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PERIOPERATIVE NURSES COLLEGE N.Z.N.O

The Dissector

Journal of the Perioperative Nurses College of the New Zealand Nurses Organisation

June 2018, Volume 46, Number 1

OTORHINOLARYNGOLOGY

Auditory brain stem implant • Transoral robotic surgery • ENT emergency

EDUCATION

Neuroradiological Management of Acute Ischaemic Stroke • Surgical Smoke Plume Survey

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The DISSECTOR

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for writing articles intended for publication in *The Dissector*. The Editorial Committee of *The Dissector* welcomes articles, reports, book reviews, letters to the editor, exemplars, case study experiences, research papers/projects, theatre or section news etc. Guidelines that are designed to help first-time authors as well as those who have published previously are available on request from members of the Editorial Committee.

Remembering Florence, again . . .

Welcome to the June issue of '*The Dissector*.' I was recently asked for a copy of Heather Richardson's article that was published in the March 2016 issue of *The Dissector* (Volume 43, Number 4) highlighting the life of Florence Nightingale. The nurse making the enquiry felt it was a great and indeed timeless translation of the work of a nurse, important at a time when nurses are angry, and managers and politicians need to be reminded of the essence of nursing.

The article in question followed the theme of the 42nd Perioperative Nurses College Conference in Palmerston North "Reflection and Action" where Florence's story was presented. This theme seems particularly pertinent at this time. It is also very encouraging when articles that have clearly had an important impact on colleagues continue to be appreciated and, in this way, live on.

Plastic surgery history

For this issue, Juliet Asbery presents Part II of her personal, on-location research around the development of plastic and reconstructive surgery. It is not only interesting to see the emergence of flap and grafting techniques critical in managing World War II casualties, but to be reminded of the emergence of formal nursing education and registration in the United Kingdom in 1919. Of particular importance was recognition of the critical part nurses played in caring for and supporting their patients through their long and difficult recovery from severe wounds and burns.

While reflecting on where we have come from, the first recognised training school in New Zealand was established in 1883 and Ellen Dougherty of Palmerston North became our first Registered Nurse in January 1902 (Richardson, 2015).

Otorhinolaryngology

The June issue also features three articles with an otorhinolaryngology (ORL) theme. *Dissector* Committee member Feng Shih provides another fascinating and detailed case study of a patient undergoing an auditory brain stem implant to restore her hearing, after the removal of bilateral vestibular schwannomas. Continuing on the new technology theme, Deborah Woodcock looks at transoral robotic surgery (TORS), the establishment of this service in her workplace and the patient benefits. June Richardson looks at three ORL emergencies involving uncontrolled bleeding in a short article based on her presentation from the 43rd PNC Conference in Dunedin.

Ischaemic stroke

Gillian Martin provides an overview of the interventional neuroradiological management of acute ischaemic stroke and the changes she has seen in the course of her nursing career. The article is based on her presentation from the 44th Perioperative Nurses Conference.

In her role as Radiology Clinical Nurse specialist at Auckland City Hospital, Gillian has recently sourced a number of new books for the department and provides reviews of these new resources.

Scientific meeting

A synopsis of the Asia Pacific Society of Cardiovascular and Interventional Radiology (APSCIVR) scientific meeting held in New Zealand for the first time and involving a number of experienced medical imaging nurses is also provided in this issue.

Smoke plume

Perioperative Nurses College Chair Johanna McCamish summarises the findings of the Surgical Smoke Plume Survey conducted as part of your College registration last year. Johanna emphasizes the well documented fact that surgical plume is an occupational hazard. Despite this, it is concerning that 43 per cent of Perioperative Nurses who answered the survey still do not believe inhaling surgical plume is harmful. Please review the resources on the subject available on the Perioperative Nurses' College website or *The Dissector* (2016) 43 (4).

Planning

The Dissector Editorial Committee met recently to plan material for the coming issues. Next year we would like to publish an issue looking at the impact of obesity across the perioperative continuum and another with a paediatric focus, material permitting. Please do not hesitate to contact the Editorial Committee members with your ideas.

Shona Matthews, Chief Editor

Reference Richardson, H., (2015). Florence Nightingale's visit to NZ Perioperative Nurses Conference. *The Dissector,* Vol. 43(4), 36-41.

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Anaesthetic scope of practice consultation

Welcome to another edition of *The Dissector*. This Table Talk will provide an update on the anaesthetic scope of practice consultation and an overview of things learnt from the 2018 AORN (Association of periOperative Registered Nurses) conference.

Anaesthetic Technician Scope of Practice Documents

At the time of publication of the March edition of *The Dissector*, the Anaesthetic Technician Scope of Practice discussion documents were just being released. From the consultation document, a conclusion has been released. The Medical Sciences Council of New Zealand has released the information that the following steps will be taken:

- There will be no change in the title of the Anaesthetic Technician;
- Revised competence standards have been aligned with the Anaesthetic Technician scope of practice.

Further information and consultation outcomes are available on the Medical Sciences Council website. (https://www.mscouncil.org.nz)

AORN Overview

This year's AORN Conference in New Orleans in March was run under the theme "Embrace Action: Mind, Body and Spirit."

Attending the AORN Conference was a pleasure and a privilege, representing New Zealand as part of the significant International global representation. The conference and Expo was made up of presentations, trade stands and poster presentations, along with the networking and communication with leaders within the perioperative international community.

There were re occurring themes throughout the conference including communication, leadership, distraction in the OR (operating room), retained surgical items, the importance of first cases starting on time, patient-centred care and practice drifts.

Examples of studies included:

'A Comparison of Pre-operative Fasting Regimes': Poster presentation by P Boyle and D Inouye.

A literature search was done looking at practice guidelines for adult patients undergoing elective surgery. The practice of consumption of fluids up until two hours before surgery was compared to the older practice of nil per mouth after midnight. The study looked at the negative effects on perioperative patient outcomes, including the increased risk of pulmonary aspiration, increased insulin resistance, hospital length of stay and nausea, hunger and thirst. The authors concluded the implementation of a fasting regimen that included a beverage consumption protocol provided the perioperative patient the best chance of achieving optimal clinical outcomes.

'The PACU Residency Programme': Poster presentation by K. White-Edwards and H. Tran.

The PACU residency programme aligns to the New Graduate programme in New Zealand and looked at new staff and new graduates to the post anaesthetic care unit.

Research demonstrates that new graduates were unable to apply clinical knowledge to their nursing practice, having low levels of confidence in nursing skills.

The nurses in the PACU residency programme were divided into two groups, a simulation group and a non-simulation group, to enable a comparison of which group had the greatest improvements in confidence levels following a simulation education programme compared to an education programme that did not contain simulation. The nurses in the simulation programme showed a greater increase in confidence when compared to the non-simulation group.

Patient discharge from PACU

The topic of discharging and transporting patients in a timely manner to maintain flow and prevent bed blockage in the post anaesthetic care unit has been discussed on numerous occasions. In a poster presentation, a push / pull concept was discussed. In the past, the perioperative area has instigated (pushed) to move patients from the post anaesthetic care area. The pull concept looked at the wards (floor nurses) taking the initiative to pull the patient to the ward and making contact with PACU.

On bed allocation, the patient management computer system alerts the ward the patient is ready for discharge from PACU. The ward then calls PACU for a handover and the patient is transferred. This is able to work in the United States due to the computer and communication systems in place.

Improving First Case Starts

A theme that was repeated throughout poster and oral presentations was first case starts. First case starts have a big potential to increase efficiency and impact on the theatre for the day. Studies looked at why late starts occurred and how these could be improved.

When looking at why late starts occurred, themes of surgeon delay, patients arriving late to the hospital for surgery, bottleneck in the pre-op. admission area so patients may not be ready in a timely manner, and the theatre room not being ready were indicated as problems.

There were a number of studies done that provided recommendations of team communication to ensure the multi-disciplinary teams were aware of problems and could be involved in finding solutions. One poster indicated that at the beginning of their study, only 39 per cent of first case starts began on time. Six months later at the end of the study, 76 per cent of first case starts were commenced on time and this was attributed to the "collaboration of the multi-disciplinary teams, increased awareness and the ability to overcome identified barriers" by utilising daily huddles.

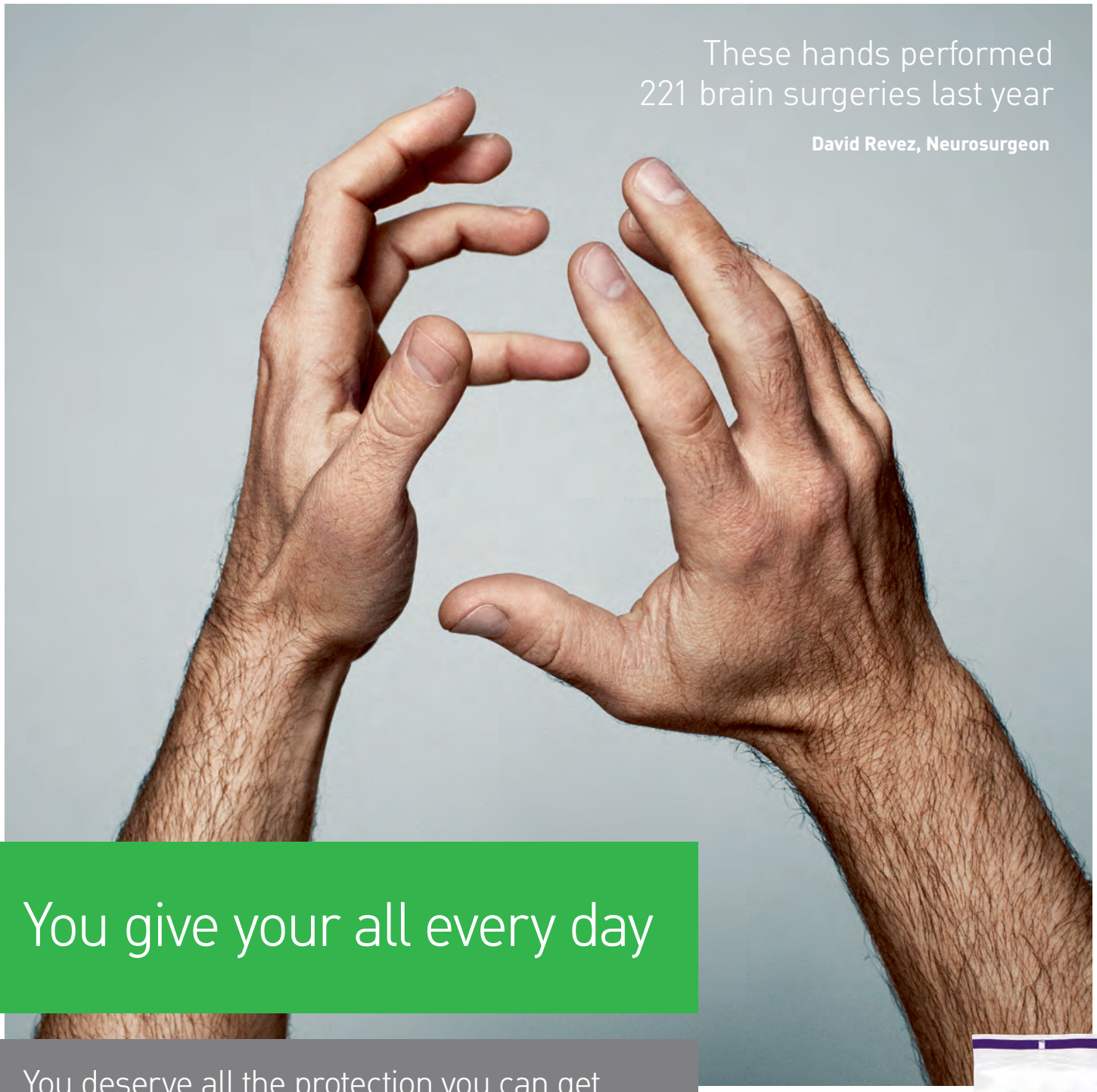
Interesting points picked up from different sessions included:

- The increased use of space helmets in the theatre setting being better able to see, hear and communicate – (AORN standards, 2018);
- Patient-centred care relating to the perioperative environment was discussed direct, indirect and interactive care making up the ideal caring practice;
- Our own mindset – JOY is an inside job and it's free;
- The major cause of mistakes included distraction, multi-tasking and not following procedure. Practice drift was a term that was used throughout different sessions, with practice drift being cutting corners in guidelines and procedures.

Although a perioperative conference, a wide range of topics relevant to the theatre nurse, the post anaesthetic care nurse and the medical imaging nurse was covered.

Don't forget the Perioperative Nurses conference is coming up in Nelson (October). I hope to see you there.

Johanna McCamish, Chair, Perioperative Nurses College



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1. MHC on file Report no. 887. 2. Wigmore SJ & Rainey JB, BJS 1994: 81: 1480.

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Communication is the key

Claudia Teunissen will be presenting research papers at the 2018 PNC Conference in Nelson.

Mark October 11-13 in your diary. These are the dates for the 2018 Perioperative Nurses Conference, this year hosted at the Rutherford Hotel in sunny Nelson.

Conference convenor Bronwyn Ball extends the warmest invitation to all nurses across the perioperative continuum to attend the 45th Annual Perioperative Nurses Conference.

"Come one, come all we are going to have a ball," she says.

"Seriously though we would love you to join us and go home with renewed energy for your career, some different perspectives on communicating within the working team and insights into your motivating behaviours.

"We have some fabulous speakers," she adds.

Masquerade is the theme for the dinner…

This year's conference theme is 'Communication is the key.'

The line-up of speakers includes:

Dr. Paul Woods – His motivational presentation questions "What is your personal prison" and "Five Steps to freedom". A year ago Sonia Kiran reviewed him and said, "this speaker made me come face to face with my excuses for not living up to my highest potential".

Claudia Teunissen/ project manager is another great speaker. She will be presenting research papers on "effective surgical teams". She will give you an insight into managing an OR team in New Zealand when you have trained in another country.

"Maryanne Coyle is also a wonderful inspiring speaker who will bring a smile to your face as she talks about communicating within your team, " Bronwyn adds.

"We hope to present a scenario that led to Nelson/ Marlborough DHB introducing Morsim and Thunderstruck workshops to our CME mornings. We are looking forward to sharing these great learning experiences with you.

"These are just a few speakers from a truly inspiring line up that our hardworking committee has prepared for you. I cannot wait for you to see the full programme which is now on the website. At this time we will also be open for early online registrations."

The online website is: wwwconfer.co.nz/periop

Masquerade is the theme for the dinner and there will be a prize for the best costume, whether it is just a mask or a full costume it is up to you.

"I hope I have piqued your interest for this year's conference and I am really looking forward to meeting with you, networking and sharing great interactive learning experiences that you can take back and pass on to your colleagues."

Bronwyn Ball, Nelson/Marlborough Regional Chairman, 2018 Conference committee member

Nurse Manager Conference For Napier

This year's Nurse Manager Conference is set down fo November 8-9 in Napier. It will be hosted by the Hawkes Bay Branch of the New Zealand Nurses Organisation under the theme, 'Peak Performance - Recruitment and Retention, Workforce planning.'

It will be held at the East Pier Hotel, 50 Nelson Quay, Ahuriri, Napier.

The conference will bring together a host of speakers from diverse backgrounds to impart their knowledge. The aim is to achieve an effective dynamic nursing workforce to support the needs of the New Zealand population and create a nursing workforce capable of delivering a high standard of care to all New Zealanders.

The conference organizers are committed to keeping registration costs to a minimum, thereby enabling more nurses to attend

Conference contacts: events@nzno.org.nz or margaret.radich@hbdhb.govt.nz or tracemccarrey@gmail.com

Online registration: http://www.eiseverywhere.com/nursemanagers

Education Committee has a new name

The Professional and Education Committee of the Perioperative Nurses College of the New Zealand Nurses Organisation (PNC,NZNO) has been renamed.

This follows the approval of a remit at last year's annual general meeting (AGM) of the College.

PNC Rules Remit 8

That the name of the Professional and Education Committee of the Perioperative Nurses College of NZNO be changed.

Recommendation The current members of the Professional and Education Committee recommend that the name of this committee is changed to the Professional Practice Committee (PPC).

Proposed change: Rule 16

Change all wording in Rule 16 from Professional and Educational Committee to Professional Practice Committee (PPC).

Rationale

- To more accurately reflect the current and future role of the committee, which is to advise the National Committee about professional practice matters and issues, as and when, they arise;
- The committee also develops, evaluates, reviews and revises policies, procedures and standards of care related to the Perioperative Nurses College of New Zealand;
- The committee is not involved in the formal education of PNC members;
- Education is implicit in the notion of professional practice.

Thus, the group formerly known as the Professional and Education Committee is now the Professional Practice Committee.

Reducing incidence of SSI associated with C-Sections

Mölnlycke's commitment to advancing performance in wound care and surgical solutions was highlighted by the presentation of new evidence to benefit caregivers and patients at this year's AORN Conference in New Orleans.

Focused on reduction of Surgical Site Infections (SSI) on C-Sections, two new studies supported an up to 10-fold reduction in SSIs through utilisation of Mepilex Border Post-Op antimicrobial dressings as part of surgical protocol.

"Continued caregiver and patient understanding is important to us and central to what we call having 'Customer at Heart'. Combined with our gained expertise and advanced technologies, we've developed a portfolio of SSI bundle solutions for perioperative care. Mölnlycke truly believes that together we can make a difference. Everyone involved - the patient, healthcare provider, the care facility and our healthcare system overall - benefits when we are able to work together to reduce infection rates," says Al Concemi, Vice President Surgical Marketing at Mölnlycke.

Surgical site infections are a leading hospital-acquired condition and cause for readmission. If a patient acquires an SSI, their hospital stay will be extended, on average 9.7 days, with the associated cost that goes with that. Healthcare providers, more than ever, are seeking improved solutions that will help achieve the best patient care outcomes and provide value all around.

Mölnlycke also showcased Mepilex® Border Sacrum and Heel and Z-FloTM Fluidized positioners for Pressure Ulcer Prevention, in addition to its trusted line up of prevention to post-acute solutions. ■

Advances, Problems
Interventional Radiology Society of

In March, the Interventional Radiology Society of Australasia (IRSA) hosted the Asia Pacific Society of Cardiovascular and Interventional Radiology scientific meeting in New Zealand for the first time. It was held at Sky City Convention Centre in Auckland.

The society meets regularly to encourage international exchange of knowledge vital to cardiovascular and interventional radiology among radiologists, interventional radiologists and individuals in related fields, in countries of the Asia Pacific region.

They bring together those working in related fields to improve the level of clinical practice and research regarding cardiovascular and interventional radiology.

The theme of the meeting was "Advances, Problems, Solutions" which is at the forefront in the development of the programme.

Numerous world experts travelled to Auckland to participate in the meeting along with other international interventional societies and the Vascular Society of New Zealand, who held combined sessions with Interventional Radiology, highlighting the latest in vascular and endovascular advances.

On the opening day of the meeting there were "live cases" from Auckland City Hospital Interventional Radiology (prostate artery embolisation) and from Singapore (microwave ablation of liver tumour and trans–arterial chemo-embolisation of liver tumour (TACE).

Topics covered by the many speakers – who often had only 10 or 15 minutes for their presentation – included safety in the Interventional Radiology room, trans-jugular intrahepatic portosystemic shunt (TIPS) and other portal vein interventions, non-stroke Interventional neuro-radiology,

Interventional Radiology team at Auckland Hospital during live case presentation.

obstetric and gynaecological interventions, advanced embolisation, women in Interventional Radiology and many, many more.

On the third day of the meeting there was, for the first time, a session devoted to nurse and medical radiation technologist (MRT) speakers. Perioperative Nursing College (PNC) member Fiona Unaç from the Hawkes Bay spoke to a mixed audience about "Enhancing Nurse-led Pre-angiography Assessment" and a "Team Approach for Minimising Contrast Induced Nephropathy for Patient's with an eGFR of 15-29". She was followed by Auckland PNC member Gill Martin talking on "The Importance of Continued Education for Nurses and MRT."

Throughout the meeting there were other nurse speakers covering such topics as "Radial Access for Interventional Radiology procedures," "Portacath Insertion" and "The Radiology Lounge" by Mike McAleer (Mercy Angiography, Auckland), "Advances in Central Venous Access Device (CVAD) Securement, an Auckland District Health Board (ADHB) experience" by Samantha Cotton and "Inventory Management in Interventional Radiology" by Tracy Nicholls (ADHB).

PNC member Bron Taylor, also from Auckland, spoke in a session entitled "The Hybrid operating Room". Bron explained why the Hybrid set-up is different to that of both a conventional operating room and an Interventional Radiology room.

This conference was an exhausting three and a half days, which included 480 presentations, in 67 sessions, presenters from 26 countries and live cases from three countries, culminated in a session entitled "Intervention without a Bungy!" – a series of presentations highlighting success and disasters which encouraged audience participation with

Some of the many nurses and radiographers from Auckland City Hospital who attended the meeting.

, Solutions

Australasia meeting

questions, solutions and comments along with congratulations when the disaster turned into a success.

Throughout the meeting, the speakers continually reinforced the theme of the meeting, talking of advances in techniques and practices, solving of problems and the finding of solutions to any number of issues, be they clinical, managerial or of life in radiology in general.

A final presentation was an invitation to attend APSCVIR 2019 in Bali, Indonesia.

Gillian Martin

Transoral Robotic Surgery and the benefits of robotic approach

by Deborah Woodcock RN

Abstract: Transoral robotic surgery (TORS) of the tonsil and base of tongue offers a number of advantages over conventional surgical techniques. The process involved in establishing the first TORS programme in New Zealand is discussed along with the benefits this service offers to the patient.

Keywords: Transoral robotic surgery, tonsil and base of tongue cancer, Perioperative Nursing

Introduction

Transoral Robotic Surgery (TORS) is a technique in which the surgical team uses minimally invasive robot-assisted technology to remove suspicious lesions and cancerous growths through the opening of the mouth and throat.

Transoral robotic procedures currently are most applicable for use in lesions of the oropharynx – tonsil, tongue, palate, parapharyngeal space, larynx and hypopharynx – supraglottis, glottis, piriform sinus, pharyngeal wall and skull base (Weinstein & O'Malley, 2011).

This article discusses tonsil and base of tongue surgery using the da Vinci Xi robot. It outlines the process involved in setting up of the TORS programme and the benefits of the robot approach.

Background

The use of robotics in our everyday lives is certainly not new. Robots are used in many areas: manufacturing industry, space travel, transportation and the healthcare industry, to name but a few.

In 2000, the da Vinci became the first robotic-assisted surgical system cleared by the United States Food and Drug Administration (FDA) for general laparoscopic surgery, with the first robot introduced to New Zealand in 2007 (Intuitive Surgical, n.d.).

My robotic journey started in February 2016 when I was involved in performing the first robotic assisted laparoscopic prostatectomy (RALP) at Southern Cross North Harbour hospital. The was the first of many and the start of my fascination with this new technology.

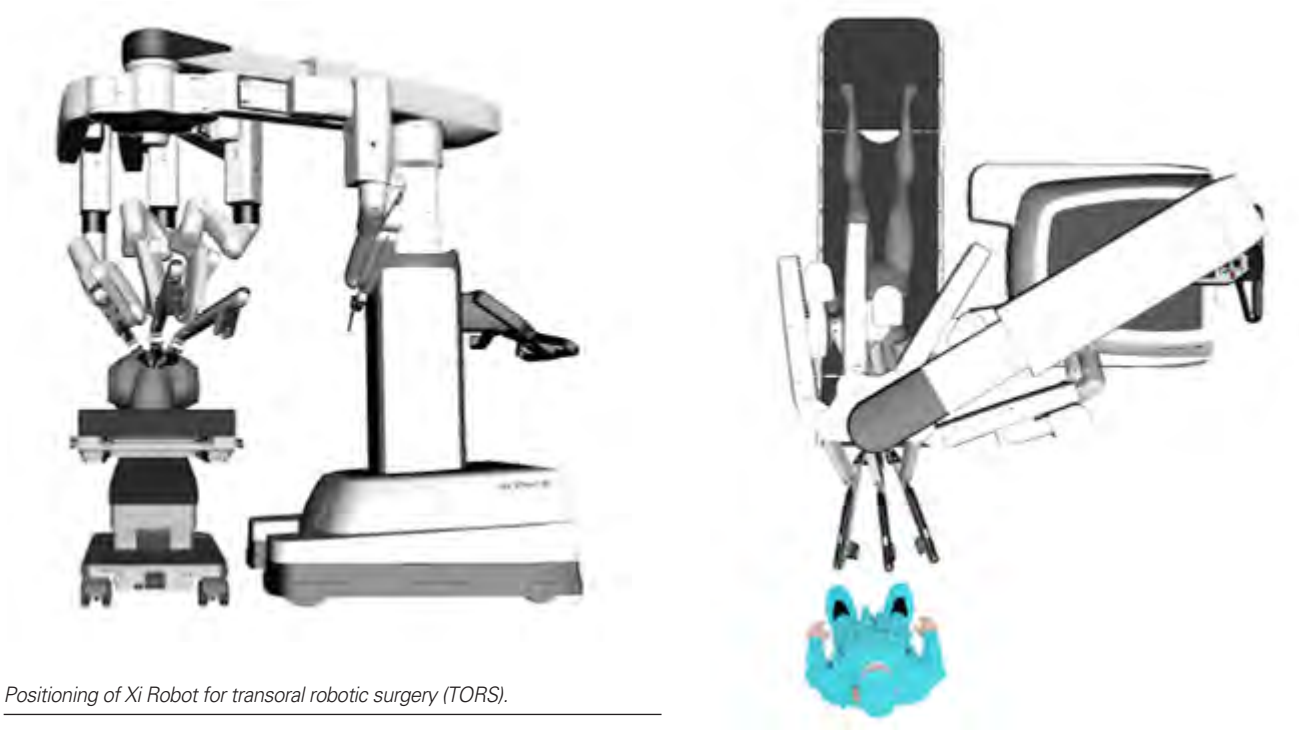
In October 2016 we successfully completed our first TORS procedure for a tonsil and base of tongue tumour. This was a first for New Zealand. It was performed by Dr Andrew Cho and Dr Francis Hall – both experts in their field having gained robotic experience in the United States.

This was well documented in the media and a huge kudos for Southern Cross North Harbour with our patient staying three nights, requiring no gastric feeding, speech or swallowing therapy.

There are of course many surgical specialities that currently fall under the robot umbrella, therefore working with a team experienced in handling and understanding the robot certainly helped when initiating the programme.

Setting up the programme

As with all new procedures, a project plan was initiated and led by our General Manager, identifying action points, responsibilities and a running status.



Positioning of Xi Robot for transoral robotic surgery (TORS).

Due to the surgical complexity of the case, pre-planning was the key to successful outcomes on the day, with the team completing the da Vinci TORS learning pathway.

Being a first for New Zealand clearly required guidance and I was fortunate to spend two days in Australia at the John Flynn private hospital, accompanied by Device Technologies' clinical nurse educator Cheryl Hughes, observing TORS procedures, networking and gathering vital information to assist with our own programme. We needed to purchase additional equipment of oral retractors, surgical tracheostomy sets, operating bronchoscope and Laryngoforce left and right clip appliers.

Trial run

Initiating a dry run involving the multi-disciplinary team was essential for positive outcomes on the day. Working with an experienced head and neck anaesthetist and anaesthetic technician certainly helped support the team with this.

We agreed on a floor plan, ensuring easy access should a complication occur, determined team roles on the day with on-site technical support confirmed.

From a safety perspective, we reviewed emergency protocols to include airway management, fire, excessive bleeding, anaphylaxis and robot failure.

It was determined that all members of the robot team should be able to trouble-shoot issues at the surgical site should the robot malfunction. We also needed to be able confirm the location of the emergency wrench, allowing the team to manually open an instrument to release tissue already grasped.

Surgical setup

With our project plan refined, positioning of the robot is dictated by the layout of theatre and location of the anaesthetic machine; in our case it is positioned to the right of the patient's head with the robot cart driven in also from the right, with robot arms two, three and four draped and positioned over the mouth with the number one arm stowed.

The surgeons' console is positioned away from the surgical field but within visual contact to enable the surgical assistant and scrub nurse positioned at the table to converse easily with the operating surgeon, through a microphone on the robot console.

TORS require two surgeons to attend each case, with the prime surgeon operating the console and the second assisting at the head.

The patient is placed in a supine tonsillectomy position with a shoulder roll, Hot Dog (body warming system), SCUDS (sequential compression devices), bladder catheter with temperature probe as required and eye goggles as standard.

At the start of the procedure, a nasogastric (NG) feeding tube, is inserted if required by the anaesthetist with an x-ray completed in recovery to ensure correct tube placement.

Use of the Boyle Davies gag or Feyh-Kastenbauer (FK) retractor is determined by tumour position and surgical access.

Dental injury is always a possibility and the use of appropriate mouth guards must be adhered to. The nurse and surgeon must also remain alert when positioning the robot instruments in the oral cavity.

Surgery

Prior to placement of the mouth retractor, the surgeon finds it useful to evaluate the lesion using a laryngoscope and 30-degree functional endoscopic sinus surgery (FESS) scope attached to a camera.

This re-assesses the depth and position of the lesion prior to resection.

The da Vinci system consists of three components: surgeons' console, patient-side robotic cart equipped with four arms, of which only three are used for TORS, and a high-definition three-dimensional D vision cart.

Surgery is performed with a robotic articulated bi-polar Maryland

Dental injury is always a possibility and the use of appropriate mouth guards must be adhered to. The nurse and surgeon must also remain alert when positioning the robot instruments in the oral cavity.

forceps and monopolar spatula and the use of either a 0 degree or 30-degree endoscope depending on surgeon requirements and the position of the lesion.

Both the endoscope and instruments are introduced trans-orally, allowing the surgeon on the console and the assistant to perform the minimaly invasive surgery.

Frozen section of the lesion requires specific planning. If the pathologist can attend the case on site, this reduces surgical time. We also found setting up an area in theatre for the pathologist to map out the specimen with the surgeons' input helps identify the tumour margins.

The robot remains draped whilst awaiting the pathology outcome, the mouth gag is relaxed and lip balm re applied. If no further margin is required, the robot is de docked and final checks of the surgical site performed.

Working closely with Surgeons Dr Andrew Cho and Dr Francis Hall whilst developing the TORS programme highlighted the many advantages of the robotic approach:

- Surgery through a natural orifice;
- Minimally invasive surgery allows deeper access and dissection of lesions;
- Allows Surgeons to operate in tight spaces without a large open incision;
- Shorter hospital stays;
- Magnification x 10 times offers better visualisation with increased precision;
- Offers excellent excision of the tumour, resulting in good speech and swallowing ability.

Conclusion

Establishing our TORS programme has greatly facilitated the minimally invasive surgical approach offered to our patients in New Zealand.

Since completing our first case we have continued to carry out these procedures, improving our practice and efficiency through standardisation of care.

About the author: *Deborah Woodcock completed her Enrolled Nurse training in the Hastings School of Nursing 1981 in Britain, followed by Registered Nurse training at Brighton University in 1988. She held senior positions in the United Kingdom prior to moving to New Zealand and has since established and co-ordinated the robotic group programme at Southern Cross North Harbour. Her particular interest is Urology, establishing a Urology interest at North Harbour.*

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Microscopic excision of the vestibular schwannomas.

Hearing is an essential sense to receive the external and internal world. Through the disease process, some patients can lose their hearing ability and detach from the outside world. This case report is about 'Ms A' (pseudonym for privacy reasons) who lost all her hearing as a result of bilateral brain tumours and the attempt to restore her hearing with auditory brainstem implant.

A Voice from Within

Intra-operative nursing considerations for Auditory Brainstem Implants

by Feng Shih & Juliet Meldrum

Abstract A case study approach is used to explore the surgical management of a patient with bilateral vestibular schwannomas and the insertion of auditory brainstem implants to restore her hearing. Effective collaborative intra-operative and post-operative care is critical in complex surgery involving a number of specialty services and the intra-operative nursing considerations are described. A brief outline of the differential use of auditory brainstem implants verses cochlea implants is also provided.

Keywords: Hearing loss, auditory prosthesis, auditory brain stem implant, bilateral vestibular schwannomas, Perioperative Nursing

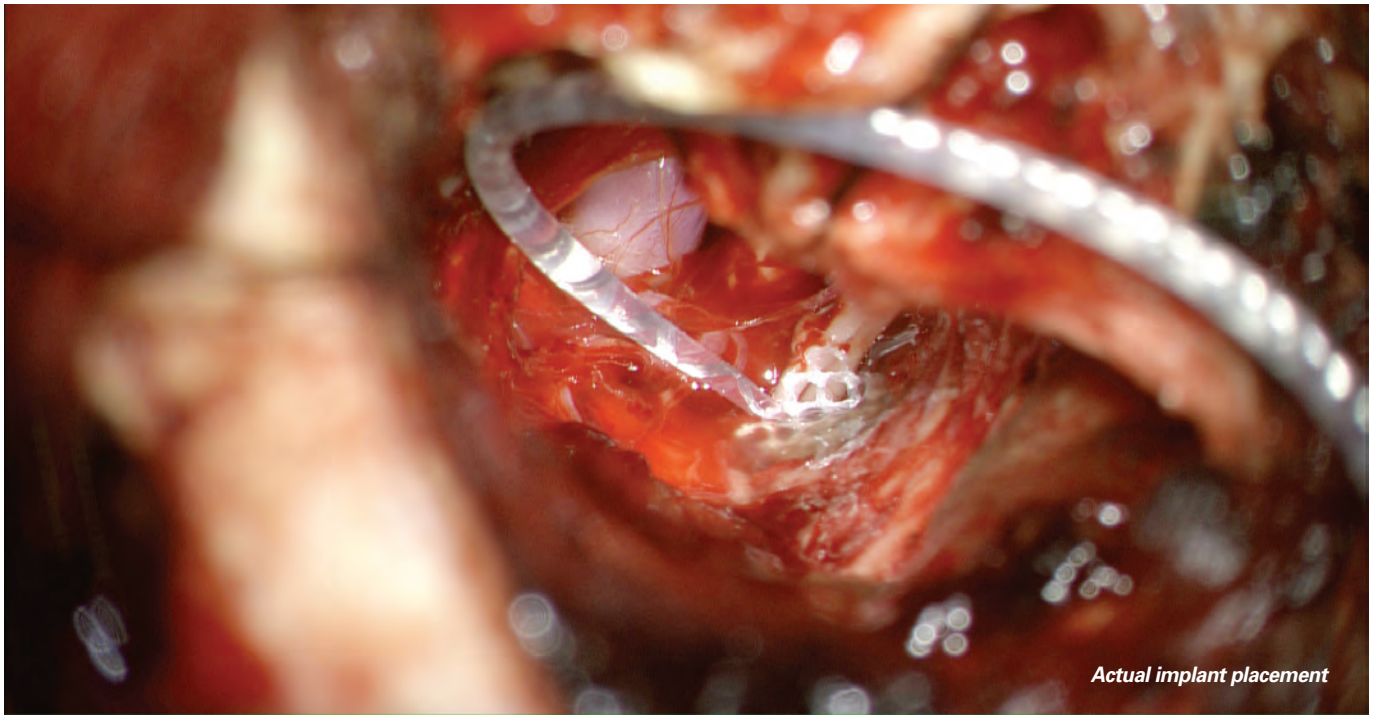
Background

Ms A was diagnosed with bilateral vestibular schwannomas in the early 1990s. The left tumour was significantly larger at the time and started to compress on her brainstem; hence it was removed in 1994. Her left auditory nerve was sacrificed, so she lost her left-side hearing completely. In view of preserving her right-side hearing, it was agreed to not operate any further and keep Ms A under regular surveillance. Over the years, the tumour continued to grow and started to impinge on her hearing. To date, with a hearing aid and lip reading, Ms A was able to converse with people. However, recent magnetic resonance imaging (MRI) revealed the tumour was compressing her brainstem. Surgical intervention became inevitable because Ms A would definitely lose her remaining hearing as a consequence.

To rehabilitate her hearing, special funding was granted by the Ministry of Health for an Auditory Brainstem Implant (ABI) to be implanted directly after the tumour removal.

Vestibular schwannomas

Vestibular schwannomas (VS), also known as acoustic neuromas, are slow growing benign tumours. Studies report a prevalence from 0.6 to 1.9 per 100,000 population (Babu *el al.*, 2013). VS comes from over-production of



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Schwann cells around nerve fibres. They arise from the vestibular division of the eighth cranial nerve. As the vestibular schwannoma grows, it affects the cochlear nerve, causing neuro-sensory hearing loss, tinnitus (ringing in the ear) and dizziness. Other nerves that may be affected are the trigeminal nerve, facial nerve and brainstem – if the tumours press against nearby structures (Carton, Daly, & Ramani, 2007; National Institute on Deafness and Other Communication Disorders, 2017).

Treatment options for VS are observation, radiation/radiosurgery and surgical intervention. Three different surgical approaches are used for VS removal. This is dependent on the tumour size, patient age, anatomy of the vestibule and involvement of the internal auditory canal (IAC). These surgical procedures are:

- Middle cranial fossa approach involves retraction of the temporal lobe which may increase the risk of post-operative seizures and speech disturbances. This may offer a better hearing preservation rate; an approach suitable for younger patients with a smaller tumour and is useful in hearing preservation.
- Retro-sigmoid approach allows panoramic view of the cerebellopontine angle (CPA), but the cerebellar retraction is thought to cause post-operative ataxia. This is a versatile route for tumours of any size, although it can be difficult to reach the outer end of the internal auditory meatus.
- Trans-labyrinthine approach allows early identification of facial nerves and, some believe, all of the cranial nerves. It provides good visualisation of the lateral IAC and fundus which allows for a more complete removal of tumour (Ansari, Terry & Cohen-Gadol, 2012).

Auditory Prosthesis

Auditory prostheses (i.e. cochlear implants and auditory brainstem implants) can restore hearing sensation through by-passing the ear structure and providing electric stimulation with tiny electrodes. The electrodes are inserted onto/into the auditory neural pathway. The neural activity transmits to the cortical areas and produces auditory perception (Azadpour, 2013). The simulation of auditory nerve firing is a complex task – however, modern devices, such as cochlea implants, can mostly produce good speech understanding, in spite of crude patterns of nerve activation, compared with acoustic hearing. Evidently more than 200,000 people around the world have gone from deafness to being able to converse on the telephone with the aid of an auditory prosthesis (Shannon, 2012). The following offers a review of different type of auditory prostheses:

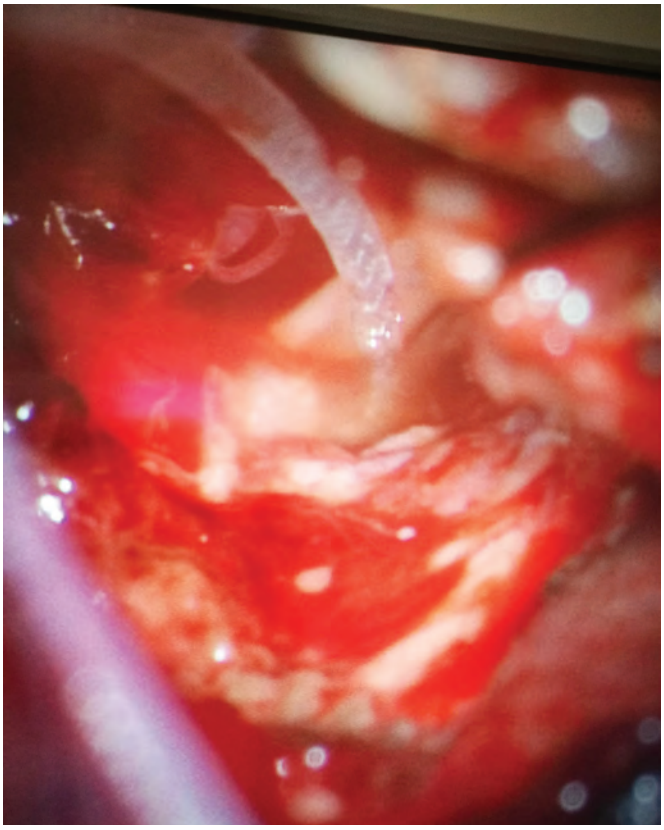
Cochlear implant (CI)

In a normal ear, acoustic energy is transmitted to the auditory nerve. For patients with severe sensory-neural hearing loss, cochlear implants (CI) are a good choice of treatment to bypass the malfunctioning or missing inner hair cells as they transmit the energy directly to the auditory pathway.

Behind the ear, there is a micro-computer converting sound waves into radio frequency (RF). The surgically implanted device decodes the RF into electrical current impulses. The electrical impulses are then transmitted through a surgically implanted intra-cochlear electrode. The electrode is placed through the round window or via a cochleostomy into the inner ear, which can transmit electrical impulses directly to the auditory nerve (Azadpour, 2013; Stataloff & Lalwani, 2015). CIs have the potential to achieve speech understanding but the results with music and voice quality are less reliable (Shannon, 2012). CIs can sometimes be used as treatment for patients with tinnitus or single side deafness. The afferent electrical impulses from the CI may inhibit the increased neural activity in the central auditory areas caused by the hearing loss (Arts, George, Stokroos & Vermeire, 2012).

The Auditory Brainstem Implant (ABI)

The design of auditory brainstem implant (ABI) is similar to CI, except the electrodes are placed onto the cochlear nucleus of the brainstem surface (Azadpour, 2013; Ramina, Aguiar, & Tatagiba, 2014). It is prescribed for patients who do not have an auditory nerve to conduct the electric impulses. This can be caused by temporal bone fracture, vestibular schwannomas or severe ossification of the cochlea.



Electrode paddle to locate the nuclei cochlears on the brain stem.

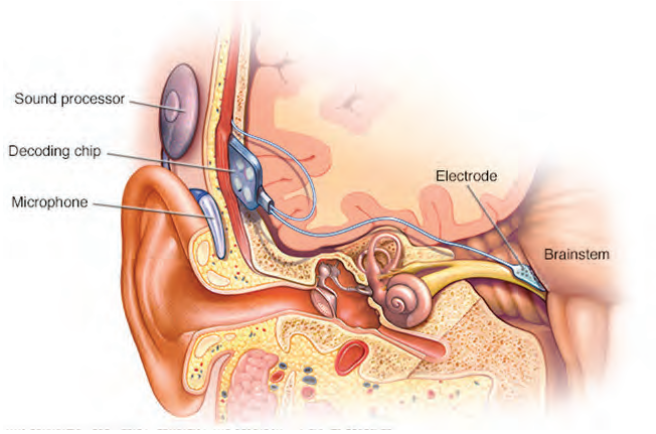
Because the area the ABI stimulates on the brainstem contains different types of neurons with diverse roles in auditory processing, patients with ABI generally have poorer outcomes than patients with CI**.** Patients with ABI can receive useful auditory information, but mostly cannot understand without lip reading (Azadpour, 2013; Shannon, 2012).

Intra-operatively, the electrode is placed into the lateral recess of the fourth ventricle. The correct position of the electrode is identified by detecting electric stimuli in the auditory pathways instead of adjacent cranial nerve nuclei or sensory/motor tracts (extra-auditory stimulation). Six weeks after the surgery, patients start the initial stimulations. ABI should provide useful auditory sensations for environmental sounds (Ramina, Aguiar & Tatagiba, 2014).

Surgical procedure

To ensure absolute head stability when locating the brainstem implant, Ms A was placed in a Mayfield head holder. Nerve monitoring electrodes for facial nerve monitoring and also for auditory pathway testing were placed prior to skin preparation and draping. Translabyrinthine approach was used to excise the tumour. A post-auricular skin incision was made, and the mastoid and inner ear bone were removed with drills. Mannitol solution was given intravenously to prevent cerebral oedema. The dura was then opened and retracted with a 4/0 silk suture. Throughout the procedure, the facial nerve was constantly monitored to aid preservation of the nerve. The tumour was removed with fine microvascular instruments.

After the tumour removal, the lateral foramen of the fourth ventricle was identified and a trial electrode was inserted onto the floor of the fourth ventricle. This was then tested to see if it was in the correct



Anatomical view of the ABI

position over the cochlear nucleus by stimulating the electrode and seeing the response in the brain via the electrodes on the scalp (see Image 3). During the process, all potential interferences in the Operating Room (OR) were switched off, including the diathermy machine and neural impulse maximiser (NIM) monitoring. After the cochlear nucleus position was located, the implant electrode was placed with a packing of teflon and a haemopatch. The receiver-stimulator and coil were implanted in a post-auricular pocket. A fat graft was used to fill the drilled out temporal bone to prevent cerebrospinal fluid (CSF) leak. Skin was closed with nylon sutures and dressed in a head bandage.

Perioperative nursing consideration

Ms A's case required coordination of multiple specialties, including ORL, neurosurgical team, audiologists and the company representative. Nursing staff played an important role in ensuring collaborative intra-operative and post-operative care. Here are some examples from the case which needed to be addressed in the context of perioperative care:

- **Team Briefing:** The procedure was complex and involved personnel from various specialties. A team introduction at the beginning of the day to clarify the roles and requirements was necessary. Appropriate OR layout and patient positioning had to be agreed upon to suit care requirements.
- **OR flow control:** Post craniotomy infection can cause severe consequences, including meningitis and possibly a return to the OR (Dashti *el al.*, 2008). In Ms A's case, it could lead to implant failure; hence, strict adherence to sterile techniques was paramount. OR nursing staff can have a significant impact by ensuring the minimal number of personnel enter the OR. Infecting bacteria can sometimes be traced to shedding from OR personnel movements; hence, unnecessary door opening should be avoided (Gorbach, Bartlett & Balcklow, 2004).
- **Diathermy use after implantation:** Diathermy produces heat to cut and coagulate tissues. Bipolar diathermy allows current to flow between the instrument tips, whilst monopolar diathermy passes from hand-piece through the body to the return electrode plate. ABI is similar to a CI implant, conducting the current through the electrode to the auditory pathway. It is advised that monopolar diathermy should not be used above the clavicle in patients with cochlear implants. Bipolar diathermy should not be used within 2cm of the implant, as the electrical current may damage the implant electrode and create heat on the adjacent nerve (Frampton, Ismail-Koch & Mitchell, 2012). However, the considerations are debated by some (Jeyakumar *et al.*, 2013).
- **Intraoperative positioning:** In the case of Ms A, she was placed in the Mayfield skull holding clamp for a duration of 11 hours. The Mayfield head holder uses three-point pin clamps to provide adequate fixation for intraoperative stability. Injuries, such as skull fracture, epidural hematoma, scalp laceration, and air embolism, have been reported (Lee & Lin, 2010). This adds to the Perioperative Nursing considerations for observing potential injuries.
- **Post-operative arrangement:** In the case of Ms A, a craniotomy was performed with extensive intracranial work. Hence, a post-operative neurology high dependency unit (HDU) bed was organised for monitoring.

Conclusion

When auditory nerve conduction is destroyed by either disease or trauma, auditory brainstem implants give patients hope of reconnecting with the outside world. The procedure involves extensive exploration in the patient's intracranial space, so it is imperative for OR nursing staff to have a thorough understanding of the process and particular risks. Complex multi-specialty surgery also requires an ability to plan and work collaboratively to ensure a good patient outcome.

In terms of Ms A's recovery, her procedure was completed uneventfully, and she was discharged from the HDU after two days. The external part of implant was fitted six weeks after the surgery. A long training process lies ahead to retrain her hearing for different sounds.

About the authors:

Feng Shih *completed her Bachelor of Health Science (Nursing) through AUT University in 2009 and her postgraduate Diploma in Advanced Nursing Practice in 2013 from the University of Auckland. She has been working in the perioperative services across Waitemata and Auckland District Health Boards and the private sector. Her particular interest is to incorporate evidence-based practice into daily nursing practice. Feng is also a member of The Dissector Editorial Committee.*

Juliet Meldrum *graduated from the Royal Free Hospital School of Medicine in London, UK. She undertook higher surgical training in the east of England and obtained an MSc in audiovestibular medicine at the UCL Ear Institute. She is currently working as the Otology/ Neuro-otology Fellow in Auckland District Health Board.*

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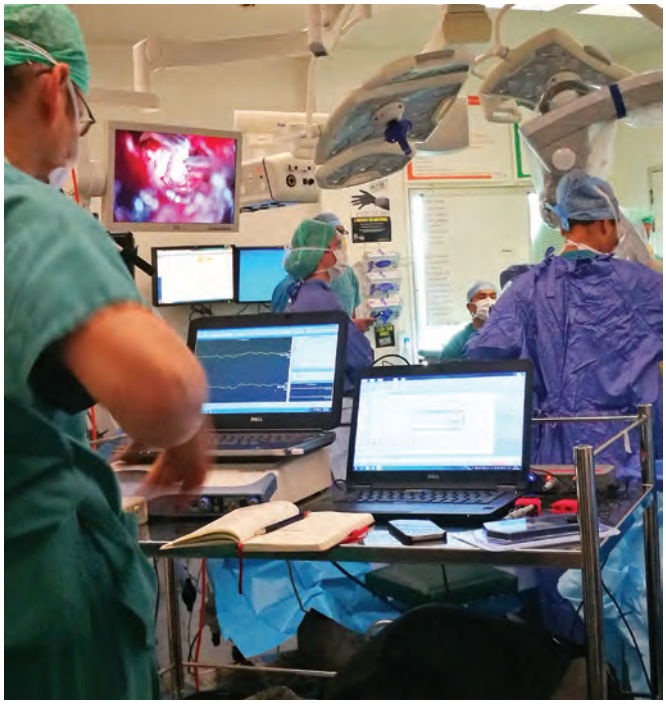

MED-EL engineer verifying implant location through electrical stimulations.

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A life time of stroke treatment

By Gillian Martin

Abstract: Providing treatment for patients suffering from an acute ischaemic stroke is a medical emergency and with the adoption of tissue Plasminogen Activator and clot retrieval techniques in 2011, Auckland City Hospital (ACH) has greatly improved its patients' outcomes. The Percutaneous Stroke Intervention Service was officially started in July 2017 and provides fast, coordinated, expert care for patients in the upper North Island suffering from an acute ischaemic cerebral event.

Key words: Stroke, Cerebral Ischaemia, Percutaneous Stroke Intervention Service, Clot Retrieval

Introduction

Treatment for both haemorrhagic and ischaemic stroke has gone through many advances in the last 50 years. When I started my nursing career in 1976 there was no treatment for stroke patients. Basic nursing care and rehabilitation with physiotherapy and speech therapy were all that was available. In less severe cases patients might have been advised to drink less alcohol and to smoke less to conservatively manage their risk factors for a second stroke. The use of Aspirin was introduced as a preventative measure in cases of ischaemic stroke. It was another 20 years before any actual treatment was developed.

People of all ages can suffer a stroke, but 75 per cent occur in people aged over 65 years (Stroke Foundation of New Zealand, 2017).

Ischaemic strokes are the most common in older people whilst younger people are more likely to suffer haemorrhagic stroke. In New Zealand, Maori and Pacific Islanders are more likely to suffer a stroke, and men are more likely than women, although pregnant women have a heightened risk.

What is a stroke?

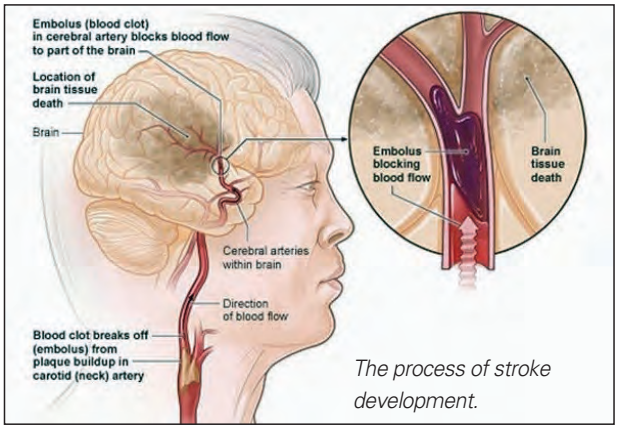
A stroke is a 'brain attack', a sudden interruption of blood flow to part of the brain causing it to stop working and eventually damaging brain cells. A stroke is also referred to as a cerebral vascular accident (CVA). There are different types of strokes, with different causes:

Ischaemic strokes occur when a blood clot completely blocks an artery in or to the brain. They are the most common type of stroke, occurring in about 85 per cent of cases. Ischaemic strokes can be either thrombotic or embolic.

Thrombotic strokes occur when a blood clot (thrombus) blocks an artery that supplies blood to the brain, which has been narrowed by the build-up of fatty deposits (plaques) during a process known as atherosclerosis.

Embolic strokes are due to a clot that has formed outside the brain and travels to the brain in the blood stream. When this occurs, the clot is known as an embolus and the result is brain cell damage.

Haemorrhagic strokes occur when a cerebral vessel bursts or develops a leak into the brain known as a cerebral haemorrhage. This "break" in the blood supply again causes brain cell damage.



The process of stroke development.

Signs and symptoms

Signs and symptoms of a stroke usually occur suddenly. The type of symptoms experienced will depend on what area of the brain is affected. The areas of the brain that control function on one side of the body are often located in the opposite side of the brain. Therefore, lack of blood to one side of the brain can often result in signs and symptoms on the opposite side of the body. Common initial symptoms of a stroke include:

- Severe headache;
- Impairment or loss of vision;
- Memory loss;
- Confusion;
- Loss of balance or co-ordination;
- Poor balance and dizziness;
- Sudden numbness, paralysis or weakness of an arm, leg or side of the face;
- Slurred or abnormal speech;
- Loss of consciousness;
- Incontinence.

Pathophysiology of an Ischaemic Stroke

Treatment

In 1995 clinical trials established the first approved treatment for acute ischaemic stroke with the use of tissue Plasminogen Activator (tPA). This was administered by intravenous infusion to dissolve the clot and therefore improve blood flow (Park, Mavanir, Dahn, & Menzolan, 2006).

Tissue Plasminogen Activator (tPA) needs to be administered as soon as possible following stroke diagnosis and ideally within four hours, to reduce the risk of disability and to maximise the potential for patient recovery.

At the end of the 1990s, two new approaches to treatment of ischaemic stroke were looked at: carotid endarterectomy, which is the surgical removal of plaque and clot, and carotid artery stenting where the stent is placed in the arterial stenosis, thus opening it up to improve blood flow and decrease the risk of stroke.

Clinical trials comparing the two treatments could find no significant difference in outcomes between the two techniques, but there were higher total hospital costs associated with carotid artery stenting (Park *et al.,* 2006)

Moving on to the early 2000s and clot retrieval techniques had been developed. Again, clinical trials were conducted comparing clot retrieval and tPA with tPA treatment alone. Many of these trials had overlapping time lines – with one trial starting before the outcomes of others were known. This was because they were using different retrieval devices from different manufacturers.

Clot retrieval procedures were commenced at Auckland City Hospital (ACH) in conjunction with the continued use of tPA in 2011 by the team of interventional neuro-radiologists. Selected patients were those with severe deficit who had previously been independent, with an upper age limit of 60 years. This included patients who had been recruited into the EXTEND IA Clot Retrieval Study (Barber *et al.,* 2015)

EXTEND IA was an Australian/New Zealand based multi-centre randomized control trial comparing tPA alone with tPA and clot retrieval. After only 70 patients had been treated with clot retrieval and were showing good outcomes, the results of another trial "MR CLEAN" were published. This was a similar trial to EXTEND IA but was conducted in the Netherlands. The results from MR CLEAN and early evidence form EXTEND IA clearly demonstrated the overwhelming success of the combined treatment using tPA and clot retrieval.

A decision was made by the team at ACH that all patients would be treated with tPA and clot retrieval, but because the trial had been abandoned, ACH would have to cover the cost for all patients from all four of the Northern Region District Health Boards (DHBs). In addition to the expensive clot retrieval device, angiography catheters, guidewires and the tPA infusion, each procedure would need two Interventional neuro-radiologists, two radiology nurses, two medical radiation technologists (MRT) an anaesthetics team and product specialists.

The Northern Region Clinical Practice Committee then recommended that ACH should continue to provide the clot retrieval service as a single component of a Regional Hyper-Acute Stroke care pathway. At this stage patients could only be considered for treatment if all staff were available, either in normal working hours or out of hours, which limited the number of patients the team were able to treat (Barber *et al.,*2015).

Behind the scenes, neuro interventional radiologists, neurosurgeons, neurologists, stroke specialists and the Radiology Clinical Director at ACH were negotiating with the four DHBs and the Ministry of Health to gain Government funding to provide a 24-hour seven day a week clot retrieval service.

Finally, on July 24 2017 the "Percutaneous Stroke Intervention (PSI) Service" went live and was fully funded 24 hours a day. The provisional

F FACE: Ask the person to smile. Does one side of the face droop?

A ARMS: Ask the person to raise both arms. Does one arm drift downward?

S SPEECH: Ask the person to repeat a simple phrase. Is their speech slurred or strange?

T TIME: If you observe any of these signs, call 1-1-1 immediately.

Use FAST to Remember the Warning Signs of A Stroke. Stroke Foundation New Zealand (2017)

estimate was for 100 patients to be treated per year, but this was re-evaluated in October 2017 to 200 per year. Two thirds of the patients treated are non-Auckland District Health Board (ADHB) patients and include patients from Waikato District Health Board.

Multi-disciplinary team

The PSI team is multi-disciplinary, starting with St Johns Ambulance staff doing initial patient assessment and ending with ward staff providing post-procedure care. The setting up of the PSI Service also involved re-organisation on the stroke ward at ACH, with beds being permanently allocated for patients undergoing clot retrieval and the recruitment of a team of acute stroke nurses, one of whom would always be on-duty to co-ordinate the patient's pathway from arrival to transfer to the Post Anaesthetic Care Unit (PACU) or ward post treatment.

Ambulance staff assess the patient and decide whether the patient should be taken to their local DHB or ACH, guided in their decision by the New Zealand Out of Hospital Acute Stroke Destination Policy (2017). This is dependent on patient acuity, time elapsed from the onset of symptoms, location of the patient and the time of day. Ambulance staff received extra training in assessing patients for signs and symptoms of stroke.

On arrival at hospital, the patient has a Computed Tomography (CT) scan to diagnose whether the stroke is ischaemic or haemorrhagic in origin. This is done with the least delay possible as every minute, 1.9 million neurons are lost. Images are viewed by a neuro radiologist either on site or remotely, tPA is commenced immediately and the patient is transferred, by the quickest means possible to ACH. The patient often by-passes the Emergency Department and goes directly to Interventional Radiology where the team is waiting with the room and all equipment ready to start the clot retrieval procedure as soon as the patient arrives.

Conclusion

Treatment of ischaemic stroke has significantly improved in the last 15 years with the combined use of tPA and clot retrieval. The Percutaneous Stroke Intervention Service now provides fast, coordinated, expert care for patients in the upper North Island suffering from an acute ischaemic cerebral event.

A stroke is a 'brain attack', a sudden interruption of blood flow to part of the brain causing it to stop working and eventually damaging brain cells.

Acknowledgement

Thanks go to Interventional Radiologists at Auckland City Hospital for background information regarding the development of the PSI service at Auckland Hospital.

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Interventional Radiology Operating Room set up for Clot Retrieval procedure

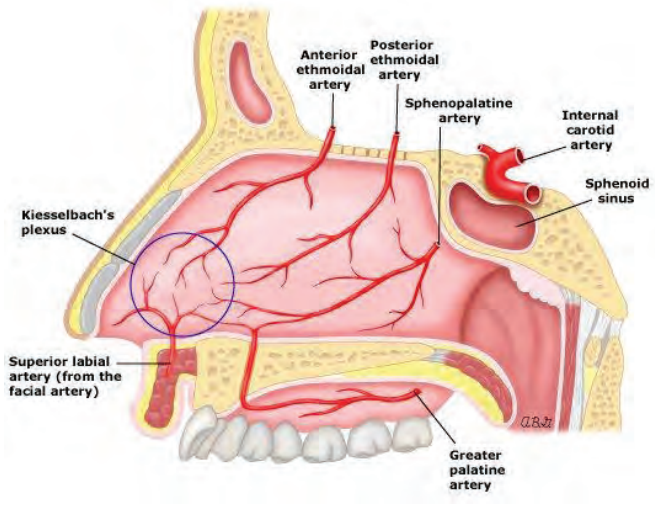
Code Red
AN ENT EMERGENCY

by June Richardson Rn, Pg Cert. (Nursing Speciality).

Abstract Emergency Ear Nose and Throat (ENT) also known as Otorhinolaryngology (ORL) cases involving uncontrolled bleeding are stressful for all concerned. Posterior epistaxis, postoperative tonsillectomy bleed and haematoma formation post thyroidectomy are some of the most common presentations in the ENT clinic.
The article describes the patient journey and discuss some of the treatment techniques that may be useful in managing these three problems for Perioperative, Post Anaesthetic Care Unit (PACU) and surgical ward nurses.
Key words Epistaxis, tonsil bleed, thyroidectomy haematoma, Perioperative Nursing

Epistaxis

Epistaxis, or bleeding from the nostril, nasal cavity or nasopharynx, is common, occurring in up to 60 per cent of the general population. Of these only ten per cent of patients will present for treatment (Villwock & Jones, 2013) because the bleeding cannot be stopped with first aid measures, or is reoccurring too frequently. Epistaxis is divided into two categories; anterior or posterior, depending on the location of the bleed in the nose.



As can be seen in Figure One, the rich vascular supply means that the epistaxis can be very dramatic which can be very distressing for the patient. Bleeding typically occurs when the nasal mucosa erodes and the exposed vessels break. More than 90 per cent of bleeds occur anteriorly and arise from the Little's area, where the Kiesselbach plexus forms on the septum (Villwock & Jones, 2013). Anterior bleeding tends to be an ooze. Located further back in the nasal cavity, posterior bleeds pump. They create a greater risk of airway compromise and aspiration of blood and are difficult to control under local anaesthetic conditions.

Causes

Local causes of epistaxis include:

- nose picking;
- facial trauma;
- nasal surgery (acknowledged risk of endoscopic sinus surgery);
- dry weather (low humidity);
- mucosal irritation from topical medicines;
- septal deviations and spurs;
- allergic rhinitis;
- benign and malignant tumours.

Systemic causes include:

- congenital coagulopathies (Haemophilia and Von Wilebrands disease);
- thrombocytopenia;
- alcoholism;
- oral anticoagulants;
- Hereditary Haemorrhagic Telangiectasia.

Idiopathic causes account for 10 per cent of epistaxis cases. Even after a thorough history, no identifiable cause can be found.

Epidemiology

Epistaxis has a bimodal age distribution with a higher incidence in children under 10 years probably attributed to nose picking and another peak between 45 and 65 years of age. Below the age of 49 years there are more males than females hospitalised with epistaxis after which the distribution equalises. This trend is thought to be attributed to the presence of oestrogen (Kucik & Clenney, 2005).

Patient History

During the examination, severity, frequency, duration and precipitating factors that led to bleed are determined. A general medical history is obtained, including: medical conditions, current medications and social factors.

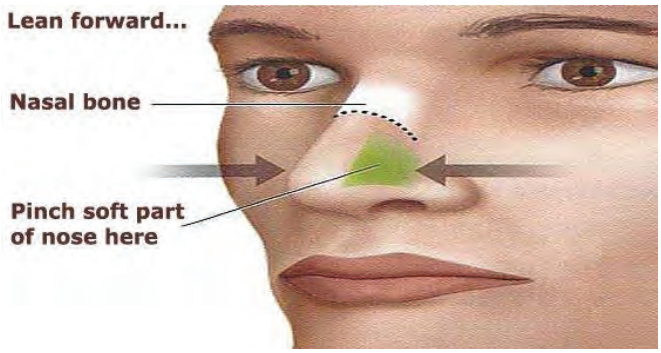
Treatment

The first line of treatment for epistaxis is at home and is aimed at forming a clot in order to stop the bleeding.

- Tilt head slightly forward;

- Pinch nose under bony ridge so alars come together (see Figure 2);
- Hold for at least 10 minutes continuously and uninterrupted;
- An icepack can be placed above the bridge of the nose.

If the bleeding does not stop after an hour to an hour and a half, then a trip to the Emergency Department (ED) is required where the on-call ENT registrar will be notified. The affected nasal passage and area is



determined, local anaesthetic administered and a pack, usually a Rapid Rhino nasal pack, will be inserted (See Figure 3).

If the bleeding has stopped, the rapid rhino pack will be deflated for half an hour and then removed. Sometimes the bleeding site requires cauterisation. This may be done chemically with a silver nitrate stick or electrically with bipolar diathermy. The patient will wait for an hour and is then discharged home to rest with a post epistaxis event advice.

Posterior Epistaxis

Patients with a suspected posterior source of bleeding will be admitted and almost certainly sent straight to the Operating Theatre (OR) to have the offending artery clipped. Usually the Posterior Ethmoid Artery or the Sphenopalatine Artery.

By the time your patient comes to the OR, their nasal passages will be very tender. They will have swallowed a lot of blood, be feeling extremely nauseous and will want to spit out blood clots that have formed in the nasal pharynx. Keep a vomit bowl handy at all times both pre- and post-operatively. Your patient's airway anatomy may be difficult to visualise due to the large amount of blood which may mean they could be difficult to intubate, so keep the suction handy during this time.

Suggestions for Scrub Trolley

- Nasal prep as per Surgeons' preference;
- Head drape;
- 20 ml syringe to let balloon down from Foley catheter or rapid rhino;
- SUCTION!;
- Nose tray/ Endoscopic sinus extras;
- Rigid endoscope and washing system;
- Stamberger bipolar suction;
- Vascular applicator and clips (see Figure 4);
- Post-operative nasal packing;
- Nasal bolster.

Discharge care

Discharge instructions post epistaxis include no heavy lifting, nose blowing or picking, avoid straining to pass stools and minimise very hot drinks and showers.

I also like to warn the patients that they may have black stools, and old blood clots in the nasal passages can take up to two months to remove.

Post-operative Tonsillectomy Bleed

A severe post-operative tonsil bleed is an emergency as it can be lethal. The two types of haemorrhage are primary and secondary. Primary occurs within the first 24 hours. The main risk of bleeding occurs between Day 7 and 10. This is when the eschar falls off and the tonsil bed has not

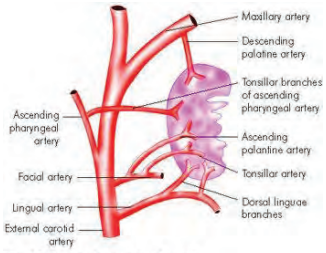


Fig. 50.3 Arterial supply of tonsil.

completely healed. Figure 5 shows what the Eschar formation looks like on the tonsil bed. Small surface vessels are exposed to local trauma.

Figure 6 demonstrates the blood supply to the palatine tonsil. As with epistaxis, your patient will have been swallowing a lot of blood so watch for vomiting. The anaesthetic team will require considerable support. Trying to intubate during a severe postoperative haemorrhage is extremely stressful.

Suggestions for scrub trolley

- Tonsillectomy tray;
- Head drape;
- Headlights;
- SUCTION!;
- Lots of small swabs. **Vigilance at swab count required;**
- Electric cautery;
- Suture for tying offending vessel.

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About the author: *June Richardson qualified as a Registered Comprehensive Nurse from Auckland Technical Institute in 1986. Travel and work opportunities saw June accept a role to train as a Perioperative Nurse in Scotland in 1988. On returning to New Zealand, June commenced employment in the main operating theatres at Dunedin Hospital in 2000. Her specialty area became ENT in 2001. A desire for new challenges meant June left to become an ENT Outpatients Clinic nurse in 2012.*

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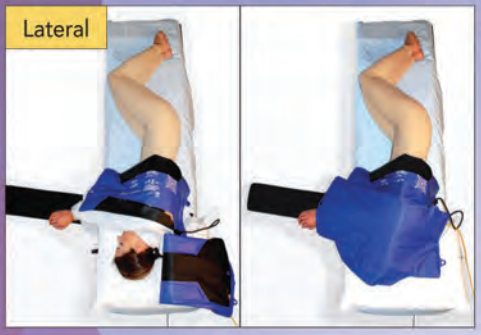

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Surgical Plume Survey 2018

by Johanna McCamish

Introduction

Occupational hazards have been described as something unpleasant that you may suffer or experience as a result of doing your job or hobby (Collins, 2018). Surgical plume has been prioritised as an occupational hazard within the perioperative environment. Around 90 per cent of endoscopic and open surgical procedures generate some level of surgical smoke (Ulmer, 1998).

With a push to be smoke-free, nurses and especially operating theatre nurses, need to be aware of surgical plume. Surgical plume is an occupational health hazard.

Surgical plume results from the vaporisation of cells through absorption heating, when energy-based devices such as lasers, diathermy and ultrasonic devices are used. Symptoms reported by staff members include nausea, double vision, headaches fatigue and a number of respiratory problems (Ball, 2018; Alp, Biji, Bleichrodt, Hansson & Voss, 2006).

Because of the potential impact surgical plume has on Perioperative Nurses, a survey was compiled with the objective of exploring Perioperative Nurses College (PNC) members' knowledge and understanding of surgical smoke plume and what they saw happening in the workplace. The aim of this document is to provide an overview of the information gained from the survey.

Survey

A survey consisting of eight questions was attached to the membership registration, to be answered when renewing PNC membership or becoming a new member of the Perioperative Nurses College. The survey was open to all members registering for membership and was open from April 1, 2016 to March 31, 2017.

In the time allocated, 686 nurses answered the survey.

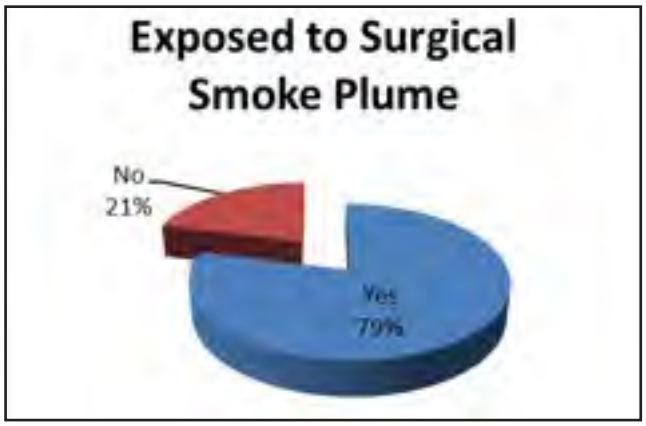
As part of the registration process for the Perioperative Nurses College, generic information or population demographics was collected capturing information such as the region the member comes from, address, age and workplace. This information provides an overview of the College membership.

The Perioperative Nurses College is made up of nurses from operating theatres, post anaesthetic care unit, medical imaging and pre-operative areas, from day stay units to acute hospital settings, within private and public hospital systems throughout New Zealand. These areas make up the perioperative continuum.

The next questions specifically related to smoke plume included:

- Are you exposed to surgical plume?
- Do you believe inhaling surgical plume is harmful?
- Is your workplace smoke-free?
- Is your department seeking to be smoke-free?
- Does your department have surgical plume extraction equipment?
- Would you prefer to work in a smoke-free environment?
- Does your department have a surgical plume policy?
- What do you see as barriers to being smoke-free?

The first question in the survey, "Are you exposed to surgical plume?" required a Yes or No answer. Of the 686 responses, 21 per cent of Perioperative Nurses said they were not exposed to surgical smoke plume, while 79 per cent of nurses said that they were exposed.

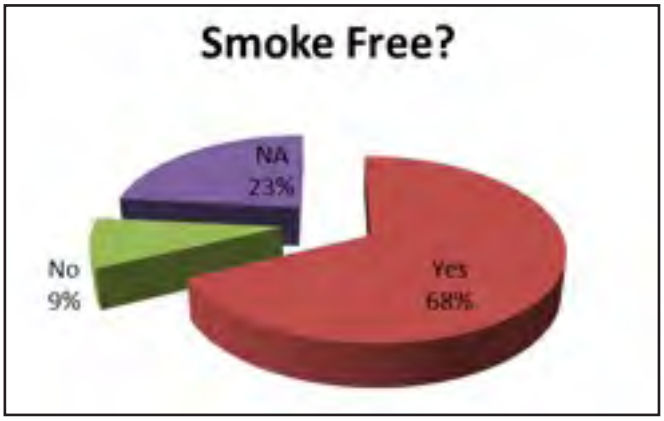


"Do you believe inhaling surgical plume is harmful?" was then asked.

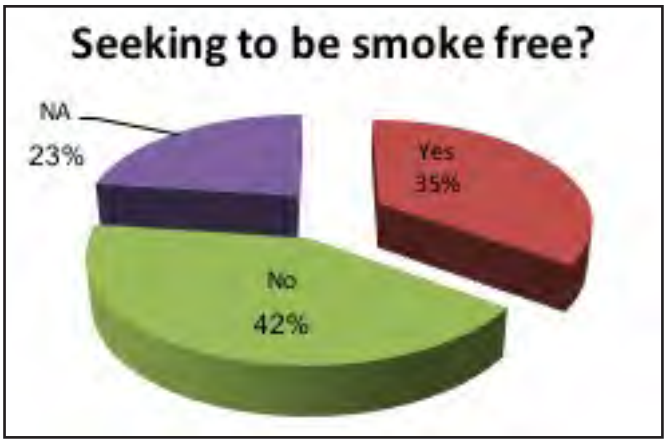
Forty-three per cent of Perioperative Nurses believe inhaling surgical plume is NOT harmful while 57 per cent of nurses believe that inhaling surgical plume IS harmful.

Despite information to the contrary, it is notable that just under half of the nurses answered surgical plume was not harmful.

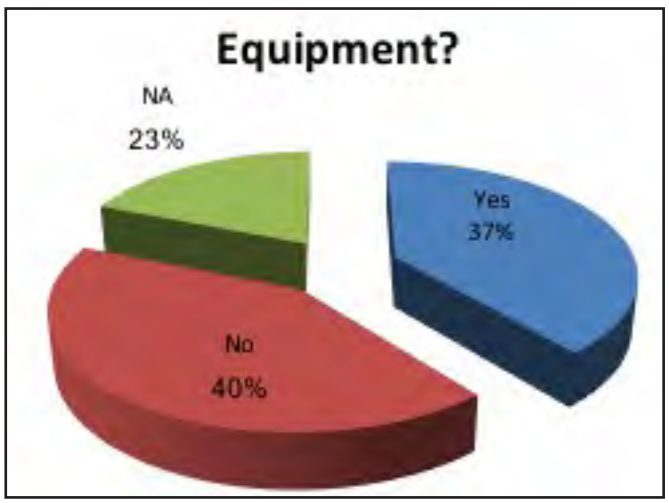
The question, "Is your workplace smoke free?" resulted in 68 per cent of Perioperative Nurses answering that they believed their hospital was smoke-free, while nine per cent answered that their hospital areas were not smoke-free. Interestingly, 23 per cent answered "not applicable".

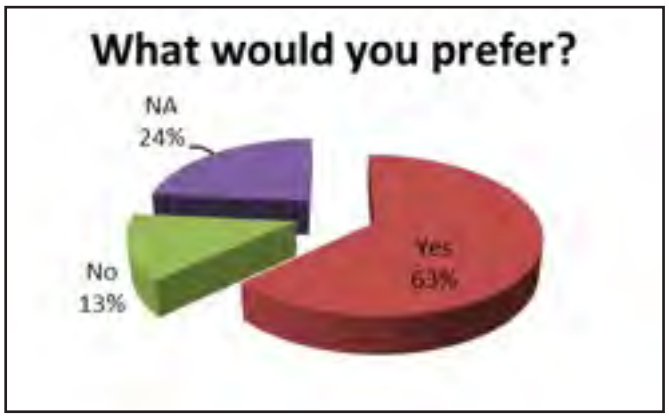


In response to the question, "Is your department seeking to be smoke-free?", 42 per cent of Perioperative Nurses stated that their department was not seeking to be smoke-free, while 35 per cent stated their department was seeking to be smoke free. Again, 23 per cent responded that the question was "not applicable".

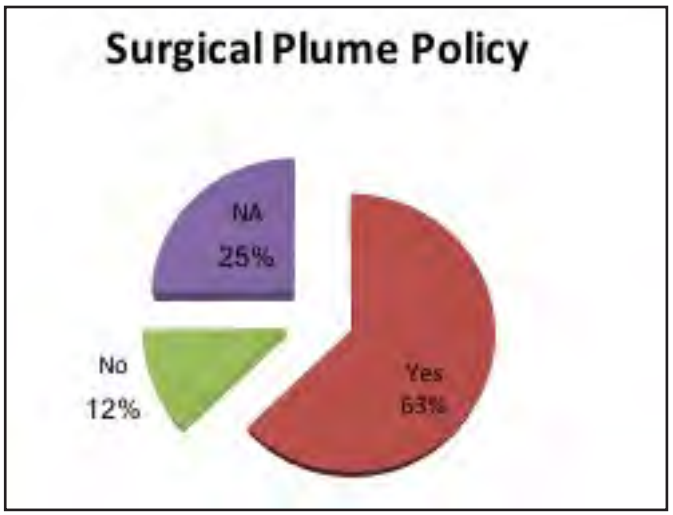


For the question, "Does your department have surgical plume extraction equipment?", 37 per cent of Perioperative Nurses answered that their department had surgical plume extraction equipment, while 40 per cent indicated that their department did not have equipment. Yet again, 23 per cent answered this was "not applicable" to them.





The question, "Would you prefer to work in a smoke-free environment?" resulted in 63 per cent of Perioperative Nurses answering that they would prefer to work in a smoke-free environment while 13 per cent answered "no"and 24 per cent indicated it was "not applicable".



When asked the question, "Does your department have a surgical plume policy?", 63 per cent of Perioperative Nurses indicated that their department did have a smoke plume policy while 12 per cent indicated that their department did not, while 25 per cent indicated this was "not applicable".

What do you see as barriers to being smoke-free?

Barriers to being smoke-free were listed as surgeons refusing to use equipment, equipment not being available, equipment being too noisy, consumables not being readily available, and staff are complacent in the use of equipment.

Nurses who completed the survey were able to indicate which barriers they thought applied. The greatest barrier was listed as "surgeons refusing to use equipment", followed by complacent staff.

Identifying the barriers to being smoke-free provides valuable information for targeting behaviour change.

Discussion

Numbers have been presented that relate to the questions answered. Further in-depth analysis can be done, for example to breakdown and compare regions, or to further target the relevant area of the operating theatre. It should be remembered that not all Perioperative Nurses who answered the survey come from the operating theatre environment. For example, nurses working in post anaesthetic care and the medical imaging specialties may not have a knowledge and understanding of smoke plume in the health setting and this may have had an impact on the results.

Recommendations

Throughout New Zealand, nurses are promoting the elimination of surgical plume in local workplaces. However not all workplaces have guidelines and policies in place to guide nurses and medical staff. The elimination of surgical plume needs to be addressed on a national level.

Each workplace where surgical plume is created should have systems in place to identify hazards associated with surgical plume and to eliminate or minimise the risk through implementing appropriate controls.

Where to from here

The Perioperative Nurses College is committed to promoting surgical plume-free workplaces, supporting the elimination of surgical plume in New Zealand hospitals and supporting improved occupational health and safety standards in the perioperative environment.

The Perioperative Nurses College is a member of the International Council of Surgical Plume, collaborating with international leaders advocating for smoke plume-free environments. The PNC web page provides links for members on the ongoing problem of surgical plume, linking to relevant information, updates and websites

A "guidance request to Worksafe New Zealand" has been submitted. The importance of risks has been acknowledged and Workforce New Zealand states they will consider any submissions made to assist in developing guidelines on those risks. This will be taken into consideration when Worksafe New Zealand considers work priorities for the next financial year.

The Perioperative Nurses College and the New Zealand Nurses Organisation supports the elimination of surgical plume in New Zealand hospitals. Raising awareness in the workplace is paramount to protecting our health workforce and the patients that we care for.

Special thanks to Emma Brooks for facilitating and compiling the surgical plume survey. Further results can be obtained through the Perioperative Nurses College.

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Worksafe Q & A

In March, Michael Esdaile, the Publisher of *The Dissector*, sent an email to Worksafe New Zealand enquiring about progress on the development of a standard for smoke plume evacuation in New Zealand hospital operating theatres.

In part, Esdaile asked:
Surely under the Health and Safety at Work Act, operating theatre staff should be protected from the hazards of surgical smoke? I note these slogans on the Worksafe website:

WorkSafe's role as a regulator

We are New Zealand's primary work health and safety regulator. It's our aim that every Kiwi who goes to work comes home healthy and safe.

Our aim as the regulator: Getting you home healthy and safe is what we're working for. To achieve this aim, we need people to comply with the requirements outlined in the Health and Safety at Work Act 2015 and in health and safety regulations.

Also: all work and workplaces are covered by HSWA unless specifically excluded.

Question 1: Apart from the item about the wonderful initiative of Mercy Hospital in Dunedin – posted in the Worksafe New Zealand website on September 4, 2017 – has there been any action for a draft standard for smoke plume evacuation in New Zealand hospital operating theatres?

Answer: WorkSafe does not have guidelines for smoke excavation in healthcare settings and there does not appear to be a New Zealand standard covering this matter. It is up to a PCBU* to manage risks arising from the work of their business or undertaking. There are international standards available for PCBUs to consider in doing so. View them at: https://www.iso.org/obp/ui/#iso:std:iso:16571:ed-1:v1:en

Question 2: Are hospital operating theatres excluded from the health & safety regulations?

Answer: No. Hospitals are subject to the Health and Safety at Work Act and its regulations, and duty holders have responsibilities as any other business or undertaking.

Question 3: Should operating theatre staff be protected from the hazards of surgical smoke under the Health and Safety at Work Act?

Answer: Yes – surgical smoke is a health hazard to workers and a risk to workers that a PCBU* must manage.

*A PCBU is a 'person conducting a business or undertaking'. It is a broad concept used throughout the Health and Safety at Work Act 2015 (HSWA) to describe all types of working arrangements.

The development of plastic & reconstruc

Abstract Post-World War I saw plastics and reconstructive surgery continue to develop with advances in wound management techniques, a move towards a series of surgeries, improvement in flap and grafting techniques and in the recognition and management of burn shock. The period also saw the development of formalised nursing training and registration and a greater understanding of the mechanisms of wound healing. The importance of the nursing role in providing care and psychological support to patients during the long recovery period following burns and plastics and constructive surgery was increasingly recognised.

Keywords: plastic and reconstructive surgery, nursing history, Great Britain, World War II, flap and graft surgery, burns shock, nursing registration

Introduction

Part one of this article (published in *The Dissector*, Vol. 45, No. 2) outlined the emerging speciality of plastic and reconstructive surgery (PRS) and how nursing developed within the speciality until the end of World War One (WW1). It became clear that WW1 pushed the speciality to develop new and innovative ways to repair, care for and manage patient rehabilitation. The aim was always to give patients the ability to live a functional, integrated life after suffering traumatic and disfiguring injuries. The following 20 years provided an opportunity for plastic and reconstructive surgery to fine-tune some reconstructive and wound management techniques. These skills would ultimately become integral to managing the next influx of casualties in World War Two (WWII). This article will be looking at how nursing continued to develop throughout this period and rose to the challenge of caring for patients who came to need the care and skills of this developing speciality.

Nursing development between the wars

After the passing of the Nurses Registration Act (NRA) in the United Kingdom in 1919, nursing finally began to take its place as a profession. The NRA laid the foundations for formal training and qualifications for nurses. PRS, like any other nursing area of practice, would have been able to begin to develop educational and professional skills for Registered Nurses that became standards of care within the speciality. Formalised nursing training in specialist centres, lectures and articles in journals all provided the opportunity for nurses to develop their skills, share information and experience and reflect on clinical practice. These early examples of professional practice development were demonstrated in a lecture given by the Vice President of the Royal College of Surgeons to nurses in 1933 (*British Journal of Nursing*, 1933) where he emphasised the need to understand the mechanisms of wound healing; he specifically focussed on the importance of wound care not denigrating into a mechanical process.

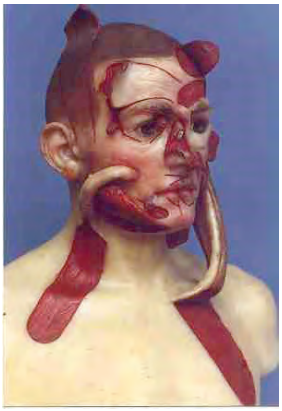
Plastic Surgical Nursing between the wars

The reconstructive process continued between the world wars. It became increasingly clear that plastic and reconstructive surgery, in relation to traumatic injuries, required a series of surgeries – the aim being to achieve a finished result that was acceptable to the patient, the surgical team and society.

Sir Harold Gillies and his team performed some 11,000 operations at The Queen's Hospital in Sidcup, Kent between 1917 and 1925 (Furness, 2012). Many of these reconstructive surgeries would be on the same patient as flaps, grafts and specialist reconstructive options were adapted to suit the patient.

When Archibald McIndoe (cousin to Sir Gillies) arrived in the United Kingdom from New Zealand in the 1930s, he set up in practice with Sir Gillies. Together they developed flap and grafting techniques that were to become invaluable during the Second World War (Mayhew, 2016). The practice and experience of the surgeons at Sidcup and in their private practice throughout the 1920s and 1930s would have been mirrored by the nursing staff caring for these patients.

Throughout this period the nursing profession was addressing the need to have a formal, standard educational system in place for nurse training. The Royal College of Nursing (RCN) in the United Kingdom set out to establish nursing as a profession, with a specific set of knowledge and skills – for which



A teaching model used at Sidcup by Sir Gillies to demonstrate flap techniques.

By Juliet Asbery

tive surgery nursing (Part II)

The psychological aspects of nursing became a core aspect of plastic surgery nursing as patients required as much emotional as physical care

all nurses should be fully trained (McGann, Crowther and Dougall, 2010). One of their concerns in the 1920s was to prevent the sudden influx of semi-trained women into the profession post-war. Therefore the 1920s and 30s were a period of consolidation and a struggle for influence and this often involved nursing organisations developing political and social influence to effect change.

As WWII approached, nursing came under increasing pressure to supply more numbers to meet the expected demand. The educational standards and skills established over the last 20 years would become invaluable.

Plastic surgery theatre staff at Queen Mary's Hospital with Gillies seated at right. (Gillies archives, Queen Mary's Hospital, Sidcup).

An injured World War I serviceman, Private Brigg – one of the many water colours that form part of the Macalister watercolours in the Gillies Archive.

The introduction of registration led to very small hospitals not offering training, whereas large hospitals, such as The Queen's Hospital in Sidcup, Kent where Sir Gillies worked, were able to sustain a nursing training programme (Abel-Smith, 1964). Nurses working in these Plastic Surgery wards and theatres in the 1920s and 1930s would have had to undergo formal nurse training.

The challenge of managing severely injured patients

Up until the end of the 1930s, severe injuries, especially burns over 30 per cent, killed nearly everyone who suffered them almost immediately; whereas after 1939 they did not (Mayhew, 2016).

The 1930s saw the most significant breakthroughs in the treatment

Sir Harold Gillies and his team performed some 11,000 operations at The Queen's Hospital in Sidcup, Kent between 1917 and 1925

of burn shock. In 1921, after the New Haven Rialto Theatre Fire, Frank Underhill observed that burn shock was related to intravascular fluid loss rather than direct toxic effects of injury (Peeters, Vandervelden, Wise & Malbrain, 2015). He noted that deaths following a severe burn injury occurred due to an overwhelming systemic inflammatory response with associated capillary leak syndrome. This resulted in hypovolaemic shock due to fluid shifts that reached a maximum at 12 to 24 hours post injury (Peeters *et al.,* 2015).

The nursing role was to closely monitor those patients having plasma and saline transfusions and to report and deal with responses to treatment (Mayhew, 2016). As experienced nurses do today, the nurse on a plastic surgical ward in the 1930s would have become expert at managing these patients. This would have provided a level of skill capable of managing the influx of burns patients about to present throughout WWII.

Wound management

Wound management techniques were also undergoing research and innovations in the inter-war years. Coagulants had until then been the mainstay of burn treatments (Abdelsamie, 1936). Tannic acid, which was used in leather works to stiffen hides, was applied to burns and other wounds to provide a barrier to infection and to provide immediate pain relief. This was stored in emergency departments and was an effective way to manage minor burns; however, when applied to major burns it was disastrous for the patient.

Mayhew (2016) reports that when tannic acid was applied circumferentially to fingers and thumbs, it stiffened into an unyielding casing which compromised circulation and blocked the dispersal of post traumatic oedematous swelling. The dressing would have to be removed, which caused considerable pain and potentially destroyed any viable surface for grafting. After much debate and trials of alternative methods of managing major burns (Mayhew, 2016) a system of simple gauze and petroleum jelly became standard practice for burn management in WWII. This system allowed nursing and medical staff to closely observe wounds at regular intervals, they could then detect infection and necrosis at an early stage and manage it more appropriately.

This new system, although superior to tannic acid, was also labour intensive. Plastic surgery wards had a higher ratio of nurse to patient than seen on any other hospital ward (Mayhew, 2016). Nurses needed to perform numerous daily dressings and the liquid nature of the dressings also meant that bed clothes had to be changed frequently. The need to monitor pressure areas would have become paramount as the skin was often moist and compromised by patient immobility. Ward beds were rearranged, given removable head boards and wheels to allow ease of access for facial dressings or circumferential wounds.

The otherwise well patient

An article by Barron (1941) in *The Nursing Times* discussed the principles of plastic surgery and how the nursing approach differs because you are often dealing with a patient who is often systemically well. The psychological aspects of nursing became a core aspect of plastic surgery nursing as patients required as much emotional as physical care. Mayhew (2016) reports a patient's experience of undergoing a series of facial reconstructive surgeries. The patient reported the "sometimes chaotic" nature of the ward and theatre with activity everywhere, but in the middle of everything, there was a constant, calm and proficient presence of the nurse.

Although Barron (1941) does not go into detail about what aspects of psychological care were addressed, the calming and normalising presence of an educated, proficient nurse would have been invaluable to patient psyche.

Conclusion

Sandeluss (2017) reports her perception of the nursing role as one that includes personal, medical and psychological care. The nurse is the one who is there when the patient struggles to perform personal hygiene tasks and makes it acceptable to receive help with the most personal cares. It is the role of the nurse to do this without embarrassment or limitation.

The experienced plastics nurse was learning to provide the care and emotional support to these traumatised patients that would eventually lead to the patient's re-integration into normal society. The next stage of the development of the PRS nurse occurred during WWII and saw all the experiences and preparation of the inter-war years come to the fore.

About the author *Juliet Asbery, Nurse Practitioner (Acute Care) trained at Derbyshire Royal Infirmary in the United Kingdom. She emigrated to New Zealand in 2005 where she initially worked in theatres at Wakefield Hospital, Wellington. Juliet is a member of the Professional Practice Committee of the PNC and is the National Committee Representative for the PNC (Wellington Section). Juliet currently works full time as a Nurse Practitioner throughout the perioperative continuum in Plastic and Reconstructive Surgery. She is passionate about patient advocacy and education.*

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Tannic acid, which was used in leather works to stiffen hides, was applied to burns and other wounds to provide a barrier to infection…

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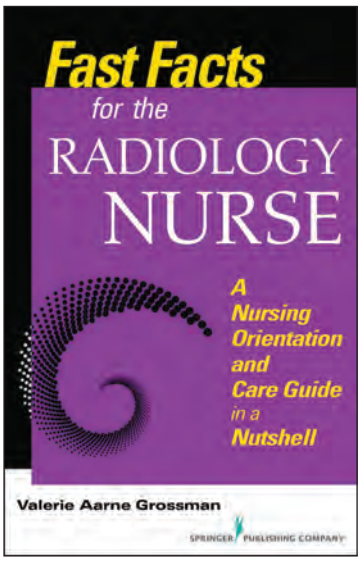
FAST FACTS FOR THE RADIOLOGY NURSE:
An orientation and Nursing Care Guide in a Nutshell



Title: FAST FACTS FOR THE RADIOLOGY NURSE: An orientation and Nursing Care Guide in a Nutshell
ISBN: 978-0-8261-2936-9
Author: Valerie Aarne Grossman MALS, BSN, RN
Published: Springer Publishing Company, 2014
Page count: 302, paperback/softback
Reviewer: Gillian Martin
Price: $80

An increasing number of nurses work in Radiology Departments and this book provides a comprehensive resource addressing the many roles the nurse fills within the imaging areas. It will serve as an important basis for nurses who are novices in radiology.

Radiology nurses are vital to the success of the radiology team and every radiology nurse needs knowledge regarding the basic skills for everyday practice. Nurses draw from prior experience and knowledge in patient assessment but in radiology they learn new skills specific to the imaging environment.

Learning to be a Radiology Nurse takes us out of our comfort zone and immerses us in a world developed by Radiologists and technicians (MRTs). "Fast Facts in a Nutshell" boxes located throughout the book highlight information that is essential to know. The book covers all aspects of radiology nursing including all modalities, the essentials of nursing care for radiology patents, Interventional Radiology, diagnostics, and special issues in radiology nursing including patient populations, current trends in nursing care, and the importance of communication between the emergency department and radiology

In summary, this book is a welcome addition to the resources for radiology nursing, which are few compared to other specialities. The handbook's size makes it easily portable as a bedside reference. A copy of this handbook would be an important addition to any radiology nursing resources.

What we need to bear in mind though is that this book is an American text and the roles of nurses within the radiology team differ to those here in New Zealand.

This is a great resource for the nurse new to radiology to refer to during the orientation period. ■

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Writing guidelines for The Dissector

The Editorial Committee of *The Dissector* welcomes articles, reports, book reviews, letters to the editor, exemplars, case study experiences, research papers or projects, perioperative services and quality improvement issues, Study Days or Regional News.

The following guidelines are designed to help first-time authors as well as those who have published previously.

Inquiry for Intent to Publish:

The Editorial Committee requests authors to send an inquiry email or letter before beginning to write a manuscript. Briefly describe your idea or topic and the Committee will respond with feedback that will help you to develop the manuscript in accordance with *The Dissector*'s requirements.

Articles intended for publication may be sent by email to the Editor, Shona Matthews: editor@dissector.co.nz. Please attach your document as a Word.doc attachment.

Preparing a Manuscript:

The usual length for a journal article is around 1500 words. Longer articles may be edited or published in more than one part. Key points to remember when preparing a manuscript for a journal article are:

- obtain information on the journal publishing requirements;
- check the maximum length;
- include illustrations, photographs and diagrams;
- avoid abbreviations, long and complicated sentences;
- include a short abstract (100-150 words) and up to six key words;
- use headings and sub-headings to separate major sections and ideas;
- check reference style – APA Style mandatory;
- have copy proof read prior to sending;
- use the "English language" spell check option on your computer.

Instructions to Authors:

Material may be submitted by e-mail. The article can be saved in Microsoft Word or Microsoft Works using plain text formats.

Illustrations, tables, graphs, diagrams and photos will enhance the text. Electronic images (high resolution only) should be saved as separate files. **DO NOT embed images into a MS Word document!**

Images should be numbered consecutively and cited in the text and sent as *separate attachments* or files. Mark the position of tables, graphs etc. in the margin of the printed manuscript. Be sure to include a title for each table and a caption for each illustration. Photographic prints of clinical procedures, equipment etc. are welcomed.

Permission to reproduce illustrations should be obtained by the author from the owner of the copyright. Photographs should be protected in the post by being enclosed in stiff card. Digital photos need to be in .jpg format and saved @ 300 dpi resolution, minimum. (Low resolution images are not acceptable for professional printing).

References:

The Dissector has adopted the American Psychological Association (APA) system (2010). This is widely used in universities and many nursing journals. APA manuals are available in most libraries and the web address is: http://www.apastyle.org. Footnotes are not used and a full list of references is given at the end of the manuscript, in alphabetical order. The use of EndNote or other referencing tool is recommended.

Reference in the Text: Referencing cited in text should include the author's last name and the year of publication. For example:

- Brooks (1997) describes the signs of malignant hyperthermia …
- A major factor in the care of the malignant hyperthermia patient is the early detection (Brooks, 1997).
- Brooks (1997), states, "The knowledge of malignant hyperthermia signs and symptoms is essential for every Perioperative Nurse" (p.70).

Reference List:

Reference lists are given on a separate page at the end of the manuscript in alphabetical order using the APA reference style. Only reference material that has been referred to in the text should be entered on the list. Background material does not need to be included. Material should be in double-spacing and the name of the author, year of publication, name of article, name of journal (in full), volume number, and part number in brackets and finally page numbers. For example:

- **Books:** Brooks, S.C. (1997). *Nursing in New Zealand Operating Rooms*. Wellington: Whitcoulls
- **Journals without DOI** Jones, A. (1992). Quality Improvement for pressure ulcers. *Evidence-Based Nursing*, 1 (4), 45–27.
- **Journals with DOI** Online articles follow the same guidelines for printed articles. Include all information the online host makes available, including an issue number in parentheses.
  Author, A. A., & Author, B. B. (Date of publication). Title of article. *Title of Online Periodical, volume number* (issue number if available). Retrieved from http://www.someaddress.com/full/url/
  Bernstein, M. (2002). 10 tips on writing the living Web. *A List Apart: For People Who Make Websites, 149*. Retrieved from http://www.alistapart.com/articles/writeliving
- **Chapter in a book:** Fry, A.S,. (1998) *Power, politics and change*. In: D.J. Dawson, & S.W. Talbott. (Eds) *Political action handbook for nurses*. Menlo Park California: Addison-Wesley.

Multiple Authors:

- Two authors – use both last names joined by an ampersand, (Scott & Fuller, 1997).
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- Six or more authors - In the body of the text, the first notation is *et al.* All author's names are stated in the reference list.

Submitting the Manuscript:

Please email manuscripts to the Editor (editor@dissector.co.nz) and include a covering letter specifying the article title, author's name, address and telephone number with the original manuscript and inclusions attached. Authors are asked to provide a brief profile of themselves (about the author), including their current position and qualifications. Inclusion of a personal photograph is entirely optional.

The Editor will acknowledge all manuscripts, but not letters nor news items of interest. The Editor's decision to publish or reject is final but they may discuss with you required changes. The Editor reserves the right to edit the article or amend the style. The article, once published, becomes the Copyright of *The Dissector*. Non-members will receive a copy of the issue of the journal in which the article appears.

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