

The Dissector

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

June 2023, Volume 51, Number 1



VOLUNTEER SERVICE ABROAD

NZ nurse: Operating Theatres
Clinical Manager with Africa Mercy

MEDICAL IMAGING

Enhanced resolution MRI
in diagnosis of Vestibular
Schwannomas

CLINICAL

An identified need for a written
diabetic management guideline

LITERATURE REVIEW

Preoperative testing can prevent
unnecessary harm to the foetus

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The Dissector

The official Journal of the Perioperative Nurses
College of the New Zealand Nurses Organisation
(PNCNZNO).

June 2023, Volume 51, Number 1
[http://www.nzno.org.nz/groups/colleges/
perioperative_nurses_college](http://www.nzno.org.nz/groups/colleges/perioperative_nurses_college)

The Dissector is published quarterly (March,
June, September, December) by Advantage
Publishing Ltd.

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Overseas subscriptions (inc. airmail postage):

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ISSN: 1174-7579

Take care of your own health and wellbeing!

Tēnā koutou katoa. Welcome to the June issue
of *The Dissector*. Yes, it is late arriving in your
mailbox, for reasons I shall get to later.

It's hard to believe we are already more than
halfway through the year. In early May, Dr Ayesha
Verrall, the Minister of Health, announced a
series of initiatives designed to help reduce
hospital demand and support community care
during the winter period (Te Whatu Ora, e-mail
communication, 24 May 2023).

These initiatives fell into eight areas. Of these
'Maintaining planned care delivery under system
pressure' and 'Addressing workforce pressures
and supporting staff' are of particular relevance
to the perioperative environment. However,
the media questioned where the workforce was
to enable implementation of these initiatives
(Neilson, 2023). In my hospital it has felt like
the usual pressures we associate with the winter
season began months ago!

I've heard nurses around the country talking
about how difficult it has been, with staffing
and skill mix issues impacting on our services.
It certainly makes it hard, especially when we
are also trying to catch-up on the planned care
that was delayed during COVID-19. The last few
years have highlighted the importance of taking
care of our own health and wellbeing in order to
help cope with the additional stressors on our
stretched health workforce. I do hope you manage
to get some time to relax and unwind over the next
few months: I'm certainly going to try to.

Clinical focus

This issue of *The Dissector* features three
clinical articles, all by first-time authors.
Christchurch-based Rey Canozza provides us with
the translabyrinthine approach for resection of
Vestibular Schwannoma (VS). Rey's in-depth
article discusses the cause and development of VS
along with recommended diagnostic management
and surgical intervention.

Yves Francesca (Cheska) Tan, also from
Christchurch, provides us with an article about
the importance of appropriate preoperative
pregnancy testing. Cheska discusses the
importance of pregnancy testing and timing
during the preoperative surgical phase, arguing
early detection leads to improvement in surgical
outcomes for the patient and avoids potential
damage to a developing foetus. Our third clinical
article is by Liying Duan from Auckland. Liying
provides us with an article on preparing patients
with diabetes mellitus for CT Colonography.
Lying describes a quality improvement clinical
project which resulted in a diabetic management

guideline written specifically for outpatients
undergoing CT colonography.

Mercy Ships

The team at Mercy Ships provides us with an
article about the recently deployed hospital ship
Global Mercy™. The article focusses on Operating
Theatre Clinical Supervisor Kylie Bentham Huber,
a New Zealand nurse. The article describes how
Kylie was intricately involved with the outfitting
of the new ship's six operating rooms, as well as
staffing and the first patient procedures.

Reports and Webinars

This issue includes a regional report from
Wellington region's study day in March which
was packed full of interesting topics for those
new to the PACU environment. It is great that
we are having our face-to-face conferences,
training and education sessions again. However,
I encourage you to also attend the educational
webinars hosted by our regions. The feedback on
these consistently demonstrates that attendees
find them incredibly valuable. Please do keep
supporting these sessions and let us know of any
topics you would like to see included either in *The
Dissector* or through the webinars.

Future of The Dissector

As you have realised, this issue is late arriving. This
is due to a substantial reduction in advertising
support — and a 35 percent increase in New
Zealand Post mailing charges. This has meant
the College has had to step in to underwrite the
costs of producing and distributing this issue —
the first time this has happened since Advantage
Publishing took on the contract to produce our
journal in 1998.

Until this issue, *The Dissector* has been laid out,
printed and mailed at no cost to the College.

We are working with Advantage Publishing to
ensure the journal continues. At this point, *The
Dissector* is the ONLY journal produced by any
of the 15 Colleges in The New Zealand Nurses
Organisation (NZNO) that is published in printed
form. All the others are produced in digital format,
which is something we too will have to explore.

Noho ora mai

— Bron Taylor, Chief Editor

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radiology, telehealth, [nzherald.co.nz](https://www.nzherald.co.nz). Retrieved
from [https://www.nzherald.co.nz/nz/health-
minister-ayesha-verrall-launches-winter-health-
plan-to-reduce-system-ed-pressure-boosts-for-
pharmacies-community-radiology-telehealth/327-
M3EPJWRDCJNQIFWGMONSRT/](https://www.nzherald.co.nz/nz/health-minister-ayesha-verrall-launches-winter-health-plan-to-reduce-system-ed-pressure-boosts-for-pharmacies-community-radiology-telehealth/327-M3EPJWRDCJNQIFWGMONSRT/)

The DISSECTOR



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Chief Editor Bron Taylor exhorts us to take care of our own wellbeing.

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Perioperative Nurses College Chair Cass Raj highlights the fact that the regular educational webinars of the Perioperative Nurses College of the New Zealand Nurses Organisation are proving a real success.

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New Zealand Kylie Bentham Huber has been volunteering with Mercy Ships since 2003. She describes how she utilises her expertise as an operating theatre nurse to benefit the marginalised in low-income countries. She has served on multiple hospital ships, including the recently deployed *Global Mercy*, the world's largest civilian hospital ship.

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Liyang Duan describes a quality improvement clinical project in response to an identified need for a written diabetic management guideline, specifically for outpatients undergoing CT colonography (CTC).

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Touching Base

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Webinars proving a success

Welcome finally to winter. Here's hoping we have the beautiful, crisp and clear mornings and the last of the autumn leaves and rain. With seasonal changes come health changes and we as healthcare professionals will be doing the hard mahi keeping our patients and families safe. Do not forget to keep yourself safe too; perioperative nurses are a valuable part of the surgical planned care directive.

Webinar series

I would like to start by congratulating all those who have attended our perioperative webinar series. "How to make Nursing Meaningful" was our 8th Webinar since its inception in April 2022. The feedback we are receiving encourages the College Regional Representatives and their committees to continue to network and provide quality, perioperative-specific education by nurses for nurses and perioperative healthcare professionals.

Education is vital for our nursing practice and using evidence-based guidelines helps keep healthcare workers and surgical patients safe. Register for our next webinar at: <https://myhealthhub.co.nz/pnc/>

AORN conference

Recently I had the incredible opportunity of representing New Zealand perioperative nurses, along with two perioperative nurses from Auckland hospitals, at the Association of periOperative Registered Nurses (AORN) conference in Texas.

AORN, representing more than 44,000 registered nurses in the United States of America, held its annual Global Surgical Conference & Expo in Texas in April this year. PNC regularly represents New Zealand at this Global Conference and 2023 was the first time since 2019 that we could attend and network with international delegates and perioperative leaders around the world. I came away with several themes from AORN's Global Conference:

- Team communication must be a team approach including all groups involved in the patient's perioperative journey to ensure the safe care of surgical patients.
- Reducing Surgical Site Infections (SSI's) and preventing Retained Surgical Instruments (RSI's) were major topics, presented in many different platforms from within the Conference.
- Smoke Free perioperative departments are created by nurses and are driven from the clinical floor using legislation and policy to gain success. These are then celebrated with much excitement and relief to the perioperative staff.
- All presentations and speakers spoke highly of the effect of evidence-based learning and how guidelines based on evidence-based learning supported them to make positive change within their departments. Research, research, research, was the key to change and we were encouraged to use it to base changes in your department. They utilised evidence-based practice to cultivate a 'spirit of inquiry' which then gathered momentum to create positive change.

Learning Labs

I was also impressed with the poster presentations and 'Learning Labs' within the Trade Expo arena. The Learning Labs were presentations

by nurses alongside a company representative, sharing their quality improvement projects, how they have changed practice to improve the safety of nurses and the health of perioperative patients. These were very well attended within the Trade/Expo site and much competition and fanfare was carried out between Learning Labs to get nurses to their presentations.

Shortage of theatre nurses

Throughout the AORN conference there were several presentations by international delegates and panel members describing the shortage of perioperative nurses. The shortage itself does not present nursing leaders and healthcare systems with an easy fix. Some of the causes spoken about were retiring nurses, aging workforce, faculty shortage, an aging population, Ebola/COVID-19 and high patient to nurse ratios.

The Nursing Council of New Zealand predicts a shortage of 15,000 nurses and indicates that 50 percent of the nursing workforce will have retired by 2035. When asking nurses why and the causes of the shortage, some of the causes mentioned were heavy workloads, insufficient resources, leadership betrayal, burnout, stress, violence and compensation. Discussing what solutions globally could assist with the shortage, the main focus was advanced career education, free tertiary education and mandated nurse-patient ratios. All three countries on the panel agreed that, to improve retention, health ministries and policy makers must be part of the solution.

Salaries of nurses should be corrected to a level corresponding to the demands of work and level of education and career development of nurses should be advanced by recognising and rewarding excellence in nursing practice. These were valuable presentations to be a part of and they have ignited my passion to ensure that registered nurses in the perioperative environment are valued, retained and can practice safely.

The AORN conference was busy, highly educational and empowering. Conferences of this size are an amazing opportunity to attend and I will be talking more about this conference as there is much more to share, give and motivate others.

PNC work in progress

I'd like to let you know what Perioperative Nurses College committee members are working on currently. To date some of the current works for National Committee, Perioperative Practice committee and *The Dissector* Committee are:

- Conference Planning and preparation for October 2024 in Wellington;
- Submission to the Ministry of Business, Innovation and Employment for Diathermy Smoke Plume to be added to the list of occupational diseases under the Accident Compensation Act 2001;
- Submission to the New Zealand Parliament on the Therapeutic Products Bill regarding medical devices;
- Full issues of *The Dissector* are soon to be published on the PNC NZNO Webpage for members.

The Perioperative Nurses College Awards are now open for 2023. Please go to our website for more information. ■



New Zealand nurses invited to BeHeard

The Australian College of PeriAnaesthesia Nurses (ACPAN) has extended an invitation to New Zealand colleagues to attend the National Conference for perianaesthesia nurses in Newcastle, New South Wales, October 13-14, 2023.

The conference theme is #BE HEARD and incorporates all levels of perianaesthesia nursing practice including pre-admission, Day Surgery, different types of anaesthesia, and postanaesthesia care. The Newcastle conference will focus on trauma, emergency and paediatrics, which will be provided through various presentations, group sessions and can be live streamed to all ACPAN members.

ACPAN is the only dedicated professional affiliation for perianaesthesia nurses working in Australia and New Zealand. With the increasing number of nurses stepping into the anaesthetic role through the Southern Cross Hospital RNAA program, this is an opportunity to develop your networks and share professional perianaesthesia nursing knowledge and clinical practice.

ACPAN is excited to welcome nurse delegates to Newcastle, the town drenched in rich historical culture, with everything from settlements and military, to mining and steel work. It is located two hours from Sydney and one hour from the Hunter Valley vineyards and Nelsons Bay.

New Zealand nurses are welcome to become members and join the growing area of perianaesthesia nursing, with benefits of discounted conference registration, access to the ACPAN Academy, Education, Conference and Research Grants among many other benefits.

For more information on the conference and to become a member visit www.acpan.edu.au.

REGIONAL REPORT

Wellington Region PACU Study Day

The Hutt Valley Learning Auditorium was the venue for the March 18 Wellington PNC Region's post anaesthesia care unit (PACU) study day, with 35 Perioperative Nurses on hand listening attentively to the six quality presentations.

Nurses in attendance ranged from juniors with only a few months experience through to senior theatre nurses who occasionally help out in PACU on-call and a range of experience in between for other PACU nurses in attendance.

Amber Cox got the study day underway with an introduction to the role of the post anaesthesia care unit (PACU) nurse. She was followed by Anastasia James, Clinical Nurse Educator from PACU Wellington Regional Hospital, who gave an excellent presentation on atelectasis. Anastasia covered the importance of PACU nurses encouraging post-operative patients to deep breathe and perform sustained maximal intakes (SMI).

Sue Anderson, Nurse Practitioner Pain at Hutt Valley Hospital, proved entertaining as ever in her jam-packed pain management basics, and had the room laughing along with her. Victoria Pointon, Clinical Nurse Educator at Hutt Valley, then covered spinal and epidural anaesthesia in depth.

Dr Stephen Pearce Zoomed in from Wairarapa and covered anaesthetic drug pharmacology. The day finished with a presentation from Keri Paterson from 3M on maintaining normothermia: taking an active role in PACU.

It was great to see nurses passionate about PACU education and it was clear that there is more demand for PACU specific nursing education. Feedback from participants was very positive and one attendee summed it up nicely in their feedback: "fantastic to have a PACU specific study day".

Another participant commented: "Awesome day thank you. Very relevant, informative and well presented, a great refresher and insight into best practice".

The Wellington region is looking forward to organising another study day for the second half of 2023.

Theatre Managers impressed by Cubro facility

This year's Theatre Managers and Educators conference (TMEC) was held in Tauranga at the end of April. As part of the conference, delegates got the opportunity to visit Cubro's Tauranga headquarters to inspect their ultra-modern integrated operating theatre.

Feedback from the visit was very good with delegates impressed by the state-of-the-art operating theatre and technology within it.

Those interested in seeing Cubro's operating theatre for themselves can email hello@cubro.co.nz or contact their Cubro Account Manager to arrange a visit.



Translabyrinthine resection of Vestib

By Rey Canozza

Introduction

Technological advancements have transformed the diagnostic and treatment armamentarium of large Vestibular Schwannomas (VS) that remain challenging for the Neurosurgical and Otolaryngological department. A translabyrinthine (TL) approach is a microsurgical strategy that prioritises preserving the patient's neurological function. VS can cause significant impact on a patient's ability to function independently and can negatively impair quality of life, afflicting the population in New Zealand and the rest of the world (DeHart et al., 2017).

This article discusses the aetiopathogenesis of VS and its current epidemiological status, evidence-based recommended diagnostic management and its relevance with the disease process and surgical intervention. Recent studies and literature related to TL microsurgery in the New Zealand context are also reviewed and considered.

Vestibula Schwannomas Aetiology and Epidemiology Features

Vestibular Schwannomas (VS), formerly termed Acoustic Neuromas, are benign, sporadic, slow-growing tumours originating from the vestibular division of the vestibulocochlear (eighth cranial) nerve's myelinating Schwann cells (DeHart et al., 2017; Jun et al., 2020). Goldbrunner et al. (2019) stressed that 80 percent of reported VS cases are found in the vestibular portion, whereas 20 percent arose from the cochlear aspect and most of the tumours are located unilaterally.

VS are the most common extra-axial posterior fossa neoplasm in adults, comprising over 90 percent of the tumours occurring in the cerebellopontine angle (CPA) (Erickson et al., 2018). Semaan et al. (2015) reported that VS account for 8 to 10 percent of all intracranial tumours.

Recent epidemiological trends reveal that though VS is often considered rare, the annual incidence is estimated at 3 to 5 cases per 100,000 people (Goshtasbi et al., 2019). According to Dang et al. (2020), more than 3300 VS cases are annually diagnosed in the United States. In New Zealand, cranial nerve tumours, including VS, comprise 33 percent of the most common benign mass lesions (J-H Kim et al., 2015). The observed escalation in VS's incidence is primarily due to widespread access to diagnostics, leading to a notable increase in detection (Carlson

Abstract: Vestibular Schwannomas (VS) derive from myelinating Schwann cells of the vestibular division of the eighth cranial nerve and are considered one of the most common neoplasms of the cerebellopontine angle in adults. The enhanced resolution of magnetic resonance imaging corroborates the diagnosis of VS. Treatment algorithms depend on clinical presentation, the size of the tumour, and the surgical team's expertise. Translabyrinthine microsurgery is generally preferred for patients with a medium to large lesion (>20mm) and deteriorating acoustic function.

Keywords: Vestibular Schwannoma, acoustic neuroma, behavioural audiometric, magnetic resonance imaging, retrocochlear disorder, cranial nerves, Translabyrinthine microsurgery.

& Link, 2021).

VS is present in the third to fifth decades of life (Erickson et al., 2018). The mean age is 53.1 years, and Caucasians have a higher median annual incidence than other ethnicities (Goldbrunner et al., 2019; Ölander et al., 2018). It also occurs more frequently in parous women (Schwartz et al., 2018).

Carlson et al. (2016) revealed that African American, Hispanic and Asian citizens are more likely to exhibit larger tumours

because of the delay in clinical diagnosis related to healthcare access. In addition, VS tumour growth has a relatively indolent rate of 1-2mm up to 17mm per year (Dang et al., 2020; Paldor et al., 2016).

Currently, VS's aetiology remains unknown and has scarcely been investigated (Chen et al., 2016). However, environmental risk factors considered with VS tumorigenesis include a history of ionisation radiation exposure, radiofrequency electromagnetic fields, persistent leisure loud noises and allergic pathology (Carlson et al., 2016; Kaul & Cosetti, 2018). Chen et al. (2016) also indicated several other possible risk factors for VS, such as head trauma, history of epilepsy and other malignancy.

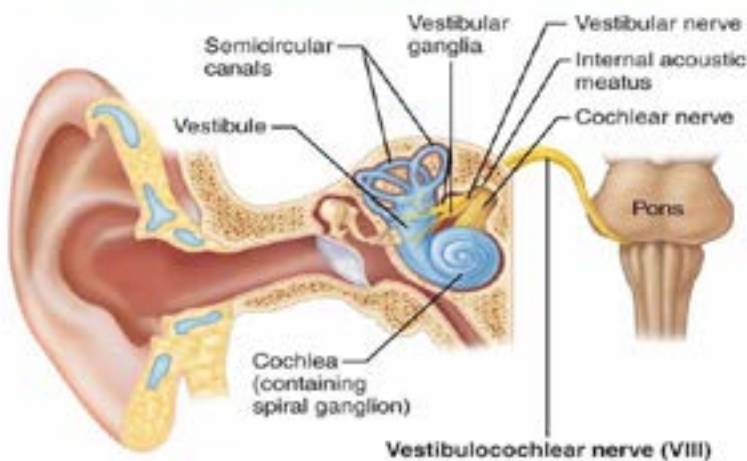
Vestibular Schwannomas Clinical Presentation

Presenting VS symptoms are associated with tumour growth and anatomical location (Kaul & Cosetti, 2018). Bird and MacFarlane (2007) accentuated that the tumour's progression from one of the vestibular divisions into the internal auditory canal (IAC) and out of the CPA predicts the clinical course with the involvement of intracranial structures. Vestibular dysfunction in the aftermath of neoplasm's development and the associated ipsilateral vestibular nerve, manifests continuous dizziness, disequilibrium, aural fullness, gait disturbance and vertigo (Jun et al., 2020).

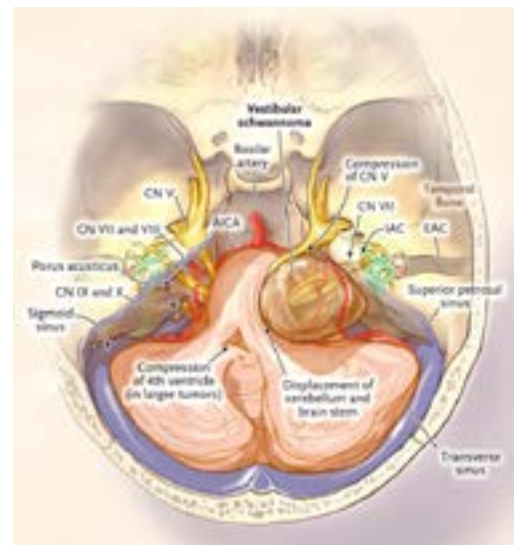
Cochlear deafferentation and cortical maladaptation result from the compression of the ipsilateral cochlear nerve in the IAC, leading to sensorineural hearing loss and asymmetric tinnitus, the most commonly present clinical symptoms of VS (Carlson & Link, 2021). Also, pressure to adjacent cranial nerves such as trigeminal, glossopharyngeal and vagal nerves lead to facial numbness, hoarse voice, and progressive difficulty in swallowing and aspiration (Bird & MacFarlane, 2007). Progressive facial

the approach for Vestibular Schwannoma

The Vestibulocochlear Nerves - VIII



(Benoudiba et al., 2013)- Normal Anatomy (above), VS's Disease Presentation (Carlson & Link, 2021).



paresis is associated with significant pressure, stretching and thinning of the facial nerve (Kim et al., 2019). Patients with larger tumours may have hypoesthesia, hypoalgesia and increasing ataxia due to displacement of the cerebellum and brain stem and slowly progressive hydrocephalus. This is due to obstruction of cerebrospinal fluid (CSF) outflow from the fourth ventricle, which can lead to life-threatening neurological complications requiring urgent surgical intervention (Dang et al., 2020).

Diagnosis

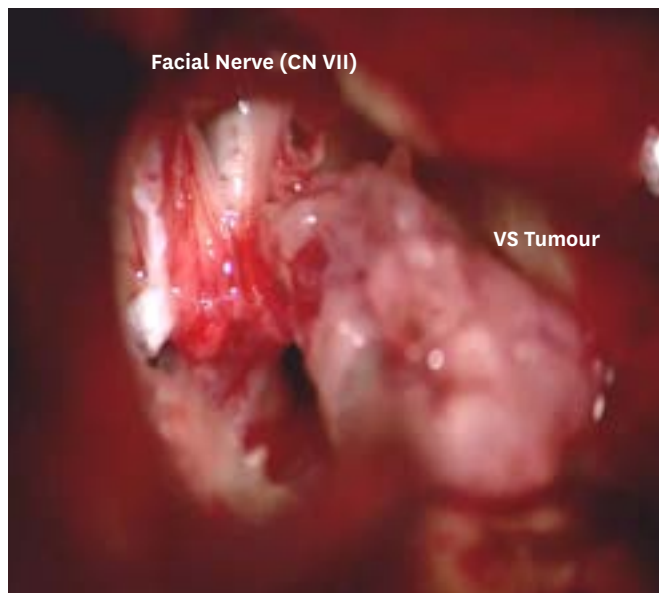
Easier access to advanced imaging technology, expanded screening protocols for asymmetrical hearing loss and enhanced resolution of magnetic resonance imaging (MRI) has led to a more significant number of VS diagnoses and often smaller sized tumours are found earlier (Carlson et al., 2016; Paldor et al., 2016).

After routine patient history workup and physical assessment, Behavioural Audiometric evaluation is preoperatively performed, including Pure-tone audiometry, speech reception thresholds and word recognition scores (Hentschel et al., 2021). Patients with poor speech discrimination is a classic hallmark of retrocochlear disorder (Dang et al., 2020). Goshtasbi et al. (2019) highlighted that due to the asymmetric hearing loss or other unrelated otologic complaints, VS may be diagnosed incidentally following radiographic imaging for other reasons.

Compared to other cranial tumours, VS presents similar clinical

manifestations and hearing-related findings; hence, confirmatory diagnosis relies on radiologic imaging (Kaul & Cosetti, 2018). Advanced high-resolution imaging is critical for more accurate preoperative planning and direct management of patients with VS (Dang et al., 2020).

Gadolinium-enhanced (GD) MRI is currently the method of choice for the identification of suspected VS and considered to be the gold standard for the initial evaluation and postoperative assessment of recurrence and residual neoplasm (Semaan et al., 2015). According to Dang et al. (2020), this MRI technique enhances the tumour, can detect tumours as small as 2mm and fosters improved visualisation of surrounding microneurovascular structures of the CPA. Substantial enhancement after using gadolinium-based contrast promotes a transparent interface between the tumour and brain parenchyma, which results in precise identification of VS (Carlson & Link, 2021). The mass, which is typically solid or cystic, is usually isointense on T1-weight (T1w) imaging. In contrast, on T2-weight (T2w) imaging, more extensive lesions may show scattered cystic degenerative and haemorrhagic changes because of hyperintense resolution (Kaul & Cosetti, 2018). Axial submillimetric higher resolution T2-weight sequence is the most significant sequence to assess tumour volume and evaluate the vestibulocochlear nerve and the IAC contents and depict the nerve as a linear hypointense structure surrounded by hyperintense CSF within nearby cisterns (Goldbrunner et al., 2019). Moreover, this sequence is obligatory to exclude potential



Debulking VS attached to the Facial Nerve. (Feng et al., 2019)

brainstem's neuropathology mimicking VS clinical symptoms such as glioma (Goldbrunner et al., 2019).

Though GD-based contrast MRI remains the gold standard diagnostic tool, it does have some disadvantages (Carlson & Link, 2021). GD is considered less allergic stimulating than the iodinated contrast solution. However, patients with poor renal function and allergic reaction may be refused utilisation of the contrast (Dang et al., 2020). Also, some MRI facilities may limit access for some clients because of weight restrictions and claustrophobic issues (Dang et al., 2020). Lastly, patients with implantable metal prosthetics such as cochlear implants may not be compatible with utilising MRI (Dang et al., 2020).

When MRI is contraindicated, computerised tomography (CT) imaging with contrast serves as an alternative radiologic modality (Dang et al., 2020). Goldbrunner et al. (2019) conferred that CT provides beneficial preoperative information regarding the skull base's anatomy displaying bony remodelling of IAC for more extensive VS and changes in petrous bone. CT is also effective for showing other pathological changes such as widening of facial nerve's fallopian canal in facial schwannomas and

calcification of meningiomas (Schwartz et al., 2018). Although CT is a fast, cost-effective diagnostic process, smaller intracanalicular tumours can be missed even with the utilisation of contrast and involve radiation risk (Dang et al., 2020). In addition, a patient's allergic reaction to iodine and renal dysfunction may preclude from receiving CT contrast, which can further slow down the ability to diagnose tumours (Dang et al., 2020).

High-resolution non-contrast T2w is an alternative MRI sequencing that enables precise detection of VS (Dang et al., 2020). This imaging has a significantly shorter scan time and accurate depiction of micro intracranial structures over soft-tissue resolution, making the T2w an excellent screening study for VS (Dang et al., 2020). Also, utilising T2w as part of the initial diagnostic strategy may lead to sizable healthcare expenditure savings because this screening tool is only half the cost of contrast-based MRI (Dang et al., 2020). Conversely, one major limitation of T2w is that it may not detect subtle inflammatory process or meningeal disorders, which could lead to misdiagnosis of a patient's pre-existing infectious and malignant conditions (Dang et al., 2020).

Another promising device is the Diffusion Tensor Imaging (DTI), an MRI-based technique that can differentiate VS from epidermoid and arachnoid cysts (Goldbrunner et al., 2019). DTI is also utilised to determine facial nerve location, specifically in cases of more significant VS where the preservation rate decreases in a mass bigger than 2cm (Dang et al., 2020). DTI also measures water molecule diffusion that provides information regarding the location and orientation of nerve fibres (Dang et al., 2020).

Management of Vestibular Schwannomas Tumours

VS management is multifactorial, and consideration of tumour growth and chronic morbidities related to surgical or radiation treatment is required on a patient's neurological function and preservation to maintain a better quality of life (Aboukaïs et al., 2018; DeHart et al., 2017). Microsurgical resection is the primary treatment of choice to remove symptomatic and potentially life-threatening voluminous larger VS associated with symptomatic brainstem compression, neuropathy and hydrocephalus (Kim et al., 2019). TL approach is one of the microsurgical techniques that is mainly used for patients with a medium to large VS (>20mm) with deteriorating hearing (Ölander et al., 2018). Erickson et al. (2018) stressed that the cardinal goal of the operation is

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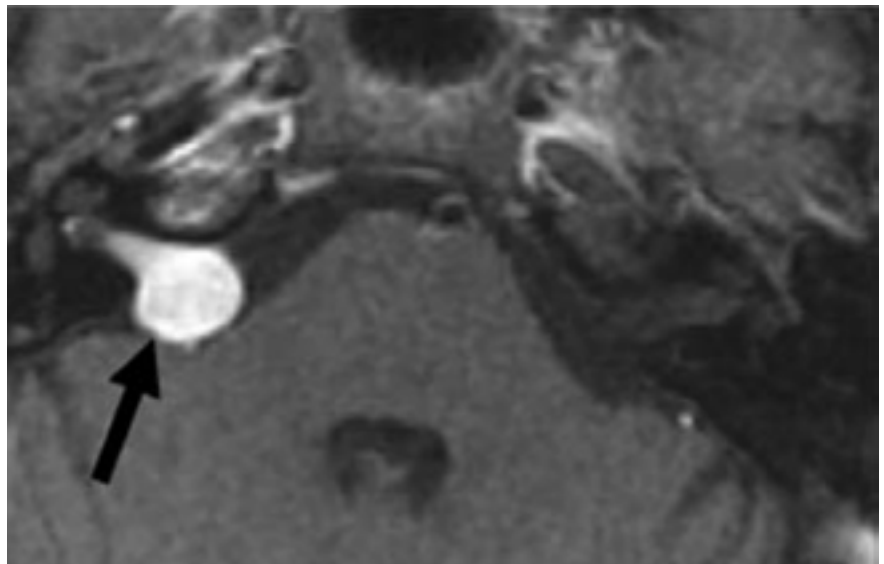
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the preservation of the facial nerve.

Neurotologists in the TL approach the bone work and perform a mastoidectomy and labyrinthectomy for IAC and lateral aspect exposure (Semaan et al., 2015). The TL method cannot preserve hearing, which is attributable to the otic capsule's violation (Schwartz et al., 2018). This method delivers a superior exposure of the IAC and CPA and allows direct exposure and comprehensive visualisation of the entire tumour with a short operative depth, from the meatus to fundus, with minimal cerebellar manipulation (Kim et al., 2019). Continuous facial nerve monitoring and stimulation are routinely performed (Kaul & Cosetti, 2018). The neurosurgeon opens the dura from the sinodural angle and tumour removal is performed subsequently. Multi-layered closure is performed with autologous fat and fascial grafts to prevent CSF leakage (Kim et al., 2019). In the event of tumour adhesion to the brainstem or facial nerve, a small thin rind of tumour tissue is intentionally left instead of risking nerve injury and compromised postoperative function (Ölander et al., 2018). However, Carlson and Link (2021) stated that the risk of postoperative progression of residual neoplasm is proportional to the tumour volume left behind.

TL is considered the most definitive surgical operation with the lowest chance of requiring subsequent treatment (Schwartz et al., 2018). Jun et al. (2020) revealed that the TL approach is correlated to a higher rate of tumour's gross total resection and a lower rate of tinnitus and cranial nerve deficit postoperatively. TL resection remains a particularly appealing choice for patients suffering from many vestibular symptoms (Schwartz et al., 2018). According to Semaan et al. (2015), hospital and ICU length of stay and presence of major postoperative complications are significantly less for patients who undergo TL resection.

In comparison to TL resection, the retrosigmoid (RS) approach provides excellent exposure of the CPA and possible hearing preservation, though a variable amount of substantial cerebellar complications due to cerebellar retraction occur (Kim et al., 2019). Also, lower cranial nerve



GD-based contrast MRI of the internal auditory canal demonstrating a right vestibular schwannoma. (Dang et al., 2020)

dysfunction (LCN), caused by the direct stretching manipulation of LCN and brain retraction injury, has a higher incidence in the RS approach (Kim et al., 2019; Semaan et al., 2015)

Aboukai's et al. (2018) studies reveal that the surgical outcome depends more on the surgeon's experience than the advantage of a specific surgical approach; hence surgeons with a higher surgical volume have better operation results than low-volume hospitals. At present in New Zealand, the best practice for the management of patients with larger VS is with both neurosurgeon and otolaryngologist trained and proficient in the surgical approach to operate on these complicated tumours (Bird & MacFarlane, 2007)

For smaller VS tumours, because of the technological innovations in radiotherapy and imaging, surgical providers advocate for the benefits of observation ("watch and wait") and Stereotactic Radiosurgery (SRS) (Goshtasbi et al., 2019). However, according to Schwartz et al. (2018), due to claustrophobia and MRI's aversion, many patients opt for the TL surgical resection instead of SRS. Additionally, microsurgery is more cost-effective when treating the older population rather than radiation therapy (Zygourakis et al., 2014).

Conclusion

Although it is an acoustic-destructive surgical procedure, Trans-labyrinthine resection of larger VS provides an excellent outcome regarding tumour control, facial nerve preservation and evasion of postoperative complications. The surgeon's valuable expertise, tumour characteristics and patient's preference should be considered when tailoring an individualised surgical management plan for clients with VS.

About the Author *Rey Canoza completed a bachelor's degree in nursing in 2007 and moved to New Zealand in 2010. Rey is an experienced Registered Nurse who worked at Christchurch Public Hospital in the operating theatre for 13 years. Rey worked across all theatre specialities including Otorhinolaryngology, General surgery, Orthopaedic Trauma, Cardiothoracic and Neurosurgery and performed as a theatre coordinator after hours. Rey obtained a Postgraduate Certificate in Perioperative Specialty Nursing in 2013 and a RNFSA qualification in 2021, receiving the First in Course Award. Rey is currently working as a Neurosurgery RN First Surgical Assistant in a private setting and harvesting autologous abdominal fat grafts for patients with VS.*

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New Zealand nurse's leading role in surgical hosp

Introduction

According to The Lancet Commission on Global Surgery, 16.9 million people globally die each year from a lack of safe surgery — more than three times the annual number of people who die from HIV, malaria, and tuberculosis (TB) combined.

Access is worst in low-income and lower-middle-income countries, where nine out of ten people do not have access to safe, affordable surgical and anaesthesia care when it is needed (Meara & Leather, 2015).

Using her operating theatre nurse expertise to benefit the marginalised in low-income countries is a passion that has driven New Zealand's Kylie Bentham Huber since she first studied nursing. The not-for-profit Mercy Ships working in sub-Saharan Africa in 2002 connected the dots.

"It appealed to me that I could work on a ship and be an operating theatre nurse. I knew it would be a unique place to work, with crew from all over the world serving with a common goal. These same reasons still drive me today," Huber reflects.

After entry nursing roles at Middlemore and Mercy Hospital (now Mercy Ascot), Huber completed a diploma at the London School of Tropical Medicine to help prepare for her long-term career goals, initially volunteering for three months in 2003, while Mercy Ships was providing free essential surgical care in Togo, West Africa with the charity's first hospital ship, *Anastasis*.

Abstract Access to safe surgical care is a critical issue in low-income countries, where millions of people die each year due to lack of access. Mercy Ships, a not-for-profit organization dedicated to providing surgical care in Africa, utilises hospital ships to address this issue. Kylie Bentham Huber, a New Zealand nurse, has been volunteering with Mercy Ships since 2003, utilising her expertise as an operating theatre nurse to benefit the marginalised in low-income countries. She has served on multiple hospital ships, including the recently deployed *Global Mercy*, the world's largest civilian hospital ship. In addition to providing direct surgical services to those in need, Mercy Ships also focuses on increasing local surgical capacity through education, training, and advocacy. Huber and her family have been instrumental in setting up operating theatre suites and systems on board the *Global Mercy*, which includes comprehensive technology for training and mentoring opportunities. Strengthening surgical capacity is a vital aspect of Mercy Ships' work, with a focus on empowering local health professionals and building sustainable surgical systems in under-served communities.

Key words Increase access, strengthen surgical capacity, education, training, advocacy, Mercy Ships, volunteer service

Translators and national medical crew play a key role in patient safety and consent.



ital ship

Care for those out of reach

Mercy Ships provides surgical care in low-income countries. The faith-based non-profit organisation utilises hospital ships to positively impact the lives of individuals facing the complex challenges of poverty, disfigurement, and disability.

The surgical vessels are docked, by host nation government invitation, in a sub-Saharan Africa nation for typically 10 months each year. Volunteer professionals deliver direct surgical services for individuals who would otherwise have no access to these specialities. A dual priority is increasing local surgical capacity by working with local partners and agencies, strengthening their healthcare systems and enhancing their capacity to meet both immediate and future healthcare demands.

By combining compassionate care with capacity-building initiatives, Mercy Ships strives to improve the quality of life for vulnerable populations while making a sustainable surgical impact in under-served communities.

Increasing access to surgical, anaesthesia and obstetric care in Africa

After a second volunteer service of a few months, Huber returned to New Zealand and studied sterilisation technology to prepare for her first extended tour-of-duty. The two-year assignment as Operating Theatres Manager saw her returning to West Africa in 2006; a key player in transitioning the surgical services from the retiring Mercy Ship *Anastasis* and starting up the 'Operating Room Department' on the newly renovated and larger surgical vessel *Africa Mercy*.

Responsible for all aspects of the five on-board operating rooms on the *Africa Mercy*, Huber managed surgical services including administration, theatres, PACU, central sterilising and biomedical departments and patient flow, while keeping a strong alignment throughout the hospital areas. This was an invaluable experience.

Huber has now committed to two more years full time volunteering as Operating Room Clinical Supervisor from 2022, setting up the operating theatre suite and systems on the recently built, much larger hospital ship *Global Mercy*.

The first of an anticipated surgical procedures was undertaken in March 2023.

Huber lives on board with her husband Dan, whom she met on board in her previous service. Their 11-year-old daughter attends the ship school.

"I keep coming back because I love serving in the unique Mercy Ships' environment; using the skills God has given me to make a difference in the lives of those who would otherwise not get the surgical help they needed. The patients show so much appreciation and gratitude," she says.

"I love working with volunteers from all over the world with a common goal, because we all want to help. This makes for a great crew to work alongside and Do Life with.



Kylie Bentham Huber, Operating Theatres Clinical Manager on the *Global Mercy*, docked at Dakar, Senegal in November 2022.

"This time around we wanted our daughter to experience life onboard a hospital ship, and to see Africa. It is the chance in a lifetime for her to see how other cultures live and work together."

At 37,000 gross tonnes (twice the size of a New Zealand inter-island Cook Strait ferry), the *Global Mercy* has an international crew of 640 volunteers. The hospital facilities cover two decks — 7000 square metres — with six operating theatres and 102 acute care beds, and a seven-bed intensive care unit (ICU) sponsored by New Zealand donors. All pre-operative and post-operative work is delivered on board.

Education, training, and advocacy

Mercy Ships' chief medical officer Professor Mark Shrimme explains there is disparity that brings premature death and needless life-long disability to people in Sub-Saharan Africa. "The entire means of production — the staff, the space, the stuff, and the system; the people, the electricity, the suction, the water, the infrastructure, the education, the oxygen — all of that has to be brought closer to the patient. The entire surgical ecosystem, and the people who work in it, must exist near where patients live, or it might as well not even exist for them." (Shrimme, 2022, para. 6).

Huber elaborates: "strengthening surgical capacity is vital in building the skills of health professionals in the countries we are serving. It is an opportunity for national colleagues to increase their knowledge and experience within a first-class setting, with surgeons who come from all over the world. We have the responsibility to impart what we have, rather than just do the work and leave."

Innovative medical education technology on board the *Global Mercy* includes simulation laboratories with virtual and augmented reality,



Kylie Huber (right) with husband Dan (left) and daughter Hannah are one of 25 families on board the *Global Mercy*.

simulated post-op care space, mannequins and other training tools. Mentoring and training courses are also key components of healthcare multiplication as Mercy Ships strengthens the host nations' surgical systems with education, training and advocacy through in-country partnerships.

Outfitting the new theatres

Huber and her family joined the new Mercy Ship *Global Mercy* in September 2022.

"*Global Mercy* was in the equipping phase in Europe; medical machines were being installed, medical supplies loaded, and last-minute upgrades were being completed. Overseeing the Operating Room Department as an end user of all the equipment and spaces, I ensured it would functional well when we went to field service.

"The Omnicell, which stocks our medical supplies, had to be set up with the correct supplies for our specialties. It took considerable time to learn the system and adjust as we started up the hospital. I did extensive departmental preparation with policies and procedures," she says.

The new hospital ship's inaugural surgical field service began in Dakar, Senegal in January 2023, and Huber's role pivoted.

"I am clinically supervising the Operating Rooms Department (sterilisation, Post-Op Care Unit, and operating theatres) making sure that the crew have what they need to function properly. Since this is a new platform there are many challenges as we start up the hospital. Flexibility is a key, and to give yourself grace as some processes may work and others not. I make sure that safe surgery can take place."

Huber assesses, plans, implements, and evaluates the theatres' services, while providing guidance, development, and communication in the multi-national volunteer theatre teams – including the teams of national translators working alongside the Mercy Ships volunteers.

There are six surgical specialties that can be offered by Mercy Ships to the host nation's Ministry of Health; women's health, in particular obstetric fistula reconstruction, paediatric orthopaedics, reconstructive plastics, specialised paediatric general surgery, ophthalmic, and maxillofacial, including benign tumour removal and cleft lip and palate reconstruction.

"The operating theatres are of a good size and are equipped like those at home, with the best equipment to help health professionals provide the best care possible for our patients. Theatre teams include two scrub

Operating theatre facilities aboard *Global Mercy*

From operating theatre tables and positioning equipment to sterilisers, washer disinfectors and instruments, everything was new for the launch of surgery on board Mercy Ships' third surgical vessel *Global Mercy*, in March 2023.

- Omnicells to dispense surgical supplies and facilitate restocking;
- C-Arm for Xray of paediatric orthopaedic patients with bowed legs or club feet;
- Ship-board oxygen concentrator, which pipes oxygen the theatres via pendants that anaesthetic machines plug into;
- C-MAC blades, a Glidescope and intubating fiberoptic scopes as conditions treated on board frequently have difficult airways;
- Ultrasound to track difficult veins, especially in children;
- CT scan assists in diagnosis of patient's conditions and surgical care plans;
- Laboratory capabilities include the ability to view specimens under a microscope on board and stream to a remote pathologist, who can manipulate the microscope to help them get the best specimen images from across the globe;
- Surgical recording capabilities capture live surgery for education and mentoring purposes - with informed consent from patients and crew.

New Zealand perioperative nurses Kylie Bentham Huber in one of the six full equipped operating theatres on board the hospital ship *Global Mercy*.



nurses and one Team Lead nurse. We are running up to four rooms, so there are 12 theatre nurses working at the same time. We also have a theatre manager, a clinical supervisor and an operating theatre nurse educator, and a couple of nurses to cover as charge nurse or if someone is sick. Specialty surgeons, anaesthesia providers, anaesthesia assistants and translators complete the surgical team.”

Similarities, and differences

Mercy Ships volunteers bring excellent standards of surgery in state-of-the-art theatres within the reach of some of the world’s poorest people. How does working in a ship-board operating theatre compare with working in a regular, land-based OR?

“Most operating theatres in the world have similar practices,” Huber says. “This is what makes it quite easy for a theatre nurse to transition into the operating rooms onboard. We work in teams with medical crews from all over the world. Even though there are cultural differences, the fundamentals of operating theatre nursing are still the same.”

“The main difference on board is our medical teams are exposed to unusual and extreme surgical cases that we would not see in our own countries. In New Zealand we do not see the deformities that we see in Africa. Patients in low-income countries are not able to access early intervention, preventative or medical care.”

Huber says she has been impacted personally and professionally in a profoundly positive way by her volunteer service with Mercy Ships. She encourages other New Zealand theatre nurses to consider volunteering for a month or two during their career.

“Helping make essential surgical care accessible to the marginalised poor doesn’t just affect our patients’ lives, volunteering changes our lives too.”

More about volunteering opportunities with Mercy Ships at www.mercyships.org.nz/volunteer-job/theatre-nurse/

About Mercy Ships

Mercy Ships operates hospital ships that deliver free surgeries and other healthcare services to those with little access to safe medical care.

An international faith-based organisation, Mercy Ships has focused entirely on partnering with African nations for the past 30 years. Working with in-country partners, Mercy Ships also provides training to national healthcare professionals and supports the construction of in-country medical infrastructure to leave a lasting impact.

Each year, more than 3000 volunteer professionals from over 60 countries serve on board the world’s two largest non-governmental hospital ships, *Africa Mercy* and *Global Mercy*. Professionals such as surgeons, dentists, nurses, health trainers, cooks and engineers dedicate their time and skills to accelerate access to safe surgical, obstetric and anaesthesia care.

Mercy Ships was founded in 1978 and has offices in 16 countries including New Zealand, and an Africa Service Centre in Dakar, Senegal. For more information visit mercyships.org.nz or follow @mercyshipsnz on social media.

Sira’s story:

When all attempts at finding help were exhausted, Sira’s family had one last hope that her badly bowed legs could be straightened. Video link: <https://tinyurl.com/4jhx2f47>

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Preparing patients with diabetes mellitus for CT Colonography

By Liying Duan

Introduction

Diagnostic computed tomography colonography (CTC) requires patients to follow dietary restrictions and bowel preparation. For patients with diabetes undergoing CTC, the management of their diabetic medication, maintenance of normal blood sugar level and compliance with the preparation is particularly challenging. To improve patient safety, patients must be well informed about their diabetic medication adjustment related

to dietary change so they can manage their diabetes and prevent any complications associated with fasting and bowel preparation. Accordingly, clear and concise instructions, which are easily read and understood, are required before the appointment.

Considering the risks associated with poor diabetic medication management, the need was identified for a quality project to produce a simplified, plain language written guideline, specifically for diabetic patients attending a CTC appointment, to complement the current verbal information. This should reduce the risk of complications, increase compliance, and improve the quality of bowel preparation and patient confidence and satisfaction with our service. The need to upskill the nursing team around current management of diabetes was also identified. This quality project became the focus of my final Masters Clinical Practicum. The article explores the background and uses literature sourced in the quality project to provide a strong evidence-base.

CT colonography (CTC)

CTC has been performed in the Radiology Department at Greenlane Clinical Centre (GCC) since 2006. Initially a small number of procedures were undertaken while general preparation protocols and information was developed. Increasing demand for bowel screening and the move towards a national screening programme has seen a steady increase in patient numbers with initial triaging of referrals through the

Abstract: A quality improvement clinical project was done in response to an identified need for a written diabetic management guideline specifically for outpatients undergoing CT colonography (CTC). In the future this will be included with the bowel preparation and appointment details to complement the current telephone conversation. The project's aims and rationales are discussed, theoretical framework and process outlined and supporting literature used to provide a strong evidence base for the study. Possible complications related to bowel preparation and blood sugar control are reviewed in relation to the common diabetic medications.

Keywords: Clinical quality project, CT colonography, bowel preparation, colorectal cancer, diabetes.

gastro-enterology department. Among these referrals for CTC appointments is a high percentage of people with diabetes.

Compared with colonoscopy, CTC is a relatively quick, minimally invasive screening procedure for the early detection of colorectal cancer (CRC). With no anaesthesia or sedation required, it offers a purely diagnostic alternative to the gold standard colonoscopy (Dreyer & Duncan, 2021).

CTC is now widely accepted as a valid screening method

particularly useful in screening low risk patients for CRC, especially frail, elderly patients with significant other comorbidities unlikely to tolerate a colonoscopy. It is also a useful screening tool for those with known diverticular disease (Matthews, 2014).

As a solely outpatient service, our Radiology department at Te Toka Tumai Auckland is reliant on accurate information from the referrer. Diabetic status is often omitted from this information, requiring the triaging Radiologist or often nurse, to identify patients with either type 1 or 2 diabetes and review their medication. There was therefore reliance on making telephone contact to provide patient-specific advice around diabetic management and bowel preparation. Existing documents from other departments are currently used as reference to provide verbal diabetic medication adjustment during CTC bowel preparation. Patients with diabetes are also asked to contact the department in their appointment letter. In addition, many patients are elderly, have limited family support, varying degrees of health literacy and at times poor command of English.

Bowel preparation is a vital part of CT colonography and is related to the quality of the procedure (Neri et al., 2013). Like colonoscopy, to avoid compromising the diagnostic quality and subsequent interpretation of the exam, patients need to complete a bowel cleansing preparation before CTC. To get a good look at the lining of the colon, bowel preparation

should be followed as residual faecal material or fluid left in the colon can obscure important pathological features (Mangnall, 2012; Neri et al., 2013). Therefore, when CTC patients with diabetes undergo bowel preparation, a clear written guideline should be given regarding change of medication dose and timing and glucose level monitoring, to prevent the risk of diabetic complications while still achieving a diagnostic study (Meyer et al., 2020).

Background

Colorectal cancer is the third most common cancer internationally and the risk of developing CRC is about four percent in a lifetime (Dreyer & Duncan, 2021). In New Zealand, the occurrence of CRC is high compared with the international incidence rate; about 3000 people are diagnosed each year and more than 1000 die from this disease (Ministry of Health, 2012). Therefore, early prevention and detection is crucial to patient survival.

Diabetes is a chronic metabolic disease and prevalent worldwide. Diabetes is one of the fastest-growing long-term conditions in New Zealand; on December 31, 2014, the number of people diagnosed with diabetes was estimated at over 250,000 or six percent of the population (Ministry of Health, 2015). According to the Ministry of Health (2015), for the last eight years, the prevalence of diabetes has been increasing seven percent each year. The Ministry of Health (2015) also noted that, in Māori and Pacific people, it was about three times more prevalent than other ethnic groups.

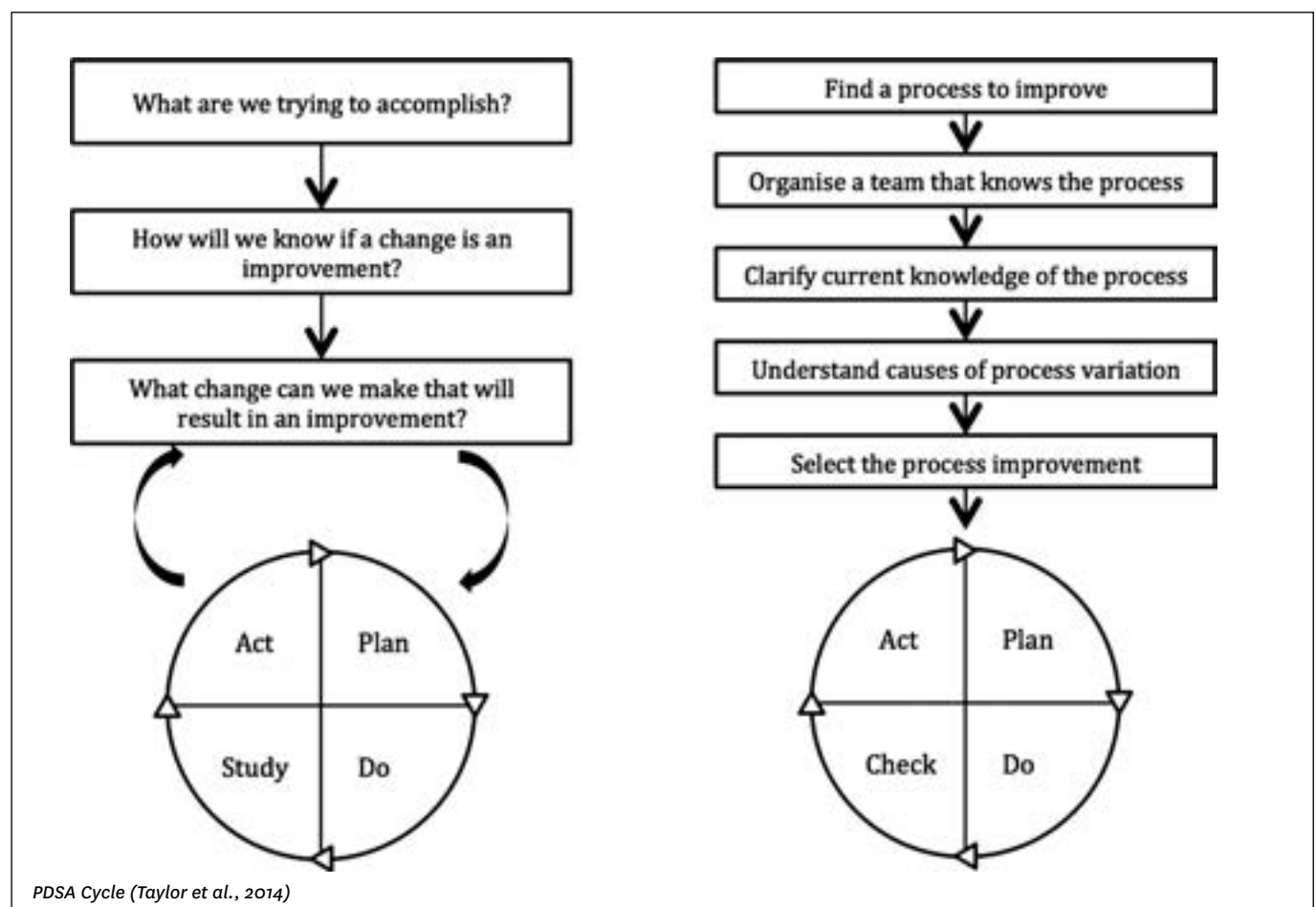
Though diabetes mellitus (DM) has not been recognised as a risk factor in any screening guideline for CRC, a recent nationwide cohort study has shown that DM is associated with increased risk of CRC (Ali Khan et al., 2020). Due to the increased rates of diabetes, the number of diabetic patients undergoing colon procedures is steadily rising (Müssig & Adamek, 2022).

For diabetic patients, the major challenge of having CTC is adhering to bowel preparation and at the same time maintaining their blood sugar control. Unfortunately, there are no studies found regarding risks of complications for diabetic patients associated with bowel preparation prior to and during colonography. Several studies focused on colonoscopy have shown that diabetic patients have a higher risk of complications relating to bowel preparation (Hochberg et al., 2019; Lee et al., 2020). These complications include hypoglycaemia, hyperglycaemia, water and electrolyte imbalance, lactic acidosis, and ketoacidosis, as a result of pre-colonoscopy bowel preparation, clear fluid only dietary restriction and fasting (Hochberg et al., 2019; Wamae & McHoy, 2006). Additionally, with the increased use of sodium-glucose cotransporter 2 inhibitor (SGLT-2i) for glycaemic control, there have been a series of cases of diabetic ketoacidosis (DKA), associated with colonoscopy reported, due to the required pre-procedural dietary restrictions (Ata et al., 2021; Meyer et al., 2020; Ray-Barruel & Kerr, 2020).

Consequently, this initiated the quality improvement project to develop a guideline helping diabetic patients manage their medications during CTC bowel preparation and prevent any complications related to the dietary change while still attaining a diagnostic study.

Description of the Project

This project was divided into four phases based on the quality development model Plan-Do-Study-Act (PDSA). PDSA was developed by Shewart and Deming and is also known as the Deming cycle (Stikes & Barbier, 2013). Although there are many models for quality improvement change, the PDSA model has been widely adopted in healthcare to drive changes and improve quality. It gives a clear framework to follow and is particularly helpful to a novice (Taylor et al., 2014).



Discussion

Patients undergoing CTC must follow a dietary restriction regime and bowel preparation to ensure a diagnostic scan. To achieve this goal, a combination of laxatives and tagging agents along with a restricted diet is used. In Radiology at GLCC, it usually involves three days' preparation, starting with a low fibre diet two days before, then followed by clear fluid one day before, finally fasting on the day of the procedure.

Gastrografin and Tagitol are posted to patients along with instructions for bowel preparation and an appointment letter, typically six weeks before the procedure. Gastrografin is a water-soluble radiologic contrast media, containing iodine, which marks or highlights remaining fluid in the bowel aiding diagnosis while also acting as an osmotic laxative to clear the bowel (Gu et al., 2019). Tagitol is a low-volume contrast agent, which highlights residual stool, particularly in the right side of the colon (Taylor et al., 2008).

Bowel preparation is a significant cause of discomfort ahead of any colonic study (Taylor et al., 2008). The diarrhoea caused by Gastrografin can be significant, with many CTC patients complaining about going to the toilet many times over night and disturbed sleep. Most of them report feeling 'starved' at the time of the scan. It can be challenging for patients with diabetes to comply with the diet change and also to control their blood glucose level.

Complications and Medication Adjustment

There are no studies found on the safety and dose adjustment of antihyperglycemic agents (AHAs) relating to CTC bowel preparation. There are however, multiple research articles on colonoscopy which have demonstrated that, due to change of diet, other comorbidities, and inappropriate administration of AHAs, diabetes patients have a higher risk for complications during bowel preparation (Ata et al., 2021; Hochberg et al., 2019; Lee et al., 2020).

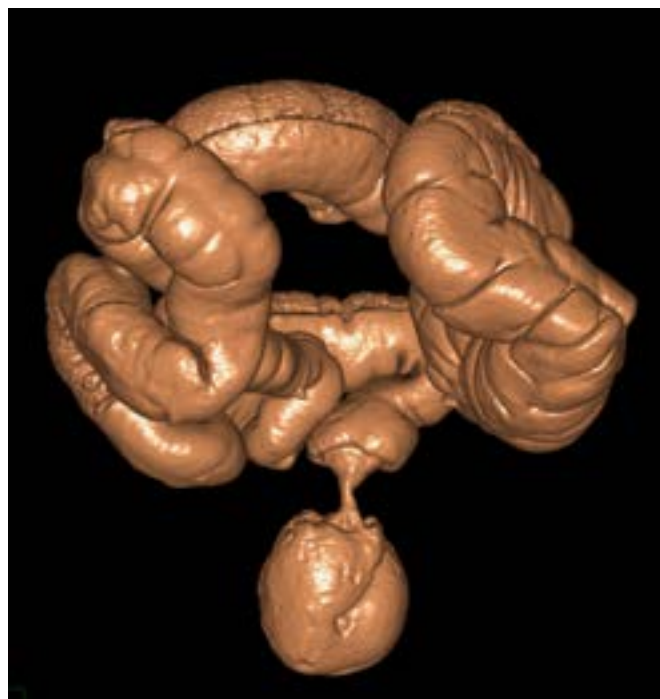
Like colonoscopy, patients for colonography need a change of diet and bowel preparation before the procedure in order to get high quality diagnostic images of their bowel. Therefore, there are potential concerns for complications caused by taking AHAs during colonography bowel preparation.

Hypoglycaemia

Hypoglycaemia is one of common risks for diabetic patients who need to take medications to control their blood glycaemic level. Glycaemic control is a balance between diabetic patients' carbohydrate intake and their daily activities; it is also associated with what kind of AHAs they take and how those medications function (Kuzulugil et al., 2019).

On the low-fibre day, patients are instructed to eat refined carbohydrates, like white bread, white rice etc. However, because these kinds of food have a high glycaemic index, diabetic patients are usually told to avoid taking them. Hence, they might significantly reduce their carbohydrate intake. If they do not adjust their AHAs accordingly, there will be an increased risk of hypoglycaemia occurring (Hochberg et al., 2019; Wamae & McHoy, 2006). Though sugary juice and tea are allowed to be consumed in the clear-fluid day, with the habit of avoiding sugar-sweetened beverages, diabetic patients normally continue their diet of no carbohydrates and may become more hypocaloric. Therefore, without adjusting their AHAs, diabetic patients are more likely to become hypoglycaemic on the clear fluid and laxative day before colonography or the day of the scan.

Regarding AHAs adjustment, the Israeli position statement and the guidelines of the Australian Diabetes Society suggest that all oral AHG should be skipped while patients are having clear fluids and short-acting insulin discontinued until solid foods are taken (Müssig & Adamek, 2022). Meanwhile, some agents (such as sulfonylurea preparations and long-acting insulin) act by lowering glucose concentrations and



Three-dimensional CTC image of the colon showing an 'apple core' lesion and narrowing in the lower bowel.

preventing glucose levels from rising. They have a very long half-life, so even when taking them over 24 hours before the scan, it can still cause hypoglycaemia. According to Lee and his colleagues (2020), they should be stopped from the morning of the day before the actual scan.

Metformin-associated lactic acidosis (MALA)

Metformin-associated lactic acidosis (MALA) is another concern during bowel preparation. Metformin is usually the first choice for management of type 2 diabetes (Kuzulugil et al., 2019). It is recognised as a safe medication; however, it can lead to lactic acidosis, a potential life-threatening complication, mostly due to dehydration. MALA-caused mortality rate is relatively high at about 50 percent compared with other causes of lactic acidosis (Hussain et al., 2014; Pessoa et al., 2019). There are several cases reported where patients with acute renal failure who continued with metformin during bowel preparation for colonoscopy developed MALA (Asif et al., 2019; Hochberg et al., 2019). Pessoa et al. (2019) reviewed a few case reports and concluded that due to the long half-life of metformin, it would be reasonable to stop metformin for at least a day before endoscopic procedures and recommend individuals drinking plenty of fluids at the same time. This is in accordance with the recommendation given by Hochberg and his colleagues (2019), who recommend withholding metformin when not taking solid foods.

SGLT-2i-induced ketoacidosis

Another concern is SGLT-2i-induced ketoacidosis. SGLT-2i is a new class of AHAs. It rapidly became popular because of its cardiovascular benefits. However, there are increased reports worldwide about SGLT-2i intake induced diabetic ketoacidosis (DKA) with the absence of major hyperglycaemia (Hsia et al., 2017; Musso et al., 2020; Palmer & Clegg, 2021).

Both Hochberg et al. (2019) and Meyer et al. (2020) reported DKA events related to SGLT-2i intake; they considered that the combination of the low-carbohydrate diet, fasting and potential risk of dehydration provoked these events. After reviewing a case series of eight patients with type 2 diabetes who managed their diabetes with SGLT-2i and developed different degrees of ketoacidosis during bowel preparation for colonoscopy, Müssig and Adamek (2022) suggested that SGLT-2i should be withheld at least two days before colonoscopy. This is consistent with

the American Diabetes Association (ADA)'s current clinical practice that recommends withholding SGLT-2i three days prior to surgery (Müssig & Adamek, 2022).

Health Literacy

It is well known that health management and outcomes are closely associated with the degree of health literacy (Hackett, 2020). Numerous studies have found that limited health literacy is related to inadequate understanding of health information, poor adherence with screening instructions, lack of ability in medication self-management, poorer health outcomes, and early deaths (Hackett, 2020). Unfortunately, low health literacy is a worldwide problem.

Health literacy statistics in New Zealand in 2006 showed most adults have poor health literacy and Māori and Pacific people particularly have much lower health literacy levels compared with other ethnic groups (NZMA, 2017). It has been discussed in the literature that one of the best strategies for improving health literacy is good communication, which includes providing clear, consistent and relevant information in a simple way (Sudore & Schillinger, 2009). Therefore, when developing this guideline, health literacy has also been taken into consideration.

Conclusions

This clinical project provided the opportunity to undertake a quality improvement activity, confirming the need for a guideline to improve both the safety and outcome for patients with diabetes having CTC in the radiology department. By doing this project, an evidence-based resource for the department has been produced, providing valuable information on possible complications relating to colonography bowel preparation and ways to adjust common diabetic medication including insulin administration. The importance of considering health literacy and use of plain English when developing the guideline was highlighted. By following the four cyclical steps of PDSA (plan, do, study, act), engaging with different health stakeholders and incorporation of the available scientific evidence a guideline draft was developed. Once the guideline is actioned and with continued verbal guidance, diabetic patients should be able to manage their medication and maintain blood sugar control. Continued monitoring and regular review and updating of information will be done to ensure patient safety and further improve the quality of the patient care.

Recommendations: The recommendations arising from this article are that when new treatment and medication are introduced, the guideline should be updated to reflect the change. In addition, the current guideline has been developed specifically for patients with morning appointments. If afternoon appointments are added in the future, the guideline will need to be amended to reflect the change. Furthermore, the guideline should be translated into different languages to meet the needs of our multicultural and diverse population.

Acknowledgement: The author would like to express special thanks to her Clinical Charge Nurse, Shona Matthews, who acted as both her project mentor and clinical supervisor for the clinical project, took extra time to guide and support her throughout the course of the project planning, preparing, and implementing. She has also proofread the article and given suggestions and amendments for finalising it.

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Preoperative Pregnancy Testing

By Yves Francesca Tan

Introduction

This article investigates the confusion that surrounds preoperative pregnancy testing, the importance of pregnancy testing and timing during the preoperative surgical phase, with the intention of improving surgical outcomes for the patient and avoiding potential damage to a developing foetus.

The literature is reviewed and the specific preoperative tests and assessment that patients over the age of 16 years may require prior to elective surgery is considered. The types of surgical procedures which pose the greatest risk to a developing foetus are also reviewed. It highlights the importance of local policy and documentation and recommends development of national resources on the subject.

Preoperative Pregnancy Testing

Pregnancy testing has been and still is considered a controversial subject in many countries. There are various considerations when it comes to pregnancy testing, each adding to the layer of complexity (Homi & Ahmed, 2012). Whenever mentioned, pregnancy testing has always sparked discussion among nurses with different opinions and confusion as to when and for whom it is required. According to Wingfield and McMenamin (2014), approximately 0.5–2.0 percent of female patients undergo surgery and exposure to anaesthesia at some time in their pregnancy, with the incidence of previously undiagnosed pregnancy ranging from 0.15 to 2.2 percent. This is significant as medications and procedures preceding surgery, or the operation itself, pose an elevated risk to the foetus, especially during early pregnancy (Kuczkowski, 2004).

It is important to establish early pregnancy before any elective surgery as this may be deferred to a later time, giving both the medical specialist and patient an opportunity to make informed decisions regarding treatment plans (Maher & Mahabir, 2012). Furthermore, informing patients of the need and the reason behind establishing their pregnancy status and recognising their right to refuse, promotes autonomy when it comes to their care plan, upholding their rights as required in the Health and Disability Commissioner Regulations (1996).

The National Institute for Health and Care Excellence (NICE, 2016) acknowledged that there is still uncertainty in whether to perform pregnancy testing in all women of childbearing age or only if those patients are unsure if they are pregnant. It emphasised that it is considered best practice to offer it to all women of childbearing

Abstract: Preoperative pregnancy testing for elective surgical patients has long been fraught with controversy. Preoperative testing can prevent unnecessary harm to the foetus and allow for informed choices in the preoperative tests performed prior to surgery and the timing and type of surgical procedure. Local policy and guidelines can guide staff in the implementation of pregnancy testing and documentation.

Keywords: Pregnancy testing, preoperative assessment, policy guidelines, elective surgery.

potential preoperatively. The American Society of Anesthesiologists (ASA) (2016) has a similar recommendation but added that it should also be offered to patients whose care management will depend upon the result of the test. Females who first experience menstruation and one year after the last reported menstruation fall under the category of childbearing potential

(Maher & Mahabir, 2012; NICE, 2016).

It is likewise important to identify when pregnancy testing is not applicable as results will produce inconsequential outcomes. For example, patients who have had previous surgeries such as hysterectomy (NICE, 2016) and procedures involving the removal of both fallopian tubes and ovaries or salpingo-oophorectomy.

Tubal ligation is not an exclusion criterion and still requires preoperative pregnancy testing (Maher & Mahabir, 2012). According to Health Navigator New Zealand (2021), tubal ligation, which is an effective and established approach to contraception, is particularly reliable but is not 100 percent effective, with a ratio of approximately 1 woman in 200 becoming pregnant. It should also be taken into consideration that tubal sterilisation and intrauterine devices have potential failure rates and should a pregnancy test turn out to be positive for these patients, ectopic pregnancy needs to be ruled out (Peterson, 2008).

The detection of early pregnancy prior to surgery still proves to be challenging and relying on historical information alone can be problematic as inaccurate information may be gathered during patient assessment (Lamb, et al., 2019; Wingfield & McMenamin, 2014). However, Kerai, Saxena and Wadhwa (2019) point out that some reports note that self-assessment of pregnancy by patients is a reliable method, specifically when it considers their sexual history. This method is more reliable in establishing their pregnancy status compared to menstrual history alone. Conversely, both methods could be used in conjunction with one another when it comes to completing the preoperative patient assessment.

In the hospital setting, urine and serum pregnancy testing are often used with the former method being sufficient for testing on the day of the surgery (Fleisher, 2009 as cited by Homi & Ahmed, 2012). It should be noted that urine pregnancy testing, though useful due to its rapidity and reliability, is less sensitive in detecting early pregnancy compared to

serum pregnancy testing.

Urine pregnancy tests have efficacy in detecting a positive result 14 days after fertilization and ovulation, while the serum pregnancy tests can yield a result 10 days after fertilisation and ovulation (ASA, 2016). Urine pregnancy tests may give false negative or false positive results, but these are quite uncommon (NICE, 2016). Factors like urinary dilution, longer storage of urine samples or contamination by bacteria could yield a false negative result. False positive results might occur for patients who have just recently given birth, suffered a miscarriage, or disease and malignancy in women who are reaching the end of their reproductive years (Kerai, Saxena & Wadhwa, 2019).

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Gnoth and Johnson (2014) warn that the use of fertility drugs which contain the glycoprotein hormone human chorionic gonadotropin (hCG) could give a false positive result. It is useful for patients to understand and acknowledge that not all tests are 100 percent accurate and that getting a false negative or false positive result, however slim, is still possible. Providing this information means that the patient's rights as consumers are being considered.

Surgeries involving the uterus directly pose the greatest risk for the foetus. These include hysterectomy, myomectomy and those that involve the uterine cavity like dilatation and curettage, hysteroscopy, and endometrial ablation.

Cardiovascular surgeries involving the arteries like the common iliac, internal iliac, uterine, and ovarian arteries and the aorta are examples of procedures that can cause a disruption to the blood flow in the uterus and are equally as critical to foetal viability (ASA, 2016; Mollov & Twersky, 2013). Hence, the importance of undertaking a preoperative pregnancy test for all women who will undergo a gynaecological procedure is supported by this evidence.

Maher and Mahabir (2012) presented previous studies involving surgery during pregnancy. Those studies have shown similar outcomes including perinatal mortality, low and very low birth weights, spontaneous abortions, and premature births.

Of all other non-gynaecological operations, commonly done laparoscopic procedures compared to open procedures, pose an increased risk of miscarriage for pregnant patients (Kerai, Saxena & Wadhwa, 2019). However, Prasad, et al. (2016) argue that external factors such as anxiety and stress can also be linked to incidents such as spontaneous miscarriages. It is therefore difficult to associate such outcomes with surgery and anaesthesia alone and present-day anaesthetic agents used at standard clinical concentrations have not shown any teratogenic effects in humans (ASA, 2016; Wingfield & McMenamin, 2014).

It is also useful to consider exposure to potential teratogens such as ionizing radiation from x-rays during surgery. This is because they are found to be linked to major defects and congenital anomalies, particularly if the exposure happened during the first trimester of

pregnancy or the fourth to fifth gestational weeks, the crucial period for organogenesis (Kuczkowski, 2004; Maher & Mahabir, 2012; ASA, 2016). Offering pregnancy testing to all female patients regardless of the type of procedure is supported by this evidence. Additionally, consumer rights are upheld when the patient understands and recognises the risks and benefits of identifying the possibility of early pregnancy as it facilitates informed choice and minimises the potential for harm for the patient and, if present, the embryo.

Pregnancy testing in young adults

Conducting a pregnancy test for female patients has been, and still is, considered a controversial subject. The complexity becomes even more challenging when female adolescents are included in the mix, thus resulting in variations in practice in different countries (Homi & Ahmed, 2012). While most literature supports the necessary assessment for pregnancy prior to any surgical procedure or exposure to teratogens (NICE, 2016; ASA, 2016), caution must be taken when it comes to the circumstances surrounding pre-procedure pregnancy testing for young people. This may challenge healthcare providers' adherence to good practice, mainly because sexuality is considered an extremely delicate topic for this age group (Azzam et al., 1996; Homi & Ahmed, 2012). Then again, the previous statement regarding practice can be rejected if a definitive policy is in place as detailed in the guidance for clinicians by the Royal College of Paediatrics and Child Health (RCPCH, 2012). If the guideline contains clear steps around conducting patient assessment, pertinent information that patients need to know, accurate documentation of patient results and a detailed process for acquiring consent and disclosure, then including patients below 16-years-old for pregnancy testing should not pose a problem (RCPCH 2012).

Documentation and Policy Guidelines

Evidence suggests that clear documentation is necessary and that it should include the consent given by the patient, the outcome of the test and the action taken after considering the result of the test (RCPCH, 2012). It is good practice to inform the patient, and for younger patients, to inform their parents or guardians if the patient permits. In the event of a positive pregnancy test result "there should be extensive documentation in the medical notes of the clinical and safeguarding actions taken in light of the result" (RCPCH, 2012 p. 12).

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The second point to consider in regard to increasing the effectiveness of the implementation of pregnancy testing is the availability of a local guideline and the issue regarding documentation. Having a local policy can have an impact in achieving proper documentation as it will set out all the details that need to be captured in the patients' notes. It can also include what to ask patients on the day of the procedure, how the information will be provided to the patients and what information will be provided to them (NICE, 2016).

It is worth considering having a national policy around preoperative pregnancy testing to ensure uniformity in clinical practice. A national policy on preoperative pregnancy testing would be really useful in

pulling together current evidence-based information, both general and specific and would remove much of the confusion. This can be adopted by individual organisations and their own local guideline created, including details that would cater to their own health care setting.

Numerous authors have recommended that having a policy that healthcare providers can refer to is useful because the institution can then include all vital considerations with minor adaptations for their department (Azzam et al., 1996; Homi & Ahmed, 2012; Maher & Mahabir, 2012; Wingfield & McMenamin, 2014; RCPCH, 2012; ASA, 2016; NICE, 2016). It could potentially reduce the variance in practice, specifically when it comes to documentation.

Another recommendation is to incorporate patient education; initiated by the Medical Specialists and supported and followed up by the nurses, as it will allow the patients to better understand the risks, benefits and purpose of doing preoperative pregnancy testing. Including an information leaflet about pregnancy testing in the patient's preadmission pack might be a useful tool (RCPCH, 2012). In addition to that, Lambet et al. (2019) state that instructional signs prove to be an effective method of enabling patient participation. The authors stated:

“Clear signage posted in the presurgical patient waiting area alerting female patients about the collection of a presurgical pregnancy urine sample before surgery may increase the patient required participation in the protocol and would help prevent delays after the registration process once the patient enters the presurgical holding unit on the day of surgery” (p. 7).

A national policy on preoperative pregnancy testing would be really useful in pulling together current evidence-based information, both general and specific and would remove much of the confusion

Furthermore, educational materials may overcome the barrier of time constraints that nurses in the ward or the Day Stay unit experience during patient admission. With the help of the information leaflet and instructional signs, the patients and or the parents will have a better understanding of the purpose behind the preoperative pregnancy testing and the process for obtaining or not obtaining the test may be shortened (ASA, 2016).

Conclusion

In conclusion, pregnancy testing can be a controversial topic but the risk to the foetus from exposure to medications and the surgical procedure highlight the importance of early detection. This enables informed choice for the patient about the treatment plan and alternative options. Best practice recommends that all women of childbearing potential should have a pregnancy test preoperatively. This can be done by either urine or serum pregnancy testing. Certain surgeries pose greater risk to the foetus such as gynaecological and cardiovascular surgeries. Laparoscopic procedures pose an increased risk of miscarriage. Care must also be taken when discussing pre-procedure pregnancy testing with female adolescents. Clear documentation and utilisation of local

guidelines can increase the effectiveness of preoperative pregnancy testing.

About the Author *Yves Francesca Tan*, or *Cheska* as her family and friends call her, graduated with a Bachelor's degree in Nursing in 2009 from Trinity University of Asia in the Philippines. She then completed her training for Perioperative Nursing in 2011 at University of Santo Tomas Hospital where she began working as a nurse in the Operating Room Department.

As a nursing student *Cheska* helped care for her father and was present in the operating room when he underwent surgery for a Coronary Artery Bypass Graft. That experience was instrumental in igniting her interest and passion for theatre nursing which she has pursued ever since.

Cheska and her husband decided to migrate to New Zealand in 2017. She received her practicing certificate after completing the Competency Assessment Programme for international nurses. *Cheska* is currently working as a theatre nurse at Southern Cross Hospital in Christchurch where she specialises in General Surgery, Urology and Gynaecology.

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