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The Dissector

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

September 2018, Volume 46, Number 2

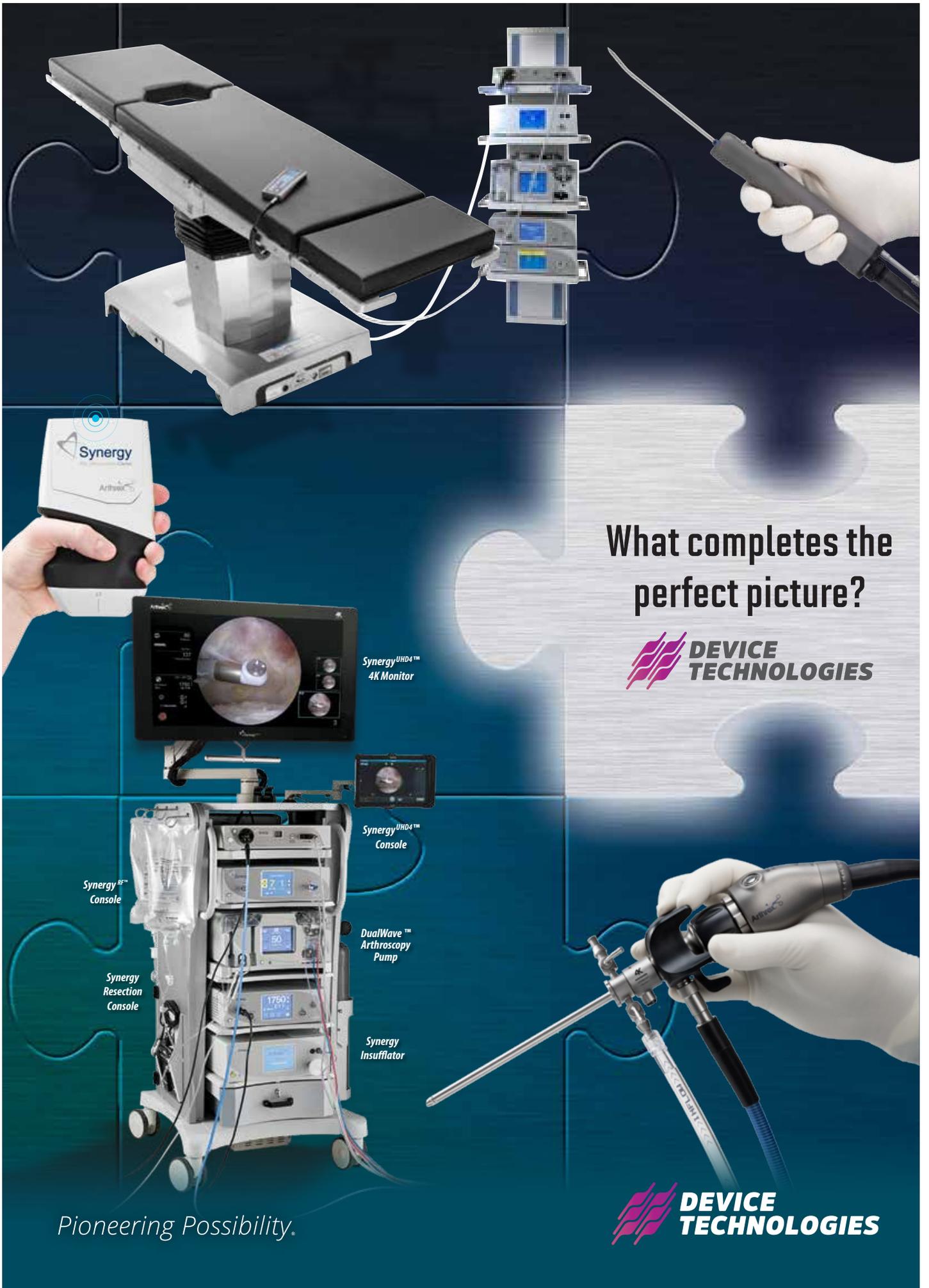
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The DISSECTOR



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Rising obesity rates are a major health concern that account for nine per cent of all illness and premature death Catherine Freebairn reports. Obesity is an obstacle to accessing anatomical structures, including veins, and creates difficulties for medical imaging and image-guided procedures. She uses a case study to illustrate the development of an alternative approach to Peripherally Inserted Central Catheters (PICC) for the bariatric patient and the establishment of a safe efficient service.
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The expanded practice role of The Registered Nurse First Surgical Assistant (RNFSA) has been shown to improve patient care whilst providing advanced academic pathways and career opportunities for nurses in New Zealand. Yvonne Morgan and Lesley Doughty examine the evolution of the RNFSA role and in particular the impact of postgraduate education and pathways available to the nurse pursuing this course of practice, along with some of the challenges faced.
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Touching Base

EDITORIAL COMMITTEE

SHONA MATTHEWS RN, BN MHsc (Hons).
Nurse co-ordinator Radiology, Green Lane Clinical Centre, Auckland DHB. Email: editor@dissector.co.nz or shona1046@orcon.net.nz or shonamat@adhb.govt.nz

SANDRA MILLIS RN, BN, PG Cert. HSc (Advanced Nursing), RNFSA Perioperative orthopaedic nurse, Mercy Hospital, Dunedin. Email: s.millis67@gmail.com

FENG SHIH RN, BN, PG Dip. (Advanced Nursing Practice). Theatre RN Auckland City Hospital, Auckland DHB. Email: chinshih@xtra.co.nz

TRACEY LEE RN, MN (Hons). Perioperative Associate Nurse Director- Workforce Development, Education and Training Auckland DHB. Email: TLee@adhb.govt.nz or tracey.lee@xtra.co.nz

CATHERINE FREEBAIRN RN, BN, PG Cert. Radiology Nurse, Radiology Department, Hawkes Bay DHB. Email: catherine.freebairn@airnet.net.nz

DEVIKA COOK RN, BN, Dip Mgmt. Charge Nurse, PACU, Level 8, Auckland City Hospital, Auckland DHB. Email: devikac@adhb.govt.nz

NATIONAL COMMITTEE

Chairperson Johanna McCamish;

Secretary Sue Claridge
pnc.sec@xtra.co.nz;

Treasurer Johanna McCamish
whosnz@hotmail.com

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Hawkes Bay – Amanda Gibson;

Wellington – Juliet Asbery;

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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.

Research is a great opportunity

Welcome to the September issue of *The Dissector*. I freely admit being a research junkie and willing volunteer when participants are required for studies. It is a great opportunity to learn about emerging health science and access a range of otherwise unavailable diagnostic tests and treatments.

The latest University of Auckland study I was involved in looked at establishing a non-invasive technique for measuring brown adipose tissue volume. Brown fat may have beneficial effects on reducing obesity and related diseases. The main function is heat production for the body when it is cold, and the more energy used for heating the body, the easier it will be to lose weight. The study is focused on children as unfortunately our percentage of brown fat decreases with age, so my involvement was as a control. Do look at opportunities to participate in such projects as it is time well spent.

The Spring issue of *The Dissector* has a range of interesting reading. Annelies Lindsay, recipient of the 2017 Catherine Logan award, uses a case study approach to look at the development and management of pulmonary emboli post knee arthroplasty.

We feature two excellent articles based on presentations from last year's Perioperative Nurses Conference. In our medical imaging feature, new Editorial Committee member Catherine Freebairn describes an alternative approach they have developed in the Hawkes Bay to place Peripherally Inserted Central Catheters (PICC) in morbidly obese patients.

Sandra Millis, another Editorial Committee member, takes a reflective look at how speaking up about bullying, although difficult, is important in order to change work place culture and poses the question, "what would it take to speak up?"

Smoke evacuation audit

First time contributor Assunta Rodrigues outlines an audit and subsequent continuous quality improvement action plan at her place of work, to address the inconsistent use of smoke evacuation units in conjunction with the use of diathermy. This article will provide some useful insight into addressing this important issue for those departments where it remains an issue.

Evolution of RNFSA role

An education focus is provided by Yvonne Morgan and Lesley Doughty in their article examining the evolution of the Registered Nurse First Surgical Assistant (RNFSA) role in New Zealand and in particular the impact of

postgraduate education and pathways available to nurses pursuing this course of practice. It is disturbing to hear that RNFSA within some District Health Boards are not allowed to perform the assisting role despite completing the training. Also, that some surgeons and nurses remain cynical to the benefits of postgraduate education – despite strong evidence supporting its value.

Strategic Plan

The Perioperative Nurses College National Committee recently held a workshop to develop a strategic plan. It was great to see the bound volumes of the journal for the years 2006–2017.

Encouraging membership participation remains an issue in most regions. There are multiple ways to get involved, both at local and national level, and of course by writing material for *The Dissector*.

The College has a significant number of awards available to support on-going education and research. Regional committees also have funding available to allow attendance at the National Conference if you become involved, so please consider this as it is an enriching experience.

Paediatrics

Remember that we would also like to publish an issue next year with a paediatric focus and another looking at the impact of obesity across the perioperative continuum, material permitting.

I hope to see you all at conference in Nelson and would love to discuss ideas for future articles.

Shona Matthews, Chief Editor



Great news! The College has now organised the binding of every issue of The Dissector for the years 2006-2017.

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Editor: SHONA MATTHEWS
Email: editor@dissector.co.nz

Publisher: MICHAEL ESDAILE
Advantage Publishing Ltd.
michael@advantagepublishing.co.nz
Tel: 09 416 5013 / 027 495 4510

Editorial Committee:
SANDRA MILLIS
FENG SHIH
TRACEY LEE
CATHERINE FREEBAIRN
DEVIKA COOK

CIRCULATION:

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CORRESPONDENCE

The Editorial Committee welcomes all correspondence intended for publication.

Correspondence should be addressed: The Editor, Shona Matthews, editor@dissector.co.nz or Tel: 027 323 2857 Please ensure the author's name, address and telephone number appears on the title page of any article or letter intended for publication.

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Developing a Strategic Plan

Wow! Another edition of *The Dissector*. There has been a lot of moving and shaking in regard to pay talks with the New Zealand Nurses Organisation (NZNO) and District Health Boards, with nurses raising their profile and finding a voice.

Thank you to all the nurses who have supported each other by being available in critical areas and to those who attended marches and meetings.

Thank you

Strategic Planning:

In July an executive group (the Perioperative Nurses College National Committee and selected individuals), met to discuss and formulate a strategic plan for the future. The focus was developing a strategic plan that would suit the College, a plan to work toward common goals and to establish agreements around goals and outcomes.

The strategic plan will allow the College to set priorities, establishing a focus to strengthen operations that focus on the future.

The strategic plan followed the NZNO planning model, vision and mission statement but has been refined and adapted to be relevant to the College. Like NZNO, the headings of improved health outcomes, skilled Perioperative Nurses, a strong Perioperative Nursing workforce and effective organisation were used.

The strategic plan to support Perioperative Nurses looks at "Improved Health Outcomes." Points to focus on included:

- Engaging in debate about effective models of care for the perioperative area;
- Demonstrating the contribution the perioperative speciality makes to improved health outcomes and healthy communities, hapu and iwi;
- Ensuring a culturally safe perioperative environment;
- Promoting research and use of evidence based best practice throughout the perioperative continuum.

The Heading "skilled Perioperative Nurses" focuses on contributing to the on-going professional development of Perioperative Nurses working in and across the health system.

Focus points included:

- Participating in the design and review of education programmes that equip nurses to practice across the perioperative continuum;
- Supporting and ensuring opportunities exist for student nurses to experience the perioperative environment;
- Mentoring to encourage leadership.



"Strong Perioperative Nursing workforce" is described as strengthening the perioperative nursing workforce, planning, sustainability and leadership.

Focuses include:

- Highlighting the public image of Perioperative Nursing;
- Promoting and strengthening inter professional practice;
- Engaging and supporting leadership;
- Promoting the retention of experienced perioperative staff;
- Increased engagement of the undergraduate nursing student to the perioperative speciality.

The heading "effective organisation" - is to ensure the Perioperative Nurses College is a healthy and sustainable organisation. This is achieved by engaging members and increasing the Perioperative Nurses' College profile in perioperative areas throughout New Zealand. Suggestions of succession planning for senior nurses and roles within the College were also discussed.

As the strategic plan comes together, a full version will be distributed for comment.

As we plan for the future, supporting the perioperative speciality area and ensuring the workforce is supported is a priority.

Johanna McCamish, Perioperative Nursing College Chair



To celebrate the new Bamford website we are offering a 15% discount on every pair of wock clogs or shoes. To redeem this visit Bamford.co.nz and at checkout enter promo code **DISSECTOR** (valid until 7 October)



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CLOG, is ideal for activities in which professionals spend many hours standing and, who hence have a tendency to suffer foot discomfort or lower body fatigue, especially to be used in:

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-  Hospitals and Other Healthcare institutions
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- Resistant to abrasion;
- Resistant to detergents;
- Resistant to lactic acid;
- Resistant to liquids (such as infiltration of blood);
- Resistant to chemicals;
- Resistant to saltwater;
- Recyclable.



-  Sterilizable +
-  Breathable +
-  Antistatic +
-  Antislip +



CLOG 01
Orange | White



CLOG 03
White | Navy Blue



CLOG 05
White | Orange



CLOG 06
White | Green



CLOG 09
White | Fuchsia



CLOG 10
White | White



CLOG 11
Black | Black



CLOG 17
White | Red

Nelson hosting 45th PNC Conference

The Nelson organising committee extends an invitation to all nurses across the perioperative continuum to the annual conference of the Perioperative Nurses College of the New Zealand Nurses Organisation (PNC, ^{NZNO}).

This is the 45th annual PNC Conference and it will be held at the Rutherford Hotel in Nelson from Thursday October 11 to Saturday, October 13. As this is the last week of the school holidays, the conference organising committee invites you to “bring the family along and enjoy a fabulous family holiday”.

The conference committee hopes attendees “come away from this conference with a new, fresh approach to your career and a deeper understanding of your emotional psyche. We want you to be motivated to be able to make changes in your home and working life with a deeper understanding of what triggers and drives you. This event offers wonderful interactive learning experiences that will give you more hours toward your PDRPs. Altogether we feel this is a winning formula!

“We are really looking forward and excited about seeing all of you and showing you our fabulous region. We do know that it is often very hard to get time off and to secure funding from our hospitals. So please go to our website (www.confer.co.nz/periop/) and find the letter that can be given to your hospital that will help your case. The website also contains the programme and gives a summary of each of the speakers involved.”

The Keynote Speakers are:

Dr. Paul Woods, who will open the conference with his address “What

is your personal Prison” which will get you questioning your personal boundaries.

Claudia Teunissen is a great speaker whose role is Project Manager for bowel screening at NMDHB. Claudia will talk on “Effective Surgical Teams” and present her research papers on the same. She will also give you an insight into managing an OR team when you have trained in another country.

Maryanne Coyle is another wonderful inspiring speaker who will talk about team communication, including ways of communicating and potential barriers to communication.

“We invite you to register online and hope you find the programme, thought-provoking stimulating and innovative.

“The theme for Friday night’s dinner is ‘Masquerade’ and we would love to see guests get fully involved and dress-up to the theme – but will be just as happy if you wear a mask. There will be a prize for the best costume. We also have a fabulous challenge in the works, which we know you will all enjoy.

“We hope we have piqued your interest for this year’s conference and we are all looking forward to meeting with you all, networking and sharing great interactive working experiences that you can take back and pass on to your colleagues.

“See you in October.”

Nelson-Marlborough Region Conference Committee 2018

REM Systems is PNC’s conference partner

Thirty-one medical supply companies have signed up as Exhibitors at the 45th annual PNC Conference, with REM Systems Ltd. also taking on the Conference Partnership role.

The Leading Sponsor is BSN medical with Ashburton’s Hallmark Surgical taking the official Supporter role.

REM Systems is a privately-owned New Zealand company with Auckland-based head office and massive warehousing facilities to manage logistics closely and effectively. The company has a comprehensive product range, touching virtually every department within a hospital.

REM Systems understands the difference well informed advice can make to patient outcomes and says “whether you’re simply re-ordering consumables or looking for better ways to get your job done, we’re here to help.”

Leading Sponsor: BSN medical

BSN medical is a global leader in the medical device sector, specialising in the areas of wound management, orthopaedics, vascular therapy and lymphoedema.

The company has a focus on developing and providing first class products and services to help deliver improved healthcare outcomes for the healing of bone, skin, soft tissue and lymphatic and vascular conditions. Its product range includes trusted brands: Leukomed[®], Propax[®], Cutimed[®], JOBST[®], Fixomull[®] and Leuko[®] Tapes.

Supporter: Hallmark

Hallmark Surgical has deliberately set the bar high.

The company is committed to excellence: “to fall short, when a life, (or lives), are at stake – on your part, or ours – would be unthinkable.”

All life is both precious and perilous.

“The instruments, devices and clothing we provide are devoted to preserving that life,” the company says.

In addition to REM, BSN and Hallmark, the other exhibitors are: 3M Health Care, Arjo New Zealand, B. Braun, Big Green Surgical, Boston Scientific, Bravura Education, ConvaTec, Culpán Medical, Defries Industries, Denyers NZ Ltd., Device Technologies, Downs Distributors, EBOS Healthcare, Endo Sport New Zealand, F&P Health Care, Global Medics, Healthcare Australia, InterMed Medical, Jackson Allison Medical & Surgical, Johnson & Johnson, Lohmann & Rauscher, Medtronic New Zealand, Molnlycke Health Care, Opritech, Ortho Medics, Schulke New Zealand, Stryker New Zealand, W.M. Bamford and Zimmer Biomet.

Tongariro Cardiothoracic Meeting

The New Zealand Annual Tongariro Cardiothoracic meeting is being held in Napier on March 22-24, 2019.

The focus of this meeting will be “Rheumatic and Complex Valvular Heart Disease”.

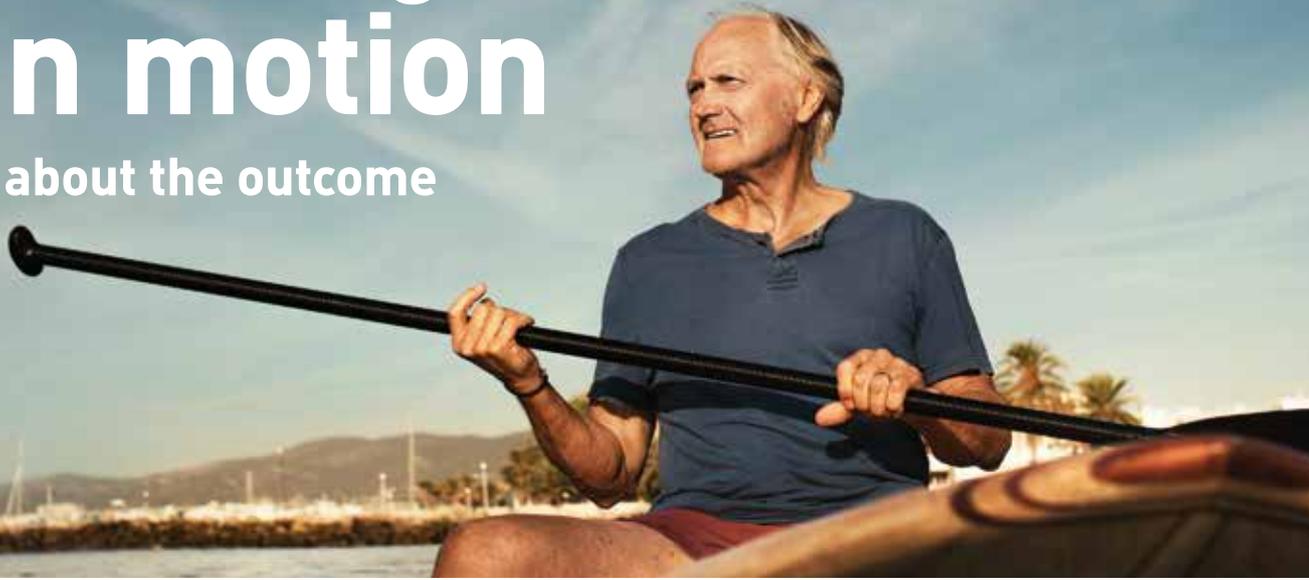
The meeting will tackle all aspects of the condition and be extremely interesting to nursing staff. Nursing and Allied Health staff with an interest in Cardiothoracic Surgery are invited to submit an abstract that applies to any aspect of cardiothoracic patient care. Selected work will be displayed as posters and judged by faculty. The winner of the Nursing and Allied health section will receive an award.

Closure for abstract submissions is December 31, 2018.

For submissions and more information please visit www.tongariro2019.co.nz or contact Kelsey Simpson, email: Kelsey.Simpson@waikatodhb.health.nz ■

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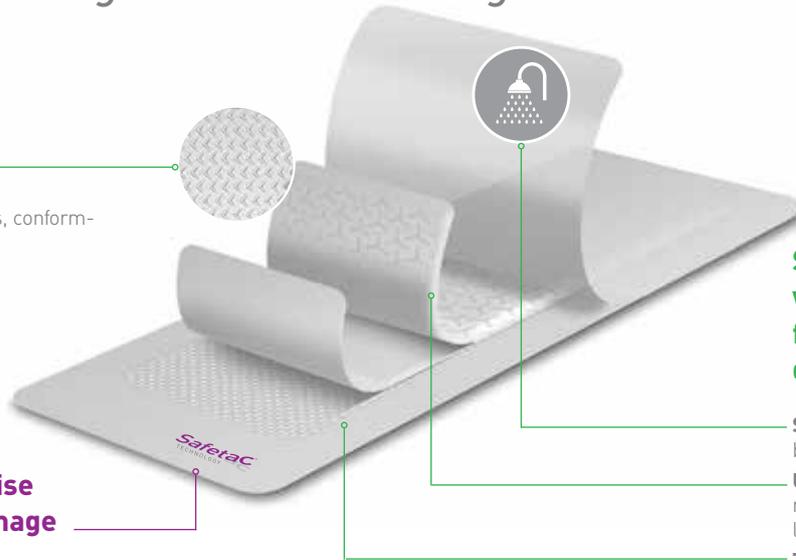
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Mölnlycke helps find the balance

For post-operative patients, finding your balance could mean starting to move again. For healthcare professionals it means finding a way to balance a range of concerns like patients' pain, mobility and overall satisfaction – as well as preventing infection.

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Mepilex Border Post-Op dressing is specifically designed for incisions and to support early patient mobilisation (Peghetti *et al.*, 2018)

A flex-cut pad stretches in all directions, conforming to the body even as it moves. Its Safetac® Technology is clinically proven to reduce pain and minimise dressing-related skin damage, including post-operative blistering (Johansson *et al.*, 2012; Van Overschelde *et al.*, 2016; Zarghooni *et al.*, 2016; Bredow *et al.*, 2016) which is painful for the patient and can compromise mobility.

Patients who have undergone hip or knee replacement surgery must start moving as soon as possible. If stiff and injurious dressings and blisters prevent them from doing so, the consequences could be serious. Post-operative complications can be reduced by using a dressing with good exudate management properties. Mepilex Border Post-Op effectively absorbs and retains blood and surgical exudate and is optimised for post-operative use and blood absorption.

Mepilex Border Post-Op and its shower-proof seal supports longer wear time and is designed to minimise the number of dressing changes (Van Overschelde *et al.*, 2016; Zarghooni *et al.*, 2016; Bredow *et al.*, 2016), reducing surgical site infection (Peghetti *et al.*, 2018).

It is well-known that fewer dressing changes limit the risk of external contamination, as well as potentially reducing dressing related costs (Zarghooni *et al.*, 2016; Bredow *et al.*, 2016).

The better care and treatment a wound gets, the faster it tends to heal. It makes sense that the better a dressing can support the patients' recovery process, the less suffering and complications will result. Healthcare professionals know this, and will naturally turn to products allowing less complicated healing. Valuable resources are then released, creating potential for reducing the long-term overall health costs associated with wound surgery and post-operative treatment.

The outlook for wound care professionals is bright - smart, practical thinking and design allows them to do their jobs even better. And the future for patients with wounds treated with Mepilex Border Post-Op is looking significantly less painful.

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Orthopedic surgeons training in virtual reality

The Johnson & Johnson Institute has recently launched a virtual reality training programme designed to prepare orthopaedic surgeons and nurses for some common procedures.

The programme will expand to other surgeries, but for now it's focusing on total knee replacement with direct anterior approach and hip fracture treatment with a proximal femoral nail. The hope is that using virtual reality to learn and practice surgical techniques will help improve clinical outcomes for patients.

David Badri, Virtual Reality and VVW Professional Education at Johnson & Johnson, says the VR training programme is designed to help enhance surgical techniques and drive greater patient outcomes.

"VR enables surgeons and nurses to train in a safe environment, providing them with flexibility, repeatability and direct feedback to enhance surgical techniques, reduce travel costs and save time," he says.

The idea of the VR programme is to allow surgeons, nurses and residents to practice at their own pace and as often as they want until they master a procedure.

The programme currently includes three unique VR training modules for orthopaedic surgery – total knee replacement, total hip replacement with direct anterior approach and hip fracture treatment with a proximal femoral nail. With a variety of modules that meet clear educational needs, the programme is designed to allow surgeons and nurses to refine their techniques, helping enhance patient outcomes.

All instruments and implants in the VR training modules are designed to simulate real-world experiences in a fully immersive operating room, while anatomy and biomechanics provide an accurate scenario for the user.

Badri leads Global Educations Solutions for Johnson & Johnson Medical Devices, as well as the Johnson & Johnson Institute, which provides medical education for surgeons and other healthcare professionals around the world. ■



A study conducted in 2017 with the first Johnson & Johnson VR education module found that 80 per cent of 107 interviewed orthopaedic surgeons would like to use VR frequently for training, and 90 per cent would recommend VR training to their peers. The Johnson & Johnson Institute has already deployed 50 VR systems, with the goal of including these experiences in basic courses and expanding to other Institutes around the world.



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Packed programme for Canterbury Study Day

The Canterbury-West Coast Region held another successful half study day at Burwood Hospital Christchurch on June 9.

With a theme “Core Practice”, five speakers covered a diverse number of topics related to Perioperative Nursing.

Wendy Davies, Clinical Nurse Educator from St. Georges Hospital, spoke on the Early Warning Score (EWS), which was set up by the New Zealand Health Quality and Safety Commission to standardise a Patient Deterioration Programme – to recognise and respond together as a team. “Recognition and Response saves lives” is the slogan.

The New Zealand EWS is calculated from routine vital sign measurements and increases as vital signs become increasingly abnormal. It triggers an escalating clinical response so that clinicians with the right skills can intervene and manage a patient’s deterioration. The national vital signs chart and NZEWS were developed based on the best available factors and clinical evidence and tested for usability in several different hospital sites and ward settings.

Whilst most attendees worked in the operating theatre environment, Wendy’s presentation gave them an understanding of what is involved around the EWS on our patients in the ward setting and PACU.

Further information/details on the Early Warning Score charts can be found on the Health Quality & Safety Commission website.

Specimen Management

Bobby Guy, Clinical Nurse Specialist, Operating Suite Burwood Hospital, presented an informative and thought-provoking session on Specimen Management and the importance of the “Sign Out”

process is to avoid errors around specimens within the Operating Theatre.

Bobby summarised a previous conference presentation, adding her own experiences and systems she used at Burwood Hospital e.g. including it in the orientation of new staff/students, new graduates and hints for them to avoid any mistakes being made.

The take home messages from her presentation were:

- Have a standardised system;
- Pay attention to specimen checking at the sign out and making sure all staff are in engaged;
- Include it in the orientation of all staff;
- Have a designated specimen trolley/area in theatre;
- Check and re-check patient labels – making sure the correct ones on the specimen correlate with the form and notes. Check with the Surgeon;
- Inform and include the multi-disciplinary team – a MDT inclusion reduces errors;
- All patient labels are removed from the OR prior to the next patient’s arrival.

Bobby recommended staff go back to their units and question if there is a specimen issue, thus causing a delayed diagnosis for a patient, or whether mistakes/wrong labelling have been made causing more surgery for the patient. Have a structured surgical safety checklist, follow up incidents, frequent audits and feedback results.

Tissue Management of Wound Healing

Speakers from Johnson and Johnson, Bidy Hoskin and Mikaela



The latest Canterbury-West Coast Region Study Day saw five speakers cover a diverse range of topics. It was very well attended.

Gilbert, presented on the Science of Tissue Management of Wound Healing and the Science of Tissue Management of Energy.

The Science of Tissue Management is a principle Johnson and Johnson follow to achieve scientific understanding of living tissue and device interaction.

The history of tissue management by Tenets and Halstead was covered first. They then moved on to the importance of using the correct sutures or device on various wound closures to ensure meticulous haemostasis, preservation of blood supply, and minimisation of tissue trauma and tension on the tissues.

The importance of suture strength during the critical healing period in wound closure was highlighted. All these factors influence wound healing, or complications in wound healing, scarring, infection and getting the desired wound closure outcome.

Tissue management of energy was also highlighted and one of the questions asked was "Why don't patients get electrocuted using electro-surgery?"

The principles of electro-surgery were discussed with emphasis on the fact that the moment the electro-surgical instrument is put down, it is still hot and can cause burning.

Operating with Respect

The last speaker for the day was Dr Sally Langley, Plastic and Reconstructive Surgeon. Dr Sally Langley presented a comprehensive and enlightened session on "Operating with Respect" and the work that the Royal Australasian College of Surgeons (RACS) are addressing around recognising, managing and preventing discrimination, bullying and sexual harassment.

Bullying is a real problem in our profession – as it is in the rest of the health sector. It compromises patient safety.

Many have seen it or experienced it so now is the time to build respect and improve patient safety in surgery and deal with discrimination, bullying and sexual harassment.

Dr Langley's thought-provoking presentation outlined RACS action plan, identifying two core principles: Respect and Collaboration.

RACS runs an "Operating with Respect" (OWR) course which aims to equip surgeons with the ability to self-regulate behaviour in the workplace and to moderate the behaviour of colleagues in order to build respect and patient safety. There is also an E-learning module.

Dr Langley asked if any of us had heard of the Vanderbilt Principles. The RACS action plan aligns with the principles in the Vanderbilt Model. More on these can be found on the internet.

Also available is MORSim: Multi-disciplinary Operating Room Simulation from the NZ Health Quality Safety Commission.

One of the many take-home messages from Sally's presentation was: that if you witness or are being bullied/harassed then confront and speak out. Always follow up as there are processes in place to deal with this and to stop escalation.

Marilyn Casey

Wellington struggles for attendance

The Wellington Region of the Perioperative Nurses College usually has seven meetings over the year, each meeting being held at the region's hospitals (Wellington, Hutt, Kenepuru, Wakefield, Bowen, Southern Cross and Boulcott).

We struggle with attendance and for the first time ever we have no Chair. Emma Brooks remains as Treasurer with myself as secretary,

though both of us would like to hand over - but to whom?

Up until last year each meeting allocated no more than half an hour to "business" followed by a guest speaker – an educational approach. This year we are holding an education session only as we felt this would make the evening more attractive to members.

The first two meetings this year were cancelled as members at the hospitals had not got back with a speaker/topic. Thus our first meeting this year was at Wellington Hospital with Rosie Moller as the guest speaker. Her topic was 'Perioperative Hypothermia: how a small audit can help make a big change in a NZ Hospital.'

Rosie had presented this at a Conference in Dubai.

Our next meeting was in July at Hutt Hospital with Region member Tryna Kenny our guest speaker. We had funded her to attend the recent Women's Health Conference held in Nelson.

Tryna was very impressed with this Conference, for both the quality of the Speakers invited to speak and the content of their presentations. The content had relevance for Tryna as she works at CCDHB in the Caesarean Theatre.

Karen Hall has since met with Juliet Asbery to try and come up with ideas on how to stimulate the region. Juliet is currently looking at establishing a Facebook page for our region - this is work in progress.

We have two more Education Sessions scheduled this year. They are: **October 2** at Southern Cross Hospital. This is the pre-PNC AGM meeting, scheduled before the annual conference and AGM in Nelson. **November 14** at Kenepuru Hospital.

Karen Hall, Secretary, Wellington Region



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Changing workplace culture

what would it take to speak up?

By Sandra Millis

INTRODUCTION

What would it take to speak up?

This was the sole question on a survey in the tea room at work and I picked it up to respond. But the question was too complex. I was unable to articulate the multiple answers in my head, so I placed the blank piece of paper back on the coffee table and headed back to work.

Bullying behaviours in the healthcare setting have been well documented and have become ingrained in the hierarchical culture of healthcare. These behaviours negatively affect productivity, job satisfaction and staff retention which can hinder safe patient care. We could all probably give examples where workplace interactions are inappropriate, but these behaviours have become so common that they are often overlooked. We instead move on through our busy day without giving them another thought. Within the last few years targets of bullying behaviours have begun to speak up. There is a greater awareness and understanding around the subject of bullying.

This article, based on a Surgico-sponsored Free Paper presentation at the 43rd Perioperative Nurses Conference, explores the process of personal reflection alongside recent research literature, legislation and guidelines.

BACKGROUND

Perioperative Nursing has been my career for more than 20 years. Early on in my working life in theatre, the senior staff nurses that I most remember were terrifying, unapproachable and grumpy. They tolerated surgeons yelling and ranting at them just because that was how it was! They treated the junior nurses the way they did because these negative interactions had been normalised.

Horizontal violence has been well documented in the literature and is only now beginning to be addressed. Professor Jenny Carryer from

Abstract: Bullying in the healthcare environment historically has been tolerated, and in many cases expected. The Health and Safety at Work Act (2015) has provided the necessary legislation to stimulate a move toward addressing the bullying culture within New Zealand hospitals. This article takes a reflective look at how speaking up about bullying, although difficult, is important in order to change work place culture.

Keywords: Bullying, Perioperative Nursing, horizontal violence, respect, health and safety, workplace culture.

Massey University believes that bullying between nursing colleagues is undoubtedly an oppressed group behaviour. She also maintains that when nurses feel valued and hold appropriate power and control over their own destiny, horizontal bullying will decrease markedly (Carryer, 2016 cited *Nursing Review*, 2016).

These experiences early on in my perioperative career have highlighted the importance of providing junior nurses with positive role models and encouraging them to achieve and know the feeling of success.

In my current position I am respected by my colleagues, both medical and nursing, and my opinion is valued. This for me is key to my job satisfaction. However, it hasn't always been so positive. I have worked in environments for years where bullying behaviours were common with many subtle instances leaving me feeling overwhelmed and frustrated. It was only when someone showed me an employment relations website that listed seven bullying behaviours that I realised what I was experiencing had a name, was wrong and was not my fault.

The difficulty in identifying bullying behaviours is due to their sometimes subtle nature and in some cases the perpetrator may have little insight into how their behaviour impacts on others (Blackwood, 2018).

To deal with the situation I chose to change jobs. This approach to dealing with bullying was a significant finding in Dr Kate Blackwood's PhD research (2015). Dr Blackwood's participants included 34 nurses who met the study's bullying definition. Interestingly, 28 of the 34 nurses acknowledged being bullied. Fifteen reported action was taken but only one indicated the bullying was successfully stopped. The other 13 nurses said that no action had been taken. Leaving their

We could all probably give examples where workplace interactions are inappropriate, but these behaviours have become so common that they are often over looked.

job was the most commonly reported way the bullying was stopped.

DEFINITIONS

There are numerous online bullying resources available, including from the New Zealand Nurses Organisation (NZNO), Worksafe New Zealand, Health Quality and Safety Commission and Employment New Zealand. They all provide definitions of bullying.

Key words in these definitions include: persistent, misuse of power, systematic, interpersonal, unreasonable, intimidating, malicious, insulting, undermining, humiliating, abusive behaviour. Which may cause social, psychological harm, loss of dignity and respect and compromise the targets safety and well-being.

The Health Research Council of New Zealand released a report in 2009 titled "Understanding Stress and Bullying in New Zealand Workplaces" which took a comprehensive look at bullying across the health sector, education and hospitality. It found that bullying was more likely to occur in the following situations:

- In the absence of strong effective leadership;
 - When the organisation is of a hierarchical nature;
 - When there were staffing shortages and a general lack of resources;
 - When there was a lack of bullying reporting systems.
- (Bentley *et al.*, 2009)

NZNO also has a definition of what is not bullying. This is important to note as sometimes the word bullying can be used when it is not appropriate to do so. It is worth checking this at www.nzno.org.nz/bullyfree.

Royal Australasian College of Surgeons Acknowledges Bullying

In 2015 the Royal Australasian College of Surgeons (RACS) set up an Expert Advisory Group in response to a complaint made by a junior female doctor about her senior consultant. Between April and July 2015 this Advisory Group conducted research and consultation with fellows, trainees and international medical graduates as well as the healthcare sector and the wider community. In September 2015, the panel released a report to RACS highlighting the extent of the issue in the healthcare setting.

Their research found that 49 per cent of fellows, trainees and international medical graduates reported being subjected to discrimination, bullying or sexual harassment. Seventy per cent of hospitals reported discrimination, bullying or sexual harassment by a surgeon in their hospital in the last five years, with bullying the most frequently reported issue. Thirty-nine per cent of fellows, trainees and international medical graduates report bullying, 18 per cent report discrimination, 19 per cent report workplace harassment and seven per cent sexual harassment, with some reporting more than one behaviour. The problems exist across all surgical specialties and regions in both Australia and New Zealand and senior surgeons

and surgical consultants are reported as the primary source of these problems.

These findings are probably something any nurse working in the perioperative environment has known for years, but to have it acknowledged by such a major player is a massive step forward in eliminating bullying behaviours in the healthcare setting. RACS has gone on to set up online and face-to-face courses under the umbrella "Lets Operate with Respect".

Two of the three surgeons I work with have completed the training and both have initiated discussions in theatre around bullying behaviours. The more discussion that occurs, creates awareness and leads to the possibility of self-reflection. The College has gone on to develop strategies and recommendations to bring about a much-needed change.

The Health and Safety at Work Act 2015

Bullying is now being viewed as a health and safety issue and is covered under the Health and Safety at Work Act (2015).

The relatively recent 2015 change in the Act has brought about a change in focus around how workplace health and safety is handled. It recognises that a well-functioning health and safety system relies on participation, leadership and accountability by government, businesses and workers, meaning everyone needs to work together.

A guiding principle of the Act is that workers and others need to be given the highest level of protection from workplace health and safety risks as reasonable. The key change in this Act is the focus from monitoring and recording health and safety incidents to proactively identifying and managing risks. Therefore, everyone in the workplace has a role in dealing with bullying (Worksafe NZ).

What Triggered my Self Reflection

There were multiple triggers that got me thinking about bullying in the workplace. Firstly, as mentioned the unanswerable questionnaire in the tearoom, but more importantly an inappropriate exchange between a senior staff nurse and a new graduate in theatre that I witnessed. My reaction to the situation was to afterwards offer support to the new graduate but I made no attempt to intervene during the conflict.

Next came the June issue of *Kai Tiaki* which contained Christine Gardiner's story of enduring three years of toxic bullying during her nursing training and Rebekah Kelsey's story of how unresolved bullying lead to her leaving nursing. Rebekah and Christine's stories are brave, and I admire their courage in speaking up. I concluded that the best way to deal with bullying behaviour is to talk about it and identify it as being wrong in an attempt to change workplace culture. However, speaking up is not always easy!

A group of researchers at the Otago University Bioethics Centre and Otago Medical School are currently undertaking research into

student bullying in the healthcare setting. Dr Althea Blakey is one of the lead researchers of the Creating a Positive Learning Environment (CAPLE) Project. At a meeting with Dr Blakey to discuss her research, she asked me how effective I thought confronting the staff nurse would have been? She pointed out that there is a move away from naming and shaming to working alongside staff in a non-targeted, inter professional approach to encourage self-reflection. While not directly studying bullying, the CAPLE project is able to use teaching and learning as a covert platform to explore workplace culture and ways to change it.

The theatre environment in particular is a high stress cauldron providing plenty of opportunities for bullying behaviours to occur. It is therefore a great place to implement strategies to reduce bullying.

Bentley *et al.*, (2009) reported the targets of bullying in theatre cannot always physically remove themselves from the situation and are sometimes unable to challenge the perpetrator due to the risk of an error occurring while surgery is taking place.

As nurses, we are bound by the Nursing Council Code of Conduct with particular relevance to Principle 6 "to work respectfully with colleagues to best meet health consumers' needs". Standard 6.4 states: "Your behaviour towards colleagues should always be respectful and not include dismissiveness, indifference, bullying, verbal abuse, harassment or discrimination" (NCNZ, 2012).

We are also bound by the following Nursing Council Competencies:

Accepts responsibility for ensuring that his/her nursing practice and conduct meet the standards of the professional, ethical and relevant legislated requirements (Competency 1.1);

Communicates effectively with health consumers and members of the healthcare team (Competency 3.3);

Collaborates and participates with colleagues and members of the healthcare team to facilitate and coordinate care (Competency 4.1);

Recognises and values the roles and skills of all members of the healthcare team in the delivery of care (Competency 4.2).

(NCNZ, 2007)

Therefore, all nurses have a personal and professional responsibility to work towards a change in workplace culture.

Conclusion

The focus of workplace bullying research has moved on from looking at the personality traits to seeing bullying as a product of the work environment and placing the onus on organisations to do something about it. Even with all of the available resources, policies, templates, guidelines and toolboxes, our standard approach to dealing with

The problems exist across all surgical specialties and regions in both Australia and New Zealand and senior surgeons and surgical consultants are reported as the primary source of these problems.



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bullying is not working and the focus is moving to changing institutional culture.

By taking a moment to reflect on a situation in the workplace I have been able to explore the complex issue of bullying and have developed a greater understanding of strategies and processes. For changes to be made, a major shift in behaviour across all disciplines and management levels is required. With large professional bodies now acknowledging the problem exists and the appearance of personal accounts in the media, I am confident bullying cultures in our hospitals will begin to change. This change will be accelerated with strong leadership, breaking down the hierarchical structure in healthcare, increased resources and robust reporting systems.

By speaking up about bullying and presenting this paper I hope to have stimulated conversations and maybe encouraged people to reflect on the way they treat others. By being aware of others and caring for others you can create a much safer, comfortable, positive and productive work environment which in turn can only enhance outcomes for your patients.

We all deserve to be treated with respect, to be valued, to be treated as a professional and to work in a safe, healthy environment. ■

About the author: Sandra Millis completed her Diploma and Bachelor of Nursing at Otago Polytechnic and her Post Graduate Certificate in Health Sciences pilot RNFSA course at Auckland University in 2011. She has worked in Perioperative Nursing for 24 years and is currently self employed as a Surgical Assistant in Orthopaedics in the private setting. Sandra has held positions on both the National PNC Committee and The Dissector.

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Coming of Age

ACORN and ASIONRNA conference 2018

By Tracey Lee

The Adelaide Convention centre provided a wonderful location to enjoy the views of the nearby River Torrens and surrounding parklands. The opening ceremony for the International ACORN and ASIONRNA conference 2018 was also memorable for the Judith Cornell Oration delivered by Sally Sutherland-Fraser, celebrating a distinguished nurse who has made a significant contribution to advancing nursing in Australia.

Following Sally's address, sessions were broken down into streams for clinical, education, leadership and management, research and combined subjects and a huge selection of speakers with a variety of interesting themes and projects.

While all streams provided up-to-date issues and projects, there were quite a few with a theme of improving experiences and resilience for our nursing workforce, coming into an age of further workforce shortages. It seemed looking at the overall programme that the issues and current hot topics were very similar to those we are experiencing within New Zealand Perioperative Nursing.

Highlights from the sessions included going over the new audit tools designed by Sally Sutherland-Fraser and Menna Davies, developed to support ACORN standards and used to ensure a measure of practice against these standards. We were broken into groups to review various

audit tools and see how they may be used in the practice area through observational methods. The tools are able to be purchased on the ACORN website but there are only a few available at the moment with the full package of audits due mid-2019.

Stresses in the workplace

Another fascinating talk was Joy Jensen's session on what causes stress in the workplace and how resilience can be modelled in the clinical area through such methods as role modelling coping strategies in stressful situations and following up and talking to other staff following any significant event. She emphasised that it's the generosity of people that we work with that helps fill the bucket when it gets low and it's something we should all be aware of and actively look to remedy with our colleagues.

Supporting this theme was the session that followed. Dr Francis Seow-Choen reminded the audience about balance in life in order to ensure a sense of perspective. Working as a colorectal surgeon in Singapore, he has managed to also be the founding chairman for the Guide Dogs Association for the Blind in Singapore (until recently) and is an entomologist who has written seven books on stick insects. His focus on ensuring work doesn't impact on personal life was inspiring and he had ample advice on avoiding burnout through prioritising and setting boundaries.



There isn't a person in Adelaide who has the willpower to walk past Smelly Cheese Shop, Dough or Say Cheese in the Central Market without at least sticking their head in for a closer look...

It seemed, looking at the overall programme, that the issues and current hot topics were very similar to those we are experiencing within New Zealand Perioperative Nursing.

Education...

In the education stream there was an interesting talk by Angela Jarkey who spoke about providing education across the generation gap with many of us finding a connection with our own generation's descriptions. However, what it really provided was a means to move teaching and education forward to better meet the needs of the new generations coming through and ensure education is provided in a way meaningful to them.

We learnt that from an educators' perspective, it is good to understand how our nurses want to receive information to ensure it is useful and fits the purpose. We can then ensure, for example, that a Generation Y has information readily available and is constantly updated via electronic means about plans and changes. The centennial generation on the other hand understands the relevance in what they are learning straight up front and they may not ask questions but they will Google it later to check the answer. Though generalised, it was a very interesting summary and really gave the audience something to think about.

Burns victim

On Friday there was a remarkable session by Turia Pitt who was an engineering miner running an ultra-marathon through the Australian outback when a grass/bush fire swept through, trapping her and leaving her with burns to 64 per cent of her body. She would have been an interesting person before her accident with a quick wit and great sense of humour, but the accident and her long recovery has provided the opportunity for her to share her strength of mind and spirit along with her experience to inspire others.

Turia talked about her complete recovery in a candid way and her

determination to complete an Ironman at a stage where she was still struggling to climb the stairs. The part that brought a tear to everyone's eye was when she called out to the nurse she remembered from her multiple perioperative visits and that nurse went down and they embraced. She was visited on stage by her husband, who for a long time nursed her in her recovery at home, and her 10-month old baby, born after Turia achieved her Ironman finish.

The day then included an interesting selection of talks in a variety of streams and was nicely finished off with the conference dinner. This was a spectacular affair with everyone going the extra mile with their Great Gadsby outfits and some great entertainment on offer for the evening.

It's always nice to get to share a table with our nursing colleagues from Australia who are working in a variety of settings, both urban and rural, and get to hear about their work experiences.

Mock trial

On the last day, the mock trial made its regular appearance and as always was thought-provoking. This year it had a documentation, communication and handover theme and provided a great opportunity to reflect on how our own documentation might stand up under the scrutiny of the legal system. It was quite sobering.

Overall the ACORN Conference provided a great opportunity to catch up on developments in practice and education with a great deal of involvement in many of the sessions by the ASIORNA participants which widened the practice contexts further than just Australia. It was also wonderful to meet many nurses who have left our beautiful country to seek opportunities in Australia and hear how they are finding their experience working there. ■



The Adelaide Convention centre provided a wonderful location to enjoy the views of the nearby River Torrens and surrounding parklands.

Electrosurgical Smoke Evacuation

Quality Improvement Project

By Assunta Rodrigues RN

Introduction

Quality improvement (QI) should be embraced by Perioperative Nurses to ensure patient safety, promote quality and reduce costs. Electrosurgical smoke (ESS) plume exposure is a serious health hazard and a major quality issue facing patients and staff in the operating theatre (OT).

Surgical smoke can be seen and smelt, yet safety measures are not mandatory.

Three audits were conducted utilizing the author's hospital policy on the use of diathermy or electrosurgical unit (ESU) and smoke evacuator unit (SEU) against the Association of periOperative Registered Nurses (AORN) Recommended Practices for Electrosurgery (AORN, 2015). Audits aimed to measure staff compliance with the policy, AORN Standards and evidence-based practice (EBP). Audit results were used to critique the policy and identify an aspect of practice for QI.

The inconsistent use of SEU in conjunction with ESU were identified as key issues. An ESS evacuation QI project was initiated in July 2015 at a large teaching hospital in New Zealand. The project aimed to contribute to evidence-based practice (EBP), ensure a safe and healthy smoke free OT environment and minimize risks of the hazardous effects of ESS on patients and OT staff. A time line was established to accomplish this project by 2018. The Plan-Do-Check-Act (PDCA) QI process was utilized and Iowa Model used to implement an action plan (White & Spruce, 2015).

Background Literature

An extensive literature review included both current research studies and international standards.

Electrosurgical smoke is the gaseous by-product produced during surgery when tissue is dissected or cauterized by a heat generating device such as the ESU (Ball, 2010; Schultz, 2015). When dissecting tissues, heat generated by ESU causes the intracellular fluid to boil,

Abstract: Electrosurgical smoke (ESS)/plume exposure is a serious health hazard and a major quality issue facing patients and staff in the operating theatre (OT). A series of audits were conducted to measure staff compliance with local policy and the Association of periOperative Registered Nurses (AORN) Recommended Practices for Electrosurgery (AORN, 2015) and other research-based literature to identify an aspect of practice for a quality improvement project. Inconsistent use of smoke evacuation units in conjunction with the use of diathermy became the focus of recommendations and a continuous quality improvement action plan.

Keywords: quality improvement, evidence-based practice, electrosurgery, surgical smoke, surgical plume, smoke evacuation.

rupturing the cell membrane, converting cellular fluid into steam and expelling the cellular contents into the environment (Hill, O'Neill, Powell, & Oliver, 2012).

ESS consists of 95 per cent water vapour and five per cent cellular debris with by-products of combustion. Research studies confirmed surgical smoke can contain toxic vapours and gases such as formaldehyde, hydrogen, cyanide, benzene and bioaerosol, blood fragments, virus, live cellular material and malignant

cells (Hill *et al.*, 2012; Mowbray, Ansell, Warren, Wall, & Torkington, 2013; Fitzgerald, Malik, & Ahmed, 2012).

One gram of electro-surgically ablated tissue is equivalent to the mutagenic potency of smoking six unfiltered cigarettes (Tomita, *et al.*, 1981) and surgical smoke produced on a daily average is equivalent to 27-30 cigarettes (Hill, *et al.*, 2012).

ESS particles can be smaller than 0.1 micrometre (μm) which can be inhaled and deposited in the respiratory tract and alveoli. Surgical masks are ineffective as they filter particles larger than $5\mu\text{m}$ (Mowbray *et al.*, 2013).

Literature states that the use of a local exhaust ventilation (LEV) device is the best protection. The wand to evacuate ESS should be effectively placed as close as possible but no further than 5cms from the smoke point of origin (Hill *et al.*, 2012; AORN, 2015). Literature revealed the potentially hazardous nature of ESS and its effects on patients and staff, however, the consequences of long-term exposure are still unknown (Mowbray *et al.*, 2013; Marsh, 2012).

Hazardous effects of ESS on patients include risk of carbon monoxide toxicity during laparoscopies (Marsh, 2012), port site metastasis in cancer patients during laparoscopies (Mowbray *et al.*, 2013) and viable bacteria in ESS can cause surgical site infections increasing the cost of hospitalisation (Schultz, 2015; Ball, 2010).

Cumulative exposure to ESS on a regular basis increases health risks to OT staff causing headache, ocular irritation, dizziness, nausea, chronic and acute respiratory disease (Mowbray *et al.*, 2013; Marsh, 2012). However, its carcinogenic effects on staff are unproven (Fitzgerald *et al.*, 2012; Marsh, 2012).

Worldwide views on surgical smoke differ. Regulatory bodies such as AORN and the Australian College of Operating Room Nurses (ACORN) have been proponents of SSE (AORN, 2015; Australian College of Operating Room Nurses (ACORN), 2012). WorkSafe New Zealand recognised surgical smoke as a potential hazard and awarded Mercy Hospital Dunedin a Safety Award for eliminating surgical smoke in theatre (Goodwin, 2014). The Perioperative Nurses College of the New Zealand Nurses Organization (NZNO) is currently a member of the International Council on Surgical Plume Inc. (Perioperative Nurses College of NZNO, 2015). However, Health and Safety Executive (HSE), United Kingdom states that it cannot make an evidence-based conclusion as statistical data was lacking in respiratory ill-health symptoms linked with surgical smoke exposure (Beswick & Evans, 2012).

Methods, data collection and analysis

The mixed-method study combined qualitative and quantitative data collection and analysis which enhanced the reliability and validity of the project. A staff survey questionnaire, a prospective observational clinical audit and a retrospective documentation audit was conducted in the OT.

The project management process was discussed with the interdisciplinary project team which included the unit manager, charge nurse manager (CNM), quality coordinator, four charge nurses, nurse educator, health and safety nurse, an anaesthesiologist and a surgeon.

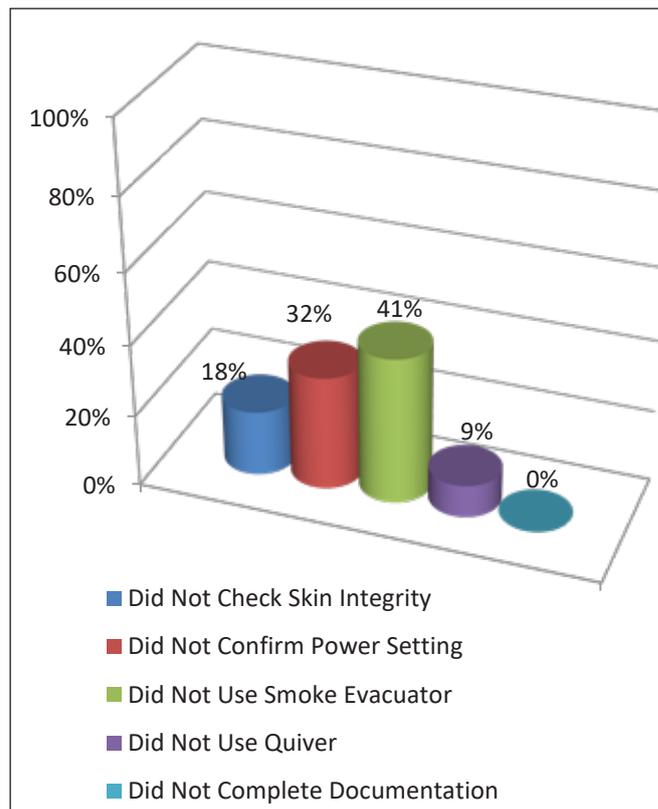
Operating Theatre nurses were informed of the project at the staff meeting and a survey questionnaire with six close-ended questions focused on aspects of the policy were handed out. Forty-seven questionnaires were distributed, and 32 nurses responded. A prospective observational clinical audit tool was developed with four clinical questions that referenced the AORN standards (AORN, 2015), providing evidence on how staff aligned with the policy and best practice. Clinical audit is the most important tool in advancing EBP (Steel, 2015). A retrospective documentation audit checked if the intra-operative documentation was complete and accurate. Twenty-two surgical procedures in OT were audited in various specialties for four days on day shifts.

Ethical consideration

Ethical issues were considered utilising the Code of Conduct for Nurses (Nursing Council of New Zealand, 2012), with emphasis on respecting privacy and confidentiality of patients and staff. Approval and written consent was obtained from the CNM. Informed consent is an essential part of the audit process and project details were explained at the staff meeting. Staff anonymity was ensured. There was no potential for harm; in fact, the observational audit was beneficial as nurses' performance improved knowing that they were being audited. Research ethics respecting the individual's autonomy and free-will are the moral principles that reflect the researcher's integrity (Rees, 2011).

Results

Sixty-eight per cent of nurses responded to the survey with 53 per cent unaware of the local electrosurgical smoke evacuation policy – despite 47 per cent working in OT for more than five years. Thirty-eight per cent did not receive education on the use of ESU and 44 per cent on SEU. Fifty-three per cent were non-compliant with smoke evacuation while 16 per cent were unaware of the adverse effects of surgical smoke.



Overall results of clinical audit at North Shore Hospital.

Forty-one per cent were unaware of safety considerations when using ESU but all theatres were 100 per cent compliant with intraoperative documentation on its use.

In contrast, the clinical audit results evidenced 41 per cent did not use SEU in conjunction with the ESU with 27 per cent commenting that it was due to 'surgeon's preference'. Another comment was, 'not routinely used in the specialty'.

Nurses are well positioned to address this gap between research and practice, by implementing EBP as we have the potential to lead quality improvement in healthcare. However, nurses need to go beyond 'doing things the way they have always done' and it is crucial to gain knowledge and skills of EBP, to be leaders and active participants in healthcare redesign (Hain & Tamara, 2015). Further, 32 per cent did not confirm power settings with the surgeon prior to connecting the diathermy lead, reference to which was also missing from local policy.

The audit also revealed 18 per cent did not comply with checking the patient's skin integrity and nine per cent did not comply with placing the active electrode in a quiver or scabbard when not in use.

Discussion

Audits are revealing as to how a team successfully incorporates standards, safety strategies and current literature into clinical practice (Steel, 2015). Although some aspects of the policy were acceptable, critical analysis together with results of the audit revealed a paucity of detail on aspects of surgical smoke evacuation, giving rise to compliance issues.

AORN recommendation (XI) (AORN, 2015) as well as the hospital policy states that all staff should receive initial education and on-going in-service on the use and functional aspects of the ESU and SEU, *but there was major non-compliance*.

Errors and potential injuries to patients and staff can be minimised with education (Alkatout, Schollmeyer, Hawaldar, Sharma, & Mettler, 2012; AORN, 2015). Hence, this issue was immediately addressed with the CNM and an in-service was organised in September 2015.

One theme addressed was safety considerations in the use of ESU.

The majority of nurses commented on placement of the dispersive return electrode pad, but policy requires that the patient's skin integrity be checked prior to application and after removal of the return electrode pad, but compliance was poor. In one instance the diathermy return electrode pad was placed on the patient's abdomen after draping the patient, however skin integrity was checked postoperatively.

The diathermy return electrode pad can cause burns if incorrectly applied (Saaq, Zaib, & Ahmad, 2012).

Another theme identified was confirming the power setting with the surgeon prior to connecting the diathermy lead and before activation to minimize risk of injury (AORN, 2015). In another instance the surgeon requested the power setting during the procedure. Policy also states that the active end of the electrode must be housed in the quiver when not in use but there was nine per cent non-compliance on this aspect. The quiver prevents unintentional activation of the active electrode that can lead to burns (Saaq *et al.*, 2012; Alkatout *et al.*, 2012).

Staff was 100 per cent compliant on documenting the use of ESU as per AORN recommendation (XII). Audited intraoperative record included documenting the location of the return electrode pad and condition of patient's skin integrity post operatively. Documentation provides continuity of patient care and is a legal requirement of nursing activity for the safety of the patient and staff (Braaf, Manias, & Riley, 2011; AORN, 2015).

Successful QI projects depend on the culture within the department. Positive culture and communication enables continuous QI. Ball (2010) suggests that the basis of a strong interconnected system is team work which is vital for EBP compliance. The OT is currently experiencing a change in organisational culture where the past culture of control is slowly transitioning to a culture of enquiry and evidence-based practice. There is greater team work between surgeons and nurses with positive leadership support for QI projects.

Using audit data to evaluate current practice against AORN standards and critique the current policy, the major clinical practice issue identified was inconsistency in the use of SEU in conjunction with ESU. One can argue that the reason for variance could be because the policy was ambiguous regarding surgical smoke evacuation, hence there is

disconnect between the policy and clinical practice.

The strength of the policy is as a staff education tool, but survey results revealed that staff education was lacking on the use of ESU and SEU. Literature suggests that staff education and training based on the hazards of ESS and effective smoke evacuation methods is vital to increase compliance, minimise errors and potential injuries (AORN, 2015; Ball, 2010; Johansson, Fogelberg-Dahm, & Wadensten, 2010). Hence the project resulted in two key recommendations. Firstly, comprehensive staff education and training on ESS evacuation with competency validation to increase compliance (Johansson *et al.*, 2010; ACORN, 2012) and secondly, development of a clear and easy to follow policy to mandate ESS evacuation with detailed instructions for laparoscopic and open surgical procedures. It is hoped that a clear and succinct policy will result in higher rates of compliance (Ball, 2010).

Limitations and Barriers to implementation

Limitations of the project include a small sample size. The clinical and documentation audits were conducted on four-day shifts with surgeons not included in the process. Barriers and challenges to implementation of ESS evacuation policy include dismissive attitude, a few surgeon's resistance to change, inadequate evidence-based knowledge and skills, reluctance to change, lack of resources such as EBP mentors and champions, staff complacency and lack of motivation. These attitudes were addressed with teaching sessions, updating surgeon's preference cards with smoke evacuation sterile supplies, removing the regular diathermy from custom packs such as the hip pack, and management support mandating the use of smoke evacuation units for all procedures producing electrosurgical smoke. It is imperative to extend the education to the physicians to garner support to effectively evacuate ESS.

Nursing implications

The Iowa Model was utilized to implement the action plan (White & Spruce, 2015). The gap was identified and awareness created with teaching sessions and PowerPoint presentations on ESS and its evacuation. Additionally, the survey improved staff awareness of the

Continued on page 24



Clearing the air – evacuating surgical smoke which can contain toxins such as formaldehyde, cyanide and benzene. One gram of electro-surgically ablated tissue is equivalent to the mutagenic potency of smoking six unfiltered cigarettes.

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policy and the risks of ESS. Audit results were displayed on the quality board which increased visibility of QI. Interest around ESS evacuation increased with suggestions that the policy needed to be revised and updated.

An interdisciplinary project team was formed creating interconnectedness and facilitating the development of a draft policy based on the best available evidence and integrated team feedback. A new 'Electrosurgical Smoke/Plume Evacuation' policy was published mandating the use of SEU for all procedures producing ESS. After publication, the policy was launched at a staff meeting with a Power Point presentation. Throughout the implementation phase, education and training sessions were conducted. Various smoke evacuator sterile supplies were trialled, taking into consideration surgeon's preference. The CNM consulted various companies to procure more SEU and supplies to ensure adequate equipment was available. The use of smoke evacuation supplies has continued to trend steadily upwards indicating our ESS evacuation strategies have been effective.

Conclusion

In conclusion, providing high quality evidence-based care is the responsibility of every Perioperative Nurse. Perioperative Nurses have a major ethical responsibility to identify practice issues, collect and evaluate best evidence to make recommendations, implement a practice change and evaluate the process. The audit provided the theatre nurses an opportunity for reflection on practice and actively participate in QI. Findings identified the inconsistent use of SEU in conjunction with ESU. Teaching sessions were organized on the hazards of ESS and smoke evacuation with competency validation. Additionally, a

Literature states that the use of a local exhaust ventilation (LEV) device is the best protection.

clear and succinct Electrosurgical Smoke/Plume Evacuation policy was developed based on current literature and international standards. The new policy mandating the use of SEU for all procedures producing ESS was published in December 2017 and consequently implemented in March 2018 with a PowerPoint teaching session.

It is imperative to extend the education to the physicians to garner support to effectively evacuate ESS and ensure a smoke-free operating theatre environment which facilitates health and safety of the patient and staff. Furthermore, undertake regular audits to monitor and evaluate outcomes and achievements initiating corrective action for continuous quality improvement. ■

About the author: *Assunta Rodrigues is a Registered Nurse with 25 years' operating theatre experience of which the last 15 years have been at North Shore Hospital, Auckland. After graduating in 1985, she continued on to complete her Postgraduate Midwifery from St. Martha's College of Nursing, Bangalore, India. She has a Postgraduate Certificate in Perioperative Specialty Nursing from Whitireia, Wellington. Her particular area of interest is research, quality improvement and patient safety. Assunta is currently a member of The International Council on Surgical Plume In. (ICSP), Clarence, NY as well as the Institute of Healthcare Improvement (IHI), Boston, MA.*

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An innovative approach to PICC line insertion for the bariatric patient

By Catherine Freebairn

Introduction

As health professionals we are aware that New Zealand has an obesity problem and our population is getting fatter. Obesity is defined by World Health Organization (WHO) as having an excessively high amount of body fat in relation to lean body mass. Body Mass Index (BMI) measures the ratio between weight and height kg/m² and classifies as overweight adults with a BMI greater than 25, and adults with a BMI greater than 30 (*World Health Organization, 2018*) as obese.

The New Zealand obesity reality has our adult population with the third highest rate in the Organisation for Economic Co-operation and Development (OECD) - behind only Mexico and the United States of America (USA).

The Ministry of Health statistics illustrate a steady rise in obesity from 10 per cent of the population in 1977 to 30 per cent in 2012 and 32 per cent in 2015, meaning one in three adults are obese (*Ministry of Health New Zealand, 2016-17*).

Increasingly our hospitals are faced with the impact of obesity.

In 1991, the estimated healthcare costs of obesity in New Zealand was \$135 million, a more recent study in 2006 estimated costs at \$600 million annually (Marj Moodie, Ashton, Siahpush & Swinburn, 2012).

Dr David Galler, Intensive Care Physician from Middlemore Hospital states, "some people are so big now we can't actually diagnose what's wrong with them" (Dastgheib & Kirk, 2014, 11:14).

Rising rates of obesity impact on radiology services with current imaging technology limiting the ability to accommodate and provide quality imaging. Obesity becomes an obstacle for interventional radiology accessing anatomical structures during PICC and tunnel line

Abstract: Rising obesity rates are a major health concern that account for nine per cent of all illness and premature death. Obese patients impact on the health system, increasing hospital admissions and healthcare costs, delivering challenges to current resources. Obesity is an obstacle to accessing anatomical structures, including veins, and creates difficulties for medical imaging and image-guided procedures. A case study illustrates the development of an alternative approach to Peripherally Inserted Central Catheters (PICC) for the bariatric patient and the establishment of a safe efficient service.

Keywords: PICC line, bariatric, obesity, radiology nursing, fluoroscopy guidance

procedures, arterial stent insertion, or targeting lesions to be drained or biopsied.

Difficulties also surround the peri-procedure management of sedation, airway and baseline observations for the morbidly obese patient, with a surgical approach for diagnosis or treatment the alternative, if image guidance cannot be provided (Aberle *et al.*, 2017). A patient who is morbidly obese and fits two or more of the following criteria – weight more

than (>)120kgs; BMI >35, and seated hip width > 51cms – are termed bariatric.

Bariatric patients are often denied access to radiology services when weight exceeds computed tomography (CT) and magnetic resonance imaging (MRI) table load limits of 220kgs and 150kgs, and more frequently limits sonography services as ultrasound beams struggle to penetrate the thick layers of subcutaneous and intra-peritoneal fat (Uppot *et al.*, 2007).

The Hawkes Bay District Health Board (HBDHB) last year transferred five morbidly obese patients requiring radiology services to other DHBs that were able to cater for larger patients.

The table load limit of 200kgs restricts fluoroscopy imaging for bariatric patient access to the Radiology PICC line Service at HBDHB. The bariatric patient is therefore limited to bedside placement of PICC lines, a time consuming, labour-intensive process that can expose the patient to higher radiation doses if multiple chest X-rays are required during PICC position adjustment. Position changes of the patient for X-ray checks compromises the sterile field, often requiring new sterile supplies. Extra staff or bariatric transfer equipment is required for patient positioning and delays occur if radiology staff are not provided relevant clinical information concerning the patient's body shape and weight.

The New Zealand obesity reality has our adult population with the third highest rate in the OECD – behind only Mexico and the USA...

Case study

A 57-year-old male with left leg cellulitis required six weeks of antibiotic therapy and was referred to Radiology for a PICC line insertion. He weighed 223kg with a history of airway and back problems, diabetes and difficult vascular access. Initially it was decided to place the PICC at the bedside in Radiology using the mobile X-ray to check PICC position.

Following discussions with the Medical Imaging Technologist (MRT), a different approach for the PICC insertion was arranged to:

- Reduce procedure time and the number of X-ray checks;
- Reduce the physical effort of patient positioning;
- Improve the sterile set-up;
- Give 'real time' visualisation during PICC line insertion;
- Provide peri-procedure comfort and safety of the patient.

Method

The patient arrived by orderly in a bariatric wheelchair and was positioned against a vertical fluoroscopy table as used for barium swallow screening. The patient remained in the upright sitting position for the duration of the procedure with no further position changes required.

The sterile field was arranged around the extended arm of the patient, at right angles from his body. The MRT assisted the PICC nurse to create the sterile environment for PICC insertion. Ultrasound guided needle insertion to the basilic vein above the antecubital fossa was achieved. The Seldinger technique* secured the vein with a guide wire and fluoroscopy imaging provided visualisation of the catheter moving over the wire into the superior vena cava position, two centimetres below the carina.

The patient was returned to the ward in the bariatric wheelchair.

Discussion

For radiological procedures, obesity presents an obstacle to accessing many of the anatomical structures, including veins. This problem is compounded when the table load weight specifications are exceeded, creating difficulties in obtaining medical imaging for image-guided procedures. Our technique overcomes the table load issue by using a wheelchair and adjusting the fluoroscopy equipment.

Obese patients are technically more challenging; accuracy decreases the deeper the target. Accessing the basilic vein using ultrasound guidance was challenging as the patient's veins were small and deep in the subcutaneous fat and the ultrasound beam had poor penetration. Manipulation of the wire and catheter and a position change of the patient's head was necessary to move the catheter out from the jugular into the subclavian vein to reach the optimal position in the superior vena cava.

Generally, a larger field of view decreases image resolution.



Above: J Sexton placing a PICC line in the 'wheelchair position'.
Right: Adjustments made to fluoroscopy equipment for wheelchair positioning.



Obesity is an obstacle to accessing anatomical structures, including veins, and creates difficulties for medical imaging and image-guided procedures

However, the fluoroscopy image quality was sufficient to achieve visualisation of the catheter and wire manipulation during the procedure.

The 'wheelchair' technique used current resources efficiently without increasing radiology time and was a shorter duration than a bedside placement. No extra staff resourcing was required to help with patient positioning. The sterile field was safely maintained throughout the procedure.

The bariatric wheelchair provided a comfortable position for the patient who experienced no airway distress or back discomfort during the procedure.

No physical lifting of the patient was needed for position alteration so there was minimal risk of staff workplace injury.

Our Radiology PICC line audit results show that over six years we have inserted 2491 PICC lines, 32 on the morbidly obese. Since the 'wheelchair' technique was initiated three years ago, we have placed 16 PICC lines successfully, about five per year. Two PICC lines have been inserted at the bedside for patients unable to sit in a wheelchair. The numbers of patients requiring this technique may be few at this stage, but the latest New Zealand health survey indicates this number is likely to grow in the future.

Recommendations

A fitted arm board attachment to the wheelchair frame that was able to extend out at right angles would provide better arm positioning and support during the procedure.

The 'wheelchair' technique can also be used for non-obese patients who cannot lie supine due to their medical condition.

Better imaging equipment will improve visualization and image quality.

Conclusion

The high rates of obesity in New Zealand affect all aspects of healthcare including Radiology. Diagnostic and interventional imaging equipment has limitations that become physical barriers for the bariatric patient to access Radiology services. By modifying equipment and patient positioning, the 'wheelchair' technique accommodates the larger patient and will be used increasingly as obesity rates continue to rise and impact on our health system. This alternative technique has multiple benefits:

- Provides a safe comfortable position for the bariatric patient;
- Improves procedure positioning for the PICC insertion team;
- Allows procedure visualization;

- Eliminates patient lifting and reduces the incidence for workplace injury;
- Provides a secure sterile environment.

The wheelchair technique can be applied within the current resource management framework to create a safe streamlined approach to a task that is physically and technically challenging.

***The Seldinger Technique** is a commonly used in Radiology when placing a central intravenous (IV) line typically into the internal jugular vein, subclavian vein, femoral vein or PICC line or ultrasound (US) guided IV into a deeper vein. It involves the introduction of a needle typically under US guidance into a vein until blood enters the syringe. The syringe is removed and a guidewire threaded through the needle into the vein to the required position. The needle is then removed, and the catheter or sheath is inserted over the wire, enlarging the insertion site as required, until the desired position is reached (Busti, 2015). ■

About the Author *Catherine Freebairn is a Registered Nurse with a Post Graduate Certificate in Nursing and a certificate in Theatre Nursing from Wellington Hospital. Catherine has worked for the past 15 years in the specialist environment of Radiology as an Imaging Nurse at Hawkes Bay District Health Board, and recently joined the Editorial Committee for The Dissector Journal.*

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The Registered Nurse First Surgical Assistant Paving the way

By Yvonne Morgan RN RNFSA MHSc and Lesley Doughty RN, BHSc, MEd (Hons)

Introduction

Nursing as a profession continues to advance at a rapid pace and can be attributed to the constant change impacting the healthcare environment in which we work. In recognition of these changes, nursing roles are continually developing to ensure the healthcare needs of New Zealanders are met. The role of the Registered Nurse First Surgical Assistant (RNFSA) is now well established in New Zealand, with 61 nurses having completed the University of Auckland postgraduate RNFSA training programme since its implementation in 2010. This article will examine the expanded role of the RNFSA with particular attention to the impact of postgraduate education and the continued postgraduate educational opportunities and pathways available to the RNFSA.

The RNFSA is considered to be an expanded practice nursing role and has been established in New Zealand since 2009 due to service provision needs and requirements (New Zealand Nurses Organisation Perioperative Nurses College, 2014).

The RNFSA programme is on the Master of Nursing academic pathway and allows nurses to understand the principles underpinning their practice whilst developing advanced knowledge and skills in this area. The Nursing Council of New Zealand (NCNZ) presented guidelines for Registered Nurses (RNs) delivering expanded practice care to ensure that nursing facilitated growth whilst ensuring best practice and patient safety (Nursing Council of New Zealand, 2018).

The first two cohorts of postgraduate RNFSA students were part of the Health Workforce New Zealand initiative to introduce the RNFSA role (Health Workforce New Zealand, 2012a).

The programme was audited externally to ascertain if there were benefits to patient care and service provision, as the RNFSA role envisaged a contribution to higher productivity and efficiency within the perioperative environment (Health Workforce New Zealand, 2012b). There was evidence of statistical significance with shortened operating room times with some of the specialties reviewed, and qualitatively, both surgeons and nurses acknowledged that having

Abstract: The expanded practice role of The Registered Nurse First Surgical Assistant (RNFSA) has been shown to improve patient care whilst providing advanced academic pathways and career opportunities for nurses in New Zealand. This article examines the evolution of the RNFSA role and in particular the impact of postgraduate education and pathways available to the nurse pursuing this course of practice along with some of the challenges faced.

Keywords: Expanded practice, Registered Nurse First Surgical Assistant, Perioperative Nursing, postgraduate education, academic pathways.

RNFSA's present allowed for surgeons to be released from surgery earlier allowing them to perform other duties (Field *et al.*, 2012).

Background

Anecdotal evidence suggested there were significant numbers of Registered Nurses (RNs) within New Zealand who were performing first assistant activities that if performed overseas, would require the nurse to have

undertaken postgraduate education and demonstrate competence to practice safely at an expanded level (Morgan & Kent, 2008; Porton-Whitworth & Doughty, 2016). It was noted and of equal significance that there were a large number of RNs undertaking activities that did not comply with the Health Practitioners Competence Assurance Act (Ministry of Health, 2005). This highlighted the fact that many RNs were potentially practicing outside of the RN scope of practice (New Zealand Nurses Organisation Perioperative Nurses College, 2014).

In 2010, NCNZ incorporated expanded practice activities into the RN scope of practice to effectively allow for growth of the RN profession whilst ensuring accountability of practice by both the RN and their employers, as well as provide safe provision of care to their patients (Nursing Council of New Zealand, 2011).

The RNFSA role was not designed to be in competition with surgical training positions or as a substitution for this but allowed a career pathway for experienced RNs. This new career pathway could ultimately affect retention within the perioperative area as well as enhance the training opportunities of surgical trainees (Health Workforce New Zealand [HWNZ], 2012B; Porton-Whitworth & Doughty, 2016). It is essential that a career pathway is underpinned by an appropriate educational pathway, preparing RNs with the advanced knowledge and skills they require to perform in the expanded practice role. It is important to be able to demonstrate the effectiveness of care delivery and the benefits to the patient and the organisation as a result of education and to be able to factor this into workforce planning and development (Adlam, Dotchin, & Hayward, 2009; Covell, 2009).

Education Pathway

Evidence supports the direct benefits of RNs engaging in postgraduate (PG) education. Aitken, Clarke, Cheung, Sloane, and Silber (2003) provided the first empirical evidence that employment of RNs with postgraduate qualifications is associated with improved patient outcomes. This was a large study which looked at educational levels of hospital nurses and surgical patient mortality. It took a cross-sectional analysis of outcome data for 232,342 surgical patients over an 18 month period and looked at risk-adjusted patient mortality and failure to rescue in 30 days of admission and was associated with nurse educational level. The outcome of this significant study was that in hospitals where nurses had completed PG education, the surgical patients experienced lower mortality and failure to rescue rates. Nurses who undertake postgraduate education are noted to make more informed decisions, have improved critical thinking skills, support their practice with evidence and have increased confidence in communication within the team (Barnhill, McKillop, & Aspinall, 2012; Cotterill-Walker, 2012).

The RNFSA programme is a complex, resource intense programme to deliver. It includes complex anatomy laboratory workshops and live simulation training with students completing a Postgraduate Certificate Health Sciences (PGCertHSc) specialisation Advanced Nursing (Health Workforce New Zealand, 2012b).

It has now been eight years following the successful implementation of the RNFSA training programme, which is now recognised as “business as usual”, with national interest in the programme.

Postgraduate education is expensive and decisions on funding are generally linked to the strategic direction of the organisation to achieve their vision and to equip the nursing workforce with suitably qualified RNs to meet current future workforce demands. However the increasing uncertainty around future funding of postgraduate nursing education is raising concerns. Interestingly, the past couple of years has seen a shift in approach, with a notable increase in RNs self-funding their postgraduate education (*Nursing Review*, 2017).

As previously stated, the RNFSA is considered an expanded practice role which requires additional education and acquisition of specific knowledge and skills (New Zealand Nurses Organisation Perioperative Nurses College, 2014). The RNFSA programme challenges RNs so they can make a difference to health outcomes as well as broaden their own employment options in the public and private healthcare sector working in expanded practice roles.

The University of Auckland postgraduate programmes have been developed to enhance nursing practice and focus on the improvement of patient outcomes and the health of all New Zealanders. Strong collaboration with local healthcare providers ensures that courses and qualifications remain clinically focussed, robust and up to date.

The University of Auckland has developed academic pathways



Figure 1: Generic Postgraduate Pathway



Figure 2: RNFSA: Specialised Academic Pathway

(approved by the Nursing Council of New Zealand) for RNs who wish to acquire the competencies defined by the NCNZ for advanced nursing practice roles such as Nurse Practitioner and Registered Nurse Designated Prescriber. On successful completion of the RNFSA training programme (PGCertHSc) (60 points), some RNFSA students opt to complete further postgraduate studies. A further 60 points may be completed towards a Postgraduate Diploma Health Sciences (PGDipHSc). At this stage it is crucial that course options are discussed with an academic advisor to ensure an individual academic pathway is devised to meet both academic and individual professional goals. For students who achieve a B Grade average (GPA>5) on successful completion of the PG Diploma, progression to Masters Nursing (MN) may be considered (See Figures 1 & 2). The choice of a research Masters or a taught Masters is very much determined by the clinical role the individual pursues and is discussed in depth with the student and academic advisor.

RNFSA work across the perioperative continuum and as a result of this, there is the potential for some RNFSAs to follow either the Registered Nurse Designated Prescriber or Nurse Practitioner advanced pathways. The Medicines Regulation 2016 (Designated Prescriber: Registered Nurses) allows suitably qualified and authorised RNs to prescribe for a range of common and long term conditions e.g. minor infections, respiratory disease or cardiovascular health concerns, in outpatient or nurse-led clinics (Ministry of Health, 2016).

RN prescribers meeting Nursing Council requirements will prescribe a small number of medicines from a schedule of medicines relevant to their area of practice and competence (Nursing Council of New Zealand, 2016). Therefore the RNFSA performing as an RN Designated Prescriber will require advanced skills in the

*Aitken, Clarke, Cheung, Sloane, and Silber (2003)
provided the first empirical evidence that employment
of RNs with postgraduate qualifications is associated
with improved patient outcomes.*

Nurses who undertake postgraduate education are noted to make more informed decisions, have improved critical thinking skills, support their practice with evidence and have increased confidence in communication within the team...

pharmacotherapeutic approaches relevant to the conditions with skilful deliberation of risks and benefits, considerations of pharmacological and non-pharmacological treatment approaches and the ability to work closely and effectively in a multi-disciplinary team environment. The RNFSA performing as a Nurse Practitioner will have the advanced skills of disease diagnosis and treatment prescribing as an authorised prescriber from an extensive formulary.

Current State

To date, six cohorts of students have completed the RNFSA training programme offered at the University of Auckland with a 2018 (seventh cohort) currently underway. Geographically the students come from the four corners of New Zealand, including Invercargill, Auckland, Gisborne and Greymouth; and both District Health Boards (DHBs) and private practice have been represented (See Figure 3).

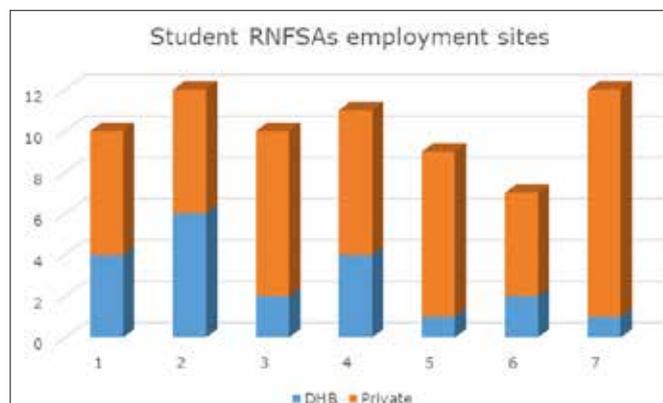


Figure 3: Cohorts to date

The pass rate for this programme currently sits at 95 per cent, with a further three per cent opting to only complete one of the two papers given extenuating circumstances. Whilst there is no formal data on where each RNFSA is practising and to what standard this may be, some students from past programmes readily agreed to share their current experiences (as noted below) having successfully completed the RNFSA programme.

Two RNFSA's have successfully completed the Nurse Practitioner (NP) pathway and are currently working as NPs within the orthopaedic subspecialty.

Another RNFSA is employed by a DHB in a fulltime position, currently working across the continuum of the perioperative arena performing preoperative patient assessments, intraoperative assisting, postoperative follow-ups and outpatient clinic assessments.

Another RNFSA is working within a rural DHB covering many specialties and is in the process of being credentialed for an expanded scope once they complete their expert PDRP.

There are three cardiac RNFSA's currently employed within the DHBs as clinical nurse specialists.

It appears the majority of those RNs who completed the RNFSA programme are working within the private surgical setting and this is due to a lack of trained medical counterparts to perform this role. RNFSA's appear to be working in a range of aspects across the perioperative continuum, with the majority employed solely in the intraoperative area. RNFSA's have employment through many different avenues from being self-employed, to having fulltime employment through an organisation, or a combination of both public and private settings.

One RNFSA working within a DHB stated:

"I love my job, completing the training has invigorated my passion for being a nurse, I believe I am providing my best patient care ever".

Another RNFSA reflected on the experience and stated:

"Initially I wished I had not enrolled in the RNFSA programme, having realised the magnitude of the role. However on understanding the principles behind activities, my eyes were opened to the bigger picture. These feelings have now dissipated as I have gained confidence and am extremely happy with the role and enjoy the mentorship role I have with my colleagues. I have now completed my PGDip and am hoping to commence a Master of Nursing in the future".

It is disappointing to hear and frustrating for those impacted that some nurses working within the DHBs are not allowed to perform the assisting role – despite completing the RNFSA training, with one nurse stating:

"it has been frustrating being financially supported through the training by my DHB, but not being allowed to consolidate my training afterwards".

Interestingly one RNFSA who attended a conference recently, witnessed a presenting surgeon dismiss postgraduate nursing education as being "too much, unnecessary and over rated". Upon further questioning, the RNFSA elaborated further:

"that the delegates were predominantly nurses, and most of them laughed and nodded at the surgeon's comments".

It was disappointing to hear of this and indicates an obvious need for a culture change with some nurses' attitudes towards on-going nursing education. These opinions need to be challenged, from within the nursing and medical fraternity. The evidence from the literature clearly supports the positive impact and benefits of RNs engaging in postgraduate education, ensuring the workforce is suitably equipped to deliver the most appropriate nursing care to meet the current and future needs of the patient population (Nursing Council of New Zealand, 2014).

Evidence-based practice (EBP) is the "integration of research, evidence and clinical expertise with patient values and circumstances"

(Straus, Richardson, Glasziou, & Haynes, 2005); and according to Murphy, Staffileno, and Foreman (2018) nurses should provide care based on best available scientific knowledge and not illogically from nurse to nurse and organisation to organisation.

The discourse around nurses' perception of quality and safety should be centred on research and evidence-based practice and not merely historical practice traditions and routine. Baker (2017) supports this by stating that data can either validate nursing traditions or demonstrate the requirement to make improvements. Postgraduate education can help RNs achieve EBP by advancing nursing practice through increased confidence gained, enabling better decision making and enhancing nursing knowledge and skills (Black & Bonner, 2011; Cotterill-Walker, 2012; Johnson & Copnell, 2002; Levett-Jones, 2005).

Conclusion

The RNFSA role is recognised as an expanded practice role, which has been shown to improve patient care whilst providing advanced academic pathways and career opportunities for nurses. Statistical evidence also supports the benefit of the RNFSA role to service provision by increased productivity and efficiency. Postgraduate education further supports and provides nurses with the advanced

knowledge and confidence to make informed decisions based on current research. The role of the RNFSA continues to evolve and there is still obvious work to be done and progress to be made, but as the English playwright John Henwood wrote, "Rome wasn't built in a day". We need to celebrate how far the role has developed and recognise the future potential.

The RNFSA is clearly paving the way having laid the foundations for future growth. ■

About the authors: *Yvonne Morgan RN RNFSA MHS is the Company Director of First Assistant Ltd. and is contracted as a Registered Nurse First Surgical Assistant (RNFSA) in both private and public hospitals. Yvonne holds an honorary teaching fellow appointment at the University of Auckland where she coordinates the RNFSA training programme.*

Lesley Doughty RN, BHSc, MEd (Hons) is a Professional Teaching Fellow and Management Director of the Postgraduate Taught Programme at the University of Auckland. Lesley is a Doctoral Candidate at the Faculty of Education and Social Work, University of Auckland and is researching the impact of postgraduate education on the new graduate nursing workforce as they transition to practice.

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Pulmonary embolism in the post-operative knee arthroplasty patient

By Annelies Lindsay

Introduction

Orthopaedic procedures have the highest incidence of pulmonary embolism (PE) with up to a 30 per cent risk of developing a PE with no prophylactic treatment (Smith & Murauski, 2017; Coleman, Obi & Henke, 2015).

Hip and knee arthroplasty procedures are two common orthopaedic operations which reduce the pain caused by osteoarthritis and improve quality of life. According to Hooper, Lee, Rothwell & Framptom (2014), osteoarthritis is a major health problem in New Zealand with 47 per cent of older adults likely to develop the condition. With the aging population, it is projected that there will be an 174 per cent increase of hip arthroplasty and 674 per cent of knee arthroplasty by 2030 (Hooper, Lee, Rothwell & Framptom, 2014; Statistics New Zealand, 2000).

Mr Brown (pseudonym) had bilateral knee arthroplasty due to his debilitating osteoarthritis and subsequently developed a PE. The following case study reviews the risk factors, pathophysiology, clinical manifestations, diagnosis and management of this condition.

Mr Brown's assessment

Subjective: states he feels well, denies chest pain, feels mildly short of breath on exertion, has mild pain in both knees.

Objective: HR 90-110, RR 18-20, BP 96/62, oxygen saturation 91 per cent on room air, temperature 37.1.

Risk Factors and Virchow's Triad

Post arthroplasty Mr Brown was at risk for the development of a venous thromboembolism or VTE. It is routine at my area of work for patients to have pharmacological and mechanical prophylactic treatment unless contraindicated (Smith & Murauski, 2017). Furthermore, various risk factors increase the likelihood of a patient like Mr Brown developing a VTE. These include a history of diabetes, smoking, malignancy, dyslipidaemia, the type and length of surgery, central obesity, history of deep vein thrombosis (DVT) or PE, coronary artery disease, atrial fibrillation, general versus local anaesthetic, increasing age, gender and genetics such as inherited thrombophilia or protein C deficiency (Charen, Qian, Hutzler & Bosco, 2015; Smith

Abstract: Orthopaedic surgery carries a high risk of pulmonary emboli (PE). The pathophysiology, diagnosis, clinical manifestation and management of this complication are described using a case study approach.

Keywords: Arthroplasty, pulmonary embolism, venous thromboembolism, Perioperative Nursing, anticoagulation therapy.

& Murauski, 2017).

Mr Brown was 75-years-old and had Type 2 diabetes mellitus, which contributed to his increased risk of developing a VTE.

Thrombosis is caused by local trauma to the vessel wall, hypercoagulability and venous stasis know as Virchow's Triad

(Potts, 2012; Halligan, Filippaios, & Ward Myers, 2016). During Mr Brown's knee arthroplasty surgery, his lower extremity was manipulated into positions of substantial flexion and rotation, damaging the blood vessel walls and causing tissue injury. This tissue injury produces two defence mechanisms; the formation of a blood clot and the inflammatory response which reduce blood loss and prevent foreign substances from entering the blood stream in the body (Miric & Sculco, 1999).

Before, during and after knee arthroplasty surgery, there is a degree

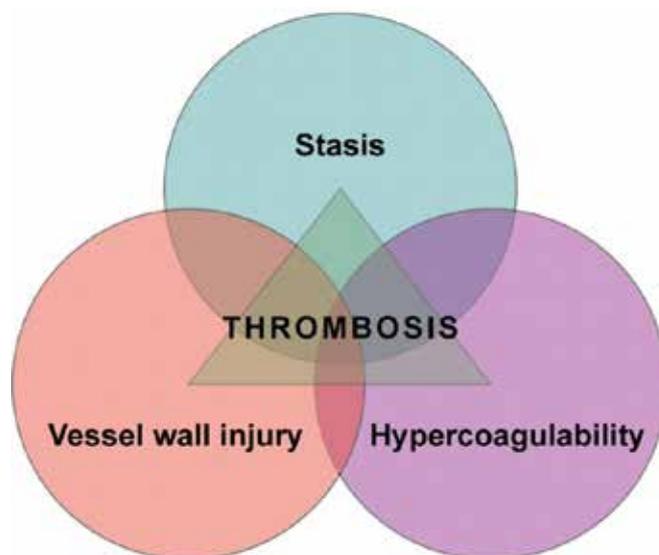


Figure 1: Virchow's triad Kyrle, P. A., & Eichinger, S. (2009). Is Virchow's triad complete? *Blood*, 114(6), 1138-1139. Accessed April 24, 2018. <https://doi.org/10.1182/blood-2009-05-223511>.

of immobility, increasing venous stasis or the slowing or stopping of blood flow, triggering platelet aggregation and causing endothelium injury (Smith & Murauski, 2017).

Pulmonary embolism pathophysiology

Pulmonary embolism is commonly caused by a thrombus but can also include tumour, fat or air embolism (Potts, 2012). An embolus is a blood clot which migrates from its original position to occlude a distal vessel. In Mr Brown's PE, the thrombi had originated from the deep venous system usually in the legs and the emboli migrated and lodged in the pulmonary vasculature (Smith & Murauski, 2017; Coleman *et al.*, 2015; Potts, 2012).

In such cases, the embolus obstructs alveolar perfusion and outflow, causing alveolar dead space where the alveoli are ventilated but not perfused, causing a ventilation/perfusion or VQ mismatch (Smith & Murauski, 2017). The mechanical obstruction of the emboli causes platelet activating factors to be released by platelets in the emboli and vasoconstriction of the pulmonary arterial bed, triggering acute pulmonary hypertension (Agnelli & Becattini, 2015). The stroke volume (SV) in the right ventricle decreases in response to the pressure change, and cardiac output (CO) drops ($CO = SV \times HR$), triggering the release of catecholamines (norepinephrine, dopamine and epinephrine) (Smith & Murauski, 2017; Tortara & Derrickson, 2012). The resultant tachycardia prevents the right ventricle from emptying sufficiently, increasing preload and putting further strain on the myocardium of the right ventricle. Afterload is increased due

to the rise in pulmonary artery pressure. The increase in afterload and preload cause the right ventricle to dilate. Dilation alters the contractile properties leading to wall tension and myocyte stretch and injury (Agnelli, & Becattini, 2015). The dilation can also lead to ischaemia of the right ventricle and impairment of the left ventricular filling which may result in right-sided cardiac failure in massive PE, luckily this was not the case for Mr Brown (Agnelli, & Becattini, 2015; Potts, 2012).

Diagnosis of a PE

PE can present with a variety of non-specific symptoms and be similar to those of cardiac disease. A physical assessment along with diagnostic testing including a computed tomography pulmonary angiogram, or CTPA, is the gold standard for PE diagnosis (Smith & Murauski, 2017).

Electrocardiogram (ECG), chest X-ray, troponin and D-dimer blood tests and an arterial blood gas (ABG) all offer support to the diagnosis (Coleman *et al.*, 2015).

A D-dimer test measures a fibrin clot breakdown product and is a good negative predictive value for those patients who have a low probability of PE (An *et al.*, 2016). In Mr Brown's case, the D-Dimer test would be irrelevant as fibrinolysis has occurred in an attempt to prevent thrombotic complications and promote tissue healing and the D-Dimer is elevated up till six weeks postoperatively (An *et al.*, 2016).

A CTPA involves the injection of intravenous contrast media and imaging of the pulmonary vasculature (Smith & Murauski, 2017). Contrast is excreted via the kidneys as a metabolic waste and therefore the patient must have adequate kidney function.

An ECG is a quick and cost-effective test to perform but has poor sensitivity and specificity in diagnosing PE and its main value is to rule out other life-threatening diagnosis such as myocardial infarction. Mr Brown's ECG results showed sinus tachycardia and new T wave inversion.

T wave inversion is associated with the increase in pulmonary artery pressure and is seen in 30 per cent of patients who have a PE (Co, Eilbert, & Chiganos, 2016).

Clinical manifestations

Type one respiratory failure or failure to oxygenate occurs due to ventilation-perfusion mismatch and reduced CO. In the section of the lung that is not perfused, inspired oxygen is unable to diffuse across the alveolar-capillary membrane and bind to haemoglobin. Since an increased amount of blood is forced to pass via the unaffected sections of the lungs, it does not have enough time to be oxygenated, further reducing oxygen saturations. This was seen in Mr Brown as his oxygen saturations were 91 per cent on room air. The peripheral chemoreceptors detect changes in PO_2 , and trigger nerve impulses in the inspiratory centre to become highly active and increase the rate of breathing, reflected in Mr Brown's respiratory rate of 18-20. This

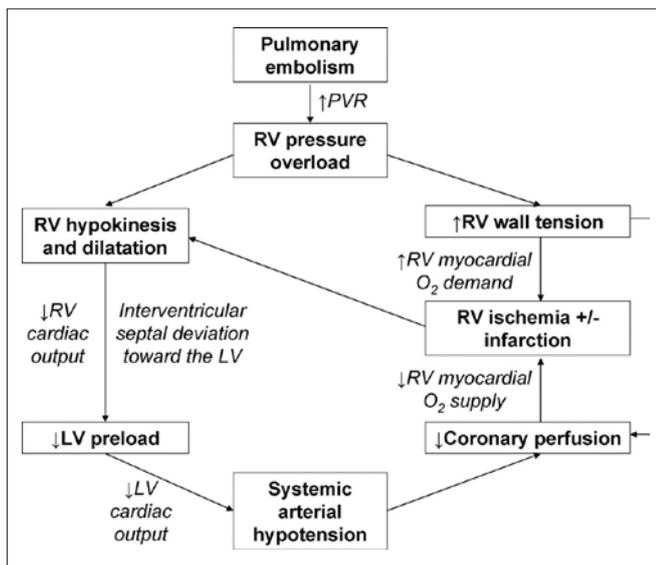


Fig 2. The pathophysiology of sub-massive PE. PVR indicates pulmonary vascular resistance

Piazza, G., & Goldhaber, S. Z. (2010). Management of submassive pulmonary embolism. *Circulation*, 122(11), 1124-1129.

With the aging population, it is projected that there will be an 174 per cent increase of hip arthroplasty and 674 per cent of knee arthroplasty by 2030...

A D-dimer test measures a fibrin clot breakdown product and is a good negative predictive value for those patients who have a low probability of PE...

rapid and deep breathing allows the inhalation of more oxygen and exhalation of more carbon dioxide.

Mr Brown's blood pressure was 96/62 and this hypotension is caused by two factors. Firstly, the decrease in stroke volume and secondly, the reduction in the left ventricular preload (Potts, 2012). Compensatory mechanisms activate in an attempt to preserve CO and perfuse vital organs. The renin-angiotensin-aldosterone system (RAAS) is activated due to decreased blood flow to the kidneys causing vasoconstriction and stimulation of the adrenal cortex to secrete aldosterone. Aldosterone acts on the distal tubule and the collecting duct of the kidney, increasing reabsorption of sodium and water, increasing blood volume and blood pressure. The hypothalamus and posterior pituitary release the antidiuretic hormone (ADH), further enhancing water reabsorption in the kidneys.

Mr Brown was tachycardic (90-110bpm), due to the activation of the sympathetic nervous system. Vasoconstriction of peripheral vasculature occurs, increasing systemic vascular resistance and improving venous return. Sympathetic stimulation is activated by the cardiovascular centre in the medulla oblongata, stimulating the adrenal medulla to release epinephrine and norepinephrine (Porth, 2004). These hormones act on the adrenergic receptors; Beta 1, and Beta 2. Binding to Beta 1 in the heart increases contractile force and heart rate. Binding to Beta 2 receptors in non-vascular and vascular smooth muscles causes vasodilation and increased perfusion to target organs such as the heart and brain (Tortara & Derrickson, 2012).

Treatment in relation to best practice guidelines

Anticoagulation is the treatment of choice for PE. Treatment is often initiated prior to the confirmation of the diagnosis (National Institute for Healthcare Excellence, 2015; Best Practice Advocacy Centre NZ (BPAC), 2015).

Mr Brown was prescribed 80mg of enoxaparin daily with overlapping therapy of 3mg of Warfarin until his International Normalisation Ratio (INR) was above 2.0 and then just Warfarin for three months with the

aim of maintaining a therapeutic INR level of between 2.0-2.5 (Bullock *et al.*, 2007; Medsafe, 2017a).

Enoxaparin binds to antithrombin III and creates a structure change, thereby inhibiting it from activating Factor Xa (Bullock *et al.*, 2007).

Warfarin inhibits epoxide reductase, depleting vitamin K from the liver. Vitamin K is required for the synthesis of prothrombin and factors II, VII, IX and X and therefore coagulation is inhibited (Bullock *et al.*, 2007). Warfarin has a slow onset of action and can take up to 96 hours to reach peak effectiveness, therefore thrombolytic therapy (Enoxaparin) is given in conjunction with Warfarin as Enoxaparin has a faster onset of action. This will achieve faster pulmonary reperfusion (Agnelli & Becattini, 2015).

New Zealand (NZ) Formulary (2017) and BPAC's (2009) recommended dosage for Enoxaparin treatment of thrombosis is 1.5mg/kg for once daily administration. Mr Brown was administered 80mg but weighed 80kg, therefore, according to NZ Formulary and BPAC, 120mg should have been prescribed.

The PE had not been confirmed in Mr Brown before the first Enoxaparin dose and the risk versus benefit needed to be taken into consideration. Due to his very recent bilateral knee arthroplasty procedure, a larger dose could have put him at significant risk of haemorrhage. Warfarin was commenced on Mr Brown once PE diagnosis was confirmed from the CTPA. Mr Brown was commenced on a standard dose of 3mg of Warfarin as a loading dose is not recommended to initiate treatment so close to surgery, due to the increased risk of haemorrhage (NZ Formulary, 2017).

An alternative to Warfarin is direct oral anticoagulants (DOAC) which include Rivaroxaban, Apixaban, Edoxaban and Dabigatran. In comparison to Warfarin, these have the advantage that they do not require on-going monitoring or dose adjusting. DOACs also have a rapid onset of action compared to Warfarin and have fewer interactions with medicines or foods. Both Warfarin and Dabigatran have reversal agents, although Dabigatran's reversal agent it not

The PE had not been confirmed in Mr Brown before the first Enoxaparin dose and the risk versus benefit needed to be taken into consideration. Due to his very recent bilateral knee arthroplasty procedure, a larger dose could have put him at significant risk of haemorrhage.

readily available and is very expensive (\$4250) (PHARMAC, 2016; Medsafe, 2017b).

In a study conducted by Décousus, Mismetti, Couturaud, Ageno, & Bauersachs (2015) DOACs were compared to other conventional therapy such as Warfarin in normotensive patients with PE. Specifically, Dabigatran had a higher incidence of VTE recurrence and PE fatality, but a lower risk of bleeding in comparison to Warfarin (Décousus *et al.*, 2015). Further research is required to support DOAC use in the treatment of VTE. Warfarin is still the most commonly used anticoagulant in PE diagnosis due to the strong evidence supporting its efficacy (Bonner & Johnson, 2014).

Conclusion

Mr Brown's pulmonary embolism was provoked by his bilateral knee arthroplasty surgery due to local vessel wall trauma, hypercoagulability and venous stasis. His clinical manifestations were caused by his VQ mis-match, activation of the sympathetic nervous system, pulmonary hypertension and consequently decreased cardiac output and finally the inflammatory response.

Mr Brown was commenced on Enoxaparin and Warfarin therapy and was given a conservative dose due to his recent operation and risk of haemorrhage. Mr Brown was discharged home on post-operative day four after extensive education with self-administering Enoxaparin, food interactions with Warfarin, and regular blood test information. Mr Brown was followed up by his GP in the community to support him through this process. ■

About the author: *Annelies Lindsay is Registered Nurse, currently working at Grace Hospital, Tauranga. She won the Catherine Logan Memorial award in 2017 for her commitment to post-graduate study with a perioperative focus. After completing her NetP year at Waitemata DHB, Auckland, her fiancée and her two cats Skye and Millie made the move to Mount Maunganui. Annelies is currently in her final year of her Postgraduate Diploma in Advanced Nursing Practice at Auckland University of Technology. When she isn't working or studying, she enjoys surfing, maintaining her vegetable garden and walking up Mauoa (Mount Maunganui).*

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Demystifying Interventional Radiology

Title: Demystifying Interventional Radiology: A Guide for Medical Students
Editor: Srihasha Athreya
Publisher: Cham Springer International Publishing 2015
ISBN: 978-3-319-17237-8
Pages: 192, Softcover
Format: 235mm x 155mm.
Price: \$145

This book is a concise introduction to the field of Interventional Radiology, designed to help medical students understand the fundamental concepts related to image-guided interventional procedures and to determine the appropriate use of imaging modalities in the treatment of patients.

Demystifying Interventional Radiology: A Guide for Medical Students is also a great resource for nurses new to interventional radiology, providing an insight into the indications, contraindications, pre-procedure checks, complications and post-procedure outcomes for patients in their care.

It covers everything from the history of Interventional Radiology,

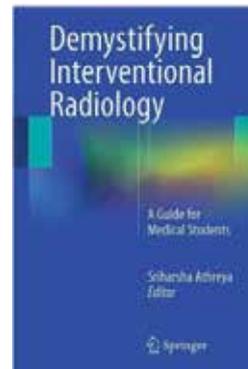
radiation safety, equipment, medications, and interventional techniques such as biopsy and drainage, vascular access, embolisation and tumor ablation.

The book also describes the indications, patient preparation, post-procedure care, and complications for the most common interventional radiology procedures.

The book is well set out, easy to follow with clear diagrams, charts, photos and radiology images.

A must for the interventional department as a resource for new staff.

Demystifying Interventional Radiology: a Guide for Medical Students runs to 192 pages broken into 19 chapters. ■



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Terumo New Zealand
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M: +64 2143 8416
T: 0800 66 77 57

www.terumo.com E: dianna_vandaatselaar@terumo.co.jp



Elissa O'Keefe RN NP FFCNP MACN
Managing Director

p: +61 423 091 829
e: elissa.okeefe@bravuraeducation.com
w: www.bravuraeducation.com

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Sales Executive,
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Mt Eden Auckland 1024
New Zealand
M +64 21 678 273
rob.heath@bsnmedical.com

Customer Service
T 0508 276 111
F 0508 998 830
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Arlene Geraghty
Sales Executive,
Hospital/Community NZ

BSN medical Limited
Suite 2-8, 72 Dominion Road
Mt Eden Auckland 1024
New Zealand
M +64 21 678 343
arlene.geraghty@bsnmedical.com

Customer Service
T 0508 276 111
F 0508 998 830
www.bsnmedical.co.nz

THERAPIES. HAND IN HAND. 

Amber McLeod
Sales Executive,
Hospital/Community NZ

BSN medical Limited
Suite 2-8, 72 Dominion Road
Mt Eden Auckland 1024
New Zealand
M +64 21 678 237
amber.mcleod@bsnmedical.com

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General Manager

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P 0800 226 3673
W bamford.co.nz

12 Victoria St, Lower Hutt, 5010
New Zealand



CAMERON WEITZ
Dip. Applied Science (Anaesthesia)
Clinical Manager

E cam@bamford.co.nz
M 021 764 009
P 0800 226 3673
W bamford.co.nz

12 Victoria St, Lower Hutt, 5010
New Zealand



CATHY CHIRNSIDE
RGON
Territory Manager

E cathy@bamford.co.nz
M 027 218 3186
P 0800 226 3673
W bamford.co.nz

12 Victoria St, Lower Hutt, 5010
New Zealand



KATHERINE VENN-BROWN
BSc. Dual Hons, Dip.M
Business Development Manager

E katherine@bamford.co.nz
M 027 442 1014
P 0800 226 3673
W bamford.co.nz

12 Victoria St, Lower Hutt, 5010
New Zealand



Wayne Titmus
New Zealand Sales Manager

m: +61 448 043 275
e: wayne.titmus@defries.com.au
www.defries.co.nz

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Lauren Dargan
 NZ Manager
 Surgical and Wound Care
 lauren.dargan@molnlycke.com
 Mobile +64 21 862 283

Craig Smith
 Senior Account Manager NZ
 Surgical
 craig.smith@molnlycke.com
 Mobile +64 21 804 885

Abigail Owen
 Territory Manager NZ
 Surgical
 abigail.owen@molnlycke.com
 Mobile +64 27 211 9371

Devon Du Preez
 Territory Manager NZ
 Surgical
 devon.dupreez@molnlycke.com
 Mobile +64 21 678 250

Joss Cole-Baker
 Senior Territory Manager NZ
 Wound Care
 joss.cole-baker@molnlycke.com
 Mobile +64 21 856 046

Michele Fuller
 Territory Manager NZ
 Wound Care
 michele.fuller@molnlycke.com
 Mobile +64 27 468 8748

Talesha Sculley
 Territory Manager NZ
 Wound Care
 talesha.sculley@molnlycke.com
 Mobile +64 21 455 322

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Mike Siddells
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msiddells@device.co.nz

D +64 9 215 0989
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tingram@device.co.nz

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Murray McMillan
 Managing Director
 Surgico Medical & Surgical Ltd

P.O. Box 300 -180 Albany
 Auckland 0632
 New Zealand



Gareth Edmondson
 Sales / Service Specialist

gedmondson@device.co.nz

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W: www.surgico.co.nz

Angela Robinson
 Product Specialist
 Surgico Medical & Surgical Ltd

P.O. Box 300 -180 Albany
 Auckland 0632
 New Zealand



Chris Williams
 Product Specialist –
 Theatre Capital

chris.williams@device.co.nz

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Sharon Scholtz
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 Surgico Medical & Surgical Ltd

P.O. Box 300 -180 Albany
 Auckland 0632
 New Zealand



Cheryl Hughes
 Clinical Educator

chughes@device.co.nz

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