surgeons who become aware of the hazards believe in the validity of the health risk associated with smoke.
- Cardio/thoracic is the least aware, and therefore least concerned specialty as indicated by 18.6% and 55.8% respectively.

OVERALL AWARENESS 39.6%

OVERALL CONCERN 71.8%

AWARENESS LEVEL BROKEN DOWN BY PROVINCE



- Ontario and British Columbia are representative of the awareness level of the country. Ontario and British Columbia have awareness levels of 39.3% and 40.2% respectively. When all surveyed province's data is tabulated together, there is an overall national awareness level of 39.5%

OVERALL AWARENESS 39.6%

Perioperative Team Building Through Decentralization and Empowerment

By Paul Shahroch-Shahi, RN, BSW and Sharon Gabriel, RN, BScN

In our current climate of economic restraints and health care restructuring, the delivery of health care in Canada has had to be reassessed in its mode of operation and the patient care delivery system. The need for assessment, planning, implementation and evaluation of a new proactive format of health care delivery requires a creative approach for health care managers and staff nurses. Nurse managers identify decentralization as a management method of achieving job satisfaction, cost containment, and improved patient care, (Lashinger and Shamian, 1994). Staff nurses identify power sharing as a means through which nurses become empowered through the shared interaction of management in achieving a similar goal or objective within the organization. Working together these goals can result in improved patient care, cost containment and job satisfaction while fostering decentralization and the empowerment process.

The purpose of this article is to discuss the facilitation and implementation of a workplace design in a perioperative setting which allowed for the professional growth and empowerment of a group of perioperative nurses while achieving the aims of decentralization within the organization.

Decentralization

The concept of decentralization within our nursing department was formalized in 1992 and introduced as an objective of the Joint Planning Group (JPG), a subcommittee of the Decentralization Nursing Program (DNP).

The JPG defined decentralization as:

". . . A philosophy, a process, and a state of being in an organization that fosters all members of the organization to be responsible, to be initiators, and to collaborate with others in relation to organizational activities and functions.

Decentralization requires a democratic system in order to build consensus. It also requires effective communication and coordinating mechanisms."

During this period, as well, another ongoing initiative in the Department of Nursing was the restructuring and redefinition of the role of the Nurse Manager, moving from a traditional director and leader to a role as facilitator and communicator. This change in role of the Nurse Manager was essential in order to facilitate the process of decentralization at the unit level.

0. R. Focus Group

Historically, within our perioperative environment there existed a committee of staff nurses elected by their peers, known as the O.R. Focus Group. This committee consisted of eleven members including full and part-time registered nurses and full time operating room technicians. The mandate of the committee was to identify and respond to issues unique to the unit. There had been some success in dealing with some issues, but outstanding and ongoing were the issues of conflict resolution, peer interaction, team work, and daily assignments. An internal review, in April of 1993 by the Associate Director of Perioperative Services confirmed these issues outstanding and endorsed the need to develop a model in which to address those issues and provide an ongoing framework for decentralization. The JPG initiatives were seen as a methodology in meeting the ongoing needs of both the staff nurses and nurse manager. The sharing of the JPG initiatives at the unit level led to consensus by the staff nurses to adopt and formalize the process of O.R. Decentralization. The O.R. staff agreed that the existing O.R. Focus Group with its current membership would initiate the first phase of O.R. Decentralization. The O.R. Focus Group invited the Nurse Manager onto the committee as a facilitator and communicator of the process of decentralization at the unit level, (Lashinger, and Shamian, 1994).

The O. R. Focus Group was given a mandate by the perioperative nurses to develop a workplace design which would incorporate the ideals of decentralization and empowerment which would be implemented for a two-year trial period. The O.R. Focus Group would develop the language, framework for the model, the implementation plan, team membership criteria, service specialties and the education process. The O.R. Focus Group were to present each phase of development back to the group at large to seek clarification and a consensus before proceeding to the next phase. By May,1993 the committee was prepared to meet the new challenge.

During the initial phase the O.R. Focus Group developed a structure under which the group would operate. The structure included committee duties such as selection of committee officials, quorum numbers, meeting times, and minute taking. Group decisions would be reached through consensus and that information would be shared with **all** disciplines within the perioperative setting.

The development of a mission statement which defined the group's ideology in broad terms was the first step to defining and identifying concepts and language as it pertained to the group process. From this first step the O.R. Focus Group expanded its conceptual terminology to include empowerment and decentralization.

It was noted that in deciding to implement this process, the first step of empowerment took place amongst the O.R. Staff. Whether this was recognized for what it was, or was inherent as a group trait, it was a milestone in the creation of the empowerment model.

Focusing on the viewpoint of sharing and the Joint Planning Group's definition of decentralization the O.R. Focus Group identified the potential for the empowering process within their workplace design. The act of the power sharing becomes represented as part of the empowerment process when it encourages not only organizational goals but personal mastering as well, (Clifford, 1992).

The O.R. Focus Group concluded that to successfully incorporate an empowerment model within the decentralization process the committee would need to define the terms and content of the meaning of empowerment and decentralization within a perioperative environment. The O.R. Focus Group hypothesized that the growth of empowerment comes at the staff level and the decentralization and power sharing comes from the management level of the organization, (Clifford, 1992).

Empowerment became defined as a process in which the perioperative nurse gains the capacity to interact within the environment which promotes and enhances his or her sense of wellbeing and satisfaction. Through the act of participation and interaction the process of empowerment develops from an identification of control and power to a feeling identified as self and professional autonomy, (Hepworth & Larsen, 1990).

Decentralization was defined within the perioperative environment as an act of power sharing in which participation improves the perioperative environment through shared goals between the staff nurse and management, (Clifford, 1992).

Life Model

The O.R. Focus Group reviewed a variety of theoretical models which incorporated the key concepts of empowerment and decentralization. The O.R. Focus Group identified the Life Model by German and Getterman (1981) as a framework for a workplace design that would foster nursing autonomy and develop strategies to increase job satisfaction and improved patient care.

Throughout this review process the O.R. Focus Group voiced concerns and opinions while struggling to define their role within the group and to the staff nurses. Active ongoing participation in team construction, consensual decision making, improved communication skills, collaboration, and shared responsibility, became characteristics which O.R. Focus Group members began to demonstrate. These attributes be-

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came, by definition, the philosophy of decentralization as defined by the Nursing Department at Mount Sinai Hospital.

Goals

The primary goal of the O.R. Focus Group was the development of a perioperative management model within the framework of the Life Model. To reach this goal the O.R. Focus group reviewed the physical set-up of the O.R., the daily staffing needs and assignments, how surgery services were defined by the medical model, and the major thrusts of the Hospital as stated in the Annual Report. The O.R. Focus Group also reviewed and defined the concept of teamwork and team construction within the perioperative environment.

The secondary goal requiring long term implementation was the increased awareness of nurses' ability to present themselves as a unique profession with a specific body of knowledge which directly influences patient care, at the bedside, and for the organization as a whole. The facilitation of self-governance would enhance professional nurses to become empowered within themselves, enhancing both their personal and professional growth.

An important developmental milestone for the group was their verbalization that not all nurses are alike and that the nature of health care delivery is dependent upon groups of people working together to provide specific tasks with expected outcomes. The group realized that multiple variables of personality traits: knowledge, skills, adaptation and coping capacities, would influence the successful integration or disruption for a team formation, (Farley, 1991).

Team Services

A review of the services which needed to be incorporated into the team structure and its relationship to the physical setting became the starting point for the team building process. The O.R. Focus Group redefined the surgical specialties into seven distinct service teams which were related by similar or complimentary resources. An example defined orthopaedics as being divided into Sarcoma and Joint Surgery with the specialties of Plastic Surgery and Neurosurgery as complementing the grouping. With this restructuring of service areas done, the O.R. Focus Group reported back to the group as a whole. Where a consensus was achieved in adopting these divisions. Formation of the Service Area was a relatively painless accomplishment and it fostered a sense of achievement of a tangible process as well as increasing the O.R. Focus Group's sense of self and identity through shared power - both components of decentralization and empowerment.

The O.R. Focus Group then reviewed the current O.R. Block Booking times of the services and potential growth of specific service teams. This information would contribute to the decision making process when determining the number of nurses required for a specific service.

Workplace Design

The O.R. Focus Group concluded that a decentralization model based on a team format specific to surgical specialties would meet the needs of the perioperative environment. These Service Teams would incorporate a three tiered nursing structure with team members being divided into three levels of nursing expertise, each being interrelated and connected and functioning as a unit.

The O.R. Focus Group identified and defined three team membership roles: team consultant, team member, and support member.

Team consultants had a mandate represented by a two-year commitment to the position. A team consultant would act as liaison to administration and the team members and deal with issues of team development, conflict resolution, and other service issues. Team Consultants would be expected to have well developed communication skills, leadership qualities and the ability to facilitate team development on a long-term basis. The ability to assess, encourage, and develop other team members to become potential team consultants and resource persons was a specific role expectation for a team consultant.

The next role, team members, represented the core of the service teams. Team members were responsible to the service teams for a one-year term and were seen as upgrading their basic skills to become potential consultants and resource persons.

Support members were the last level of team composition and were identified as individuals who did not seek a long-term position in a specialty area and floated every six months. All team members had access to these three positions providing they met the role expectations and criteria as defined by the O.R. Focus Group in consultation with the group at large.

It was identified by the O.R. Focus Group that individuals with specific areas of focus and different

levels of entry would enhance and foster team development in their area of preference. Commonality of goals and objectives would become a method or tool of team development. The 0. R. Focus Group hypothesized that when individuals are able to identify their role and purpose within the organization and identify themselves as part of the process and potential outcome, they internalize feelings of shared responsibility and ownership. This shared vision can empower the individual's perception of self-worth.

Team Goals

The O.R. Focus Group identified five team goals which represented a framework upon which to build the criteria for role expectation of team members.

The team goals were defined as:

1.) Our primary goal will be to provide continuous, individualized perioperative nursing care for the surgical patient.

2.) We will work together as a team of individuals recognizing each others strengths and weaknesses. We will assist each other to "develop" through effective communication and learning.

3.) Participate in available educational and "restructuring" opportunities related to our area of speciality in order to broaden our knowledge and understanding.

4.) Share responsibility in organization and maintenance of instruments, equipment and service specific supplies.

5.) To work collaboratively to create a positive atmosphere within the workplace.

With these goals in mind the O.R. Focus Group divided role expectations into the four categories of nursing practice: Clinical, education, research, and administration.

Clinical Practice

Clinical practice expectations were identified as those skills required of a perioperative nurse in the dual role of circulating of scrubbing expertise. These expectations included knowledge of ORNAC and AORN standards of practice, anatomy and physiology, appropriate documentation and professional membership activities which promoted professional development.

Education

Education expectations were defined as the acquisition of professional knowledge and personal growth in areas of interest. Education was seen as an ongoing process which could be represented by inservice participation, self-directed learning, or formal institutional learning.

Administration and Research

Administration and research expectations were minimal at the team and support member level. Administratively team members were expected to have a working knowledge of perioperative nursing. Team consultants were expected to be able to delegate and run the O.R. Suite for an extended period of time and problem solve issues as they arose. Team consultants were seen as actively participating in ongoing hospital wide research projects, while team members were encouraged to identify areas of potential research in the perioperative setting.

In defining team goals and role expectations the O.R. Focus Group identified the criteria for team members. Both the team and support members had identical membership criteria. The Team Consultant was expected to meet the criteria for team membership plus serve as a role model in professional development. The O.R. Focus Group recognized that what we as nurses defined as the maximum requirements for team membership was not something as professionals we had reached, but was a potentiality which was yet to be fully developed.

Communication

As the O.R. Focus Group was developing its criteria for its workplace design, communications was identified as a cointentional process emerging from the interaction of power sharing between management and staff nurses. According to Pamela Chally (1992) communication is defined as providing the tools of empowerment which lead to a joint actualization of a shared vision between the organization and its team members. This joint actualization process includes, but not limited to, the development of a positive self-concept, ongoing information sharing, positive and negative feedback, providing a supportive and flexible environment for its members, and providing an atmosphere conducive to creativity and the exchange of ideas.

Communication and its empowerment tools provides the movement which connects team members with shared vision and the empowerment process.

Application and Selection Process

For many OR nurses the process of applying to a specialized service in the perioperative environment was a dramatic shift in perspective. Nursing positions were perceived to have been randomly assigned with little reference to staff needs and service team requirements. The OR Focus Group developed an application and selection process based on a workplace design which represented specialty areas, as job competitions open to all members. The application process became a focus for professional development with a resume, cover letter and statement of intent as the criteria for admission to a team.

To provide support for the perioperative nurses in developing the skills required for the application and selection process, the clinical educator provided a series of inservices focusing on cover letter construction, resume writing and the interview process. There was a great deal of debate during the learning period, but the outcome was the highly polished, professional resumes and cover letters, and well conducted interviews.

The selection process was developed to encourage many staff members to become part of the team building process. The selection committee for the Team Consultants consisted of the Nurse Manager, a member of the OR Focus Group and a staff nurse. The selection for the Team and Support member consisted of the successful Team Consultant, Nurse Manager and an OR Focus Group member. The selection process was not without issue. For many of the nurses this was the first time they had written about their job, articulated their goals and faced an interview conducted by their peers, or they, themselves, conducted the interview.

This opportunity of choice facilitated the individual in developing a sense of identity with the process, accepting ownership for the workplace design, while fostering professional growth and personal achievement, both components of the empowerment process.

In June of 1994, the service teams were implemented for a two year trial. At the end of the first year an evaluation phase would be conducted by a new O.R. Focus Group with potential recommendations regarding the ongoing workplace design.

Outstanding Issues

The O.R. Focus Group was designated to oversee the two year implementation trial period but not to be part of the evaluation process. A new O.R. Focus Group with a new membership of perioperative nurse was to be developed which would formulate and design an evaluation phase with recommendations to be presented to the group at large within a year. During the first six months of implementation several issues were identified which required immediate intervention. These issues were based on staff quotas for specialty teams, scheduling conflicts, and length of stay for team members, especially the support member position. The original O.R. Focus Group recognized that these issues could not wait for the evaluation phase and that interim solutions needed to be formulated to address these issues.

In January, 1995, the O.R. Focus Group was responsible for initiating the rotation change of support members. Team consultants and support members identified the six month rotation period as being too short for support members, based on the impact of shift work and block bookings. Since not all specialties had been filled by team members the O.R. Focus Group made a decision to fill all team member positions and phase out the support member role until the Evaluation committee made its recommendation.

Transition Stage for New Members

During this time it was recognized that there needed to be a transition stage to facilitate new team members into new service teams. Discussion amongst the staff nurses raised issues including a redefinition of time frames, a redefining and downsizing of some specialty areas to accommodate a smoother transition period. The O.R. Focus Group acknowledged theses staff concerns and hoped that they would be demonstrated during the Evaluation process, but felt that the two year team consultant position could accommodate the transition period.

Another outstanding issue during this period was scheduling conflicts between the service teams and the team membership . Blocks of surgical time were not always filled by the designated specialty and on any given day it was possible to have more team members scheduled than was needed. The surplus nurses would then be allocated to other specialty areas. Great resentment arose if team members were floated out of their specialty area. This was an ongoing concern which was addressed at several inservices to find ways of accommodating the problem. It was exciting that nurses were taking ownership of their teams, but disappointing that the team concept resulted in inflexibility .

The O.R. Focus Group recognized that in this current climate of constantly changing health care requirements and professional changes within the nursing profession, tension and anger are a byproduct of this process. During the trial period the perioperative nurses expressed a range of feelings to the O.R. Focus Group. This was seen as a positive reaction to the

Team Consultant Role

NURSING PRACTICE	EDUCATION	ADMINISTRATION	RESEARCH
Understands and follows OR & Hospital policies, practices and standards, and updates as appropriate using ORNAC and AORN Standards.	Provides ongoing information regarding specialty areas, updates kardexes, encourages and develops knowledge-based through teaching, i.e. O.R. procedures, complications, outcomes.	Organizes and identifies problems in relation to booking and changes in surgical procedure, anesthesia and individual patient needs. Communicates with all personnel involved.	
Demonstrates in-depth knowledge in the day-to-day running of the O.R.	Supervises nursing staff and auxiliary staff in the care and handling of equipment and instrumentation safely and aseptically.	Organizes and coordinates staff according to procedure and level of knowledge and capabilities.	
Demonstrates leadership ability. - Acts as a role model - Coordinates activities in a positive, pleasant, helpful and efficient manner. - Communicates effectively with multidisciplinary team.	Provides an atmosphere for ongoing learning, i.e. self-motivation, cooperative collaboration,	Provides positive and constructive feedback on job performance of self and nursing team through an objective peer review format.	Makes all members aware of ongoing hospital and procedural changes and College of Nurse perspective based on ongoing research findings.
Ensures prothesis, instruments and equipment are available and in good working order.	Encourages an awareness of an avenue for publication	Ordering, repair and maintenance of prothesis, instruments and equipment.	
Participates in ongoing quality improvement in documentation	Demonstrates the ability to encourage and develop other team members in achieving team leader role.	Assess strengths and weaknesses of team members to provide support as necessary and help to develop a plan to meet those needs.	Encourages all members to participate in research formation and design, i.e. - formulation of research topic - development of research projects - seeking appropriate avenue for funding - evaluation of findings - publication of research results
Observation and immediate appropriate response to urgent, emergency or complicated situations.			
Utilizes appropriate channels to resolve conflicts, concerns and issues.			
Acts as a resource person and demonstrates expertise and knowledge in a specific service,			
Demonstrates ability to assess, plan and implement urgent, emergency or complicated situations.			

Editor's Note: The authors of this article also presented a similar chart "Team Member Role" with the original manuscript. Both charts were prepared by Mary Ann McDonald and Kay Osmond. Regrettably we do not have the space for the presentation of both charts.

empowerment process because it established ongoing dialogue between staff nurses and those individuals instituting change, (Hackman).

Conclusion

In conclusion, teams in the perioperative setting are one method to decentralize decision making, empower nurses and provide a basis for restructuring that will move perioperative services into the 21st Century. Perioperative staff nurses are beginning to interact with multidisciplinary teams at the unit, program, and corporate level.

Decentralization is a management model which can achieve nursing empowerment through job satisfaction and autonomy, resulting in improved patient care. The attributes of autonomy and empowerment allow for nurses to facilitate professional growth and achieve ownership of their profession. The result can be an autonomous, self activated professional body of health care providers .

This experience continues to be ongoing with the evaluation phase presently being implemented.

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Continuous Quality Improvement: A Perioperative Nursing Approach

By Cindy Bruce-Barrett, Sherry Espin & Catherine Reichert

Abstract

This article describes in detail the steps taken in the Operating Room at the Toronto Hospital in implementing a Continuous Quality Management framework. Focusing on active participation, all levels of the O.R. staff worked through a process of identifying, developing, measuring and evaluating standards of practice. A step by step framework was followed in order to monitor current standards and develop new ones, thereby complying with the institution's mandate of supporting Continuous Quality Improvement.

Since the 1980's, the health care community has shifted its interest from the traditional model of Quality Assurance to Continuous Quality Improvement. Most of the current work in this area originated from the efforts of Edward Deming in post war Japan. Deming developed a variety of techniques that North American industrialists adopted in response to the threat of Japanese competition. By the mid 1970's, Continuous Quality Improvement (CQI) had been successfully implemented by three of America's largest corporate giants; namely Xerox, Motorola and 3M. The Toronto Hospital, has kept pace with this emerging trend as they strive towards becoming a world class leader in patient care, education and research. By adopting Continuous Quality management, the institution will gain the direction it needs for achieving its mission "doing the right things right".

Continuous Quality Improvement is a proactive approach to managing organizational activities while focusing on systems improvement and mutidisciplinary collaboration. There are five key components of the CQI framework that help to influence practice and create situations whereby quality "happens". These include a)Patient/Customer Focus; b)Total Staff Involvement; c)Measurement; d) Organizational Support; and e) Continuous Improvement.

Of paramount importance to the successful implementation of the Quality initiative is the involvement of staff from all areas of the Toronto Hospital (patient care, research, administration, support services). Everyone must actively contribute to the assessment and measurement of quality within their department on an ongoing basis. Quality is measured in terms of the seven dimensions of Quality which are inherent to the CQI framework. These include a) Accessibility; b) Acceptability; c)Appropriateness; d) Competence; e) Effectiveness; f) Efficiency and g) Safety.

Acceptability examines whether the care or service provided actually meets the expectations of a department's patient or client. Accessibility involves the ease with which required care and service is received. Appropriateness determines whether the correct care and service are delivered. Competence explores the skills, knowledge and personal qualities of staff providing care. Effectiveness looks at whether care and service are being provided properly. Efficiency measures the degree to which care and services are administered employing a minimum of effort and expense. Lastly, safety ascertains what potential risks are avoided

Authors

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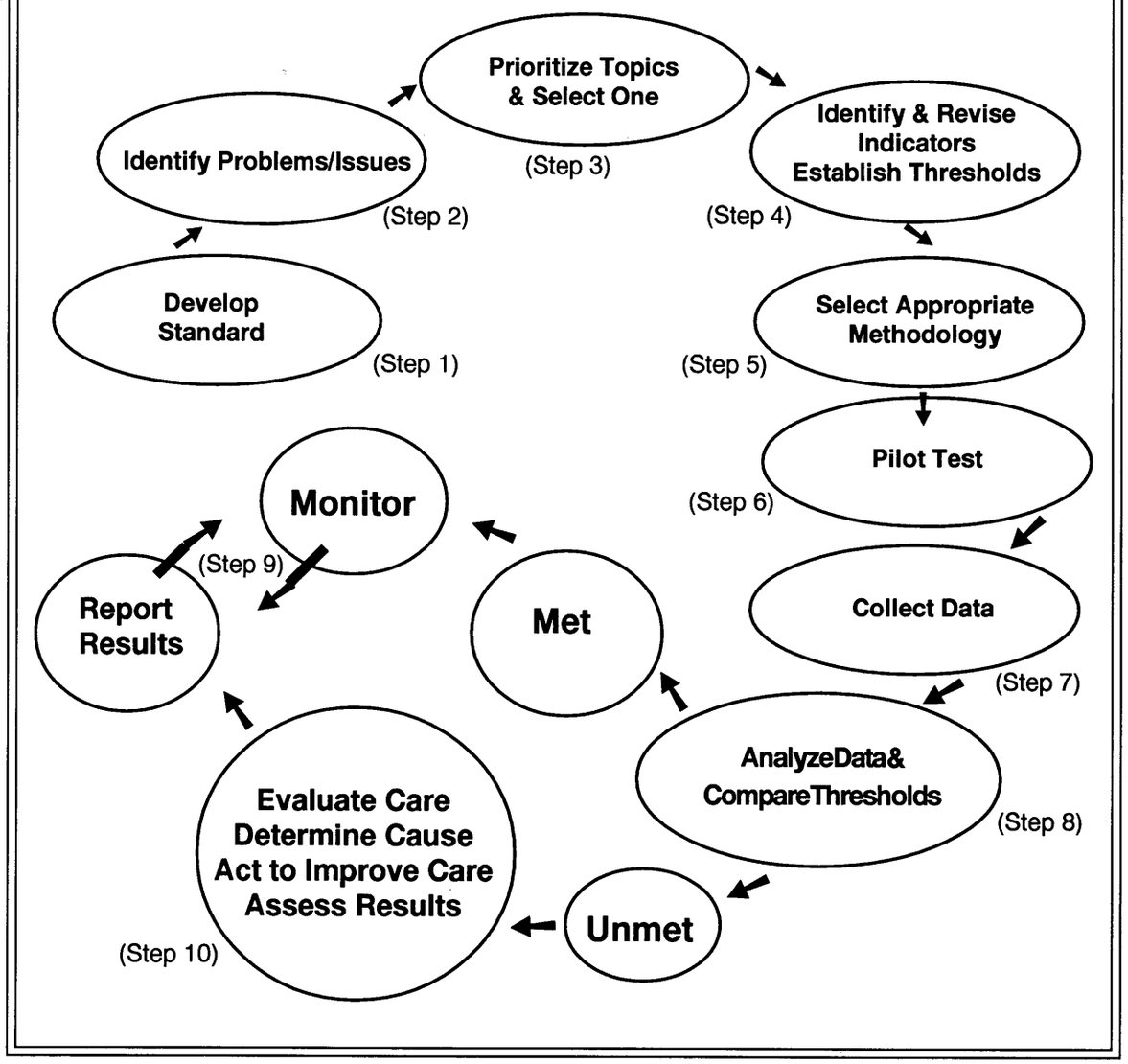
Figure 1



and/or minimized.

Initially, nursing staff in the Operating Room faced the hospital's challenging mandate with trepidation. This framework and the reporting structure were very new and unfamiliar to most of us. Within a relatively short time frame(4 months) however, we were able to introduce the framework and implement a formal process for standard development and quality measurement . Our apprehension has since given way to new found confidence in our abilities, as well as a sense of determination to continue the pursuit of quality within our peri-operative nursing practice.

The drive towards implementing the Quality framework began with a massive, hospital-wide education strategy. Staff were encouraged to participate in a two hour workshop that helped them learn the fundamental principles of Standard development. In the Operating Room, staff nurses, educators and managers all attended the learning sessions in order to establish the foundation for assessment and building of nursing practice and patient care standards.

Develop Standards

Within the Operating room, the clinical educators recruited staff to join small work groups. The purpose of the groups was to develop unit based standards of patient care. (See Step 1 - Figure l) Four criterion were used to identify those aspects of practice that staff considered imperative to the service provided by the O.R. These included areas that were a)High Risk, b)High Volume, c)High Cost and d)Problem-prone.**(See Steps 2&3 - Figure l)** Each of the Toronto Hospital's divisions(Toronto General and Toronto Western) developed two standards based on the criterion. The standards included a)Surgical Counts, b)Maintenance of Skin Integrity, c)Aseptic Technique and d) Consents.

The first task for the working groups involved writing a descriptive statement of what the expected level of performance was. This statement became the benchmark against which quality would be measured. In developing our standard statements, we defined expectations of particular roles and evaluated the performance of care we expected to provide. We then derived indicators from our chosen standards. Literature has described an indicator as a quantitative measure to monitor the quality of care or service that is provided(Schyve and Provost,1990). In the Operating Room, we used indicators to direct our attention to the problem areas within our current practice.**(See Step 4 - Figure l)**

The developmental format we chose to address our chosen standards consisted of three distinct parts. Firstly, a statement of the standard is given. Secondly, the expected outcomes are identified and lastly, the process of how to achieve the outcome is described.

The working groups approached the development of critical indicators with these three key points in mind. The indicators, by definition, had to be measurable, well defined and valid. It was also important that the indicators be worded in such a way that they would solicit a Yes or No response. This latter point became necessary when developing a "user friendly" audit form. The ability to use a "check-box" format was far more practical for O.R. staff particularly with their exposure to time and staffing constraints. **(See Step 5 - Figure l)**

Pilot Test

After much discussion and revision, the completed audit tools were implemented. Staff who had not participated in the Standards working groups were updated through inservice presentations. Written instructions augmented the presentations and provided greater detail regarding the audit tools and the chosen standards.**(See Step 6 - Figure l)**

The first audit involved Surgical Consents. We asked nurses to complete one audit form for all patients every third day for a period of six weeks(day shift only). This proved to be far too lengthy a time period for auditing however, since the amount of paper generated was enormous and compliance with completing the audits gradually declined. Some of the audits were not completed hence, they had to be discarded. Despite these minor problems, the amount of data gathered was highly significant. In subsequent audits, the actual auditing time frame was reduced to include all patients, every day for a period of 2 weeks(day shift only). This revised frequency proved to be a better balance between quantity and quality of completed audits. **(See Step 7 - Figure 1)**

Analyze Data

Upon completion of the first audit period, data was compiled onto the data collection forms. Results were then transferred to Quality Status Report forms that were implemented hospital-wide. The results of the audit provided a baseline ("where we are now") against which subsequent audits could be compared. The threshold("where we want to be") was agreed to be 100% for all of the indicators. Identification of baseline and threshold values enables us to measure our improvements in a practical and concrete way. To date, we have found that compliance with the standards measured was within range of the desired threshold. Comparisons were made with those indicators which fell below threshold. Data was analyzed and reviewed by the O.R. staff to help heighten awareness and consider revisions to practice.
(See Step 8 - Figure 1)

An educational inservice was given to present the results of the audits to the nursing staff. To make the presentation interesting and enjoyable, the Standards working groups (Toronto General division) reviewed the results of their audit and then presented a video that they had created. The video clearly demonstrated the more salient points with respect to aseptic technique and O.R. counts.

Evaluate Care

After analyzing the collected data and comparing it to our identified thresholds, we must now decide how to proceed. Essentially, if the threshold has been achieved, we will continue to monitor our practices and report the results on a quarterly basis **(See Step 9 - Figure 1)**. If the indicators are below threshold, we will make modifications to our practices. Once this is accomplished, we will then re-evaluate our improved practices to determine whether we have achieved the desired outcomes. **(See step 10 - Figure 1)**

Peri-operative Nursing at the Toronto Hospital intends to move forward in support of the Quality initiative and the institution's commitment to excellence. Through an established standard development process, nurses will be able to monitor existing standards as well as evaluate new methods of practice. Education and ongoing evaluation will play a vital role in our future endeavors if we are to continue to be successful in the implementation of a Quality Management framework.

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How to Submit Your Article to the OR Journal

The Canadian Operating Room Nursing Journal is intended to serve the information needs of perioperative nurses in hospitals and clinics throughout Canada. Readers include staff nurses, head nurses, nursing supervisors, coordinators, clinical instructors, directors of nursing and many other speciality nurses. The journal is peer-reviewed and published quarterly by Health Media Inc. under the aegis of the Operating Room Nurses Association of Canada (ORNAC).

Manuscripts are reviewed by the editorial review board members appointed by ORNAC, and when necessary by outside experts. Submissions are invited on new surgical techniques, descriptions of new technologies or new programs and educational material. Selection is based chiefly on the following criteria: originality, timeliness and relevance to the needs of the journal's readers.

Preferred length is approximately six to ten typed, double-spaced pages, numbered consecutively throughout(including tables, figures,references,which should be on separate pages). Authors should submit **three copies** (one should be the original or an excellent photocopy) of the manuscript and include:

1. An abstract summarizing the article.

2. An autobiographical statement that includes the author's full name, current title and academic qualifications. e.g. Jane M. Smith, RN., M.N.; is head nurse, Thorasic Surgery Unit, General Hospital, Perth, ON.

All illustrations, graphs, tables, etc. should be clearly labelled and, if necessary, reference should be made as to where they are to be inserted in the text. The author should submit the original manuscript and two(2) copies for reviewers. A copy of the edited text will be sent to the author for final approval.

References are arranged in alphabetical order by author surname. References are cited in the text by author-date method of citation, e.g. (Smith, 1987). Follow the APA Manual for style when typing the list of References, e.g.:

Smith, M. & Curtis, J. (1987). Ethics in Nursing (2nd ed). New York: Oxford University Press.

Benjamin,G. (1987).Opportunities for nurse entrepreneurs. *Nursing Outlook* 35(4),182-184.

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Authors will receive a letter from the publisher announcing reciept of the article. Later a letter of acceptance and possibly some revisions may be suggested by the editorial review board.

Manuscripts submitted to the Journal **should not** be submitted to another publication or newsletter while under review or awaiting publication.

Award for Authors valued at $3000

In 1983 with the launching of the "Canadian Operating Room Nursing Journal", Johnson & Johnson Medical Products committed an annual $3,000 award to be presented to the author of the best article of the year published in Journal.

The award recognizes Canadian nurses who contribute to the advancement of perioperative nursing knowledge and education of their colleagues through the medium of the Journal.

The Editorial Awards Committee was established in 1983. The first award was presented at the National Conference in Jasper in 1984, and is presented annually at the National ORNAC Conference or at a Provincial Meeting. The recipient receives a plaque as well as the cash award which is administered by ORNAC. This year's Awards Committee Chairperson is Shelly Zareski of Halifax, Nova Scotia.

ORNAC/Johnson & Johnson Medical Products

Bursary for OR Nurses

By Shelly Zareski
Chairperson
ORNAC Awards Commmittee

This bursary was established to financially assist ORNAC members in furthering their education in areas that will enhance perioperative nursing practice. The ORNAC Awards Committee, comprised of members from across the country, choose successful applicants in accordance with established selection criteria

Eligibility Requirements

The applicant must be a registered nurse who is licensed with the Provincial Professional Association. The applicant must also be an active member of the Provincial Operating Room Nursing Association two consecutive years prior to submitting the application. The individual must be employed, with a primary focus on perioperative nursing, according to the official ORNAC definition.

Funding is available for post basic operating room nursing programs approved by ORNAC, Baccalaureate nursing programs and Masters and Ph.D. nursing programs related to health care and considered an enhancement to existing perioperative employment.

Application Requirements

The personal profile / resume must be typed and supporting data enclosed with the completed application form. The application will not be considered if this criteria is not met. This data includes letters of reference as indicated on the application form, photo copies of nursing license, membership in a provincial OR association, perioperative nursing certification (if applicable) and proof of acceptance in an education program.

The complete, typed application form and supporting documentation must be submitted to the Chair of the ORNAC Awards Committee before is **March 15th each year.** This information can be found in every issue of the *Canadian Operating Room Nursing Journal*. Late submissions will not be considered.

This bursary is jointly funded by Johnson & Johnson Medical Products and ORNAC and is administered by the ORNAC Awards Committee. The applications are judged by the committee based on established criteria. If there are no suitable applicants, the award will not be presented and funds will be carried over to the next year. Bursary funds are designated specifically for tuition and books. Final approval for disbursement of funds rests with the Awards Committee and the ORNAC Board of Directors. At the end of the term, proof of successful completion of the course must be forwarded to the Chair of the Awards Committee in order to close out the file.

ORNAC recognizes that the education of perioperative nurses plays a pivotal role in providing a strong and successful national organization. The ORNAC Executive and Board of Directors appreciates the financial support provided by Johnson & Johnson Medical Products.

ORNAC in a Nutshell

The Board and Executive of the Operating Room Nurses Association of Canada met in Toronto, November 4th and 5th, 1995. The meeting was attended by five executive and 19 Board members. Following are highlights of the two day meeting.

1. The Becton-Dickinson Safety Compliance Video is complete and although available, few hospitals across the country have actually been involved in this education program.

2. Guidelines for the Maintenance of ORNAC historical items have been developed, approved by the Board and become part of the Rules & Regulations Manual.

3. Approval was given to assist speakers at AORN International Conferences by paying the Registration fee in American funds.

4. Joan Hutchins, Clinical Educator OR in Kingston, presented an overview of a Preparation Seminar for perioperative Certification.

5 . The Bylaws Committee is in the process of revising the format of the Rules & Regulations manual. Two revised policies were presented and accepted by the Board.

6. The Awards Committee has revised information, application forms and scoring systems on the Awards given by ORNAC and the J&J Company. An article on the historical background of the Awards has been prepared for the JOURNAL in both French and English.

7. The 1 5th National Conference for the Operating Room Nurses Association of Canada will be held in Ottawa, April 27 - May 2, 1997. Location will be the Congress Centre in Ottawa and the theme is "Changing the Guard. Planning for the next conference included board approval on, "NEAC's sponsoring of the Keynote Speaker", and "Approval to sell health related text books at the National Conference".

8. The Research Committee presented a preliminary report on data analysis of the questionnaire "Sacred Cows". Research is required on the difference nurses make to direct patient care. CNA will be approached on this matter.

9. The Standards/Education committee circulated schedules for the Spring TELEMEDICINE Canada sessions.

The WASCANA OR program has met ORNAC's recommendations to indicate it is an RN program and approval has been extended for another year.

Review of ORNAC Standards has begun in preparation for the revised document due in 1998.

The first Certification exam saw 495 applicants pass and make Perioperative Certification the largest first group to have written a certification exam. Exam item writing is ongoing and accomplished by members of ORNAC. Pamphlets, posters and booklets on Certification are available from CNA.

CAS Task groups report on Anaesthesia Assistant was approved in principle by CAS Council .

The new chair of the Advanced Nursing Practice Committee is Faye Meuser.

ORNAC will approach CNA to develop a study guide for the Certification Exam.

ORNAC continues be invited to and attend the CAS meetings to have a say in the role of the Anaesthesia Assistant. ORNAC will continue to have a representative on the NAFTA Committee for Nurse Anaesthesia Educational Requirements and Mobility between North American Free Trade Agreement (NAFTA) Countries.

10. Board approval was given for money donated by J&J Medical Products to be used to make a promotional video on ORNAC and OR nursing. ORNAC will contribute and equal amount for this.

11. The Editorial Committee reported the continuing need for more articles. An effort will be made to have French articles in the magazine.

12. The environmental committee has new manufacturer's representatives and is preparing a position paper on Environmental Issues as seen by ORNAC.

13. French Translation of the mission, value, vision and goals has been accomplished. This committee will make every effort to see that the 1998 French Standards document is ready for sale at the same time as the English version.

14. Public Awareness will be developing guidelines for ORNAC pamphlets and updating those in place.

15. ORNAC is represented at CNA and assisted in Focus validation of CNA's Code of Ethics.

16. A report on the International Planning Committee indicates that countries would like to have more input into the planning of conferences and choice of sites. The next World OR conference is confirmed for Toronto, Sept. 8th to 12th 1997.

17. Provincial highlights indicate:

•Research required for "Why RN's are needed in the Operating Room.

• Caution to all with governments attempting to remove nurses from the OR.

• Regionalization and closure of hospitals continues across the country.

Adapted from the Minutes of November 4th & 5th 1995 by **Corina Balcom**, Secretary.

Harvard study concludes workers on rotating shifts have a 50% higher risk of a heart attack

Shift workers who have worked rotating shifts for six years or more have a 50% higher risk of heart attacks than those who have never done shift work, a study by the Harvard School of Public Health has found.

"Shift work may be a stressor on the heart due to biochemical changes caused by changes in sleep patterns," said Dr. Ichiro Kawachi, one of the authors of the study published in the December issue of *Circulation*, a publication of the American Heart Association.

The researchers found that women who work shifts have higher rates of smoking, hypertension, and greater body mass. Kawachi pointed out that it was surprising that there are not more studies examining the health impact of shift work when more than one-fifth of all workers engage in some form of shift work duty. Shift work for the researchers was any work performed beyond the conventional eight-hour work day, i.e., night work, rotating shift work, and unscheduled hours.

Rotating night shifts are particularly disruptive to sleep, to eating patterns, and to social activities. They are also associated with reduced job performance and higher stress, the study found.

120,000 nurses studies

The study was conducted on over 120,000 nurses between the ages of 42 and 67 as part of a nationwide follow-up study in the U.S., which began in 1988. A further study of younger nurses is already underway.

OR BURSARY

The ORNAC/Johnson & Johnson Medical Products Bursary is offered to financially assist members of the Operating Room Nurses Association in Canada (ORNAC) in furthering their education in areas that will enhance perioperative nursing practice.

Applications are invited by ORNAC's Awards Committee yearly. Deadline for submission is March 15th. Bursary application forms are available from:

Shelly Zareski
Chairperson
ORNAC Awards Committee
5572 North Ridge Road, #1206
Halifax, Nova Scotia
B3R 5K2
Telephone (902) 454-0463
Fax: (902) 428-3214

Meetings & Conferences

May 3 & 4, 1996
Canadian Association of Nurses in Independent Practice - sponosoring "New Visions - The 11th Annual Conference & AGM. Theme: New Visions. Keynote Speaker: Susan Augustine, Ph.D. Subject: Positive Risk Taking in the 90s. Place: Notawasaga Inn, Alliston, Ontario. Contact: Mary McCaffrey. FAX: (519) 747-5003, Ph: Message (519) 271-3715.

Call for Abstracts and Posters

The Canadian Nurses Association
is calling for Abstracts and Posters for the
CNA Biennial Convention
Halifax, Nova Scotia
June 16 to 19, 1996.

Share your experiences in practice, research, management and education. "Ask A Nurse" is the convention theme. There are three ways for you to describe how you have made a difference. You can respond to CNA's call for Abstracts or call for posters, and if selected, tell your story in person at the convention. Or you can submit a written summary of your ideas that worked for possible distribution among convention registrants. For submissions contact:
Pat Mohr, Conference Coordinator,
CNA, 50 Driveway, Ottawa, ON.
K2P 1E2. Tel: (613) 237-2133 or1-800-361-8404.
FAX (613) 237-3520 . Deadline for Submission is March 15, 1996.

In Memory

Lorne Flower

We are sad to learn of the death of Lorne Flower on December 4, 1995.
Lorne Flower was well known to many O.R. Nurses. He was recognized for his expert knowledge of surgical instruments, and respected for his sincerity, integrity and enthusiasm. He was a friend of O.R. Nurses. Lorne was also very much a part of ORNAC, having been a member of the original National Exhibitors Advisory Committee, which was inaugurated in Jasper, Alberta in 1984.
I am told that Lorne Flower also helped ORNAC draft the Constitution and Bylaws. He will be sadly missed.

Vija Hay
President, ORNAC

O.R. Calendar

March 14, 15, 16, 1996
BCORNG 15th Biennial Conference, Victoria Conference Centre, Victoria, BC, sponsored by the British Columbia Operating Room Nurses Group.

Entertainment includes 'Mini' All Sooke Day Logging Show, Bar-B-Que Salmon Supper and Dancing. The Thursday Night Banquet will features the CBC's popular Vicki Gabereau.

Registered nurses to contact: Carmen Moore, Registration at FAX: (604) 655-3640 or Tel: (604) 656-5770. Publicity Yvette Kelly, OR Bookings, Royal Jubilee Hospital, Victoria,BC. Theme: "Riding The Waves".

May 6-8, 1996
Operating Room Nurses of Ontario 4th Provincial Conference, International Plaza Hotel, Toronto. Sharon Ball, Exhibit Chair, Janet MacCullouch, Publicity Chair.

June 14&15, 1996
The Manitoba Operating Room Nurses Association and the Manitoba Association of Post Anesthesia Nurses 3rd Joint Provincial Conference. Holiday Inn, Crown Plaza, Winnipeg, MB. Conference Contact: Marian Ulyatt.
Fax:(204)254-4423

ORNAC '97 - April, 1997
15th National ORNAC Conference
Ottawa,Ontario.
Sponsored by the Canadian Operating Room Nurses Association,

September, 1997
World Conference of Operating Room Nurses, Toronto, sponsored by the American Operating Room Nurses Association.

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