

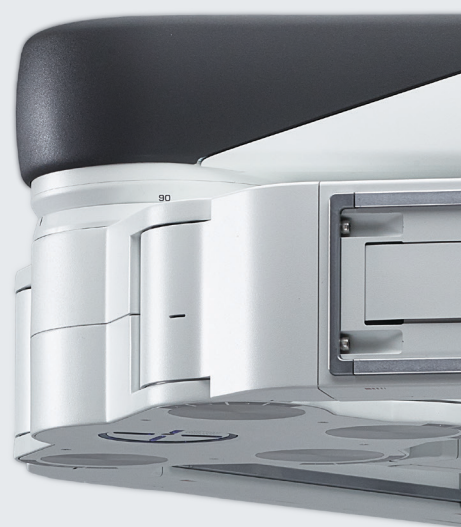
## The future of health care in New Zealand

Development of physical robotic surgery training exercises based on systematic literature review.

Interviews with cardiothoracic surgeon and ethnic dermatologist.

What happens to those students who do not get into their desired programme?

An insight into the realities of life and health in Tanzania.



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Editorial Office  
Website: <http://www.nzmsj.com/>  
Email: [nzmsj@nzmsj.com](mailto:nzmsj@nzmsj.com)  
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All other correspondence to:  
New Zealand Medical Student Journal  
c/- Medical Education Group  
University of Otago Medical School  
PO Box 56, Dunedin, New Zealand



## Editor's welcome

**Cameron Wells**

Deputy Editor, NZMSJ

**Aleksandra Turp**

Editor-in-Chief, NZMSJ

Kia ora, and welcome to Issue 27 of the New Zealand Medical Student Journal (NZMSJ)! This second issue of 2018 again demonstrates the talent and dedication of the medical students of New Zealand in their academic studies, and looks to the future of medicine in our Aotearoa.

As prospective clinicians each of us needs to consider what the developing technology will bring to the world of medicine, and what this will mean for our future practice. This issue's theme is centred on the future of health care in both New Zealand and worldwide. We are privileged to have a number of world-leading academics and clinicians contributing their thoughts on this subject, in addition to the outstanding work from students featured in this issue. Associate Professor Tarik Sammour offers a perspective on the potential of robotic surgery, while Associate Professor Robyn Whittaker argues "The Future of Health is Mobile". Dr Richard Medicott offers insight into how these technologies may be incorporated into General Practice in the future.

Continuing in this theme, Nikhar Shah's academic article entitled "Development of Physical Robotic Surgery Training Exercises Based on a Systematic Literature Review" touches on the use of robotics in surgery and the training of surgeons in this emerging technique. With a focus on palliative care, Claire Whitehead reports on a retrospective audit of deaths in Canterbury District Health, and Amy Rankin reviews the role of spirituality in end of life care. Our other academic articles include case reports of rheumatoid arthritis and oesophageal cancer; by Hemi Enright and Alistair Lock respectively, as well as a review of alcohol use in pregnancy by Amy Rankin. We also are proud to feature abstracts from BMedSc(Hons) students from Auckland and Otago.

The feature articles include a report from the New Zealand Medical Students Association (NZMSA) president, Jibi Kunnethedam, as well as the first articles from our new "Interview Series", with Dr Cheyaanthan Haran interviewing Professor Sean Galvin, a cardiothoracic surgeon from Wellington, and Dushitanthi Rasanathan interviewing Ophelia Dadzie, a dermatologist from London. Joseph Chen offers an insight often missing from medical student discussions; "What happens to those students who don't get into their desired programme?". Amy Rankin and Isabell See also offer their respective insights into their elective placements in Tanzania and the United Kingdom.

Culture is touched on in many senses by our other features articles; Shilpan Patel offers a unique Persian perspective on the history of Syphilis, while Doris Zhang and Dr Tanisha Jowsey discuss the culture of medicine and transformation of medical students during their training. Brittany Park-Ng reflects on a patient she met during her fourth year

placements, and many students will be able to relate to the experiences and emotions from this article.

Highlighting the number of outstanding opportunities that are available to medical students, we have conference reviews from the New Zealand Medical Students Association Conference, the Australasian Students' Surgical Conference, and the Australia & New Zealand Association for Health Professional Education (ANZAHPE) Conference. The issue also features the ideas presented in the NZMSA Hackathon at the Clinical Leadership Forum held earlier this year. Our media reviews section is contributed to by Michaela Rektorysova, Sylvia Duncan, Sarah Maessen, covering work by Dr Lance O'Sullivan, Doctors without Borders, and the story of Henrietta Lacks.

Finally, we are once more delighted to display the creativity of New Zealand medical students from our joint Creative Arts competition with NZMSA. This issue for the first time features photography with Anne Chiang's "Midnight Reflections", while poems from Fardowsa Mohamed and Emily Adam provide insights into life as a medical student. We hope more students will use the NZMSJ as a forum to share their creativity in the form of visual art.

The NZMSJ Editorial Board would like to thank all of the student and expert reviewers who have contributed to this issue, as well as the University of Otago and the University of Auckland for their financial and academic support, without which publishing this journal would not be possible. We would also like to acknowledge MAS for their funding and the NZMJ for their guidance and support.

We hope this issue will provide readers with a variety of thought-provoking and engaging articles. We would like to congratulate all of the authors who have contributed their work and encourage all students to submit to the NZMSJ, or join us as a reviewer or part of the editorial board.



# Rise of the machines: Is the future of health care human?

## Associate Professor Tarik Sammour

BHB, MBChB, FRACS, CSSANZ, PhD

Associate Professor, Discipline of Surgery, University of Adelaide

Colorectal Surgeon, Department of Surgery, Royal Adelaide Hospital

In recent times, whenever I meet surgical colleagues and friends practising in New Zealand (where I did almost all my medical and surgical training) it seems the first question I get asked, after pleasantries are out of the way, is 'how many robotic operations are you doing?'. The reason for this is simple: surgeons are understandably preoccupied with technical advances, and robotic assisted platforms are now in common use in Australia and most of the developed world. Penetration is lower in New Zealand, but that is a temporary situation. Make no mistake, the robots are coming soon and the expectation is that eventually they will be embedded in every operating theatre in the country.

In this issue of the journal, Shah and colleagues outline an approach where physical tasks were developed to facilitate robotic training on a retired robotic system (REF). Most current da Vinci robotic systems (made by Intuitive Surgical Inc., Sunnyvale, California) already incorporate software that allows training in a virtual environment while sitting on the console. In fact, training on these simulators is a prerequisite to accreditation, and is mandated by the company manufacturing the device along with either an accredited robotic fellowship or an intensive program of workshops and proctoring for established surgeons. Currently, almost all robotic training (prior to patient contact) is managed and regulated by industry, with the move to clinician control of this process yet to materialise, but expected soon.<sup>1</sup>

The current generation of robotic technology is being pushed largely by industry and enthusiastic surgeons, not only for financial gain, but also because they have the potential to make difficult operations (such as rectal cancer surgery) easier for the operating surgeon.<sup>2</sup> Do these robots improve patient outcomes? The answer is that they do not yet.<sup>3-6</sup> This is likely because the extent of tissue damage is not different when robotic operations are compared to other minimally invasive techniques (i.e. there is no meaningful reduction in incision size or intra-abdominal injury). In addition, claims that patients are demanding their operations to be performed robotically are also misleading in my opinion, and the technology is also not currently cost-effective by any stretch of the imagination (or creative accounting).<sup>7</sup> So why the relentless worldwide march to embrace robotics then? The real truth is that the current technology is simply a first step towards a longer-term future where machines initially augment human surgical ability, and ultimately replace it (or at least components of it).<sup>8</sup> This is happening in virtually every industry, and to think that medicine or surgery is immune, would be naïve. The forthcoming generation of robots are considerably more advanced, with flexible single port systems, true haptic feedback, and

augmented reality overlaid directly to the operating surgeon's field of view, all imminent. The advent of these new technologies will not only be able to address some of the current limitations, but also reduce the capital and consumable costs through innovation and competition to drive down prices. Further cost reduction is also likely once there is critical mass, with purchasing economies of scale and improvement in operating team efficiency reducing the real dollar cost of any given operation.

The future is even closer (and more career threatening) on the software side of the coin. Artificial intelligence, specifically deep learning technology, is already able to replicate certain tasks that do not require specific social contact with patients, namely: imaging interpretation, histological analysis, and risk prediction.<sup>9-11</sup> The combination of widespread electronic medical records (big data), and the ability of specialised software to analyse these (artificial intelligence), has created the potential for unprecedented computer learning ability. Unlike with robotics, there is no cost barrier, with the software expected to be much cheaper than the humans it will eventually replace. The only real question that remains is: who/what will be replaced and when. That is more difficult to answer. The main obstacles to adoption are likely to be patient and doctor acceptance, rather than weaknesses or delays in the technology itself. However, as we have seen with autopilot systems in airplanes and self-driving cars, perceptions will slowly change until a new normal is accepted. There will be major regulatory barriers too. How will the Royal Australasian College of (insert specialty here) react, accredit, and implement potential doctor-replacing systems? There is no part two exam for robots yet.

The overall theme of this issue of the journal centres around the future of health care in New Zealand. If I were a medical student right now, I would be seriously considering the impact that robotics and artificial intelligence will have on medical practice and patient care. The challenge will be to select specialties that are at lower risk of being made redundant, and perhaps more importantly, to lead from the front when it comes to adoption. It is imperative that as the technology develops, clinician and research-led programmes drive safe implementation with a patient-centred approach. The future is both exciting and uncertain, but that is always the case, and all you can do is embrace it.

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# The future of health is mobile

## Professor Robyn Whittaker

MBChB, MPH, PhD

Public Health Physician and Health Researcher

Waitemata District Health Board

Honorary Associate Professor

University of Auckland

The most rapid uptake of any technology in our history has been the global uptake of mobile phones. At the end of 2017 there were more mobile phone subscriptions in the world than there were people (Figure 1).<sup>1</sup> Mobile communications networks have penetrated into places where there are no health care services and even no reliable electricity supply.

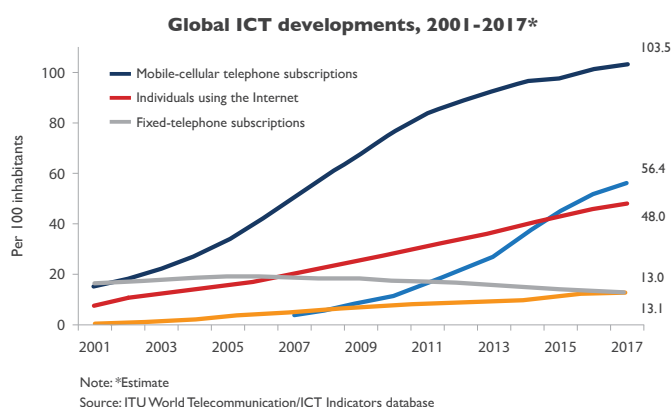


Figure 1: Global ICT uptake

In the developed world, more and more homes are 'wireless only' (that is, they have no fixed phone line, computer or access to the internet other than via mobile phones).<sup>2</sup> These wireless only households in the U.S. have been shown to be more likely to be those who are living in poverty, have no health insurance and no usual place of health care.<sup>2</sup> It is fast becoming the case that the only way to reach a great proportion of the population – indeed, the proportion that is most likely in greatest need of support to access health care – is by their mobile phones.

For health services to really make a difference to the health of those who need it, we must ensure we are reaching these people where they are. Through completely unrelated efforts, people have been trained to always carry a mobile phone within arm's reach, and to touch it on average 2617 times a day in 76 separate sessions.<sup>3</sup> So how can we use this ubiquitous tool to improve people's health?

Much has already been proven effective and many services are in place

around the world.<sup>4</sup> The most common include emergency services and text message reminders for appointments. One area with considerable evidence is the use of text messaging to support healthy behaviour change. In particular, text messaging support has been shown to double smoking cessation rates compared with control groups, and to be one of the most cost effective services we can provide.<sup>5,6</sup> Other areas include appointment reminders, medication adherence prompts, activity reminders, weight management, and general health information.<sup>7</sup>

We can also engage people in managing their long term conditions. Several different types of mobile phone based programmes have demonstrated effectiveness in supporting self-management. This may be just by providing motivation, support and reminders – our SMS4BG programme reduced HbA1c in people with poorly controlled diabetes significantly<sup>8</sup> – while others more directly link people with diabetes with their health care providers for clinical advice on the management of their condition.<sup>9</sup> Proven effective cardiac rehabilitation programmes can also be delivered by mobile phone for those who are unable to attend group sessions or find them inappropriate, or as an adjunct to in-person rehabilitation.<sup>10</sup>

In some countries, such as Sweden, people can access their own health care information via a mobile enabled patient portal.<sup>11</sup> Now Apple has made that even easier by working with some of the major electronic health record (EHR) companies to allow people to view their health records from multiple different institutions on their iPhone.<sup>12</sup>

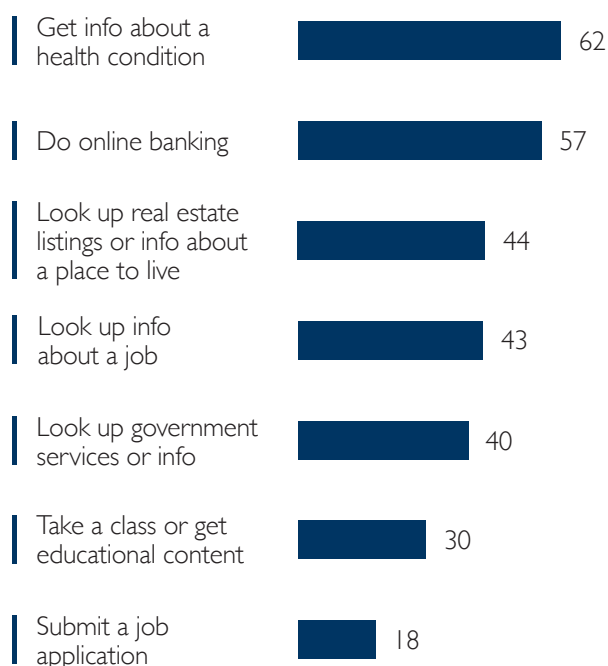
Smartphones are becoming the most common means for people to seek out health information. In 2015, 62% of U.S. smartphone owners had used their phone to look up information about a health condition in the past year.<sup>13</sup> Using apps and mobile websites we can provide education and advice about health conditions, videos from other patients about how they have coped with their illness, and connect them with others living with the same rare conditions from all around the world. *Patientslikeme* provides support, a social network of those suffering from the same issues, and information on treatments and side effects.<sup>14</sup>

Smartphone apps can connect with wearables like smartwatches to provide people with direct feedback on health-related parameters like activity levels, and make suggestions or use gamification to keep people motivated and moving. The opportunities for apps to connect with other sensors and other related information for specific health conditions is

huge, such as with smart inhalers, real-time weather information and asthma.<sup>15</sup> The mobile phone itself can be a means for individual data collection that can then be used to help the individual – such as a system which uses information on mobile phone activity and behavioural analytics to identify issues in those with underlying mental health conditions<sup>16</sup>; or ECG monitors that can be attached to the smartphone to be used to capture arrhythmias when symptomatic.<sup>17</sup>

### More than Half of Smartphone Owners Have Used Their Phone to get Health Information, do Online Banking

% of smartphone owners who have used their phone to do the following in the last year



Pew Research Center American Trends Panel survey, October 3-27 2014

### PEW RESEARCH CENTER

Figure 2: Use of smartphones to obtain health information in the U.S.

The ultimate mobile health service, perhaps, is when people can connect directly with real or virtual clinicians via their smartphone whenever and wherever they need it. Not only are there services now providing almost instant access to a clinician or therapist by video for many basic health services, we can also provide chatbots using artificial intelligence to provide support and cognitive behavioural therapy.<sup>18</sup>

That is not to say that all that glitters is gold. Mobile health interventions must be designed for, and with, those most in need. We risk widening health inequalities if mobile health programmes are only accessed by those with high end technology, data plans, and a high degree of health/technology literacy. Other issues such as data security, privacy and on-selling of data by vendors, must also be adequately addressed.

Who knows what the size and shape of future mobile phones will be. But we can be fairly sure that they will be powerful connected computers that will be with us at all times. They will be talking to the world around us and processing incoming information about where we are and what is happening around us, as well as what is going on in our bodies. The health system of the future will need to be linked into this system or we

will fall far behind our population's expectations and the opportunities for improving the health of our people. Health professionals of the future need to embrace these possibilities, be open to constant change in practice following the pace of change in technological advances, and be willing to learn about new technologies and how to use them. Doing so will keep clinicians at the forefront of how to best apply technology in clinical practice, rather than letting multinational companies outside the sector make the decisions for us.

Your job in the future is likely to not just be about medicine. We already need medical people who are interested in data, analytics, informatics, digital platforms, consumer engagement, behaviour change techniques, information systems, social networks, change management, cybersecurity, ethical use of aggregated data, and innovation. Who knows what else might be needed in the future?

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# The future of primary health care in New Zealand

**Dr Richard Medlicott**

MBChB, MD, FRNZCGP

Medical Director

The Royal New Zealand College of General Practitioners

A young woman climbs off a bus in central Wellington, checking her smartphone as she ascends the escalator that will bring her to her local general practice.

Approaching the reception desk, she is greeted by practice staff and directed to one of the tablets fixed to the corner of the bench. Speaking into the voice-activated search engine, she confirms her name and date of birth. The young woman enters a few short notes about why she has come to see the GP today, and the information is transferred to her patient notes.

The receptionist smiles at her, and thanks her for checking in. 'You'll be able to do all that on your way to the practice soon,' the receptionist tells the young woman. 'We're about to launch a safe and secure app for your mobile phone.'

Walking past an older gentleman who is checking in with another receptionist, the young woman takes a seat in the waiting area and scrolls idly through her newsfeed.

Soon, a familiar face appears around the corner and calls her name. The young woman greets her general practitioner (GP) fondly, and they continue down the hall to a consult room.

'What can we do for you today?' asks the GP, the medical transcriber blinking awake. It begins recording and summarising the consultation into standard Simple Object Access Protocol (SOAP) format, entering it into the patient notes for reviewing after the consult.

'Just let me know if you'd like to say something "off the record",' smiles the GP. 'I can turn this guy off any time.'

The consultation progresses, with the GP explaining some of the new point-of-care technologies being employed at the practice.

'Let's have a look at your lungs – I'm sorry, this will be a bit sticky on your skin – it's these new ultrasound stethoscopes.'

'You mentioned that your visa requires a test for tuberculosis? Let's take a blood sample now, this machine here can give us results within 15 minutes.'

'So you're worried about bowel cancer... Based on your age and

symptoms, your risk is very low. There are tests we can do to rule it out completely though, so let's arrange a blood test to send to the lab. We'll check for circulating deoxyribonucleic acid (DNA) markers and can let you know at the end of the week.'

As the discussion draws to a close, the GP mentions that a specialist referral they had discussed during their last visit was approved and filed automatically when the GP made the referral.

'Do you have a spare moment to speak with the specialist now?' asks the GP. 'We have a teleconference room set up down the hall, and I can see in my eSchedule that my colleague has an opening in twenty minutes.'

The young woman declines politely, opting to make another booking when it suits her schedule.

'If you'd like to connect with the specialist from your home, there's information about setting up a connection in the Patient Portal section of our website,' the GP reminds the young woman as she picks up her coat and bag to leave.

When someone asks me what general practice might look like in five years, it can be difficult to bat aside their expectations. It's enticing to conjure up visions of an aluminium and glass AI machine, or a chatbot doctor that can diagnose you during a text message exchange. More often than not, the value of technological advances lies in being able to make more significant differences in the lives of our patients – not how well we can mimic human behaviour or diagnostic pathways.

In Australia, aged-care facilities have installed laser beams and floor sensors to create a safer environment for their patients with dementia or limited mobility. A whole industry of therapeutic robots offer companionship and comfort for older patients or those experiencing post-traumatic stress. Smart robots act as learning aids for children with anxiety or phobias, while anthropomorphic helpers assist therapists to communicate with patients who have developmental disorders or who experience difficulty interacting with strangers. The best and most successful uses of technology give us more time to spend with patients, or equip us to better meet their needs.

I am privileged to work with many innovative medical professionals in my role as the Medical Director for the Royal New Zealand College of General Practitioners, and as a working GP in Wellington. My colleagues



and I think long and hard about the way we do things, and how technology can improve how we interact with each other and those in our care. To us, it seems like a natural conclusion. Technology has changed so much in our world already. Social media has changed the way we stay in touch with friends. Online reviews have changed the way we eat and travel. Gaming devices and smartphones have changed the way we spend our leisure time – if you're anything like me, this usually means trying to move away from someone at a concert as they try to record the whole thing on their phone.

From a practitioner's point of view, it is both exciting and daunting to be part of a world that is constantly reaching for improvement. We are presented with a number of tools, systems, gadgets, and developments that promise to make life easier for us and for our patients. Yet there remains a very important obligation to do our due diligence and ensure that we are not sacrificing the quality of health care we offer to patients, or their privacy and safety in the process of 'upgrading'.

GPs are well aware of this dichotomy. As medical professionals with broad responsibilities, we have an urgent need to find efficiencies in our work. This has driven much of the innovation that has already occurred in general practice, and is likely to be the focus of resources in future years. With an increasing number of general practice owners investigating how they can use technology in their day-to-day business, several District Health Boards are experimenting with telehealth services, while regulatory bodies develop guidelines and best-practice advice on navigating the technological world.

But back to a typical GP visit, there are any number of physical, financial, psychological, or geographical reasons why a patient might not be able to visit the practice. Technology can help us improve New Zealanders' access to health care services. Some rural practices use video calls to meet the needs of their community in the midst of GP shortages. Other practices have a collaborative relationship with their specialist colleagues, offering a virtual consultation in combination with a local nurse who can carry out physical examinations where necessary.<sup>1</sup>

Similarly, the advent of patient portals has signalled an opportunity to add value to our interactions with patients. In some practices, these web-based portals give patients access to their health records, test results, medications, and health care plans. They may be able to request repeat prescriptions, seek a nurse's advice, or send a query without having to come into the practice. Telehealth medicine gives us the opportunity to provide options to our patients, and can increase their sense of agency and involvement in their own health.

Most medical-school students will be well aware of the benefits that technological advancements have offered to our profession – while expensive textbooks are a fantastic source of information, the temptation to consult 'Auntie Google' for a quick answer can be great at times. While caution around accuracy and evidence needs to be exercised, there is real value in ensuring that information is shared in a forum that is accessible to the majority of our patients. Websites such as New Zealand's own HealthNavigator or DermNet curate evidence-based and peer-reviewed information in an easy-to-read format, often with dedicated areas for patients to consult when they are at home and unable to seek clarification.<sup>2,3</sup>

Leaders in the primary-care sector are paying attention to these innovations, and are starting to dedicate resources to their upkeep and development. New roles are being established within District Health Boards to investigate telehealth medicine, while virtual health services are already up and running in some parts of the country. Organisations, like the College, are responding to member requests for advice to help them navigate this technology-driven future. In our case, the College has worked with the New Zealand Telehealth Forum to produce resources for GPs and other health professionals.

So what can the health care professionals of tomorrow hope to see in their working lives? My guess is that technology is going to have a massive impact on the speed and accuracy of our diagnostic procedures. Point-of-care testing may eliminate the need for off-site laboratory analysis for a number of common tests, while ultrasound stethoscopes and virtual reality imaging for internal organs could change the way we conceptualise the human body. Pretty soon we may have high quality DNA tests for cancer, and wearable monitors that could predict the onset of epileptic seizures or detect irregular heartbeats. Medical professionals are already exploring ways to create inexpensive, portable laboratory tools such as Jane Chen's low-cost incubator for premature babies, or Dr Hong Sheng Chiong's open-source, smartphone-mounted ophthalmology device.<sup>4,5</sup>

At the core of these technological developments is a desire to make more room for the human elements of medicine – not less. As doctors, we know that technology can never replace the act of caring for another human. Even very intelligent machines can not entirely make up for the comfort of a well-timed word, an understanding nod, or commiserating smile. No matter how far technology advances, it will never grasp the subtleties of a human patient, their families, commitments, wants, and desires.

I feel that this is an incredibly exciting time to be a medical professional in New Zealand, where there are opportunities to literally develop the future of health-care technology. I know GPs in Auckland who are building their own waiting room apps, a practice in Invercargill that is pioneering virtual consults, and patients living in aged-care facilities on Waiheke Island who FaceTime their GP. I am excited for the doctors who undertake our General Practice Education Programme (GPEP) to be entering this world of opportunity and discovery.<sup>6</sup>

It's amazing to witness the mentoring and learning that happens between future GPs and existing ones. With a steady increase in doctors joining the GPEP, I see more and more hospital doctors coming into general practice and finally realising what their contribution to the profession will be. There are still fundamental issues to be grappled with and our primary concern is over whether this burgeoning technology will help close the care gap through reducing cost of access, or whether it will create a technological underclass, thereby widening the serious disparities we have in Aotearoa. As general practitioners, we must accept that we are on the cusp of change and commit ourselves to shaping that future.

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# Development of physical robotic surgery training exercises based on a systematic literature review

## Nikhar Shah

Christchurch School of Medicine  
Otago Medical School  
University of Otago

## Cameron Wells

School of Medicine  
Faculty of Medical and Health  
Sciences  
University of Auckland

## Greg O'Grady

BHB, MBChB, PhD, FRACS  
Dept. Surgery  
University of Auckland

## Mac Greenslade

Surgical Engineering Laboratory  
Auckland Bioengineering Institute  
University of Auckland

## Bruce Stokes

Surgical Engineering Laboratory  
Auckland Bioengineering Institute  
University of Auckland

> Nikhar is a Trainee Intern at the University of Otago and has particularly enjoyed his surgical attachments. He has a keen interest in medical technology and physics.

## Abstract

### Purpose

Robotic surgery is a promising surgical technique. As robotic platforms expand there is an increasing need for validated training exercises for surgeons to explore, develop, maintain and research the skills required for proficient use. The aim of this study was to evaluate the literature to inform development of an evidence-based physical simulator training platform for use with a retired da Vinci Surgical System (ISI 200; Intuitive Surgical Inc., Sunnyvale, Ca).

### Methodology

A literature review was performed on Scopus (English, all years) focused on physical training tasks for robotic surgery skill development. Retrieved data was applied to guide the development of an optimal suite of tasks based on pre-defined criteria. Identified exercises were manufactured in-house at the Auckland Bioengineering Institute for use with the da Vinci Surgical System ISI 200. Medical Students volunteers tested feasibility and face validity of the complete training suite.

### Results

Based on the literature review, evidence-based robotic surgery skills identified as priorities for physical simulators were: camera control, clutching, EndoWrist® dexterity, atraumatic handling, coordinated two handed control, cutting, needle driving, suture handling and knot tying. The following validated training tasks were identified as optimally covering these core skills: Peg Transfer; Ring Rollercoaster; Rubber Band

Transfer; Pattern Cut, Suture Sponge and Running Suture. Each simulation was able to be completed satisfactorily by medical students. Areas of potential improvements were identified in this pilot run to make the training suite more feasible and efficient.

### Conclusion

An optimal and validated suite of physical simulations were successfully identified and manufactured for use with a da Vinci Surgical System. While each task is based on validated literature, further study is now needed to define the construct validity of the training suite overall using experts.

### Introduction

Over the past decade, robotic surgery has developed into a promising surgical technique. The most commonly used system is the da Vinci Surgical System (Intuitive Surgical Inc., Sunnyvale, CA). It consists of two main components; the surgeon's console and the patient side cart (Figure 1). The patient side cart contains robotic arms which hold instruments and the camera, that are inserted into the patient via ports akin to laparoscopic surgery. The surgeon's console contains two master controllers, which translate movements of the surgeon's hands to the robotic arms. All over the world, various specialties notably urology, gynaecology, head and neck and general surgery have begun utilising surgical robots in procedures.<sup>1</sup>

There are numerous recognised advantages of robotic surgery that have resulted in its increasing worldwide utilisation; it is minimally invasive, which theoretically contributes to a shorter recovery time, less post-operative pain, lower blood loss and improved cosmesis;<sup>2</sup> it is ergonomically beneficial to surgeons; it can be more precise due to the translation of the minute hand movements to the instrument tips without tremor; and there is better visualisation and access to difficult to reach areas.<sup>3</sup>

The adoption of robotic surgery in New Zealand has been less widespread than other countries. Due to the steep learning curve and high costs of care and training it has been difficult for robotic surgery to gain a foothold in the surgical fields of New Zealand. Currently, there are only three privately-owned hospitals available to carry out robotic surgery in New Zealand and only a handful of surgeons adequately trained to carry out these procedures.

The University of Auckland has received a significant donation of a decommissioned da Vinci Surgical System (IS1200) from a local private hospital. The robot is housed at the Auckland Bioengineering Institute and now offers an outstanding and only opportunity to contribute to exposure, training and research in robotic surgery.

The aim of this project was to develop a physical simulation setup to enable practice and research on the da Vinci Surgical System. First an analysis of literature on various physical robotic surgical training tasks was carried out, focusing on information useful in guiding development of tasks. This was then used to create an optimal suite of training tools based on technical requirements, validation, simplicity and cost-effectiveness. Lastly, the devised training simulators were tested using a group of non-surgeon volunteers.



Figure 1 Surgeon's console, controlling instruments on patient side cart, which is docked into the patient (mannequin torso) through ports.

## Literature Review: Methods

A broad search of English language literature, from all years, was performed using Scopus, with the keywords "robotic AND surgery" and "physical OR inanimate" and "training". References of published review articles were manually searched to supplement the search results. Articles detailing the development, validation and use of physical training simulations in robotic surgery by both experts and novices over any time period were included. Review articles and studies describing use of virtual reality systems or technologies apart from the da Vinci Surgical System were excluded from analysis.

One author (N.S) initially screened titles and abstracts to identify potentially relevant articles. Full texts were then obtained and further screened for inclusion based on information relevant to development and validation of physical training simulations for training in robotic surgery. The information extracted from each study included the program name, technical skills identified, physical tasks developed, and validation methods and results (Table 1).

Due to the nature of the information identified, a quantitative synthesis was not possible, therefore the findings were discussed in a narrative format.

## Literature Review: Results

The search yielded 130 results, of which 115 were excluded from analysis after the abstract review as most described virtual reality simulations or did not detail the original development of physical simulations. One additional study was identified from existing review references. Of the remaining 16 studies, a further ten were excluded after reviewing the full text. Thus, six studies were successfully included in the literature review.<sup>7-12</sup> The following is a narrative summary of concepts identified relevant to the development of our own training suite of physical training simulations

### Core Technical Skills

Due to its unique approach, the skills required for proficient robotic surgery are practically different, but fundamentally and theoretically similar to other modes of surgery, especially laparoscopic surgery. For example, all modes of surgery require adequate hand-eye coordination, wrist articulation, depth perception, coordinated two-handed movement, and the basic tenets of retraction, dissection, cutting, needle driving, suture handling and knot tying.<sup>10,11</sup> After reviewing the literature, we identified a set of basic core skills that are unique to robotic surgery and are fundamental to mastery of the above skills on the robotic platform: effective camera control, EndoWrist® instrument dexterity, clutching and atraumatic handling.

A feature unique to robotic surgery is that the camera as well as the instruments are controlled by the one surgeon.<sup>1</sup> Effective camera control involves manoeuvring the camera smoothly to obtain a suitable view, without collisions and without losing sight of the instruments.<sup>10</sup>

In robotic surgery, the hand and wrist position of the surgeon is translated exactly to the movement of the specific EndoWrist® instruments (Figure 2).<sup>1</sup> This is directly compared to laparoscopic surgery where movements are inverted. Effective EndoWrist® dexterity is therefore important to train.

The field of view changes often during the surgery, and because both the camera and instruments are moved with the master controllers, it is difficult to maintain the correct hand and wrist position when operating. The clutch allows the surgeon to reset his hands back to a resting position whilst keeping the instruments still to maintain a comfortable range of motion.

A major drawback of robotic surgery is the lack of haptic feedback, so the ability to gauge force when handling tissues and objects is essential to proficient use.<sup>3,4</sup>



| Program Name (authors)  | Technical skills identified  | Physical tasks developed  | Validation methods and results.   |
|---|--|---|---|
| FIRST (Goh et al.) <sup>7</sup>                                   | Expert robotic surgeons used to identify essential technical skills, but details not available   | Penrose tube, Clover pattern cut, 3D dome peg transfer; Circular needle target  | Participants to warm up and watch an instructional video<br>Exit questionnaire provided face and content validity<br>Scoring based on Dulan et al. <sup>11</sup><br>Performance significantly different for all tasks between novice and expert, proving construct validity     |
| BSTC (Foell et al.) <sup>8</sup>                                  | EndoWrist® and camera manipulation, instrument clutching, object manipulation, needle driving, suturing, knot tying  | Ring transfer between pegs and passing a needle through a series of small rings   | Time to completion and number of errors for each task shown to be significantly improved pre- and post-course   |
| R-OSATS (Siddiqui et al.) <sup>9</sup>                            | Depth perception/accuracy, force/tissue handling, dexterity, efficiency  | Rubber band transfer; rollercoaster; suture sponge, running suture, figure of eight knot  | Each skill assessed from 1-5.<br>Demonstration video of each task shown<br>1 minute of practice and 6 minutes to complete each exercise<br>Persons with more robotic experience scored significantly higher than those with less.   |
| FRS (Smith et al.) <sup>10</sup>                                  | Camera control, clutching, foreign body management, multi-arm control, hand-eye instrument coordination, wrist articulation, atraumatic tissue handling, dissection, cutting, needle driving, suture handling, knot tying, safety of intraoperative field                        | Ring tower transfer; knot tying, railroad track running suture, 4 <sup>th</sup> arm cutting, cloverleaf pattern cut, vessel energy dissection   | Use of a single, multi-function device<br>Validation study yet to be published  |
| Proficiency based robotic curriculum (Dulan et al.) <sup>11</sup> | Energy source control, camera, clutching, 4 <sup>th</sup> arm control, basic hand-eye coordination, wrist articulation, depth perception, instrument to instrument transfer, atraumatic handling, blunt and fine dissection, retraction, cutting, interrupted and running suture | Peg transfer; Camera movement to view rectangles, rubber band transfer; simple suture, 4 <sup>th</sup> arm cutting, pattern cut, running suture | Participants shown a video and allowed to practice each task once<br>Score = cut off time – completion time – (weighting factor x sum of errors)<br>Manual controls placed back into a neutral position<br>Baseline novice and expert performances were significantly different |
| Nine inanimate exercises (Jarc et al.) <sup>12</sup>              | –  | Ring rollercoasters (4), suture sponges (3), interrupted suture, figure of eight suture   | Standardised docking model created<br>Verbal overview of each task given<br>Scoring based on Dulan et al. <sup>11</sup><br>Experienced surgeons performed significantly better than new surgeons  |

Table 1 Literature review summary

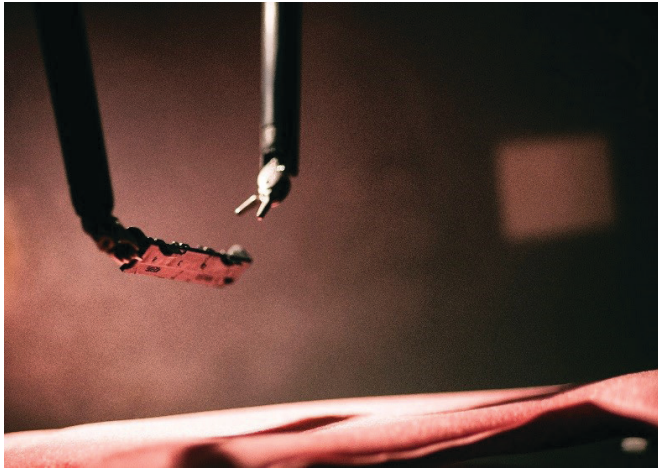


Figure 2 EndoWrist® instruments which translate and scale hand/wrist movements into movements of the instrument tips.

### Physical tasks for assessment of skills and their development

As described previously, most core skills of surgery are common between the different technical modalities, therefore many papers<sup>8-11</sup> adapted tasks already well validated as part of the Fundamentals of Laparoscopic Surgery program (FLS) developed by the Society of American Gastrointestinal Endoscopic Surgeons.<sup>6</sup> Smith et al.<sup>10</sup> describe the principles of designing tasks well; they must be 3D in nature; test multiple skills; train the full capability of the robot; not be cost-prohibitive; easy to administer; and implement physical objects.

Tasks or specific elements of tasks from the literature review were assessed to inspire use in our study. These included: Peg transfer,<sup>10,11</sup> transferring pegs between hands to encourage usage of both hands,<sup>11</sup> ring rollercoaster in different planes to encourage proper wrist articulation,<sup>12</sup> use of rubber band transfer to approximate tissue tension and assess atraumatic handling,<sup>9,11</sup> circular pattern cut,<sup>5,7,10,11</sup> use of a sponge to simulate tissue turgor when suturing,<sup>7,9,12</sup> around the world and big dipper exercises to assess driving in various directions and backhand needle driving,<sup>7,9,12</sup> and running suture and knot tying to approximate a wound.<sup>7,9-12</sup> Other tasks described in studies were assessed but not used either due to not meeting enough criteria to warrant testing, not assessing the most relevant skills, assessing skills that are better tested in other tasks, taking too much time to carry out, or lack of resources.

### Validation and Testing

Siddiqui et al.<sup>9</sup> described scoring the performance on tasks subjectively based on depth perception/accuracy, force/tissue handling, dexterity and efficiency, with each category given a score from 1-5. Dulan et al.<sup>11</sup> described a more objective scoring method where a score was given according to the formula: score = cut off time – completion time – (weighting factor x sum of errors). The weighting factor depends on how severe the errors are (10 for most). The cut off time was based on the average time that an expert robotic surgeon takes for each task.<sup>11</sup> Jarc et al.<sup>12</sup> alternatively described setting the cut off time as the mean novice time + 3 standard deviations (SD). This scoring option objectively quantifies performance by balancing both efficiency and accuracy.<sup>12</sup>

Errors in robotic surgery depend on the task, but some errors such as instrument collisions, crossing over instruments and excessive force are applicable to all tasks.<sup>7,10-12</sup> The use of video technology used to both introduce the participant to the tasks and their objectives and also record each participant's attempt for later blinded assessment seemed an effective way to assess participants.<sup>7,8,10,11</sup> A challenge for physical simulation exercises compared to virtual reality is to keep the starting conditions the same for each participant, so that the only difference

in performance is based on skill. The use of a custom docking model, prepared and setup by the same person, enables consistency and repeatable completion of tasks, allowing better comparisons.<sup>10,12</sup>

## Physical Simulation Designs and Testing

### Materials and Methods

Based on the review, evidence-based intra-operative robotic surgery core skills for development included: camera control, clutching, EndoWrist® dexterity, atraumatic handling, coordinated two handed control, cutting, needle driving, suture handling and knot tying. These skills best covered the range of robotic-specific and overall surgery specific-skills required for competency in robotic surgery operations based on expert analyses from the results of the literature review.

The following tasks were created based on the literature review to optimally train and assess the core skills: Peg Transfer, Ring Rollercoaster, Rubber Band Transfer, Pattern Cut, Suture Sponge, and Running Suture (Figure 4, Table 3). Tasks were selected based on the principles described by Smith et al., simplicity of design, meeting our own technical requirements, and the level of their validation.

To provide the best simulation of a real surgery, and for docking of the robotic arms into ports for proper function, a hollow mannequin torso was adapted to create a simulation patient with space to place the tasks inside. Multiple holes were created on the abdomen, providing flexibility in port position, and covered with neoprene, to best simulate the turgor of skin (Figure 3). Velcro was used for stability quick task changes. All work was carried out at the workshop at Auckland Bioengineering Institute using simple raw materials such as wood, wire, pins, rubber bands, latex gloves, sponge, silicon sheet, and suture needles. The only consumable materials were the latex gloves and sutures. The sponge and silicon sheet experience wear and tear with frequent use.



Figure 3 Mannequin torso with neoprene covering

Initial steps in developing training tools entails proving feasibility and validity. Feasibility is the measure of whether an assessment process is capable of being carried out. Validation determines whether the assessment succeeds in testing the competencies that it is designed to test. Validity is made up of face validity (degree to which the tool is testing what it is meant to be testing), content validity (utility as a training tool), construct validity (ability of training too to distinguish between expert and novice) and concurrent validity (correlation with gold-standard). The tasks, individually, have been well validated, as described in the literature review. As a pilot run, this project was able to test feasibility and face validity of the training suite overall.

A video was created outlining the objectives of each task, the errors and an example of how each task was expected to be performed (Figure 2, Table 3). Five fifth and sixth year medical student volunteers were invited to try out the tasks. Each were asked about their experience with surgical simulators and time practicing surgical skills such as suturing

before commencing. The robot was introduced verbally. The participant was shown the video and given 5 minutes on each task to practice. Video recording software was started. Docking and instrument exchanges were carried out by the examiner and the master controllers re-centred to a neutral position before each exercise to maintain consistency. The participants were timed for each task, and errors counted. Continuous observations about the feasibility of each task were made by the examiner. Following completion, participants were asked about their thoughts on the feasibility, difficulty and face validity of the tasks.

## Results

Participants had minimal to no experience with surgical simulators, and specific time spent practicing suturing was an average of 1-5 hours. Participants were able to complete all the tasks in a reasonable time. The time taken for each task varied considerably (Table 2). Cut off times arbitrarily set from novice practice were too short in some tasks to be of use in scoring the participants. New cut off times can now be created by using the formula (mean novice time + 3 SD) described by Jarc et al.<sup>12</sup> Specific areas of difficulty which commonly led to errors included; controlling the force applied to objects, especially in the peg transfer task and suturing tasks; depth perception; frequent clutching to maintain neutral hand position and instruments within field of view (assessed well in Ring Rollercoaster); adequate suturing and knot tying technique, probably due to minimal suturing experience. From participant feedback and observation, Suture Sponge was more difficult and took a longer time than anticipated. On the other hand, Rubber Band Transfer may have been too simple, and we could look at ways to incorporate handling of rubber bands into the other tasks. The mannequin torso and the running suture tasks were noted to have greatly added to the face validity and all tasks were noted to be testing their relevant core skills effectively.

| Task                 | Time (mean ± SD) | Errors (mean ± SD) |
|----------------------|------------------|--------------------|
| Peg Transfer         | 447.2 ± 135.5s   | 5.8 ± 5.6          |
| Ring Rollercoaster   | 309.4 ± 65.1s    | 4.0 ± 2.9          |
| Rubber Band Transfer | 332.8 ± 61.9s    | 2.4 ± 2.1          |
| Pattern Cut          | 326.8 ± 43.7s    | 7.4 ± 2.6          |
| Suture Sponge        | 830.0 ± 47.8s    | 8.6 ± 2.1          |
| Running Suture       | 630.4 ± 131.9s   | 5.4 ± 1.8          |

Table 2 Mean completion times and number of errors made by participants for each task

## Discussion

Robotic surgery is appealing, and its future is promising with new devices expected in the coming years from Medtronic, Samsung, Cambridge Medical Robotics and a collaboration between Johnson & Johnson/Google. With the availability of the surgical robot at the University of Auckland and the new training suite, it is bound to create interest in the surgical field from medical students and existing surgeons, thus creating a platform upon which the robotic surgical field can grow in New Zealand also. Many non-surgical doctors would also benefit from knowing about and experiencing robotic surgery as it becomes a popular option for their patients in the future.

Simulation to assess proficiency is especially important in robotic surgery as the mentoring surgeon cannot take over when patient safety is compromised as in conventional or laparoscopic surgery.<sup>2</sup> Although physical simulation is becoming less popular with the advent of virtual reality, they represent a relatively inexpensive and reproducible means of training, which is platform independent and will remain relevant as robotic systems evolve.<sup>7</sup> Physical simulators are also a more flexible research tool than virtual reality systems, which require complex programming and hardware.<sup>7</sup> However, virtual reality systems can provide better metrics for accurate measurement of proficiency.<sup>4</sup>

This training suite provides a valuable platform for surgical robotics training, teaching and research in New Zealand. Only six tasks were created, as surgeons are known to have very little free time available, and the effort in learning the skills for robotic surgery can be tiring. The learning curve may have been underestimated for first time users of the robot, especially medical students that also have relative inexperience with suturing in general. Our focus was solely on intra-operative skills to guide development of tasks. Non-technical (extra-operative) skills such as learning how the robot works, setting up and troubleshooting the robot may have been helpful in reducing the initial steep learning curve, and can be considered in further studies.

In terms of limitations, adapting tasks from the literature review to low-cost alternatives, whilst still maintaining their purpose in testing the surgical skills effectively was a major challenge. For example, we had to find silicon as an adequate substitute for Penrose tubes in suturing tasks. Our robot also did not have a functional fourth arm and also did not have energy sources connected, which eliminated tasks using the fourth arm and diathermy, which are both important for operations. Virtual reality simulators may thus be a feasible option to overcome technical hurdles. Due to the lack of availability of expert robotic surgeons to validate the tasks and time constraints, this study was not yet able to adequately provide content or construct validity, however feasibility and face validity were obtained by the few medical student volunteers. From the results, tweaking of exercises to make them quicker to complete and easier will likely be beneficial. Having experts carry out the exercises will likely reduce the common errors made by medical students in suturing and atraumatic handling. Experts will also greatly add to understanding of how difficult the tasks are, provide appropriate completion times and provide evidence for content and construct validity.

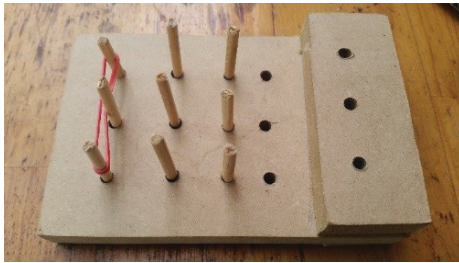
## Conclusion

This study aimed to review the literature on existing physical simulation tasks for robotic surgery, and create a suite of inanimate, cost-effective training tasks for use with a recently decommissioned da Vinci Surgical System (ISI200), donated to the University of Auckland. After reviewing the literature, the relevant core skills and tasks to most effectively test these skills were identified. All tasks were then successfully adapted and created at the Auckland Bioengineering institute. Medical student volunteers tested these tasks. The next step will be to perform a validation study with experts for the physical simulator tasks.

| Task 1. Peg transfer   | Task 2. Ring rollercoaster   | Task 3. Rubber band transfer   |
|--|--|--|
| <p><b>Specific skills tested:</b> depth perception, atraumatic grasping, hand-hand transfer; force control</p> <p><b>Specific errors:</b> damaging pegs, dropping pegs out of view</p> <p><b>Cut off time:</b> 600 seconds</p> <p><b>Materials needed:</b> wooden pegs, wooden board with holes big enough for pegs to fall, rubber band</p> <p><b>Instruments:</b> 2 Maryland graspers (or any grasper big enough to hold pegs)</p> | <p><b>Specific skills tested:</b> clutching, vertical and horizontal plane changes, hand-hand transfer; instrument positional awareness, awareness of tension</p> <p><b>Specific errors:</b> lifting track off base, ring drops</p> <p><b>Cut off time:</b> 480 seconds</p> <p><b>Materials needed:</b> pliable metal wire, wooden base, rubber rings.</p> <p><b>Instruments:</b> 2 large needle drivers</p> | <p><b>Specific skills tested:</b> clutching, awareness of force</p> <p><b>Specific errors:</b> tearing rubber band, letting go of rubber band outside of designated area</p> <p><b>Cut off time:</b> 300 seconds</p> <p><b>Materials needed:</b> rubber bands, pegs, wooden base.</p> <p><b>Instruments:</b> 2 large needle drivers</p>  |
| Task 4. Pattern cut  | Task 5. Suture sponge  | Task 6. Running suture   |
| <p><b>Skills tested:</b> tension control, cutting, precision and dexterity, atraumatic handling</p> <p><b>Specific errors:</b> cutting outside the line, cutting second layer</p> <p><b>Cut off time:</b> 480 seconds</p> <p><b>Materials needed:</b> latex gloves, permanent marker, pegs, peg board.</p> <p><b>Instruments:</b> curved scissors (in dominant hand), Maryland grasper</p>   | <p><b>Specific skills tested:</b> accurate needle driving including backhand, awareness of force</p> <p><b>Errors:</b> tearing sponge, missing first target, dropping needle out of view</p> <p><b>Cut off time:</b> 900 seconds</p> <p><b>Materials needed:</b> high density foam, rubber bands, base.</p> <p><b>Instruments on each arm:</b> 2 large needle drivers</p>                                    | <p><b>Skills tested:</b> suture handling, needle driving, two-handed coordination in pulling suture through, knot tying</p> <p><b>Errors:</b> missed targets, fraying/ breaking suture, improper knot, wound not approximated</p> <p><b>Cut off time:</b> 600 seconds</p> <p><b>Materials needed:</b> silicon sheet, pegs, peg board</p> <p><b>Instruments on each arm:</b> 2 large needle drivers</p> |

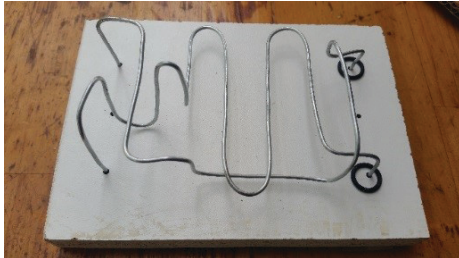
Table 3 Description of the tasks tested by study participants using the surgical robot





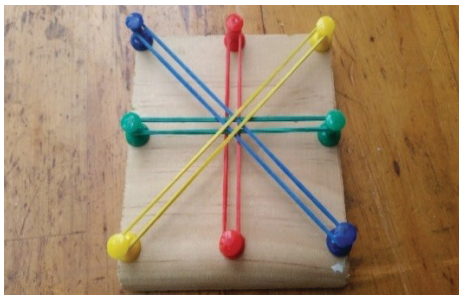
### Task 1: Peg transfer

1. Move all 6 pegs to the empty set of holes by lifting with the left hand, transferring, and placing with the right hand
2. Retract the rubber band with the right hand, lift peg with left hand, transfer and place with the right hand, while retracting rubber band with the left hand
3. Opposite of step 1; move all 6 pegs back to their original places by lifting with right hand, transferring and placing with left hand



### Task 2: Ring Rollercoaster

Move each ring individually along the track to the other side, without letting go of it



### Task 3: Rubber band transfer

1. Take each rubber band off, and place it to the right. Do not let go of the rubber band until it is completely off both pegs
2. Place the rubber bands back as they were, with the double twists on both sides of the red and green pegs



### Task 4: Pattern cut

Cut only the top layer of the latex along the line drawn



### Task 5: Suture Sponge

1. Drive the needle through the outside targets to the inside target from all four directions
2. Drive the needle from the far-left target, along the front and up to the far-right target
3. Go back along the path in step to end on the far-left target.



### Task 6: Running suture

1. Drive needle across the gap through the first two targets and tight one surgeon's knot and 2 square knots
2. Drive the needle in a running pattern through subsequent pairs of targets
3. Anchor the suture by driving through the last pair of targets

Figure 4 Illustration of tasks with instructions for study participants using the surgical robot.

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## Correspondence

Nikhil Shah: [nikhilshah@hotmail.com](mailto:nikhilshah@hotmail.com)



# Retrospective audit of deaths in Canterbury District Health Board

## Claire Whitehead

Christchurch School of Medicine  
Otago Medical School  
University of Otago

## Dr Rachel Wiseman

MBBCh, FRACP, FACHPM

## Dr Kate Grundy

MBChB (UK), FRACP, FACHPM

➤ Claire is a fourth-year medical student. She has a keen interest in research, completing several summer studentships, and Masters' research in the areas of forensics and health. Claire's research in the field of forensic psychology has contributed to criminal profiling in New Zealand.

## Abstract

### Aims

To gather demographic data on deceased persons and assess their case notes for evidence of best practice in care of the dying, as established from available literature.

### Methods

An audit tool was developed to assess deaths as part of a short-term research project for the purpose of collecting this data. The case notes of patients who had died in Christchurch Hospital, the Nurse Maude Hospice and two aged residential care (ARC) facilities in Christchurch were retrospectively reviewed between November and December 2015. Deaths were categorised as hospital or community (hospice and ARC) and 'expected' or 'unexpected'. The latter categorisation was made using a descriptive table that identifies illness characteristics that preceded the death.

### Results

Hospital deaths were predominantly in older patients on general-medical wards. A significant difference was found between 'expected' and 'unexpected' deaths in hospital in terms of the number of quality indicators of dying that were identified. No significant difference was found between 'expected' deaths in hospital and community settings. Specific indicators that were less commonly documented in the clinical notes were 'discussion of the preferred place of death', 'spiritual needs', and 'after-death care'.

### Conclusion

Based on the clinical documentation, it is possible for patients to have a 'good' death, regardless of location or background illness if physical, emotional, cultural, spiritual, and family/whānau needs are met. The audit, however, reveals aspects of care that are not well documented for dying patients, providing the opportunity for further education and standardisation of care.

## Introduction

Ensuring that patients have the opportunity to die comfortably and well supported is an important priority throughout the health care system. Quality of death is not only about the person's final moments, but the ideals and preferences around the dying process in the last days, weeks, or months of life.<sup>1,2</sup> This means taking into account the physical, emotional, cultural, and spiritual aspects of death<sup>3-6</sup> for both the patient and their family/whānau.<sup>7,8</sup>

In 1997, the Institute of Medicine defined a 'good death' as 'free from avoidable distress and suffering for patient, family, and caregivers, in general accord with the patient's and family's wishes, and reasonably consistent with clinical, cultural, and ethical standards'.<sup>9</sup> This definition is now over 20 years old and contains terms that are subjective and difficult to measure, therefore it is not surprising that there are no international standards for delivery of care to optimise a good death for patients.<sup>8,10,11</sup> The need for a set of robust measures of quality of death, however, is evident.<sup>10,12,13</sup> One reason for the lack of international standards and definitions may relate to the nature of death itself. Studies cannot easily evaluate the person themselves as they are dying, and the person cannot of course be asked how they experienced their own death. The quality of death has to be analysed from surrogate sources and will inevitably be retrospective. Options include proxy interviews or questionnaires to ascertain the views of the patient's family/whānau, interviews or questionnaires of health care staff who provided care leading up to the time of death, and the analysis of case notes, looking for specific markers or determinants following the death. It is well known that opinions vary within the different proxy groups<sup>14</sup> and while proxy interviews provide an insight into the family/whānau perspective, they may not always be accurate for the patient's wishes and needs.<sup>15,15,16</sup> It is clear that all three options have their limitations.

Death is personal to the individual,<sup>1,5</sup> therefore, defining exact outcomes and definitions of the physical, emotional, spiritual and cultural aspects is problematic.<sup>10</sup> There are a number of factors that appear to be of particular importance. These include good symptom control, an

established doctor-patient relationship, adequate time to prepare for the end of life, and a sense of life completion.<sup>9,11,17-22</sup> Most of the literature on death and dying has focused on cancer patients.<sup>23</sup> However, it is important that an understanding of the factors governing a good death are also developed for deaths from other causes. At present, whether the needs of cancer patients who are dying differs to those of non-cancer patients is unknown.<sup>24,25</sup>

Established mechanisms for reviewing deaths within health care services centre on mortality and morbidity (M and M) review meetings. These tend to be focused on adverse events rather than a wider review of the holistic care provided.<sup>18,26</sup> In the Oncology Department, Christchurch Hospital, Canterbury District Health Board (CDHB), it was recognised that M and M meetings were a good forum to review individual deaths, but no mechanism existed to systematically review all deaths.

The purpose of this study was to develop a robust process for retrospective evaluation of the case notes of deceased patients based on best practice, as established from available literature. Aspects of identified best practice were broken down to individual components termed 'quality indicators'. The primary outcome was to create a percentage score that reflected the number of quality indicators present for each death. Secondary outcomes were to compare scores by variables such as hospital department, location and type of death, as well as to identify individual quality indicators that occurred frequently or infrequently.

### Methods

A retrospective audit of case notes for all deceased patients, from November 2015 to December 2015, from all wards of Christchurch Hospital and Ashburton Hospital was performed. There was a single auditor with a basic level of clinical knowledge. Christchurch Hospital is a 600-bed tertiary referral centre, serving a population of approximately 500,000. Ashburton hospital is a rural hospital also located within the CDHB.

An audit tool was created based on items identified from the literature that have been shown to be a marker of a good death.<sup>2,24,27-29</sup> The tool included patient demographics, hospital information, and indicators for physical, spiritual, cultural and emotional aspects of death (examples in Table 1). A positive score was allocated if the notes documented that the item had been considered by the scribe in some way, rather than the presence or absence of a particular symptom. Each item had an equal weighting of one point. A final score was calculated based on the number of quality indicators per death, with the highest possible score being 34. The total score was also calculated as a percentage of the maximum possible score, with higher scores indicating that more of the quality indicators were present.

Each death was also categorised according to a pre-agreed definition (Figure 1), this did not affect the final score. These categories were grouped into 'expected' (categories a, b, and c) and 'unexpected' (categories d, e, f, and g) deaths. This categorisation was largely a reflection of whether or not the patient was assessed as having a progressive, life-limiting condition or frailty prior to death.

All hospital deaths were notified to investigators by mortuary staff during the study period, which was chosen due to availability of the auditors. Hospice deaths were notified by the hospice nurse manager and the deaths in the two ARC facilities were notified by the respective clinical managers. The audit tool was applied to the written and electronic clinical case notes of deceased patients in the hospital, and only the written case notes in the hospice and ARC facilities' audits on the hospital deaths were completed within 72 hours of death. In order to test the applicability of the tool to deaths in a community setting, the tool was modified to remove items only applicable to hospital-based care (e.g. admission to intensive care unit). Two ARC facilities in Christchurch and one hospice were also audited (Nurse Maude Hospice, Christchurch).

The ARC facilities were chosen for their large size and ease of access to deceased patient notes. As deaths are less frequent in these settings, notes from as early as July 2015 were included in order to obtain the most recent ten deaths from each.

| Category         | Examples of quality  |
|------------------|--|
| Demographics     | Age at death, date of hospital admission, date of death, sex, ethnicity, inadequate understanding of the English language, presence of hearing impairment or aphasia, lead doctor, place of death.<br><br>Time taken to complete audit.  |
| Physical         | Presence or absence of pain, restlessness, delirium or agitation, respiratory distress, urinary or bowel symptoms, pressure area cares and mouth cares.<br><br>Anticipatory prescribing for pain, dyspnoea, respiratory tract secretions, nausea and agitation, intravenous fluids and unnecessary medications ceased.<br><br>Presence or absence of intensive care unit review, clinical emergency call, or Early Warning Score documented. |
| Spiritual        | Documentation that spiritual needs identified.   |
| Cultural         | Documentation of holistic care that honours dignity and culture of the patient, own room, any communication or language barriers present.  |
| Emotional        | Documentation of discussion around fear of dying, preferred place of death and if this was adhered to.   |
| After-death care | Documentation of after-death care of the patient, and bereavement care of family/whānau.   |
| Communication    | Documentation of medical assessment, diagnosis of dying, advance care plan, referral to palliative care team, Do Not Attempt CPR order completion, ceiling of care documentation, communication with family/whānau prior to or after death.  |

Table 1 Items included in the audit tool

To compare demographic data and overall percentage scores between the different health care settings, an unpaired two samples Wilcoxon test in R (Mann-Whitney-Wilcoxon) was used. The individual items were ranked in each setting to see which items showed high or low levels of documentation. Statistical analysis was performed using Microsoft Excel and R.

The Health and Disability Ethics Committee's approval was not required due to the retrospective nature of this audit.

### Results

A total of 143 patient deaths were audited: 112 in hospital; and 31 in the community (ARC n=22, hospice n=9). A total of 25 unexpected deaths occurred in hospital. No unexpected deaths were recorded in community setting. The demographic data of the patients in each setting are presented in Table 2. As ethnicity was so variably reported, only New Zealand European/Pākehā and New Zealand Māori are included. No patients in the sample were in the 45–54 years age group and only seven patients (6%) under the age of 55 years died in hospital. In the community setting there were no deaths under the age of 55.

Table 3 shows the wards/services where hospital deaths occurred, and

|   |
|---|
| a) Anticipated death due to active, progressive, advanced disease <sup>x</sup>  |
| b) Patient has active, progressive, advanced disease <sup>x</sup> or frailty but death occurred despite medical treatment aimed at recovery from acute episode OR death occurred following precipitous deterioration either in hospital or en route |
| c) Patient has active, progressive, advanced disease <sup>x</sup> or frailty and condition most likely preventable, but medical treatment NOT initiated due to associated factors such as dementia, valid advanced directive etc.                   |
| d) Unexpected hospital death from acute illness (e.g. myocardial infarction, sepsis, stroke) with NO prior active, progressive, advanced disease <sup>x</sup>   |
| e) Unexpected community/ED death (e.g. out of hospital cardiac or respiratory arrest – previously medically stable)   |
| f) Death due to trauma/MVA  |
| g) Unexpected death from medical intervention, omission or error <sup>#</sup>   |
| h) Uncharacterised due to lack of information   |
| <sup>x</sup> Otherwise referred to as terminal illness, amenable to palliative care   |
| <sup>#</sup> These cases are likely to be referred to the Coroner, who may or may not take jurisdiction   |

Figure 1 Categories of death  
ED = Emergency Department. MVA = Motor Vehicle Accident

the mean, median and range of percentage scores for these services. Most deaths occurred on medical wards (n=58 or 41%), followed by the intensive care unit (ICU) (n=12 or 8%). Orthopaedic wards were also well represented in this audit (n=8 or 5%). Deaths in the Older Persons Health Department and Emergency Department (ED) were less frequent (n=4 or 3% and n=7 or 5% respectively). In the hospital setting, the percentage scores were higher in expected deaths than in unexpected deaths (percentage scores 55%, range=21-76% compared to 43%, range 15-71%, p<0.01). There was no significant difference in total scores between the hospital and community expected deaths (55%, range=21-76% compared to 57%, range=24-76%, p=0.52).

The highest and lowest scoring items in both the community and hospital settings were analysed. (Table 4 and Table 5). In the hospital expected deaths, the higher scoring items are associated with physical aspects of death, e.g. clinical emergency not being called. The low scoring items are associated with more spiritual or cultural aspects, e.g. patient's fear of dying.

|                                  |       | Hospital | Community |
|----------------------------------|-------|----------|-----------|
| Number                           |       | 112      | 31        |
| Age, (years) <sup>1</sup>        | <45   | 7        | 0         |
|                                  | 45-54 | 0        | 0         |
|                                  | 55-64 | 15       | 5         |
|                                  | 65-74 | 23       | 7         |
|                                  | 75-84 | 30       | 12        |
|                                  | >85   | 37       | 6         |
| Mean age, (years)                |       | 74       | 77        |
| Male, n (%)                      |       | 55 (49)  | 15 (48)   |
| New Zealand European/Pākehā, n   |       | 94       | 28        |
| New Zealand Māori, n             |       | 6        | 1         |
| Other ethnicity <sup>2</sup> , n |       | 40       | 11        |

Table 2 Demographics of audited cases

1. One age is unknown

2. Other ethnicities included pacific island nations and other European countries. Where more than one ethnicity is recorded by an individual it has been counted under each category.

| Location                     | Number (%) | Mean Score % (range %) |
|------------------------------|------------|------------------------|
| Medical (including Oncology) | 58 (41)    | 59 (32-76)             |
| ICU/CICU                     | 12 (8)     | 44 (24-68)             |
| Orthopaedics                 | 8 (5)      | 44 (26-68)             |
| ED                           | 7 (5)      | 26 (15-46)             |
| Surgical                     | 6 (4)      | 47 (21-65)             |
| Nephrology/Cardiology        | 5 (3)      | 50 (26-65)             |
| Older Persons Health         | 4 (3)      | 50 (35-65)             |
| Children                     | 2 (1)      | 32 (24-41)             |
| Ashburton Rural Hospital     | 10 (7)     | 56 (24-71)             |
| Community                    | 31 (22)    | 55 (28-79)             |

Table 3 Location and distribution of quality of death scores

ICU = Intensive Care Unit. CICU = Cardiac Intensive Care Unit.

ED = Emergency Department

|                    | Expected  | Unexpected  |
|--------------------|---|---|
| Top 5 items (%)    | Presence or absence of discomfort or pain (97)  | Medical assessment completed within 24 hours prior to death (84)                              |
|                    | Presence or absence of restlessness or agitation or delirium (89)                                   | No evidence of a clinical emergency call (84)   |
|                    | No evidence of a clinical emergency call (89)   | No evidence of ICU outreach being contacted (80)  |
|                    | Presence or absence of respiratory distress (87)  | Presence or absence of respiratory distress (76)  |
|                    | Completion of DNACPR form (86)  | Meeting with family/whānau/support person/people (76)   |
|                    |   |   |
| Bottom 5 items (%) | Presence or absence of the patient's fears and concerns around dying addressed (17)                 | Acknowledgement of an Advanced care plan/Advanced Directive/Living Will in the notes (12)     |
|                    | Documentation bereavement care given to the family/whānau/support people after patient has died (9) | Presence of Advanced care plan/Advanced Directive/Living Will in paper or electronic form (8) |
|                    | Documentation of the patient's preferred place of death (8)   | Documentation of the patient's preferred place of death (4)                                   |
|                    | Identification of the presence or absence of patient's spiritual needs (7)                          | Presence or absence of the patient's fears and concerns around dying addressed (4)            |
|                    | Documentation that the patient's preferred place of death was adhered to (1)                        | Documentation that the patient's preferred place of death was adhered to (0)                  |

Table 4 Hospital expected and unexpected death percentages of highest and lowest documented outcomes\*.

\* Percentages indicate proportion of cases where this item was scored as present

DNACPR = Do Not Attempt Cardiopulmonary Resuscitation

|                    | Expected* Community  |
|--------------------|--|
| Top 5 items (%)    | After-death care of the patient e.g. washing of the body (97)                |
|                    | Presence or absence of restlessness or agitation or delirium (94)            |
|                    | Anticipatory medications prescribed for pain and dyspnoea (90)               |
|                    | Anticipatory medications prescribed for agitation (87)                       |
|                    | Presence or absence of discomfort or pain (84)                               |
|                    |  |
| Bottom 5 items (%) | Documentation of patient's concerns and fears around dying (23)              |
|                    | Presence of holistic care that honours dignity and culture (13)              |
|                    | Documentation of ceiling of care (10)  |
|                    | Documentation of the patient's preferred place of death (6)                  |
|                    | Documentation that the patient's preferred place of death was adhered to (3) |

Table 5 Community death percentages of highest and lowest documented outcomes

• No unexpected deaths occurred in the community



## Discussion

The aim of this study was to develop an effective process to retrospectively review deceased patients' case notes with the objective of reviewing the quality of their death. The tool functioned effectively and was able to provide a consistent means of measuring health professionals' documentation of physical, emotional, spiritual, cultural and family/whānau issues, which act as a surrogate marker of the quality of death. This study provides important demographic data about deaths in the CDHB. A significant proportion of deaths occurred in high acuity areas such as orthopaedic surgery or intensive care. There was marked variation between patients in the level of documentation prior to and after death. These findings indicate that comprehensive documentation about death is not yet being achieved and supports the systematic use of the audit tool in assessing quality of death.

Audit results were made available to each service/department to identify examples of excellent practice, as well as any deficiencies and gaps. The aim of this was to drive improvements via education, support and policy development. The experience of how people die lives on in their loved ones and in the staff who cared for them. This is why it is so important that care for dying patients is scrutinised closely – so that lessons can be learned and improvements made.

From using the tool, it was apparent that quality indicators relating to physical symptoms consistently score higher than those relating to emotional, cultural and spiritual items. This may be because physical symptoms are easier to identify and remedy than symptoms relating to spirituality and culture. The finding that physical symptoms are reported more is consistent with the literature.<sup>12,27</sup>

A holistic approach to care at the end of life is important, as cultural and spiritual aspects can have a dramatic impact on end-of-life care.<sup>11</sup> For example, patients of Christianity, Judaism and other major religions differ markedly in their philosophy around end-of-life care.<sup>30</sup> Chinese culture suggests that mortality is discussed with a patient's family, and not the patient themselves, as this can cause the patient undue stress.<sup>31</sup> Culture is not just related to ethnicity, as patients and health care workers also have their own culture. In a study looking at which aspects are important in end-of-life care, patients rated control of physical symptoms highly with mental awareness a close second, whereas the doctors saw the treatment of physical symptoms far superior to mental awareness.<sup>32</sup> Another study found that patients were more likely than family members to rate religious or spiritual beliefs as an important contributor to a good death.<sup>11</sup> This can dictate who makes decisions for the patient, whether treatment efficacy can be discussed, and specific traditions around the dying process.<sup>30</sup> These different cultural and spiritual experiences may help to explain why specific quality indicators surrounding dying are not consistently addressed.<sup>18</sup> A higher level of cultural and spiritual understanding (and possibly education) is required for health care staff in order to provide the best care possible.

In the hospital setting, 41% of deaths occurred on medical wards and only 3% of deaths occurred within the Older Persons Health department. This finding of a low percentage of patients dying in geriatric wards may reflect that most were receiving rehabilitation and that patients who are relatively stable medically are being admitted for rehabilitation in the CDHB.

In the hospital setting, expected deaths were associated with a higher quality of death compared to unexpected deaths. This is unsurprising, since in an expected death patients have more time to prepare for death and so can say goodbye to loved ones, have their symptoms well controlled and live their remaining days in comfort.<sup>7,20</sup> Compared to a patient who, for example, comes into the ED after a trauma where it is uncertain if they will live, the focus is on survival as opposed to having religious, emotional, physical, and cultural needs met. This does not mean that a good death is unachievable in these situations as some individual

scores were high, meaning that despite the suddenness of the death, it is still possible to focus on symptom management, communication, and family support.

There was no significant difference in expected deaths between hospital and community settings, suggesting that quality of death was similar in the two groups. This result suggests that care provided in hospital is not dissimilar to care received in the community at the end of life. However, this result needs to be interpreted with caution, as ARC and hospice were analysed together due to low numbers. Hospice patients had consistently higher scores than ARC, whose scores were more varied. Future studies are needed to examine the differences between the three groups: hospice, ARC and hospital.

Low scoring items indicate areas that may need improvement. These were advance care planning (ACP) and areas around the spiritual and emotional aspects of death. ACP is a relatively new initiative (within the last ten years).<sup>33,34</sup> ACP has been a focus in the CDHB for the last three years. ACP allows patients to express their wishes around death and dying weeks, months or years beforehand.<sup>33,34</sup> These plans often address some of the low-scoring emotional and spiritual aspects measured in this audit tool and increased use of these plans may improve performance in this important area and improve several indicators of a good death. Bereavement care of family/whānau is also a low scoring item. At present, there is no mechanism in Christchurch Hospital to document care provided after the patient has died, either electronically or on paper. The introduction of such a mechanism could be of value to document care provided to the patient's family/whānau after death.

One explanation for low scores in quality of death indicators is physician mindset. The focus of health care professionals is geared towards keeping patients alive, and hence diagnosing dying can make health care professionals feel inadequate<sup>23</sup> or that they have failed.<sup>2</sup> However, the act of diagnosing dying can allow initiation and assessment of some of the emotional, cultural, and physical cares of the patient and family/whānau,<sup>7,15,35</sup> and opens a forum for communication between patients, families and health care professionals. Diagnosing dying provides the best opportunity for a good death.<sup>23</sup>

## Limitations

The results of this study should be considered in the context of several limitations. Firstly, aspects of the audit tool itself have limitations. As part of developing the audit tool, the tool was refined during data collection. As a result, some of the information from the beginning of the process might be recorded differently to data that was collected in later versions. Furthermore, the tool requires intra- and inter-observer variability testing to ensure it is robust and repeatable. Additionally, the tool differentiates between expected and unexpected deaths based on the patient's prior medical condition and the events leading to death. This is a subjective distinction and is particularly problematic when judged retrospectively (after the patient has died).

Secondly, the retrospective nature of the study is a limitation. Assessing the quality of dying at the time it is happening is not feasible logistically and could be deemed as an inappropriate intrusion. However, retrospective reviews can still provide useful information. In this case, this study highlighted that documentation of care surrounding dying needs improvement.

Thirdly, we interpreted the lack of documentation about quality indicators as meaning they did not occur, but this is not necessarily the case. Nonetheless, the level of documentation in itself is an important outcome measure, since it enhances the quality care by serving as a communication tool between the different health care professionals caring for that individual.

Fourthly, although theoretically the most accurate source of data in studies on dying, patient interviews are difficult to conduct and not always appropriate.<sup>16</sup> In some cases, this study took into account the direct patient perspective with verbatim statements in notes, however this was inconsistent. Moreover, it did not take into account family/whānau experiences or health care professionals' opinions on the patients' qualities of death. Collection of this information would allow a more three-dimensional assessment on the quality of an individual death.

Despite the limitations, it has been possible to demonstrate that systematic analysis of dying is possible from the clinical records and that valuable results can be obtained. It provides an excellent platform for further study.

## Conclusions

This study found that expected deaths generally had higher quality-of-death scores than the unexpected deaths, according to the clinical documentation. Physical symptoms are better documented than emotional, cultural and spiritual aspects of care. The recording of family/whānau communication and level of family/whānau support varied to a greater extent, including after the time of death. However, it is not clear if these observations reflect practices that are not being done, or simply not being documented.

The audit tool tested in this study can be used to evaluate quality indicators of death and identify areas where improvements may be made. Systematic application of this audit tool across the CDHB and potentially other organisations (such as ARC facilities, other district health boards or hospices) would facilitate the distribution of resources, including education provision and specialist palliative care support. Resources could specifically target low-scoring locations (such as wards where deaths occur infrequently, or areas where there are a high number of sudden or precipitous deaths, such as EDs), low scoring areas of care provision (such as recognising dying and spiritual care) and support further improvements in high-scoring areas. Future research should be targeted towards a more inclusive review of quality of death that correlates family/whānau/caregiver and health care professional's opinions with retrospective case note review.

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## Correspondence

Claire Whitehead; [Whic256@student.otago.ac.nz](mailto:Whic256@student.otago.ac.nz)



# The consequences of alcohol use in pregnancy

## Dr Amy Rankin

House Officer  
Middlemore Hospital  
Counties Manukau District Health Board

> Amy graduated from the University of Auckland in 2018. Prior to medical school, she completed a Bachelor of Health Science degree. She has an interest in population health and preventative medicine.

## Introduction

The foundations for our lifelong health and well-being are established during pregnancy. Fetal alcohol spectrum disorder (FASD) is the term used to describe the spectrum of adverse effects that alcohol consumption during pregnancy can have on the fetus.<sup>1,2</sup> FASD places a huge burden on the individual, their whānau and society. However, FASD is entirely preventable.<sup>1</sup> This article will discuss the teratogenic effects of alcohol, the epidemiology and impact of FASD, and current FASD related interventions, with reference to developments in New Zealand.

## Epidemiology

The true extent of FASD is unknown and likely underestimated. In New Zealand FASD is likely to be the leading cause of preventable, non-genetic intellectual disability.<sup>1</sup> In New Zealand, approximately 600–3000 babies are born with FASD each year; which equated to 1–5% of all live births in 2015.<sup>3</sup> International studies estimate up to 5% of the general population will have a diagnosis of FASD, with the prevalence being higher in disadvantaged groups including: indigenous populations, adopted children, children in state care, individuals involved in the justice system and those with mental-health issues.<sup>4</sup>

## Teratogenic impact of alcohol and diagnostic criteria

Alcohol is a teratogen and freely crosses the placenta. When alcohol is consumed, the fetus is exposed to similar concentrations of alcohol as the mother; but the fetus cannot process the alcohol as fast or efficiently, making the fetus particularly vulnerable.<sup>5</sup> Alcohol exposure has variable effects. Not all fetuses exposed to alcohol will be born with teratogenic birth defects.<sup>6</sup> The amount and pattern of alcohol consumption are significant predictors of the severity of teratogenic outcomes. The more alcohol is consumed, the more likely it is that teratogenic outcomes will eventuate. Binge drinking is associated with more damage than frequent drinking at lower doses.<sup>6</sup> The gestational period also influences the outcome. Alcohol consumption during the first trimester is most likely to result in structural defects and organ damage. Miscarriage is more likely to be induced by alcohol in the first and second trimester, while intrauterine growth is most restricted in the third trimester.<sup>6</sup> Genetic variability influences the susceptibility of the fetus. Some women metabolise alcohol faster, decreasing the risk of FASD in their offspring.<sup>6</sup> Twin studies have shown the genotype of the fetus also influences its vulnerability. Alcohol exposure needs to be considered in context as

poverty, other drug use, a lack of prenatal care, and poor maternal health can increase the likelihood of teratogenic effects.<sup>6,7</sup>

Only 10% of individuals with FASD have identifiable physical features, meaning FASD is a largely invisible disability.<sup>8</sup> Therefore, individuals with FASD often go undiagnosed or are misdiagnosed with other disorders such as attention deficit hyperactivity disorder, autism, or other mood and behavioural disorders.<sup>8</sup> The internationally recognised Canadian Guidelines in Table 1 highlights the features required for a diagnosis of FASD.<sup>9</sup>

As highlighted in Table 1, to make a diagnosis of FASD there must have been alcohol exposure prenatally. Individuals must have severe impairment in at least three areas of neurodevelopmental functioning. There are two types of FASD: FASD with less than three sentinel facial features and FASD with three sentinel facial features. It should be emphasised that FASD is a spectrum; some individuals are more affected than others and each individual has a unique set of strengths and weaknesses.<sup>9</sup>

## The consequences of FASD

In terms of economic costs, FASD-associated morbidity and premature mortality contributed to an aggregate loss of \$49–200 million NZD in 2013.<sup>2,3</sup> An estimated \$690 million NZD is spent annually on supports and services for those effected by FASD. This equates to \$15,000 NZD annually for every individual affected by FASD. These figures do not take into consideration the opportunity costs experienced by caregivers of those with FASD. Nor do they take into account the extra educational, legal, medical and interventional costs associated with FASD.<sup>8</sup>

There is also a huge psychological and social cost. Raising a child with FASD results in additional stressors for caregivers. A study of caregivers raising children with FASD reported that: 50% needed regular supervision; 58% had mental health issues; 70% were violent; 75% had attempted theft; and 96% had anger problems.<sup>6</sup> Individuals with FASD exhibit a range of behavioural issues and antisocial traits, and this places a burden on the justice system and social supports.<sup>1</sup> It is estimated that 50% of children in Oranga Tamariki care are affected by FASD and individuals with FASD are over-represented in the justice system.<sup>1,8,10</sup> In the education system, the behavioural and neurodevelopmental challenges faced by children with FASD means they required additional educational support. This

| Table 1 The Canadian Guidelines for a diagnosis of Fetal Alcohol Spectrum Disorder. <sup>9</sup>  |   |   |
|---|---|---|
| Diagnostic criteria   | Diagnostic Categories   |   |
|   | FASD with < 3 Sentinel Facial Features                                  | FASD with 3 Sentinel Facial Features                                    |
| Prenatal alcohol consumption  | Confirmed   | Confirmed   |
| Neurodevelopmental Domains:<br>1. Adaptive Behaviour; Social Skills or Social Communication<br>2. Affect Regulation<br>3. Executive Functioning, including impulse control and hyperactivity<br>4. Attention<br>5. Memory<br>6. Academic Achievement<br>7. Language<br>8. Cognition<br>9. Motor Skills<br>10. Brain Structure/Neurology | Severe impairment in at least three of these neurodevelopmental domains | Severe impairment in at least three of these neurodevelopmental domains |
| Sentinel facial features:<br>1. Smooth Philtrum<br>2. Short Palpebral Fissure<br>3. Thin Upper Lip  | Presence of all three features  | Presence of <3 of these features  |

constrains already stretched educational resources and placement in special educational facilities may be necessary.<sup>1</sup> In terms of future outlook, individuals with FASD may have decreased potential for employment and independent living.<sup>6</sup>

The recently publicised case of Teina Pora highlights consequences of FASD. Teina Pora was wrongly convicted of the murder of Susan Burdett in 1994 and subsequently spent 21 years in prison. The diagnosis of FASD was pivotal in his conviction being quashed, as due to the neurodevelopmental deficits associated with FASD, his confession was not deemed reliable. Without a reliable confession there was little evidence that could uphold his conviction.<sup>11</sup>

### Alcohol consumption during pregnancy

FASD is entirely preventable if women abstain from alcohol during pregnancy.<sup>6</sup> Despite this, a nationwide study reported that 29% of women in New Zealand consume alcohol while pregnant.<sup>12</sup> Drinking after pregnancy recognition is especially worrying, as an unborn child is knowingly put at risk. A New Zealand study published in 2018 involving 4823 women who consumed alcohol before pregnancy found that 32% of women who consumed alcohol before pregnancy (or awareness of pregnancy) continued to drink, after becoming aware of pregnancy, in the first trimester. A further 19% of women continued to drink throughout their pregnancy.<sup>3</sup> As unplanned pregnancy occurs in two in five pregnancies in New Zealand, this increases the chance of alcohol consumption before awareness of pregnancy.<sup>1</sup> Rates of drinking in the first trimester were highest for European and Māori women with no secondary qualifications and who had an unplanned and/or first pregnancy. Rates of drinking in the second or third trimester were highest for European or Māori women in their first pregnancy and aged 30 or over.<sup>3</sup> Other risk factors for alcohol consumption in pregnancy include: low socioeconomic status, poor educational attainment, paternal alcohol consumption, poor nutrition, poor access to health care and women

experiencing neglect and abuse.<sup>13</sup>

When retrospectively assessing alcohol consumption in pregnancy, just asking 'did you drink during pregnancy' is unlikely to gain meaningful information, and this question may come across as stigmatising. Instead an understanding should be sought regarding alcohol consumption and a woman's relationship with alcohol. For example, it is useful to discuss life stressors – when they found out they were pregnant, if the pregnancy was planned, their drinking habits prior to pregnancy, and their partners drinking habits – and then lead this on to alcohol consumption during pregnancy. Clear documentation regarding the amount of alcohol consumed, the pattern of drinking and at what stage during the pregnancy alcohol was consumed will allow a more in-depth assessment regarding the potential impact on the fetus.<sup>6,14</sup>

### Interventions

The Dahlgren-Whitehead model shown in figure 1 highlights that multiple factors at different levels influence alcohol consumption in pregnancy, the diagnosis of FASD and access to support services. Therefore, interventions must target both upstream and downstream factors.<sup>10,15</sup>

The 'Taking Action on Fetal Alcohol Spectrum Disorder: 2016-2019, an action plan' is a comprehensive cross-agency plan written by the Ministry of Health with the aims of: prevention, early identification, support services and increasing evidence.<sup>1</sup> There has been targeted work from this action plan and some examples will be discussed.<sup>16</sup> A major downfall of this plan is that only \$12 million NZD has been allocated to implementing this plan over the next four years. This is disappointing, considering the government levies almost \$1 billion NZD annually from the alcohol industry and Alberta, Canada (with a similar population to New Zealand) allocates \$18 million CAD annually towards FASD related interventions.<sup>11</sup>

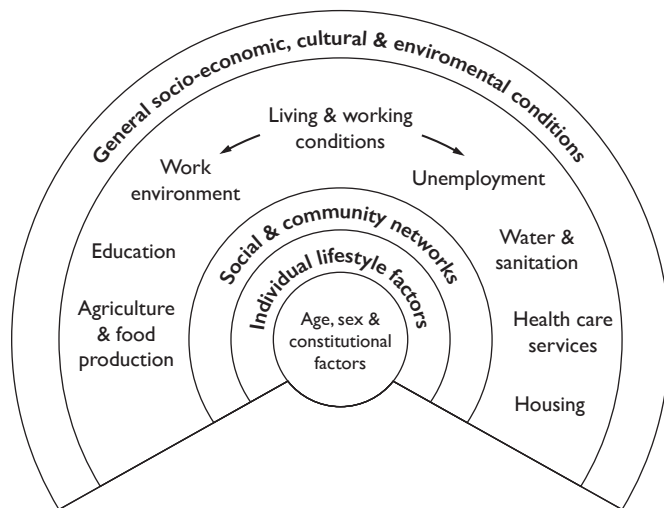


Figure 1 The Dahlgren-Whitehead Framework highlighting the multi-level determinants of health.

## Prevention

The only way to prevent FASD is to avoid alcohol consumption during pregnancy.<sup>6</sup> As mentioned earlier, rates of alcohol consumption during pregnancy are still alarmingly high. At the most upstream level, a cultural shift is needed in New Zealand's drinking culture, as drinking is shaped by the environmental, social, and cultural contexts.<sup>1</sup> Women who drink heavily and frequently prior to pregnancy are more likely to drink during pregnancy and in a more hazardous way.<sup>1</sup> Shifting New Zealand's drinking culture is going to take time and a multi-sector approach. Monthly meetings have been held by a cross-agency working group for over a year. This group has been coordinating interventions aimed at reducing harmful alcohol consumption and shifting drinking culture. Social media campaigns have been initiated, for example, the 'Say Yeah Nah' campaign, which has won awards. In September 2018 the 'Don't Know?, Don't Drink' campaign was launched, encouraging women of child bearing age to abstain from alcohol if there is any chance they could be pregnant. A specific emphasis has been placed on not drinking before awareness of pregnancy and the clear message delivered is that no amount of alcohol is safe.<sup>1</sup>

Alcohol abstinence while pregnant or planning a pregnancy is advocated by The Alcohol Health Watch, The Ministry of Health, The Health Promotion Agency, health professionals and professional groups.<sup>8</sup> Therefore, it is concerning that women often receive conflicting and inconsistent advice regarding alcohol consumption in pregnancy. In a national study, 32% of women received no advice to abstain from alcohol during pregnancy.<sup>17</sup> Consistent, clear, and unambiguous messages are needed from health professionals, public health campaigns, retailers, the alcohol industry, friends and whānau – messages that advise women to abstain from all alcohol if planning a pregnancy or pregnant.<sup>1,14</sup> Alcohol abstinence should be recommended, as there is no known safe level of exposure. Alcohol exposure at levels as low as one drink per week has been associated with adverse outcomes. Alcohol has variable effects on different fetuses due to maternal health, genetic and contextual factors. Alcohol has adverse effects throughout pregnancy, therefore, there is no safe time to consume alcohol.<sup>6,14</sup> Proposed interventions to achieve abstinence include extension of public health campaigns, education in schools and mandatory warning labels on all alcoholic beverages regarding the risk of drinking in pregnancy.<sup>1</sup> Table 2 provides guidance on how to assess alcohol consumption in pregnancy.

For the majority of women, steps 1 and 2 will provide enough impetus for the adoption of alcohol abstinence.<sup>12</sup> For women who are anxious about their drinking prior to pregnancy recognition, advice such as

Table 2 Assessing alcohol consumption in pregnancy.<sup>14</sup>

|        |   |
|--------|---|
| Step 1 | Ask about and assess levels of alcohol consumption. Try to understand the context of drinking, for example, stressors, drinking patterns, and ideas regarding alcohol consumption in pregnancy. <sup>14</sup>                                       |
| Step 2 | Advise against alcohol consumption if planning a pregnancy or if already pregnant. Justify this advice by explaining the adverse outcomes of drinking while pregnant and evidence-based guidelines supporting an abstinence approach. <sup>14</sup> |
| Step 3 | Assist women to stop drinking through brief interventions when necessary. Extra support and referrals may be needed for those finding it difficult to abstain. <sup>14</sup>  |

'stopping drinking at any stage reduces the risk' may allay fears.<sup>14</sup> However, some women will require step 3 to abstain from alcohol. Women who have a previous history of heavy drinking, an unplanned pregnancy, have children with FASD or have FASD themselves, are at increased risk of not abstaining from alcohol.<sup>1,13</sup> It is essential to increase access to responsive and flexible support for women with pre-existing alcohol and drug issues. For some women, an abstinence approach will be infeasible so a harm reduction strategy, where alcohol consumption is reduced, is more appropriate.<sup>6</sup> The Waitemata pregnancy and parenting service programme that provides alcohol and drug services for pregnant women and women with small children has been extended to include Tairāwhiti, Northland, and Hawkes Bay.<sup>16</sup>

Health care also needs to be accessible and culturally appropriate with a focus on reducing barriers to access, as engagement with health services improves outcomes. A focus on Māori and Pacific women and those with complex needs is especially important. Access to sexual health services is imperative so women can access contraception and pre-conception advice, which reduces rates of FASD.<sup>1</sup> The Sexual Health and Reproductive Action Plan aims to increase access to culturally competent and equitable sexual health services.<sup>16</sup> At a more downstream level health professionals need to be supported with educational material so clear, consistent, and up-to-date advice and brief interventions can be provided.<sup>1</sup> Table 3 highlights how interventions can be tailored to different population subgroups.

## Early identification

Over the last ten years, New Zealand has begun to diagnose FASD in a more accurate and systematic way.<sup>13</sup> Making a diagnosis of FASD is complex due to the assessment of multiple domains and the need for a multidisciplinary approach. Due to this complexity, diagnosing FASD is estimated at \$8000 NZD.<sup>11</sup> Surveys of health professionals have identified a lack of confidence in diagnosing FASD. Reasons cited for this include a lack of education and training around FASD, the often invisible nature of FASD, the stigma of FASD, and inconsistency in the use of diagnostic criteria.<sup>1</sup>

In 2011 the capacity of New Zealand health professionals to diagnose FASD was enabled after clinicians travelled to Canada and the United States for diagnostic training. The Canadian Guidelines in table 1 are the most widely used diagnostic criteria in New Zealand.<sup>13</sup> There needs to be more emphasis getting all District Health Boards in New Zealand to



| Table 3 Tailoring interventions to different population subgroups. <sup>18</sup>                   |   |
|--|---|
| Population subgroup  | Intervention strategy   |
| Educated, older, and career-driven women who continue to drink after pregnancy recognition.        | Changing drinking culture and social norms. Non-alcoholic beverages should be provided at functions. <sup>1,18</sup>  |
| Unemployed, younger women with low self-esteem, who continue drinking after pregnancy recognition. | Community based programmes involving multi-disciplinary, hands-on approaches. Counselling and motivational speakers help motivate and reinforce abstinence. This is one of the most effective abstinence strategies. <sup>1,18</sup>                |
| Women who drink as they are unaware they are pregnant.   | Media campaigns and warning labels on alcohol that warn of the adverse effects of alcohol consumption during pregnancy. This will increase the likelihood of abstinence after pregnancy recognition. <sup>1,18</sup>                                |
| Adolescents at risk of pregnancy   | School-based educational campaigns, mass media campaigns, and warning labels on alcohol. These help to change social norms. Good access to sexual and reproductive health care enabling the utilisation of effective contraception. <sup>1,18</sup> |
| Partners of pregnant women   | Mass media campaigns to increase awareness of the adverse outcomes associated with prenatal alcohol consumption. Encouragement should be given to abstain from alcohol. <sup>1,18</sup>   |

implement the Canadian Guidelines and to ensure staff are adequately trained and confident in the use of this diagnostic tool.<sup>13</sup> The Hawkes Bay is one of the most advanced FASD diagnostic centres in New Zealand, with a specialist diagnostic team comprising consultant paediatricians, social workers, speech and language therapists, occupational therapists and psychologists. These teams have shared education, beliefs and values, and thus can provide consistent and appropriate care tailored to the needs of individuals with FASD.<sup>10</sup> There are now seven of these specialist FASD diagnostic teams throughout the North Island, with two under development in the South Island.<sup>8</sup> The Ministry of Health is supporting training to further build the capacity of clinicians to diagnose and support individuals with FASD. Matua Raki, the national centre for addiction workforce, has been contracted to help design resources for health professionals to correctly identify and diagnose individuals with neurodevelopmental impairments. The lived experiences of individuals with FASD will guide the development of these resources.<sup>16</sup>

Ideally, all children in New Zealand should be screened for FASD, for example a brief screen could be implemented as part of the 'B4 School Check'. But as aforementioned, there are logistical challenges associated with a diagnosis of FASD, as a diagnosis is time consuming and requires multidisciplinary input.<sup>1</sup> Other professionals who engage with individuals with FASD also need education and tools. Teachers have a key role in identifying and supporting students with FASD. The Ministry of Education has developed FASD resources on their Inclusive Education website. Despite these great resources, there has been no money, time or initiatives devoted to getting teachers to use these resources, and it

is assumed teachers will access these materials on their own volition, in their own time.<sup>19</sup>

## Support

One of the biggest challenges after diagnosis is providing post-diagnostic support and interventions.<sup>8</sup> Research alludes to the importance of having the individual and their whānau at the centre of decision making. Support services should build on an individual's strengths, be culturally appropriate and fit within the context of an individual and their whānau. A cross-agency, collaborative and consistent approach including input from the education sector, health professionals, social workers and whānau, will improve service delivery.<sup>10</sup> A few examples of New Zealand-based support interventions will be discussed.

The neurodevelopmental consequences of FASD result in primary problems. However, some of the greatest harms come from the secondary problems that are inflicted by society in terms of intolerance, stigma, exclusion and a failure to be accommodated in medical, education and legal systems due to misinterpreting primary problems as 'bad behaviour'.<sup>10</sup> Therefore, training is necessary to educate individuals that this behaviour is not bad, but rather the result of a neurodevelopmental disability, as no child chooses to be impaired with FASD.<sup>8,10</sup>

The key worker role has been instrumental in supporting individuals and their whānau. The key worker adopts a family-centred approach that is consistent, collaborative and non-judgmental. They engage with

individuals and their whānau to provide education and support and to help navigate across different services. Key workers involved in FASD have the additional role of educating mainstream service providers about FASD, enabling the provision of appropriate care.<sup>10</sup>

Parent-led initiatives in New Zealand have been developed, incorporating advocacy and mentoring. A parent-led initiative in Dunedin has established a seven-week course for parents and caregivers of children with FASD. This course aims to empower, advocate and mentor. Resilience is developed and strategies are taught to help caregivers and parents navigate support services and parenting approaches tailored to children with FASD. There is also a monthly peer support group that parents are encouraged to attend.<sup>10</sup> The Ministry of Health has supported the organisation Fetal Alcohol Spectrum Disorder Care Action Network, which aims to help parents and caregivers learn tailored parenting strategies and to reduce the incidence of secondary problems developing.<sup>16</sup>

## Conclusion

FASD is entirely preventable through alcohol abstinence in pregnancy. New Zealand has relatively high rates of FASD and the costs to the individual, their whānau and the wider society are immense. Collaborative interventions on multiple levels are necessary to prevent FASD and to ensure those that do have FASD are diagnosed in a timely and appropriate manner. Comprehensive support services should be provided to ensure individuals with FASD are able to achieve their full potential. As this is an under-diagnosed and often stigmatised condition, more research is necessary to accurately estimate the true prevalence of this condition. Further research is also required to identify inequities, which will help to guide resource allocation and ultimately to reduce the devastating burden of FASD.

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## Correspondence

Amy Rankin: [aran096@aucklanduni.ac.nz](mailto:aran096@aucklanduni.ac.nz)

# » The role of spirituality in palliative care

## Dr Amy Rankin

House Officer  
Middlemore Hospital  
Counties Manukau District Health Board

➤ Amy graduated from the University of Auckland in 2018. Prior to medical school, she completed a Bachelor of Health Science degree. She has an interest in population health and preventative medicine.

### Introduction

Patients diagnosed with a terminal illness suffer beyond their physical symptoms; they also face a huge psychological burden as they try to find meaning and purpose amidst their suffering. The role of spirituality as a way for patients to find meaning in life, reduce suffering and improve wellbeing in the context of palliative care will be the focus of this article. The benefits and limitations of incorporating spirituality into palliative care and examples of spiritual interventions will also be discussed.

Palliative care aims to ease suffering and improve the quality of life of patients and their families who are facing a life-limiting illness, terminal illness or are at the end-stage of life.<sup>1</sup> Western medical systems typically adopt a biomedical model of care that focuses on cure and physical wellbeing. However, this model is inappropriate in the context of palliative care, as cure is no longer an option.<sup>2</sup> Therefore, it is important to consider dimensions of care that go beyond physical healing.

Spirituality is a broad term that has no universally accepted definition. Spirituality could be expressed in religious terms through a relationship with a god or other higher power. It could also be expressed non-religiously through beliefs and values, relationships, nature, art or music. Religion has a more specific definition that relates to a prescribed set of beliefs, values and moral codes that are observed by a community in the worship of a higher power. Spirituality can encompass religion, but it does not have to; people can be spiritual without being religious.<sup>1,4</sup>

### The benefits of providing spiritual care

Patients with advanced illness suffer multi-dimensionally. This suffering extends beyond the physical symptoms of their relevant pathology, highlighting the downsides of an approach that just focuses on alleviating physical distress.<sup>5</sup> Patients express feeling fearful, hopeless, angry, depressed and burdensome. A spiritual crisis around the end of life takes the form of someone losing the will to live, despair, demoralisation and a heightened desire for death.<sup>3</sup> Spiritual pain may also manifest itself physically and emotionally as seen in the diagram below (Fig 1).<sup>6</sup>



Figure 1 The consequences of unmet spiritual need.

There is evidence that palliative care patients would like health professionals to attend to their spiritual needs. Grant and colleagues found that 87.4% of their 31 study subjects perceived themselves as being spiritual, while Post and colleagues found that across four American studies 40-94% of patients were interested in care catering to their spiritual needs.<sup>6,7</sup> Therefore, unmet spiritual needs can have an immense negative impact on a person's wellbeing during the end-stages of life.<sup>6</sup> In the context of medical care, hope usually rests in the potential for a cure and restoration of health. When the transition to palliative care occurs, a new definition of hope is needed. It takes on a new dimension that relates to finding meaning in life, maintaining quality of life in the time that is left, and dying with dignity.<sup>8</sup>

Including spirituality in palliative care is mandated by international policies and guidelines. For example, the 'Hospice New Zealand Standards for Palliative Care' requires spirituality to be incorporated into palliative care.<sup>9</sup> Spiritual care is defined as assisting people to connect or reconnect to practices, things and ideas that are at the core of their being and gives them meaning in life. It is about health professionals meeting a patient at a level of spirituality they are comfortable with and implementing care that suits the unique spiritual needs of the patient. It also relates to health professionals making a human connection with patients and their families through the expression of warmth, compassion and empathy.<sup>10</sup>

There are numerous benefits of providing spiritual care. Individuals who reported high levels of spiritual wellbeing were found to have some protection against spiritual distress.<sup>3</sup> Attending to spiritual needs allows people to find meaning in life and inner peace. It can also provide a form of physical relaxation, a sense of connection with others, and self-awareness. Spirituality can act as an outlet for patients to focus on things that give them meaning and peace rather than dwelling on their impending death. Spirituality provides familiarity to patients in an often unfamiliar environment. By focusing on this, patients can regain a sense of control of their life, which has been found to dramatically increase wellbeing.<sup>3,10</sup> A poignant quote by Viktor Frankl, "man is not destroyed by suffering; he is destroyed by suffering without meaning" shows the importance of spiritual care in providing meaning to those who are suffering.<sup>2</sup>

A study conducted by Greeley found that 81% of American physicians agreed that spirituality could directly affect clinical outcomes and 91% agreed on the importance of doctors understanding the spiritual beliefs of their patients.<sup>11</sup> Spirituality has also been shown to be an effective coping mechanism. In a study of 108 women with gynaecological cancer 93% reported using spiritual beliefs to cope with their diagnosis.<sup>2</sup> These aforementioned benefits justify the importance of incorporating spirituality into palliative care, as spirituality is a key component of wellbeing in many patients.

### Assessing spiritual needs

As the benefits of spirituality have been ascertained it brings into question how do health professionals assess spiritual need? Spirituality is something that is unique and personal. Therefore spiritual care must be individualised – a one method suits all approach is inappropriate.<sup>6</sup> Patients often report difficulty when expressing spiritual needs. In Western countries there has been a loss of spiritual language and understanding the spiritual dimensions of life. This, coupled with the tension of traversing between medical and spiritual paradigms, has created uncertainty as to the best methods of assessing spiritual needs.<sup>6</sup> Patients often feel vulnerable when expressing their spiritual needs and may report feeling a sense of healing and positivity when their spiritual needs have been heard.<sup>6</sup> Conversely, patients report feeling hopeless, empty and rejected when their spiritual needs have not been addressed.<sup>6</sup> Therefore, an assessment method is needed to ascertain where a patient fits on the spirituality continuum and the level and type of spiritual care a patient desires, as the answer to this question will inevitably be different for every patient.<sup>6,3</sup>

Assessing spiritual need must be done carefully to prevent offending patients and it is important to consider professional boundaries. Whilst health professionals should attend to the spiritual needs of patients, spirituality is only one dimension of care. Extensive spiritual counselling should be carried out by spiritual leaders or chaplains, as most health professionals have inadequate training in this area and also need to focus on other dimensions of care within time constraints. Moreover, health professionals imposing spirituality on patients or undermining their beliefs is unacceptable as this blurs the patient-professional boundary and patients may feel they have to adopt these values out of fear of disagreeing with health professionals.<sup>2</sup>

In order to assess spiritual need in the context of a functioning and practical patient-professional relationship the assessment tool "FICA" should be used (Box 1).<sup>12</sup> FICA provides a comprehensive framework for assessing spiritual needs in a format that patients and health professionals find comfortable, easily understandable and accessible. This tool should be administered both during the initial palliative care assessment and when appropriate, as spiritual needs may change. There are many benefits of obtaining a spiritual history through the use of a tool such as FICA. Obtaining a spiritual history opens the door for discussions around beliefs and values, provides an opportunity to discover patient coping mechanisms, allows patients to discuss what gives them meaning in life and how this can be incorporated into care plans.<sup>2,3</sup> The benefit

of the FICA tool is that it is cross-culturally acceptable as the questions are open and the principles are general. This increases the usability of this questionnaire in a multi-cultural context such as New Zealand.<sup>12</sup>

#### Box 1 FICA Spiritual History Tool<sup>12</sup>

- F** (Faith and Beliefs): What provides you with meaning in life? Do you have spiritual beliefs that help you cope with stressors?
- I** (Importance and Influences): Do you feel spirituality is an important aspect of your life? Does spirituality influence your healthcare decisions?
- C** (Community): Are you part of a spiritual or religious community?
- A** (Address and Action): How the healthcare professional can intervene to meet patients spiritual needs. For examples, referring to a chaplain or providing patients with spiritual resources.

### Incorporating spirituality

After reviewing the literature on the benefits of spirituality and the use of the FICA tool, the question is raised about how best to incorporate spiritual care. There is no one answer to this question but an attempt will be made to provide a few examples. The literature highlights that before offering spiritual care it is important to consult with the patient if this care is in-line with what he or she desires. Spiritual care is not about resolving distress with medication; it is about allowing people to find healing within themselves.<sup>13</sup> Health professionals should always display empathy, warmth and compassion when interacting with a patient and their family. While these values are not inherently 'spiritual' they are a necessary prerequisite for the provision of spiritual care. The display of these values enhances rapport and communication between health professionals and the patient, thereby ensuring spiritual interventions are implemented in an appropriate manner in line with patient's desires.<sup>13,3</sup>

For patients that identify having a religious dimension to their spirituality it is important to cater to their religious beliefs. Patients should have access to religious leaders and members of their religious community; the ability to perform religious rituals, and access to religious texts.<sup>4</sup> As previously noted, not all patients that identify as spiritual identify themselves as religious, therefore non-religious spiritual care should also be offered.

Mindfulness interventions such as meditation, yoga and massage are some non-religious spiritual interventions that direct patients to focus on the present moment. These interventions improve wellbeing and reduce suffering by allowing patients to clear and rejuvenate their mind as they are not dwelling on stressful thoughts when engaging in these exercises.<sup>14,15</sup> Spiritual support groups where patients can network and build relationships also have the potential to improve wellbeing as people can share their experiences and avoid social isolation.<sup>14</sup>

Research literature also suggests that music, art and expressive writing may alleviate distress and improve patient wellbeing. These can be classed as spiritual interventions if they give patients a sense of enjoyment, comfort and meaning. Creative interventions have inherent soothing properties as they are familiar to the patient and allow a redirection of focus.<sup>16,17</sup> Music has been shown to calm neural pathways in the brain, which reduces anxiety. Investigating the benefits of music therapy in cancer patients found music increased patient wellbeing, increased a sense of control, promoted wellbeing, reduced pain, improved psychological and physical functioning, and improved immunity.<sup>16</sup> Art has similar benefits. Art

helps people express their feelings, while providing a tangible legacy and redirecting focus. Art therapy enhances quality of life by giving patients a challenge and a sense of achievement. Allowing the expression of feelings in a symbolic manner is important as some patients either may not be able to or are not comfortable expressing their suffering in words.<sup>16</sup> Expressive writing can improve control over pain and improve mood; it also provides an opportunity for self-reflection and the experience of writing is therapeutic for many patients.<sup>16</sup>

Garland and colleagues conducted a study that compared two groups of cancer patients. One group was assigned to mindfulness interventions (meditation, massage and yoga) while the other group was assigned to creative interventions (arts, music and expressive writing).<sup>15</sup> Participants in both groups showed improvements in wellbeing. However participants in the mindfulness group showed greater improvements in spiritual wellbeing and a greater reduction in anxiety, anger and overall stress symptoms when compared to participants involved in creative interventions.<sup>15</sup> The results of the study by Garland and colleagues provides evidence of the efficacy of both of these interventions, however it highlights the additional benefits of incorporating mindful interventions – indicating these interventions should be prioritised and supplemented with other types of spiritual intervention when appropriate.<sup>15</sup>

A novel form of spiritual intervention is dignity therapy. Patients are asked about their personal history, what they find meaningful in life and what they were most proud of. These sessions are recorded, transcribed and edited, which ultimately allows the patient to have a tangible legacy they can leave behind.<sup>3</sup> Chochinov and colleagues conducted a study of 100 terminally ill patients, reviewing dignity therapy. Ninety-one percent of respondents were satisfied with dignity therapy, 81% reported it had helped their family, 68% found a heightened sense of purpose and 47% of patients reported increasing their will to live.<sup>3</sup> This is an example of a simple intervention that can ease patient distress and improve quality of life.

### Is it realistic to provide spiritual care?

After reviewing the literature on this topic, spiritual care has the potential to improve patient wellbeing and reduce suffering. However, a number of questions are raised about the feasibility and appropriateness of providing spiritual care. Currently, many health professionals do not feel equipped to provide spiritual care. Therefore, many health professionals avoid approaching the topic of spirituality out of fear of misunderstanding and causing offense. Care must also be individualised due to the diversity of spiritual need.<sup>6</sup> Health professionals are already under increasing pressure and time constraints, therefore asking health professionals to provide spiritual care has the potential to become an additional burden.<sup>18</sup> If health professionals are expected to provide spiritual care they will need to be adequately trained in this field. Providing training puts pressure on already time-constrained health professionals as well as scarce financial resources.<sup>1</sup>

The appropriateness of offering spiritual care is also brought into question. Some patients may not want spirituality incorporated into their care plan. Spirituality is not an easy concept to define and some patients may find the concept of spirituality confusing.<sup>6</sup> Spirituality may cause an additional layer of distress for patients if they believe their illness is a punishment from a higher power. Spiritual beliefs may also be questioned during times of terminal illness, as patients question why they got their illness and what now gives them meaning. This highlights the importance of taking a detailed spiritual history and gaining an understanding of a patient's spiritual beliefs from their perspective, rather than making assumptions.<sup>14,18</sup>

### Limitations of current research and recommendations for future research

Research in the area of spirituality and its role in palliative care is increasing as the move is made towards a more holistic paradigm of care. However, several limitations exist in the current research. As spirituality is such a broad concept it makes it difficult to untangle which domains of spirituality are having the greatest impact on patient wellbeing. It is also difficult to measure constructs such as spirituality, spiritual care, hope, meaning and wellbeing as the definition of these terms invariably differs. A lack of robust outcome measures has proved a barrier to scientific evaluation of interventions and programs.<sup>3,18</sup> Researching patients in palliative care has some additional challenges as patients and their families are already suffering with life-limiting illnesses, and asking patients to participate in research may be an unwelcome burden at an already stressful time.<sup>3</sup>

There are also several gaps in the literature that could be filled by future research. More research is needed around the practicalities of implementing these inventions. Much of the research that has been reviewed has been conducted on patients in a hospital or hospice setting, while many palliative patients remain at home.<sup>3</sup> Future research could focus on increasing the availability of these interventions to patients who remain at home through community-based interventions. There is also a lack of research on how spiritual needs differ among individuals of different, ages, cultures and genders. This is likely to have important implications for the provision of appropriate care. Future research should also have a multi-disciplinary focus that includes expertise across a range of fields and contexts, rather than the current paradigm where disciplines generally work in isolation. It would also be valuable to have more research in the New Zealand context as spiritual issues are culturally bound. It would be particularly helpful to have access to further literature that relates to the spiritual needs of Māori. Longitudinal studies are also needed to determine how spiritual needs change over time – however in a palliative context this may not always be feasible.<sup>3</sup>

### Conclusion

In the context of palliative care cure is no longer an option. Therefore care must focus on more than physical wellbeing, as a terminal diagnosis has a profound impact on psychological wellbeing. This article has outlined the role of spirituality as a way to improve patients' wellbeing, reduce patients' suffering and provide patients with meaning. A lack of feasibility and the potential inappropriateness of incorporating spirituality have also been addressed, which raises the question about whether spirituality should be incorporated into palliative care.

Despite the limitations it is essential to incorporate spirituality into palliative care when appropriate. If spiritual care is not provided, health professionals may undermine patients' wellbeing, as spirituality is a large component of many patients' lives. Spirituality is especially pertinent for many individuals with terminal illnesses, as it provides patients with purpose and a source of hope. Of course, some patients may not want spiritual care, and health professionals must take this into consideration. The use of the FICA tool allows assessment of spiritual needs. This assessment is crucial as it gives patients the opportunity to express whether or not they want spiritual care and allows the development of personalised spiritual care plans. It is essential that patients guide their spiritual care journey in collaboration with health professionals. Health professionals should always show warmth, empathy and understanding when interacting with patients. The use of mindfulness, religious and creative interventions have also shown promise as feasible and beneficial spiritual interventions. Overall, research has shown the huge potential of spirituality to enhance patient wellbeing, reduce suffering and provide patients with meaning. Therefore, spirituality should be incorporated into palliative care when appropriate.

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## Correspondence

Amy Rankin: [aran096@aucklanduni.ac.nz](mailto:aran096@aucklanduni.ac.nz)





## Treatment complexities in rheumatoid arthritis

### Hemi Enright

School of Medicine  
Faculty of Medical and Health Sciences  
University of Auckland

> Hemi is a final-year medical student based in Northland. In his free time he enjoys spending time with friends and family as well as researching rongoā Māori.

### The case of Mrs A:

Mrs A is a 52-year-old woman who presented with an acute flare of her rheumatoid arthritis (RA). For the last three months, Mrs A had felt 'out of sorts'. She had an episode of being unwell with a sore throat and 'tiger scratch' lesions on her arms. In the prior few weeks, every day was a struggle. She had gone from being fully independent, to severely restricted in her activities.

Mrs A does not take any regular medications. Thirty years ago, she made a decision to avoid medications because the side effects made her feel 'rotten'. As a young person she experienced tinnitus from high-dose salicylate therapies. After stopping medications, she felt 'wonderful'. Her experiences guided her decision to self-manage her condition with dietary manipulation, exercises, and membership of support groups for the past 30 years.

Mrs A has asthma for which she takes corticosteroids. She is a mother of four. She has spent most of her life caring for her family. She is a non-smoker. She has a family history of arthritis. Her father has ankylosing spondylitis with complications of iritis. He has the human leukocyte antigen B27 (HLA B27) tissue type, which Mrs A would have a 50% chance of also having. Similarly, he self-manages and does not take medications for his condition. An important challenge in Mrs A's care is re-engaging her and her whānau in medical management.

On examination Mrs A had Bouchard's and Heberden's deformities of the proximal and distal interphalangeal joints of the hands, respectively. She had swan-neck deformities of the right index finger and left ring finger. She had a Boutonniere contracture in her left, middle finger. She had a fixed, flexion deformity of both distal interphalangeal joints of the little fingers, with internal rotation at the proximal interphalangeal joints. She had marked synovitis bilaterally of the metacarpal phalangeal joints, with subluxation of the right thumb. Finally, she had synovitis of both wrists with bilateral ulnar deviation of around ten degrees of medial rotation.

Mrs A was unable to extend her fingers to 90 degrees. She was unable to make a closed fist. Functionally she was able to turn a key, do up a button, and write. Other pertinent findings on examination were synovitis of the knees with a negative patellar tap, severe pain on palpation and passive movement of the right hip, and boutonniere deformity of the right, little toe.



Figure 1 Plain film of left and right hands.

### Investigations

1. Raised inflammatory markers: C-reactive protein 150, erythrocyte sedimentation rate 41.
2. Plain films of the hands, shoulders, elbows, pelvis, knees, and ankles were taken. There were widespread degenerative changes throughout the phalanges. Additionally, severe degenerative changes were noted in the right hip joint. Plain films of the elbows, ankles, and knees showed mild degenerative changes.
3. Rheumatoid factor 9 (reference range: 0-14).
4. Negative tests for perinuclear and cytoplasmic anti-neutrophil cytoplasmic antibodies.
5. Farr assay/negative anti-double stranded deoxyribonucleic acid antibodies (dsDNA) – used to test for systemic lupus erythematosus.
6. We did not investigate for HLA B27 tissue type.

## Problem list

1. Acute flare of RA.
2. Poorly controlled RA with long-standing disability.
3. Surgical candidate for a right, total hip-joint replacement.
4. Loss of engagement with pharmacological management.
5. Potential HLA B27 tissue type.

Mrs A is a 52-year-old woman who presented with an acute flare of RA. On examination she had characteristic deformities of RA. This was particularly evident in swan neck, boutonniere's, and Heberden's deformities of her hands. Her raised inflammatory factors and findings on plain film objectively pointed towards a diagnosis of RA. Other blood tests excluded differentials of systemic lupus erythematosus and vasculitis.

## Discussion

Since first being described by Augustin Jacob Landré-Beauvais in the 1800s, our understanding of RA has improved, but much is still unknown.<sup>1</sup> We know that RA is an autoimmune disease affecting large and small joints and causing pain, swelling, and deformity in a symmetrical fashion.<sup>2</sup> RA typically causes long-standing deformity during the first two years following diagnosis.<sup>3</sup> Current strategies in New Zealand for treating RA to reduce deformity, focus on disease-modifying antirheumatic agents (DMARDs) and biological agents.

Methotrexate is an immunosuppressive DMARD. It has an unclear mechanism of action. What we do know is that it acts on dihydrofolate reductase, increasing adenosine nucleotides, which inactivate tetrahydrofolate receptors.<sup>4,5</sup> In brief, this means that it reduces some forms of folic-acid production in the body. The net effect of this is a reduction in joint inflammation, which improves joint pain and swelling.<sup>5</sup>

Methotrexate has proven benefits for people like Mrs A who suffer from active disease. Methotrexate monotherapy, when compared to placebo, showed a 15% absolute improvement (95% confidence interval 8% to 23%) in American College of Rheumatology scores for the study participants.<sup>6</sup> These scores focus on joint pain and swelling, and other features of active disease.<sup>7</sup>

Objectively, participants taking methotrexate as a monotherapy had lower rates of radiographic progression on plain film. Researchers demonstrated that 31% of patients were less likely to develop new joint erosions 52 weeks after commencing therapy, compared to those taking a placebo.<sup>6</sup> Overall, methotrexate by itself has both subjective and objective benefits for Mrs A and other patients with RA.

Within New Zealand, methotrexate is the dominant initial treatment for RA. Biological agents are usually available after a trial of methotrexate.<sup>11</sup> Biological agents decrease inflammation and joint damage by blocking pro-inflammatory molecules, which are otherwise known as tumour necrosis factors. Our decisions to fund these treatments are based on the literature, much of which has originated in America. Within New Zealand, both adalimumab (brand name Humira) and etanercept (brand name Enbrel) are funded by PHARMAC.<sup>11</sup>

Both adalimumab and etanercept are efficacious in the management of RA. When used in combination with methotrexate, adalimumab successfully slowed the degeneration of participants' joints with less erosions on plain films taken 52 weeks after initiating therapy.<sup>12</sup> Etanercept in combination with methotrexate improves pain and functioning, and

reduces disease activity.<sup>13</sup> There was a 38% absolute improvement in the study population of patients taking etanercept and methotrexate compared to patients taking methotrexate alone.<sup>13</sup> For Mrs A, these treatments can assist with prevention of acute flairs, as well as further deformity and disability. Biologics have shown great promise in improving the journey of RA for patients. However, little is known about the long-term effects. This is a challenge in a population with confirmation biases towards treatment risks.

Adverse effects and side effects were cited by Mrs A as reasons for not taking methotrexate in the past. Fewer than 10% of patients experience gastrointestinal side effects such as nausea, vomiting, and abdominal pain.<sup>5</sup> Less commonly, and usually related to dose, patients can experience alopecia, pneumonitis, bone marrow suppression, and hepatitis with alcohol use.<sup>8</sup> An increased risk of lymphoma has been suggested but not yet proven in patients on methotrexate for longer than 25 years.<sup>9</sup> For childbearing women, methotrexate has a teratogenic effect and is not recommended during breast feeding.<sup>8</sup>

Some side effects from methotrexate can be alleviated with co-administration of folic acid. Folic acid has been shown to reduce gastrointestinal side effects with an absolute risk reduction of nine per 100 people.<sup>10</sup> Folic acid has no impact on the efficacy of methotrexate. Patients on a combined schedule were less likely to discontinue methotrexate for any reason, compared to those taking methotrexate alone.<sup>10</sup> A combination of methotrexate every Monday and folic acid every Friday was prescribed by a consultant rheumatologist while Mrs A was an inpatient.

As a result of the experience some patients have had, methotrexate has cultivated a negative reputation of having adverse effects.<sup>17</sup> Additionally, many people in our communities living with RA are unaware that folic acid has a protective effect and has been shown to reduce the risk of these side effects.<sup>10</sup> People are guided by what they know. In this respect, patients may focus on the negative past experiences of themselves, friends, and whānau. Medicine, and its documented use of trial and error, has not assisted with this. Mrs A has had her trust in medicine eroded by a pattern of therapies where well-meaning doctors treated her with medications that made her feel 'rotten'.

Addressing the loss of engagement in pharmacological management is a crucial issue for this whānau. A family meeting should be organised where Mrs A, her father, and other family members can raise and address their concerns with a consultant rheumatologist. We need to rebuild Mrs A's trust in medicine so that she can re-engage and we can move forward. Once we have rebuilt a therapeutic relationship, we can begin to address other issues such as the right total hip joint replacement that Mrs A may need and screening for HLA B27 to exclude an associated spondyloarthropathy that may impact management.

Patients can choose between conventional and alternative non-pharmacological management. Conventional non-pharmacological therapies include physiotherapy and occupational therapy.<sup>16</sup> Occupational therapy includes educational interventions, splints, assistive devices, and counselling. Occupational therapy has a proven positive effect on functional ability in patients. As part of our care plan we facilitated a referral to hand physiotherapy and provided splints for Mrs A.

Alternative therapies include dietary manipulation,<sup>14</sup> which includes vegetarian, elimination, and Mediterranean diets, and thermotherapy.<sup>15</sup> Dietary manipulation has limited evidence. While this strategy worked for Mrs A, a lack of evidence prevented us from differentiating between efficacy of this intervention and the placebo effect.<sup>14</sup> Similarly, patients may find some short-term benefits from thermotherapy, but both therapies lack research and proof of efficacy.

In brief, the decisions that patients make occur within the contexts of their lives. Mrs A has an in-depth historical perspective on RA from her

own experiences. She has experienced side effects and adverse effects through a range of pharmacological treatments. As a result of this, she has chosen to focus on what she can do non-pharmacologically for herself. The challenge lies in rebuilding a therapeutic relationship that enables Mrs A and her family to re-engage and rebuild trust in medicine again. We need to work with Mrs A to promote her quality of life and ensure she has every option available to best manage her RA.

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## Correspondence

Hemi (James) Enright: [Jenright12@gmail.com](mailto:Jenright12@gmail.com)



# Palliative management strategies for oesophageal cancer in the presence of co-morbidities

## Dr Alistair Lock

House Officer  
North Shore Hospital  
Waitemata District Health Board

> Alistair Lock is a PGY1 House Officer. He was a previous academic editor for the New Zealand Medical Student Journal and has an interest for a career in academic surgery, with a focus in orthopaedics.

## Abstract

This case was submitted as a 2018 trainee intern general medicine case history. It documents the presentation of a new diagnosis of oesophageal cancer, alongside the diagnoses of atrial fibrillation with congestive heart failure, in an 87-year-old NZ European man with known metastatic prostate cancer. The case is followed by a discussion on the definition, epidemiology, risk factors, clinical presentation and differential diagnosis for oesophageal cancer, with a focus on comparing the alternative palliative management options when faced with challenging co-morbidities.

## Background

1. Metastatic prostate cancer diagnose in November 2017 with cervical, thoracic and lumbar metastases at time of diagnosis. On hormone therapy. Secondary L1 compression fracture
2. Ischaemic heart disease with stable angina (transthoracic echocardiogram Sept 2014, ejection fraction 45%, severe aortic stenosis). Two previous myocardial infarctions (1992 and 2012)
3. Asbestos exposure with extensive plaque disease
4. Hypertension
5. Bilateral total hip and total knee joint replacements
6. Gastro-oesophageal reflux disease
7. Hiatus hernia

## Medication List on Admission

### Regular

Bicalutamide 50mg PO BD  
Goserelin 10.8 mg inj Q3Month  
Aspirin 75mg PO OD  
Metoprolol Succinate 47.5mg PO OD  
Quinapril 20mg PO BD  
Atorvastatin 40mg 2 tab PO nocte  
Ezetimibe 10mg PO OD  
Prednisone 5mg PO mane  
Frusemide 40mg PO mane  
Omeprazole 20mg PO BD

Docusate Sodium 50mg + Sennoside B 8mg PO BD  
Zoledronic acid 4 mg/5 mL inj Q1Year

### PRN

Paracetamol 500mg 2 tab PO QID  
Oxycodone Hydrochloride 5mg PO TDS  
Glyceryl Trinitrate 400mcg/actuation oral spray 1 dose SL

## Allergies/ADRs

None known.

## Presenting Complaints

1. Dysphagia
2. Chest pain with increased shortness of breath on exertion (SOBOE)

## History

Mr W is an 87-year-old NZ European man who presented to North Shore Hospital, Auckland, with multiple complaints on the above background. He had three weeks of progressive dysphagia to solids and liquids, with regurgitation of food and episodes of vomiting after eating meals. He had also noticed a new sense of early satiety. No haematemesis was described. He had two episodes of melaena prior to 4/7 constipation but reported no abdominal pain or urinary symptoms. He had 20kg of weight loss prior to his recent prostate cancer diagnosis in November 2017, which was 4 months prior to this admission, but his weight has been stable since.

His second presenting complaint was 3/7 of intermittent, dull, central chest pain associated with increased SOBOE. Orthopnoea and paroxysmal nocturnal dyspnoea (PND) were present. On admission he was only tolerating walking a distance of 5m due to breathlessness, with a baseline of 30m. Cough, sputum production, palpitations, haemoptysis, fever and recent illness were all denied on specific questioning.

## Social History

Mr W is a retired builder living in his own home with his wife. He is independent for activities of daily living (ADLs) and receives 1 hour/week home help for meals. He mobilises with a walking stick around the house. He is an ex-smoker with a 30-pack-year past history and does not drink alcohol. His family history was unremarkable.

## On Examination

He appeared comfortable at rest with a heart rate of 120 bpm that was irregularly irregular. Otherwise his observations were normal range and he was afebrile. Relevant findings included dual heart sounds with an ejection systolic murmur loudest at the aortic area, radiating to the carotids. JVP was +4cm. Bibasal crackles were heard on auscultation of the posterior chest. There was no pedal oedema present. He had a tender epigastrium without percussion tenderness, but otherwise normal abdominal examination. Per rectum and neurological exams were normal.

## Investigations:

- 1) Selected blood test results

| Blood Test        | Result                                | Reference Range |
|-------------------|---------------------------------------|-----------------|
| Sodium            | 140                                   | 135-145 mmol/L  |
| Potassium         | 3.6                                   | 3.5-5.2 mmol/L  |
| White Blood Cells | <b>15.8</b>                           | 4-11.0 xE9/L    |
| CRP               | <b>27</b>                             | 0-5.0 mg/L      |
| Troponin I        | <b>66</b> (first), <b>75</b> (second) | 0-40 ng/L       |
| Haemoglobin       | 143                                   | 130-175 g/L     |
| NT-ProBNP         | <b>235</b>                            | <35 pmol/L      |
| T4 (free)         | 13.5                                  | 9-19 mol/L      |

- 2) ECG: Fast atrial fibrillation, rate 120, no ischaemic changes.
- 3) CXR: Extensive bilateral pleural calcifications, related to previous asbestos exposure. Stable cardiomegaly. No evidence of acute pulmonary changes.
- 4) Transthoracic echocardiogram: Heavily calcified aortic valve with severe aortic stenosis. Normal left ventricular size with an ejection fraction ~20%. Hypokinetic/akinetic globally with dilated atria. Mild mitral and tricuspid regurgitation.
- 5) Oesophagogastrroduodenoscopy (OGD): Likely malignant oesophageal tumour found in the lower third of the oesophagus, in an area of Barrett's oesophagus, above a hiatus hernia. Biopsy showed HER2-negative, E-cadherin-positive adenocarcinoma.

## Progress

Mr W was admitted under General Medicine. Furosemide 80mg BD IV was given to treat congestive heart failure and an IV amiodarone infusion given with telemetry to improve the rhythm control of his atrial fibrillation. Mr W was already on metoprolol in the community. A decision was made to not anti-coagulate despite a CHA2DS2-VASc of 4, due to a HAS-BLED of 3.<sup>1,2</sup> Mr W was seen by General Surgery

regarding his oesophageal adenocarcinoma. His case was discussed in their multidisciplinary meeting (MDM) regarding surgical options, with a conclusion deeming him not to be a surgical candidate due to his age, extensive co-morbidities and prior metastatic prostate cancer diagnosis.

## Problem List

1. New fast atrial fibrillation; rhythm controlled on amiodarone
2. Congestive heart failure with severe aortic stenosis; left ventricular ejection fraction decreased from 45% to 20%
3. Dysphagia to solids and liquid and episodes of melaena; secondary to oesophageal adenocarcinoma
4. Metastatic prostate cancer with cervical, thoracic and lumbar metastases

## Discussion

*This discussion will focus on Mr W's diagnosis of oesophageal adenocarcinoma*

## Definition

Oesophageal cancers are mucosal lesions that begin in the epithelial cells lining the oesophagus. There are two main types; adenocarcinoma and squamous cell carcinoma (SCC). Oesophageal adenocarcinomas mostly occur in the distal oesophagus from a region of Barrett's metaplasia (but can occur without prior metaplasia), while oesophageal SCC is more evenly distributed throughout the length of the oesophagus.<sup>3</sup>

Figure 1 shows images from Mr W's OGD report. He had a classical location for his adenocarcinoma, in the lower third of the oesophagus at the gastro-oesophageal junction, within an area of Barrett's metaplasia. Barrett's metaplasia represents a change in the epithelial lining of the oesophagus from simple squamous, to columnar with addition of goblet cells.

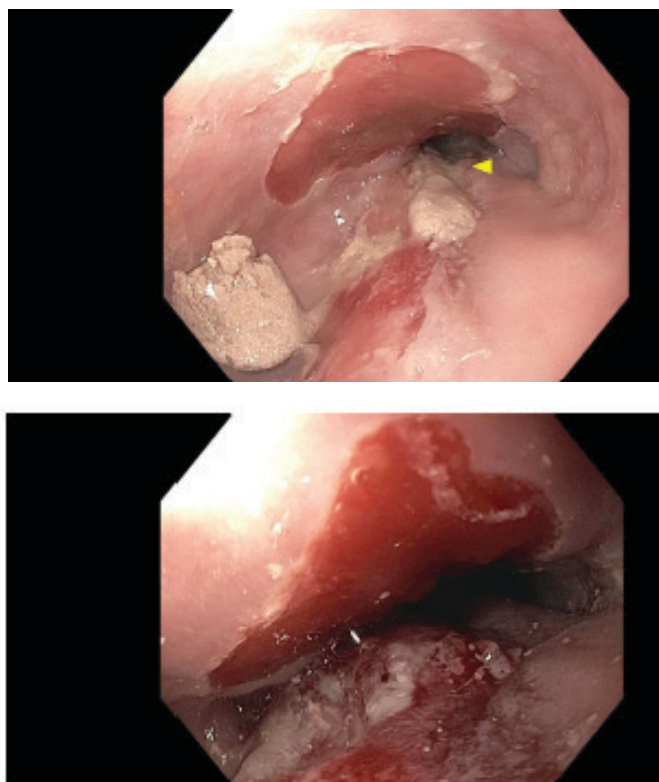


Figure 1 Lower third of the Oesophagus: Mass, Images from Mr W's OGD Report



## Epidemiology and Risk Factors

The proportion of oesophageal cancers that are adenocarcinomas has risen from 10% of cases in 1960, to 80% of recent diagnoses. This change is thought to be due to the rising incidence of Barrett's metaplasia, particularly in Caucasian men.<sup>4</sup> Risk factors for adenocarcinoma include obesity (OR 2.34 for BMI  $\geq 30$  kg/m<sup>2</sup>) and gastro-oesophageal reflux disease (GORD) (OR 5.0 for weekly symptoms). For SCC risk factors include smoking and alcohol consumption<sup>4</sup>.

The risk factors specific to Mr W's development of oesophageal adenocarcinoma included his past history of GORD (a cause for Barrett's metaplasia) for 'over ten years', although he was compliant to his treatment (omeprazole 20mg BD). He had a hiatus hernia below the site, which is known to increase GORD symptoms. His additional risk factors included a 30-pack-year history of smoking, male sex, Caucasian ethnicity, and a diet low in fruit and vegetables. He had no family history of oesophageal cancer and was not on an oral bisphosphonate, which are further known risk factors.<sup>3,4</sup>

## Clinical Presentation

Most patients with oesophageal cancers only start to report symptoms at an advanced stage. The classical presentation is progressive dysphagia to solids initially, then to liquids, with associated odynophagia and weight loss. Hoarseness of voice and cough can also occur and usually represents invasion of the recurrent laryngeal nerve.<sup>5</sup>

Mr W had a classical history with the addition of post-prandial food regurgitation and vomiting, which are symptoms of a severely obstructing cancer. He also described melaena which was likely the result of upper gastrointestinal bleeding from the adenocarcinoma, although he had only two episodes and was not anaemic on admission with a haemoglobin of 143 g/L. Mr W had significant weight loss of 20kg prior to his recent diagnosis of metastatic prostate cancer, but had a stable weight over the previous three weeks where he had progressive dysphagia. A possible explanation for his weight remaining stable, despite reduced oral intake, is weight gain due from his secondary diagnosis of CHF.

The oesophageal lesion likely represents a new primary cancer, as the oesophagus is not a common site for metastasis of prostate cancer.<sup>5</sup>

## Differential Diagnoses

The differential diagnosis of dysphagia includes non-malignant strictures, achalasia, eosinophilic oesophagitis and oesophageal webs/rings.<sup>5</sup>

For Mr W's work-up, a stricture was possible with a history of GORD, but the dysphagia seen with this condition is often slower to progress and often occurs post-radiation therapy. Achalasia is often not associated with a history of GORD. Eosinophilic oesophagitis and oesophageal webs/rings tend to produce intermittent (rather than constant) dysphagia.<sup>5</sup>

## Management Options

As oesophageal tumours are often diagnosed late, accurate staging is important for prognosis and treatment planning. The clinical stage groups for cases of oesophageal cancer, based on the TNM cancer staging system, is shown in Table 1. CT chest/abdomen is often used to stage disease. However, PET scanning is a recent alternative which has been shown to improve detection of nodal and distant metastases, and therefore identify possible surgical candidates.<sup>5</sup>

If fit for surgery, oesophagectomy is offered up to and including patients with stage III disease, with the addition of chemo and/or radiotherapy either prior to, or after resection. Chemoradiotherapy and oesophageal stenting are options available in not only stage IV patients, but also stage III patients who are non-surgical candidates due to existing co-

| <b>Squamous cell</b>  |       |      |    |
|-----------------------|-------|------|----|
| cStage group          | cT    | cN   | cM |
| 0                     | Tis   | N0   | M0 |
| I                     | T1    | N0-1 | M0 |
| II                    | T2    | N0-1 | M0 |
|                       | T3    | N0   | M0 |
| III                   | T3    | N1   | M0 |
|                       | T1-3  | N2   | M0 |
| IVA                   | T4    | N0-2 | M0 |
|                       | T1-4  | N3   | M0 |
| IVB                   | T1-4  | N0-3 | M1 |
| <b>Adenocarcinoma</b> |       |      |    |
| sStage group          | cT    | cN   | cM |
| 0                     | Tis   | N0   | M0 |
| I                     | T1    | N0   | M0 |
| IIA                   | T1    | N1   | M0 |
| IIB                   | T2    | N0   | M0 |
| III                   | T2    | N1   | M0 |
|                       | T3-4a | N0-1 | M0 |
| IVA                   | T1-4a | N2   | M0 |
|                       | T4b   | N0-2 | M0 |
|                       | T1-4  | N3   | M0 |
| IVB                   | T1-4  | N0-3 | M1 |

Table 1 The clinical TNM staging system for cases of oesophageal cancer (taken from<sup>4</sup>)

morbidity.<sup>5,6</sup> Mr W's case was discussed at a General Surgical MDM for consideration of management options. A decision was made not to perform CT imaging, and to treat as per stage IV based on his extensive co-morbidities. He was deemed not to be a surgical candidate and with his significant heart disease and metastatic prostate cancer, he would also not tolerate chemoradiotherapy. However, symptomatic oesophageal stenting was recommended as a palliative option.

When talking with Mr W, he stressed how he wanted 'to live as long as possible, with as little symptoms as possible' post-diagnosis. This made me consider the evidence behind the current palliative management alternatives for oesophageal cancer.

Although not appropriate for Mr W, patients with localised oesophageal cancer can be given combination chemoradiotherapy. Patients treated with capecitabine combinations have been shown on meta-analysis to have superior survival times compared with 5-fluorouracil (5-FU) combinations.<sup>7</sup> Both of these regimens are potentially cardiotoxic so pre-existing heart disease, in particular congestive heart failure, is a relative contraindication. Trastuzumab can also be used in addition to standard chemotherapy. This drug is a monoclonal antibody which binds to the human epidermal growth factor receptor 2 (HER 2), which is present in 25% of oesophageal adenocarcinomas.<sup>8</sup> Increased survival time of two months has been shown in those assigned to trastuzumab plus chemotherapy, compared with chemotherapy alone, without additional toxicity or adversely affecting quality of life.<sup>9</sup> It is now standard practice to test for the presence of HER2 on biopsy samples taken from OGD,



and use trastuzumab first-line alongside traditional chemotherapy if results are HER2-positive. However, congestive heart failure is again a contraindication, and although testing for HER2 receptor presence is standard, the use of trastuzumab is not currently funded in New Zealand, so cost can be a barrier for some families.

Self-expanding metal stents (SEMS) can be inserted endoscopically to hold the oesophageal lumen open, and have been shown to provide higher symptomatic relief (based on patient dysphagia scores), with less requirement for re-intervention, compared with local dilatational management alone. Overall, oesophageal stenting provides symptom control quickly, but there are recognised disadvantages, such as the potential for acute haemorrhage during the procedure, perforation and stent migration into surrounding structures.<sup>10</sup> Stenting also damages the gastro-oesophageal junction, so can worsen underlying GORD and lead to aspiration.<sup>10</sup>

To conclude, oesophageal stenting +/- chemoradiotherapy are the main palliative management strategies for patients with oesophageal cancer in the presence of co-morbidities. Mr W's case was complex with several comorbidities limiting his individual management to solely oesophageal stenting. The use of the monoclonal antibody Trastuzumab can offer HER2-positive patients who can tolerate chemoradiotherapy approximately two-months of increased survival. This additional time might seem small, but to a dying patient, it can provide enormous opportunity.

*Verbal and written consent was gained from the patient to write and publish this case report.*

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## Correspondence

Alistair Lock: Alistair.m.lock@gmail.com



## Bachelor of Medical Science (Honours) Abstracts

### **The Global Health Classroom: Experiences and learning outcomes of collaborative global health learning between New Zealand and Samoan medical students in a virtual classroom**

Roshit K Bothara<sup>1</sup>, Tim Wilkinson<sup>2</sup>, David R Murdoch<sup>1</sup>, Susan Jack<sup>3</sup>, Faafetai (Tai) Sopoaga<sup>3</sup>, Jen Desrosiers<sup>4</sup>, Malama Tafuna'i<sup>5</sup>, Tony Walls<sup>6</sup>, Philip K Pattemore<sup>6</sup>, Ashis Shrestha<sup>7</sup>, Andrew Miller<sup>1</sup>

1. Department of Pathology, University of Otago, Christchurch, New Zealand
2. Department of Medicine, University of Otago, Christchurch, New Zealand
3. Department of Preventive and Social Medicine, University of Otago, Dunedin, New Zealand
4. Department of Population Health, University of Otago, Christchurch, New Zealand
5. School of Medicine, National University of Samoa, Samoa
6. Department of Paediatrics, University of Otago, Christchurch, New Zealand
7. Department of Primary Care, Patan Academy of Health Sciences, Patan, Nepal

**Background:** Global Health Classroom (GHCRC) is a virtual collaborative global health learning model being developed and delivered at the Otago Medical School, New Zealand (OMS) in partnership with Patan Academy of Health Sciences, Nepal (PAHS) and School of Medicine, National University of Samoa, Samoa (NUS).

**Aims:** To explore the learning and experiences of New Zealand and Samoan medical students in the GHCRC and ascertain the key elements contributing to their learning and experience.

**Methods:** A mixed-method study approach using a post-GHCRC questionnaire and semi-structured interviews. A triangulation approach informed the synthesis of the data.

**Results:** Of the participants, 85% (74/87) responded to the post-GHCRC questionnaire. Nineteen semi-structured interviews were conducted: 13 OMS students and six NUS students. Students reported gaining knowledge about patient care, healthcare systems and the culture and determinants of health, with regards to their partner country. There was evidence that attitudes such as cultural understanding and respect were promoted among students by their GHCRC experiences. Majority (64%) of students reported increased interest in learning about global health after their GHCRC experience. Reported outcomes in the GHCRC align favourably with the recommended global health learning concepts in the literature.

**Discussion:** Key elements that promoted learning in the GHCRC were: use of clinical cases and global health themed guiding questions, teachers as facilitators not deliverers of content, promotion of students as self-directed learners, peer learning, social interactions, and video-

conferencing. Students in the GHCRC found that learning with their international peers in a virtual classroom made learning about global health "more real and tangible" and "much more accessible than learning on a purely theoretical basis."

**Conclusions:** The findings in this study suggest that GHCRC presents a promising global health learning model with core values of partnership, collaboration and reciprocity between medical students and institutions. Medical schools in different countries can partner together to deliver global health learning for their students by integrating the GHCRC into their curriculum. GHCRC continues to be delivered at the OMS, with plans to extend partnership to other overseas medical schools.

### **An appraisal of depression, anxiety and stress among Pacific youth at a New Zealand university**

L. Tucker-Masters<sup>1</sup>, T. Percival<sup>1</sup>, J. Tiatia-Seath<sup>2</sup>

1. The University of Auckland, Faculty of Medical and Health Sciences, School of Population Health
2. The University of Auckland, Faculty of Arts, Te Wānanga o Waipapa

**Introduction:** University students and Pacific youth may both have a high prevalence of mental health challenges. This research aimed to identify the prevalence and correlates of depression, anxiety and stress in Pacific youth aged 16 – 24 who attend university and their unique experiences of mental health.

**Materials and methods:** This research used mixed methods design. After conducting a literature review, an anonymous online survey was distributed. The survey included the short-form Depression, Anxiety and Stress Scale (DASS-21), demographic information, the Pacific Identity and Wellbeing Scale (PIWBS) and health services interaction. Three focus groups were also undertaken with eight participants, using the Pacific methodology Talanoa. Focus groups were analysed using grounded theory and Te Vaka Atafaga, a Tokelauan assessment model for mental health.

**Results:** There were 112 valid survey responses. The prevalence of mild to very severe depression, anxiety and stress among sampled Pacific youth at university were 68.8%, 66.1% and 57.2%. The PIWBS factors of perceived familial wellbeing, perceived societal wellbeing, Pacific connectedness and belonging and cultural efficacy were negatively correlated with DASS-21. Focus groups emphasised the impact of family, social support, sense of purpose, personal expectations, environmental factors and the importance of accessing help.

**Conclusion:** A mixed methods approach has allowed us to demonstrate Pacific youth at university have a high prevalence of mental health challenges and that better support is needed. More research is required on the topic of mental illness in Pacific youth. Recommendations from

this research may help to inform Pacific youth mental health initiatives.

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## A novel nutrient recycling device for gastrointestinal fistulas and stoma: design and feasibility

Sharma P<sup>1,3</sup>, Bissett IP<sup>1</sup>, O'Grady G<sup>1,2,3</sup>

1. Dept of Surgery, The University of Auckland, New Zealand  
2. Surgical Design Studio, Auckland, New Zealand  
3. Auckland Bioengineering Institute, Auckland, New Zealand

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**Introduction:** Enterocutaneous fistulae and high-output enterostomies often require intensive medical support including fluid replacement and parenteral nutrition. Refeeding stomal output has been recognised as beneficial, however clinical implementation has been limited due to the lack of an efficient and palatable method. This work aimed to develop and test a novel refeeding pump device.

**Materials & Methods:** The refeeding pump comprised a compact impeller connected to a commercial feeding tube inserted into the distal intestinal limb. The pump is activated across the stoma appliance via magnetic coupling to an electrically-operated motor. Nutritional, medical, psychological and human-use factors were evaluated in a feasibility trial. Patients were asked to use the device at least daily over a minimum three-week period. Data encompassed interviews, diaries, bloods, nutrition and admission statistics. The device was iteratively improved throughout the trial.

**Results:** The novel device was successfully validated on benchtop tests then trialled in 7 patients. Indications for inclusion included remediation for high output stoma, weaning from TPN and gut rehabilitation before re-establishment of bowel continuity. A range of chyme viscosities were successfully recycled following iterative device improvements. Preliminary data illustrate a variety of benefit from refeeding using the device including reduced stoma losses (>65%), improved renal and liver function, electrolyte levels and quality of life.

**Conclusions:** A novel nutrient recycling device was developed and shown to be feasible in clinical practice. The device has potential benefits in enhancing nutrition, improving surgical outcomes and reducing costs of care for these complex patients. Further validation is in progress.

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## Studies in the mechanisms and therapy of post-operative ileus

J.A. Penfold<sup>1</sup>, Professor I.P. Bissett<sup>1</sup>, Associate Professor G. O'Grady<sup>1</sup>

1. Department of Surgery, Faculty of Medical and Health Sciences, The University of Auckland

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**Introduction:** Post-operative ileus (POI) is the most frequent complication following abdominal surgery. POI has a large economic impact and poses a significant clinical burden. Autonomic imbalance and electrolyte derangements are commonly associated with POI however, clear pathophysiology and therapies are limited.

**Objectives:** To i) introduce non-invasive electrocolonography ("ECoG") to investigate acute colonic dysmotility ii) conduct a systematic review on existing therapeutic methods for POI; iii) investigate the relationship of electrolytes and their role in POI pathophysiology.

**Methods:** ECoG techniques were developed, used in pre- and post-operative surgical patients and validated against high-resolution (HR) manometry. A systematic review was conducted to critically appraise the use of electrical stimulation to alleviate POI. A joint clinical and

theoretical study was undertaken to evaluate the relationships between postoperative electrolyte concentrations and POI occurrence.

**Results:** ECoG feasibility studies showed proof-of-concept and patient tolerance. These data were correlated with simultaneous HR manometry in three patients with approximately eight hours of data. The systematic review showed electrical stimulation appears to be a promising technique to improve post-operative GI recovery. Sodium and chloride trend downwards post-operatively. Cell models with a 10% reduction in extracellular NaCl demonstrated a 27% reduction in frequency of electrophysiological activity in interstitial cells of Cajal and smooth muscle cells.

**Conclusion:** ECoG is introduced and validated as a tool for non-invasively assessing colonic motility. Electrolyte correction and electrical stimulation offer useful directions for novel therapeutic interventions for POI. Future studies should apply ECoG in other settings and investigate non-invasive electrical stimulation for post-operative GI recovery.

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## Vision for the future: bioengineering transition zone stem cells into corneal endothelial sheets for transplantation

H. Ng<sup>1</sup>, J. Zhang<sup>1</sup>, A. Ahmad<sup>1</sup>, CNJ. McGhee<sup>1</sup>, DV. Patel<sup>1</sup>

1. The University of Auckland, Faculty of Medical and Health Sciences, Department of Ophthalmology

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**Introduction:** Corneal endothelial disease represents a significant healthcare burden in New Zealand. Corneal transplantation using limited donor tissue is the only available treatment. The recent discovery of putative corneal endothelial stem cells in the 'transition zone' of the cornea holds exciting potential for in vitro cell regeneration and subsequent therapeutic application. Our lab group has successfully isolated and expanded these transition zone cells in vitro and shown that cells can spontaneously differentiate into corneal endothelium by 24 weeks. The aim of this project was to optimise the cell culture protocol to accelerate this differentiation process into functional endothelium.

**Materials and Methods:** Transition zone (TZ) cells were isolated from human donor corneal rims and expanded in vitro. Different culture media were systematically trialed to optimise the cell differentiation protocol. Examination of the morphological cell features under light microscopy, immunohistochemistry, western blot and flow cytometry were used to assess differentiation into mature endothelial cells.

**Results:** TZ cells spontaneously differentiated into corneal endothelium by 24 weeks, with cells developing a characteristic polygonal shape and expressing functional endothelial cell markers. Addition of 'ROCK inhibitor' significantly increased the rate of cell proliferation and shows promise in accelerating cell differentiation.

**Conclusion:** Transition zone cells have the capacity to differentiate into functional endothelial cells and ROCK inhibitor may enhance this process. With further research, bioengineering this ethical source of stem cells may help to overcome the challenges associated with a limited donor tissue supply and provide timely treatment for patients with endothelial disease.

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## Exploring perceptions of nutrition education in Year 3 medical students at the University of Auckland

D. Mpe<sup>1</sup>, J. Crowley<sup>1</sup>, H. Bhoopkar<sup>1</sup>, C. Wall<sup>1</sup>

1. The University of Auckland, Faculty of Medical and Health Science, Discipline of Nutrition and Dietetics

**Background:** Globally, the rates of nutrition related diseases is on the rise. This has led to a call for doctors to provide nutrition care to patients. However, medical students are reported to be inadequately prepared to provide nutrition care. This study aims to investigate students' perceptions of the nutrition education they receive at medical school and to identify the gaps in knowledge to help inform students' specific needs.

**Method:** Thirty-five year three University of Auckland Medical students took part in six semi structured focus groups at the Grafton campus. Each focus group was audio recorded and transcribed verbatim. The constant comparative method was used to analyse data.

**Results:** Four inter-related themes emerged from students' responses. In "Doctors' role in providing nutrition care," students opined that patient centred barriers meant general practitioners were the most accessible and sources of nutrition advice. In "Medical nutrition education," students expressed that the nutrition education they had received was inadequate. In "Nutrition in a wider context," students recognised that nutrition behaviours existed in a larger context. Lastly, in "Recommendations to improve nutrition education," students expressed that there needed to be more time and resources allocated to nutrition care (i.e. more lectures, tutorials, resources for self-directed learning).

**Conclusion:** Students felt it important that doctors play a role in providing nutrition care. However, most students felt ill prepared to provide nutrition care. A more comprehensive incorporation of nutrition science in the medical curriculum is needed to improve the nutrition education of medical students.

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## Fixing the whare: whānau experiences and wider health benefits of a healthy home initiative

K. McKay<sup>1</sup>, K. Eggleton<sup>1</sup>

1. The University of Auckland, Faculty of Medical and Health Sciences, Department of General Practice and Primary Health Care

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**Introduction:** Limited qualitative evaluations of healthy home initiatives exist in the literature and even fewer look past physical health benefits to wider health outcomes. A qualitative evaluation of Manawa Ora, a healthy home initiative in Whangarei, was conducted to ascertain whānau experiences of a healthy home initiative looking particularly at the wider health benefits.

**Materials and Methods:** Participants of the Manawa Ora programme were recruited by staff members trained in the Manawa Ora process. Participant experiences were ascertained through qualitative semi-structured interviews and analysed using Charmaz's grounded theory method.

**Results:** Three main themes emerged from the semi-structured interviews. "Overcoming the system" describes the successful aspects of the Manawa Ora programme and the barriers participants face when dealing with organizations. "Not defined by illness" pertains to improved health, both physical and mental health, following the programme. It also describes the way participants have redirected their focus from their home and health towards other things. Finally, "From a simple space to a place with meaning" highlights the way the Manawa Ora programme improved the home environment and took a simple 'space' and created a 'place' that holds meaning.

**Conclusion:** Healthy home initiatives can improve physical health as well as wider health outcomes. The Manawa Ora programme has broken down barriers; barriers to accessing health services, barriers to achieving good health and broken down the perceived idea that health exists in isolation and isn't impacted upon by the environment.

## Prioritizing long-term outcomes for babies born preterm: The HIP survey

J. Kuo<sup>1</sup>, K. Petrie<sup>2</sup>, J.M. Alsweiler<sup>3</sup>

1. The University of Auckland, Bachelor of Medicine and Surgery (HONS)

2. The University of Auckland, Department of Psychological Medicine

3. The University of Auckland, School of Medicine, Department of Paediatrics

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**Introduction:** Preterm babies are at risk of both cognitive impairment and health complications in later life. Perinatal interventions may improve cognitive outcomes, but at the risk of worsening longterm health. Our aim was to determine what people believe are the most important long-term outcomes for babies born preterm.

**Materials and Methods:** An online survey was distributed among: clinicians taking care of preterm babies, parents of preterm babies and adult controls. Six variables were examined: education (finish secondary school), longevity (live to at least 70 years of age), wealth (enough money to pay for rent and food), normal weight, health (no significant chronic illness), and intelligence, using a hierarchy ladder, Likert scale and a hypothetical scenario. Data are n(%) and mean(SD).

**Results:** Between July and September 2018, 110 participants completed the survey (35 controls, 36 clinicians, 39 parents. Health was the most frequently top ranked variable on the hierarchy ladder (76/110(69.1%)). Clinicians were most likely to choose health as the most important outcome (clinicians 26/36(72.2%), controls 24/35(68.8%) and parents 26/39(66.7%), p=0.03). The most frequently chosen outcome for the scenario was the option of normal body weight, longest life span and lowest wealth (36/110(32.7%)). On the Likert scale (1-5, 5 being most important), education had the highest mean score overall (mean(SD), 4.34(0.83)). However, parents and controls scored health as the most important variable (mean(SD), parents 4.49(0.72), controls 4.29(0.71)).

**Conclusions:** Health was perceived as the most important long-term outcome for preterm babies. Future research should prioritise health outcomes for babies born preterm.

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## A fully automated segmentation algorithm for the volumetric analysis of perihematomal oedema in patients with spontaneous intracerebral haemorrhage

Natasha Ironside, MBChB<sup>1,2</sup>; Edward Sander Connolly, Jr., MD<sup>1</sup>; Ali Mirjalili, MD, PhD<sup>2</sup>

1. Department of Neurological Surgery, Columbia University Irving Medical Center, New York, New York

2. Department of Anatomy with Radiology, Faculty of Medical and Health Sciences, The University of Auckland, Auckland, New Zealand

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**Introduction:** Secondary injury is a significant contributor to morbidity and mortality in patients with spontaneous intracerebral haemorrhage (ICH). Perihematomal oedema is a radiologic marker of secondary injury in ICH patients. The aim of this study was to develop a fully-automated image segmentation algorithm for the volumetric analysis of perihematomal oedema.

**Methods:** From consecutive ICH patients that were enrolled in the Intracerebral Hemorrhage Outcomes Project between 2009-2017, a random sample of 500 CT scans was manually segmented by two independent users and split into training (4/5) and validation (1/5) sets. A fully convolutional neural network (CNN) architecture was constructed and its performance was tested using Dice similarity co-efficient and area under the receiver operator curve (AUROC) analyses. The time to

perform segmentation, at each instance, was recorded for both manual and automated methods.

**Results:** The training and validation sets comprised 4,915 and 1,229 volumetric slices, respectively. After a training time of 33,3340s, the CNN achieved an overall Dice ratio of  $0.935 \pm 0.041$ , sensitivity of  $93 \pm 5\%$ , specificity of  $91 \pm 5\%$  and AUROC of  $0.895 \pm 0.026$ . The mean time to perform segmentation was significantly lower for the automated ( $0.19 \pm 0.01$ s vs.  $900 \pm 60$ s;  $p=0.001$ ) upon comparison to the manual method.

**Conclusions:** CNN can accurately predict oedema in patients with spontaneous ICH at a significantly faster rate than manual segmentation. The application of this tool may permit the systematic investigation of periaxonal oedema in large, multi-center cohorts and provide reliable criteria for assessing the efficacy of novel treatments in ICH patients. External validation of the network is warranted.

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## Understanding the clinical utility of streptococcal serology for the diagnosis of group A streptococcus infections

E. Han<sup>1</sup>, A. Whitcombe<sup>1</sup>, N. Hamilton<sup>2</sup>, T. Proft<sup>1</sup>, S. Ritchie<sup>1</sup>, N. Moreland<sup>1</sup>

1. Department of Molecular Medicine and Pathology, Faculty of Medical and Health Sciences, The University of Auckland, Auckland
2. Middlemore Hospital, Counties Manukau District Health Board, Auckland

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**Introduction:** Immune sequelae of Group A Streptococcus (GAS) infections such as rheumatic fever and post-streptococcal glomerulonephritis utilise serological tests to aid diagnosis. Current tests measure antibody titres to two GAS antigens, streptolysin O (anti-SLO; ASO) and deoxyribonuclease B (anti-DNase B; ADB), but have limited predictive value in diagnosing GAS sequelae in endemic settings due to high background titres. SpnA is a cell-wall anchored, conserved GAS antigen that has recently shown potential as an additional serological marker for GAS infection. The aim of this study was to characterise the immunokinetics and specificity of anti-SpnA compared with ASO and ADB in bacteraemia patients to further inform clinical utility.

**Materials and Methods:** Adult bacteraemia patients infected with GAS ( $n=10$ ) or non-GAS Gram positive bacteria ( $n=15$ ) were recruited from Auckland City Hospital and Middlemore Hospital between March-September 2018 following informed consent (HDEC 17/STH/233). Serial serum or plasma samples were obtained over the disease course and the ASO, ADB and anti-SpnA titres were determined using an in-house multiplex bead-based immunoassay.

**Results:** All of the patients with GAS bacteraemia for whom two or more samples were obtained 7-days apart showed increased titres to 2 of the 3 antigens. Of the patients infected with non-GAS Gram positive bacteria, only those infected with the closely related Group C/G streptococcus showed elevated titres to the GAS derived antigens.

**Conclusions:** This study provides additional evidence on the value of anti-SpnA as an adjunct to current streptococcal serology and novel data with respect to GAS cross-reactive antibodies generated following non-GAS bacteraemia.

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## Bariatric surgery in New Zealand: a retrospective analysis of prevalence, post-operative medication changes and cardiovascular risk prediction

M. Garrett<sup>1</sup>, K. Poppe<sup>2,3</sup>, R. Murphy<sup>2</sup>

1. School of Medicine, Faculty of Medical and Health Sciences, University

of Auckland, Auckland, New Zealand

2. Department of Medicine, Faculty of Medical and Health Sciences, University of Auckland, Auckland, New Zealand
3. School of Population Health, Faculty of Medical and Health Sciences, University of Auckland, Auckland, New Zealand

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**Introduction:** Rising obesity rates are contributing to a significant healthcare burden in New Zealand. Bariatric surgery is an effective intervention for facilitating substantial weight loss. We aimed to analyse the annual volume and location of bariatric surgery in New Zealand and outcomes such as mortality, CVD events and alterations in medication utilisation by type of surgery.

**Methods:** Clinical data from New Zealand national hospital discharge codes for bariatric procedures were recorded for all patients from 1 January 2004 to 31 December 2017. Pharmaceutical data was limited to CVD medications dispensed within 6 months of the index surgery and at 1 and 5 years afterwards. The study dataset included demographic information, hospitalisations and deaths. The statistical software RStudio was used for data analysis.

**Provisional results:** A total of 9114 patients received their first bariatric procedure within this study period. Bariatric surgery increased from 34 and 4 procedures (in 2004) to 470 and 614 (in 2015) in public and private sectors, respectively. Gastric bypass (GB,  $n=3986$ ) and sleeve gastrectomy/gastric reduction (SG,  $n=8599$ ) were the most frequently coded procedures. The majority of publicly funded procedures have been completed by the Auckland region District Health Boards. GB and SG procedures have similar efficacy by medication reduction and equally low CVD morbidity and mortality.

**Conclusion:** Bariatric surgery is increasing in frequency in New Zealand, with similar outcomes between the two most commonly performed types of surgery SG and GB.

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## Acute Pancreatitis and Cx43 – the Effect of Lymphatic Drainage

L. Ferguson<sup>1</sup>, J. Hong<sup>1,2</sup>, J. Windsor<sup>1</sup>, A. Phillips<sup>1,2</sup>

1. Department of Surgery, Faculty of Medical and Health Sciences, University of Auckland
2. Applied Surgery and Metabolism Laboratory, School of Biological Sciences, Faculty of Science, University of Auckland

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**Introduction:** Multiple organ dysfunction syndrome (MODS) is the main cause of death due to acute pancreatitis (AP). During the course of AP, it is proposed that the intestine is damaged and releases toxic substances into its lymphatic fluid, which then negatively influence other organs, contributing to MODS. The mechanism for the organ toxicity is unknown but lymphatic drainage (LD) is reported to reduce critical illness severity. Pathological opening of Connexin 43 (Cx43) hemichannels participates in inflammatory pathways by activating the NLRP3 inflammasome complex, and may thus contribute to organ dysfunction. It is unknown if LD alters connexin expression or inflammasome activity.

**Aim:** To investigate if altered Cx43 expression is present in AP and altered by LD.

**Methods:** Nineteen male SD rats were randomised to four groups: Sham±LD and AP±LD. Subjects were anaesthetised, ventilated and supplied with maintenance fluid. AP was induced by taurocholic acid infusion into the pancreatic duct and in the LD groups lymph was drained from the mesenteric duct. Changes were analysed in physiology, biochemistry and organ oedema, as well as Cx43 and NLRP3 expression in the gut, kidney and heart by immunohistochemistry.



**Results:** The AP model was established and showed organ dysfunction and biochemical derangement. Cx43 staining was detected in all three organs studied and increased in the gut mucosa of AP animals. LD significantly improved pathological lung oedema, while its effect on Cx43 and NLRP3 expression is still unclear.

**Conclusion:** LD improved pathological AP lung oedema. Gut Cx43 was successfully detected and was altered by AP.

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## Novel transanal tubes for the prevention of anastomotic leak

C. Dumble<sup>1</sup>, G. O'Grady<sup>1</sup>, I. Bissett<sup>1</sup>

I. The University of Auckland, Faculty of Medical and Health Sciences, Department of Surgery

**Introduction:** Anastomotic leaks are the most important complication of colorectal surgery. Transanal tubes (TAT) have been proposed as a method to decompress the bowel and prevent leaks. However, results have been conflicting, most devices are not purpose-built, and data is lacking on the effect on anastomotic pressures.

**Materials and Methods:** A systematic review was conducted, critically appraising TAT use, design features and relationship to leak outcomes. 3D-CAD modelling and simulation was performed to achieve an optimised novel purpose-built TAT design. Fibre-optic manometry sensors were incorporated into a further TAT design to enable evaluation of absolute and manometric endoluminal pressures. Pre-clinical feasibility studies were also performed of a novel negative-pressure TAT bypass device in a porcine model.

**Results:** Systematic review demonstrated inconsistency in the use, design and outcomes of current TATs. Best-performing designs were employed as a design foundation. Further improvements were achieved by expanding drainage points with finite-element analysis employed to determine structural integrity. For the pressure measuring TAT device, A 15cm high-resolution sensor array was incorporated and validated. The negative-pressure bypass device was found to be a feasible alternative to stomas, but it caused anastomotic damage during insertion.

**Conclusion:** TATs may play a role in decreasing anastomotic leak and the need for stomas. A novel optimised TAT was created and is ready for feasibility testing, along with an adapted version for pressure monitoring. Design modifications and additional preclinical trials are necessary before the negative-pressure device is ready for human trials.

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## Alterations in glutamate receptor and transporter expression in the hippocampus in Alzheimer's disease

J. Yeung<sup>1</sup>, B. Calvo-Flores Guzman<sup>1</sup>, W.P. Tate<sup>2</sup>, H.J. Waldvogel<sup>1</sup>, R.L. Faull<sup>1</sup>, A. Kwakowsky<sup>1</sup>

1. Centre for Brain Research, Department of Anatomy and Medical Imaging, Faculty of Medical and Health Sciences, University of Auckland, Auckland, New Zealand  
2. Department of Biochemistry, University of Otago, New Zealand

**Background:** Alzheimer's Disease (AD) is the leading type of dementia. Currently the mechanism of AD is unknown. The glutamatergic system is extensively implicated in its pathophysiology but there is a lack of knowledge regarding the expression of glutamate receptors and transporters in AD. This study aimed to characterise expression of specific glutamate receptors and transporters in a mouse model of AD

and postmortem human brain tissue using immunohistochemistry and confocal microscopy.

**Materials and Methods:** AD and control post-mortem human brain tissue sections were obtained from the Neurological Foundation of New Zealand Human Brain Bank. For mouse work, C57Bl6 mice were bilaterally stereotactically injected with beta-amyloid, euthanised and tissue sections retrieved 30-days post-injection. Freefloating immunohistochemistry was used to quantify the density of specific glutamate receptor subunits and transporters in specific cell layers of hippocampal subregions.

**Results:** We report significant ( $P < 0.05$ ) decreases in density of glutamate receptor subunits GluA1 and the vesicular glutamate transporter VGLUT1 in the CA1 region of the hippocampus, specifically the str. oriens and radiatum, in the AD mice compared to controls. Glutamate receptor subunits GluA2, GluN1 and transporter VGLUT2 showed no changes in expression in AD mice. Quantification of GluN2A expression in human postmortem hippocampus revealed a significant ( $P < 0.05$ ) increase in expression in AD compared to control in the CA1 region, whilst glutamate transporter EAAT2 showed no significant differences between control and AD.

**Conclusions:** These findings indicate that expression of glutamatergic receptors and transporters show brain region specific changes in AD, suggesting altered activation mechanisms during neuropathology.

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## Relationship between recurrence of acute pancreatitis and pancreas size

S. DeSouza<sup>1</sup>, S. Priya<sup>1</sup>, J. Cho<sup>1</sup>, R. Singh<sup>1</sup>, M. Petrov<sup>1</sup>

I. The University of Auckland, Faculty of Medical and Health Sciences, School of Medicine, Department of Surgery

**Introduction:** Progression to chronic pancreatitis (CP) from first attack of acute pancreatitis (AP) via recurrent attacks is common. The absence of pathognomonic imaging findings in early CP makes risk stratification for transition difficult. Pancreas size (assessed by total pancreas volume (TPV) and pancreas diameters) is reduced in advanced CP but has not been investigated after AP. The aim of this study was to investigate pancreas size in individuals after clinical resolution of AP and their associations with number of AP attacks.

**Materials and Methods:** Individuals with a history of AP and healthy individuals were recruited. Those with a history of AP were grouped based on the number of attacks (1, 2 and  $\geq 3$  attacks). All participants underwent magnetic resonance imaging, from which 2 blinded raters measured TPV and pancreas diameters (across head, body and tail) independently. Generalised additive models adjusting for age, sex, body mass index and glycated haemoglobin were used.

**Results:** A total of 123 individuals were studied. Total pancreas volume and tail diameter were significantly reduced in both unadjusted [TPV ( $p = 0.036$ ), tail diameter ( $p = 0.009$ )] and adjusted [TPV ( $p = 0.026$ ), tail diameter ( $p = 0.034$ )] models in individuals with  $\geq 3$  attacks compared to healthy individuals, but not in individuals with 1 or 2 attacks. Head and body diameters did not differ significantly.

**Conclusion:** Reduced TPV and tail diameter in individuals after  $\geq 3$  attacks of AP may be one of the earliest morphological changes after AP. Individuals with  $\geq 3$  attacks of AP might represent a high risk population for transition to CP.

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## The architecture of the infant gluteal musculature

E. M. Breinhorst<sup>1</sup>, L. R. Bradshaw<sup>1</sup>, N. S. Stott<sup>1</sup>, A. M. R. Agur<sup>2</sup>, S. A. Mirjalili<sup>1</sup>

1. University of Auckland, Auckland, New Zealand  
2. University of Toronto, Toronto, Canada.



**Introduction:** Gluteus maximus (Gmax), medius (Gmed) and minimus (Gmin) together form a large and functionally important muscle group. Synergising to stabilise the hip, individually they extend (Gmax) and abduct (Gmed and Gmin) the hip. Intramuscular architecture is an indicator of muscle function and how the architecture of the infant gluteal muscles differs to the adult has not been studied. The objective was to quantify the architecture and function of the infant gluteal muscles.

**Materials and Methods:** One infant (6 months-old), formalin embalmed specimen was used. After exposing the gluteal muscles, fibre bundles, tendons and aponeuroses were volumetrically dissected, digitised (Microscribe G2X) and modelled in 3D (Autodesk® Maya®). Architectural parameters were quantified; physiological cross-sectional area (PCSA), pennation angle, fibre bundle length and muscle volume (MV).

**Results:** Infant Gmax had one distal aponeurosis and three partitions. Gmed had one aponeurosis anteriorly while Gmin had two (anterior and distal); Gmed and Gmin both had four partitions. Architectural parameters differed between intramuscular partitions as well as between whole muscles, e.g. the ratio of MVs was approximately 9:2:1 (Gmax:Gmed:Gmin) however the ratio of PCSAs was approximately 4:2:1.

**Conclusion:** Each infant gluteal muscle had unique morphology and architecture which was distinctly different to the adult as described in literature. Architectural data suggest the infant muscles have different functional capabilities to the adult's. This is the only 3D volumetric study of the infant gluteal muscles and may provide insight regarding normal muscle development and developmental pathologies during childhood.

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### A three-dimensional study of infant gastrocnemius and soleus architecture

L. R. Bradshaw<sup>1</sup>, E. M. Breinhorst<sup>1</sup>, N. S. Stott<sup>2</sup>, A. M. R. Agur<sup>3</sup>, S. A. Mirjalili<sup>1</sup>

1. The University of Auckland, Faculty of Medical and Health Sciences, Department of Anatomy and Medical Imaging
2. The University of Auckland, Faculty of Medical and Health Sciences, Department of Surgery
3. The University of Toronto, Faculty of Medicine, Department of Surgery, Division of Anatomy

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**Introduction:** Gastrocnemius and soleus are important muscles in gait and maintenance of posture. However, their architectural development is unknown. Developmental knowledge may improve understanding of disorders that impair development of muscle architecture (e.g. cerebral palsy). Therefore, the aim was to determine the 3D spatial relationships of the fibre bundles (FBs), aponeuroses and tendons of an infant gastrocnemius and soleus and quantify their architectural parameters.

**Materials and methods:** Gastrocnemius and soleus from the right leg of one 6-month-old, formalin embalmed specimen, were serially dissected and digitised (Microscribe® G2X) in situ. 3D models were created (Autodesk® Maya®) and the architectural parameters, fibre bundle length, pennation angle (PA) and physiological cross-sectional area computed.

**Results:** The medial (MG) and lateral (LG) heads of infant gastrocnemius had mean PAs of 17.1° and 10.4°. Infant soleus had marginal, posterior and anterior partitions, with mean PAs of 13.4°, 16.4° and 23.6°, respectively. Distal attachment of the anterior partition was to the medial aspect of a tendon joining the calcaneal tendon (CT) distally.

**Conclusion:** Significant architectural differences were evident when compared to the adult. Mean PA of MG and LG are approximately 2.4x and 1.5x greater in the infant. For soleus, mean PA of the marginal partition is approximately 2.5x greater in the adult. Additionally, distal attachment of adult anterior partition is to the medial and lateral sides of a septum joining the CT. As the first volumetric study on infant gastrocnemius and

soleus architecture, further work is needed to elucidate architectural development from infant to adult.

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### In pursuit of precision: Validating determinants of sensitivity and resistance to the drug trastuzumab emtansine for HER2-positive breast cancer

Hilary Barker<sup>1</sup>, F. Hunter<sup>1</sup>, S. Jamieson<sup>1</sup>, B. Lipert<sup>1</sup>

1. The University of Auckland, Faculty of Medical and Health Science, Auckland Cancer Society Research Centre

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**Introduction:** Trastuzumab emtansine (Kadcyla®/T-DM1) is an antibody-drug conjugate consisting of the Herceptin® antibody linked to a potentially cytotoxic drug. T-DM1 shows significant efficacy in HER2-positive breast cancer patients, extending survival with lower toxicity. However, approximately 60% of patients show intrinsic resistance to T-DM1 and acquired resistance develops in all cases. Greater understanding of the mechanisms of sensitivity and resistance could identify predictive biomarkers, with the possibility of improved response rates in precisely selected patients.

**Materials and methods:** i. Methodology for high-throughput production of clonogenic CRISPR-Cas9 knockout breast cancer cell lines was explored. ii. 14 top gene hits identified in genome-scale screens for T-DM1 were investigated in public databases for their expression, copy number and influence on clinical outcome in breast cancer patients. iii. Eight drugs targeting pathways identified in genomewide screens were tested for their effect in combination with T-DM1.

**Results:** i. A method for high-throughput generation of clonogenic CRISPR-Cas9 knockouts was developed and implemented. 42 lentiviral vectors containing Cas9 and sgRNAs targeting 14 genes were produced and transduced into the MDA-MB-361 breast cancer cell line. ii. Gene hits had varied expression and copy number in breast cancer patients, with SLC46A3 expression, SLC46A1 amplification and TCL1A expression associated with differences in survival outcome. iii. RTA-408, GSK26992A and MK-1775 are antagonistic and Volasertib and KU-55933 display moderate synergism, in combination with T-DM1.

**Conclusions:** Clonogenic CRISPR-Cas9 knockout breast cancer cell lines can be generated in a high-throughput manner. The 14 genes must be further validated for their influence on T-DM1 efficacy.



## 2018, a proud year to be a medical student

### Jibi Kunnethedam

School of Medicine  
Faculty of Medical and Health Sciences  
University of Auckland

> Jibi is the President of the NZMSA and a fifth-year medical student at the University of Auckland, Taranaki Campus. He is an undergraduate student originally from Oamaru, who has served on the New Zealand Medical Students Association (NZMSA) executive since 2015. Jibi is also a member of the Doctors in Training Council, the New Zealand Medical Association (NZMA) board and serves the Ministry of Health as a member of the Professional Behaviours Taskforce and Medical Workforce Advisory Group. Outside of medicine, he enjoys letting off some steam on the sports field as a keen footballer and cricketer.

Reviewing our progress this year as a national student body is a matter entailed with immense satisfaction and pride. This year we have achieved significant milestones in the areas of both advocacy and representation. These were manifested in the form of our successful campaign extending the equivalent full-time student (EFTS) cap for our membership and establishing a student position with full voting privileges on the board of the NZMA. This further strengthened our purpose of uniting, representing, and empowering the medical students of New Zealand.

Our most publicised victory this year has been the extension of the EFTS cap to ten EFTSs. This was a matter that affected a significant proportion of our whānau in a rather personal manner, with many having to seek out various forms of financial support. We had been campaigning on this issue for a number of years and after a mammoth effort by the entire student body in 2015, we managed to convince the National party to extend the cap from seven to eight EFTSs. At the time this showed that our efforts were not going astray, unfortunately it still left a significant number with financial stress to confront. Our membership requested further work on this issue and we heeded the call as we amped up our campaign into the next phase. Our prime window of opportunity came with the 2017 general election, where the Labour party promised to meet our expectations in their successful bid for government. We were disappointed to see that cap remain unchanged at the 2018 budget and we retaliated accordingly through our media contacts. Following this, we engaged in further discussion with the appropriate government offices and we proudly announced that our long campaign had been successful, as the government confirmed an extension to ten EFTSs in July this year.

Another major area of progress for medical students in 2018 has been the establishment of a student representative with full voting privileges on the board of our national Medical Association. This achievement marks a giant leap for medical student representation in advocating for

health matters of national significance. As members of the NZMSA, we are also all members of the NZMA and in the past our voice in the operations of our parent organisation has been limited to the voice of our president on the Doctors in Training Council (DiTC). In recent times the importance of having our voice heard and protected at the board table became apparent. Through the diplomatic diligence of our senior leaders we were proud to announce the establishment of a permanent student voice for the board. In particular, the work of former presidents Liz Berryman and Kieran Bunn on this matter must be applauded. I would also like to acknowledge the DiTC for their support, and NZMA themselves for taking this step to ensure student representation on this frontier. It is a privilege to be our first student representative in this capacity and I look forward to embarking on this journey with the rest of the NZMA board.

We also proudly announced the winners of the inaugural New Zealand Teaching awards earlier this year at our annual conference. This award is an example of our growing partnership with senior organisations, and was an excellent way to recognise the best clinical teachers we have in our medical community. We wish to acknowledge all the fantastic teachers and leaders we have in our community, and want to encourage everyone to grow and aspire to be a positive force in the development of one another as future doctors, teachers, and leaders within the health workforce.

This year we also continued to be a strong voice within the Ministry of Health. Our roles with Health Workforce NZ and the Professional Behaviours Taskforce continue to be important areas moving forward. This year we continued to advocate for the availability of postgraduate year one jobs for our domestic graduates and were proud to see that all but one domestic graduate received an Advanced Choice of Employment match in the first round of offers. We have also been

discussing the implementation of a new reporting system for bullying in hospitals for University of Auckland students. More information on this will be announced in due course.

Finally, the reason 2018 has been so incredibly successful is due to each and every medical student that unites to form what is the NZMSA. As medical students we are amongst the most privileged students in this country, and I believe the vast majority of us uphold our title as medical students with true integrity and pride. Our reputation is paramount to our success as a collective body. The way we act and interact with our colleagues and patients in all the hospitals scattered throughout the country is what gives us this reputation and the privilege of such a powerful voice. Continue serving our title, and our voice will only continue to be strengthened.

It has been a pleasure to be your national president for 2018, and I look forward to seeing what 2019 holds for us all.



*Pictured: Jibi Kunnetedam – President NZMSA, Dr Aaron Ooi – RMO award winner, Dr Helen Pike – SMO award winner, Dr Kate Baddock – Chair NZMA.*

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Te Hautaka o ngā Akongā Rongoā



## Interview with a cardiothoracic surgeon, Professor Sean Galvin

### Dr Cheyaanthan Haran

House Officer  
Wellington Regional Hospital  
Capital and Coast District Health Board

> Chey graduated from the University of Auckland last year, where he was the 2017 Editor-in-Chief of the New Zealand Medical Student Journal (NZMSJ). Chey is interested in pursuing a surgical career where he can incorporate education and teaching. He was invited to provide the inaugural interview as part of the new NZMSJ interview series.

Prof Galvin is a Consultant Cardiothoracic Surgeon at the Wellington Regional Heart & Lung Unit, Wellington Regional Hospital, New Zealand (NZ). He graduated from the University of Otago in 2002 and obtained his fellowship in Cardiothoracic Surgery with the Royal Australasian College of Surgeons (RACS) in 2012. He is the supervisor of training for Cardiothoracic Surgery at the Wellington Regional Hospital, the NZ younger fellows representative on the RACS younger fellows committee, a member of the RACS Board of Studies for Cardiothoracic Surgery, the RACS NZ regional committee and the Wellington representative on the NZ National Cardiac Surgical Clinical Network. Prof Galvin holds clinical investigator and research positions with the Centre for Translational Physiology at the University of Otago, Gillies McIndoe Research Institute, and Victoria University of Wellington, and is involved with multiple editorial boards in international journals.

*You're a cardiothoracic surgeon, so what does that mean and what do you do?*

A cardiothoracic surgeon is a surgeon who deals with problems of the heart and lungs. For us, a significant portion of our workload is cardiac surgery, dealing with people with coronary artery disease, valvular heart disease, or thoracic aortic problems. Then another big part of the practice is lung surgery, so managing patients with lung cancer, benign diseases of the lung, mediastinal tumours, and chest wall difficulties or deformities. So in essence, it's pretty much a surgeon who deals with problems between the diaphragm and the neck.

*Why did you choose cardiothoracic surgery?*

It's a specialty with a good mix of critical care and surgery. It's highly technical surgery, there's a lot of fine motor skills and precision required in the operating room. There's a lot of collateral skills required to look after sick patients. I always enjoyed intensive care, emergency medicine, and cardiology when I was a registrar. Cardiothoracic surgery brings together a lot of those critical care issues in a surgical setting.

*What do you most enjoy about your job?*

I did a lot of general, vascular, upper gastrointestinal, and hepatobiliary surgery through my training and really enjoyed all of them. In cardiothoracic surgery you make an immediate difference to someone's quality of life. Often people come in with a fairly catastrophic problem or a new and life-threatening diagnosis, and most of them walk out of hospital dramatically better than when they came in. So it's really a dramatic, early effect on people's quality of life. And also, you know, to be able to take someone to the operating room who doesn't have too many other options and make a difference to them is quite important.

*What are the challenges you face on a day-to-day basis?*

I think some of the big things for us are the new technology, increasing cost of health care, managing more complex patients in the setting of increased resource constraints, and trying to do the best for every person in a limited health-care environment. So even if you take the example of transcatheter aortic valve implantation (TAVI)\*, it is a lot more expensive than surgical aortic valve replacement, but for the people we do it on, it makes a huge difference to their life. So it's about balancing the need of the individual patient with the most appropriate resources available.

*Say, for example, you're in a case where you're at a time critical component of the surgery, there's a lot of blood around and the pressure is mounting. How do you stay composed as a surgeon?*

I think there's always going to be difficult scenarios but the thing about any type of surgery or specialty is that it becomes very routine. While probably 90% of cardiac operations might to an outsider look difficult and stressful, it's actually routine for the surgeon so there's only a small proportion that's sort of stressful. One of the important things is to have a strong team of people around you, a good registrar, good nurses and a good working relationship with the anaesthetist. In cardiac surgery as a specialty, there is a particularly close relationship between all members of the team, both within and outside of the operating theatre. So that really helps you cope with all those problems. There're always going to

be situations that push people or test people and I think having a team around you helps with that.

*Speaking of the team, you have a perfusionist as well. Who is a perfusionist and how crucial are they in cardiac surgery?*

A perfusionist is someone who manages the cardiopulmonary bypass machine; a machine that temporarily takes over the function of the heart and lungs. They are a critical part of the team. You know, we couldn't operate without them. We work very closely with them and we have good relationship with them. You have to have a good perfusionist to have a successful cardiac surgery program.

*Can you describe a typical day as a cardiothoracic surgeon in New Zealand (NZ)?*

Most of us get up early. Because our operating lists can be ten hours long, you try and get a lot of your tasks done before you get to the operating room. So typically we come to work, do ward rounds, and try and get to multi-disciplinary meetings. Our lists usually start between 8.15am and 8.30am. There're usually two cardiac cases in a day. That might be a bypass graft and a valve. Or it might be a single bigger case like a triple valve, or big aortic case. We often do thoracic lists, and in general, we do between two and three major thoracic cases a day. We usually finish around 6:00pm, then see the pre-ops for the next day, trying to fit in paperwork and other bits and pieces in between times.

We then have non-operating days, which involves a lot of the administrative stuff and seeing patients in clinic. Triaging referrals, doing college work, supporting the registrars, and going through the various training issues they need to be helped with. So it's a pretty full-on week usually.

*Now that you've touched on training, what's it like in NZ?*

NZ has typically got a pretty good training scheme. One of the disadvantages of sub-specialty training in Australasia can be the number of people that are around. Say, if you go to a big unit in Sydney or Melbourne, you might have a couple of senior house officers, a couple of unaccredited registrars, a couple of trainees, a couple of fellows, a couple of Medical Officer of Specialist Scales (MOSS), and then the consultants. In NZ there's a much closer relationship in cardiac surgery between the trainees and the surgeons. Typically if you look at trainee experiences, NZ rates very highly as a place to train. And I think the people that are produced in NZ are very well-trained surgeons.

*Are there research opportunities and opportunities to train abroad?*

I think research is something that's sort of a continual thing in cardiac surgery. It's a very heavily studied specialty in terms of outcomes, new technology, and research. So if you look all around the world, some of the biggest and most established registries in surgery are cardiac-surgical registries. In NZ, we have a national group that coordinates research. Our unit enrolls in a number of international trials and a number of them in combination with intensive care. There's a lot of outcome-based research that goes on.

With regard to working overseas, most New Zealanders would leave in their training or after their training for overseas fellowships. A lot of people come back, but some stay overseas. Australia is a pretty tight job market to break into long-term, but it's a very good place to go for fellowship work. There's a lot of job opportunities in the United States (US) for cardiac surgeons, especially ones that are well trained. Europe is a pretty good place to go to for fellowships as well. There's a lot of people now going to places in Asia like Hong Kong, especially for the thoracic surgery experience.

*Where do you see the future of cardiothoracics?*

I think cardiothoracics is evolving. It's historically been a very open surgical specialty. But there's a growing interest in minimally invasive techniques and transcatheter therapies. So the new generation of cardiac surgeons are likely going to be dual trained with wire skills and endovascular skills. A lot of that has been driven by transcatheter valve therapies. Even in my cohort, there's a group of cardiac surgeons who are primary TAVI operators in Australia and in the US. So you're going to see an evolution and a lot more sub-specialisation in people becoming specialists, in maybe thoracic, aortic, minimally-invasive, and valvular-heart-disease surgery. There is always going to be room for generalist cardiothoracic surgeons, but in the larger units there is going to be more of a push for sub-specialisation.

*What's the work-life balance like for you?*

Work-life balance is important. It's a bit more difficult in cardiac surgery, just because of the length of the operations and the amount of operating we do. But it's important to maintain a work-life balance in terms of outside interests and other things you do. It's just finding the sweet spot for the individual person depending on what specialty you do.

*If you weren't in surgery, what would you be doing?*

Probably either travelling or teaching, or a combination of the both!

*That brings us to our final question, what would be your take home message for medical students?*

I think cardiac surgery as a career is extremely rewarding. It's a pretty demanding specialty and it's pretty competitive to get in to training. However, there's been a real resurgence in people interested in cardiac surgery. So we're interviewing a lot of people now for limited training spots. I would certainly suggest getting some exposure to it as part of your training, in particular if you're interested in highly technical surgical specialties, but also if you find the management of sick patients interesting. If you're thinking about cardiac surgery as a career option, then you need to start planning early and structuring your career to get involved with some good mentors to push you in the right direction.

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\* TAVI: A procedure where you wedge a replacement valve into the position of the aortic valve via a long catheter through a peripheral artery or a small incision through the chest.

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More information about cardiothoracic surgery can be found at the following links:

- Royal Australasian College of Surgeons (RACS), for Cardiothoracic Surgery programme details: <https://www.surgeons.org/surgical-specialties/cardiothoracic/>
- Health Workforce New Zealand, for workforce statistics: <https://www.kiwihealthjobs.com/rmo/pdf/Cardiothoracic-Surgery.pdf?pdf=Cardiothoracic-Surgery>
- Australia and New Zealand Society for Cardiac and Thoracic Surgeons, for society specific information: <https://anzscts.org/>



# The colourful dimensions of ethnic dermatology

## Dushiyanthi Rasanathan

School of Medicine  
Faculty of Medical and Health Sciences  
University of Auckland

➤ Dushiyanthi Rasanathan is a final year medical student based at Middlemore Hospital. Prior to studying medicine, she undertook a Bachelor of Health Sciences, with an interest in Asian health. She completed her fifth-year selective placement in dermatology at London's Chelsea and Westminster Hospital. Outside of medicine, Dushiyanthi enjoys travelling, writing and reading.

## Introduction

The skin is the organ most linked with our sense of appearance and identity. It therefore impacts tremendously upon our quality of life. Skin pathology exists across different ethnicities, however, the manifestations of these can vary between groups. During my selective placement in dermatology, I saw how different skin presentations could vary in their appearance, prognosis, and treatment according to ethnicity. Researching this, I came across the work of Dr Ophelia Dadzie and her special interest in ethnic dermatology. A year after corresponding with Dr Dadzie, I was fortunate to meet with her in the United Kingdom (UK) following my elective placement this year. Our discussion cultivated my interest in this emerging field and led me to realise how ethnic dermatology is highly relevant to New Zealand's (NZ) population.

Dr Ophelia Dadzie is a consultant dermatologist and dermatopathologist at North West London Pathology, Imperial College Healthcare NHS Trust (Hillingdon Hospital Site) in London, who has a special interest in ethnic dermatology. She has been the editor of several textbooks and has spoken internationally on this subject. She is also the founder and director of London Ethnic Skin Limited. For part of her training, Dr Dadzie travelled to the United States of America (USA) where for the first time she was met with the consideration of skin of colour in dermatology. 'I'd never previously thought about cutaneous diversity and how skin conditions could have different presentations. Being of African descent, I also had a personal interest.' Dr Dadzie realised how several of the needs of people with darker-coloured skin were not being met. She had begun to recognise that problems existed with understanding how pathologies in darker skin could present differently and how complex issues can arise with darker skin. Thus, Dr Dadzie's passion for alleviating skin inequities in dermatology was born. Inspired by this exposure and new way of thinking about dermatological presentations, Dr Dadzie returned to the UK and began research to identify and substantiate the issues concerning ethnic dermatology.

The need for thinking about ethnic dermatology stems from the historical background of dermatology itself. Clinical dermatology emerged as an independent discipline in Europe during the 19th and 20th centuries.<sup>1</sup> These were periods in which anthropologists and philosophers categorised groups within humans, being significantly influenced by

social ideas at the time. They strongly argued for the hierarchal ranking of these racial groups.<sup>2</sup> The classical descriptions and morphology of skin conditions were therefore developed within this context and are consequently based on patients with lighter skin.<sup>3</sup> Since then, awareness of the diversity of skin colour across the world has increased. Interest in the differences in presentations of the skin between different groups has also increased. But many of the terminologies and classifications within dermatology have not evolved, and do not pertain to variation in darker skin presentations.<sup>2</sup> Furthermore, traditional dermatology does not encompass several of the social and cultural issues for people with darker skin. Culture has an immense influence on a patient's perspective towards disease, doctors, and treatment.<sup>4</sup> There are several health practices and social views within each ethnic group that can ultimately influence a patient's skin. It was to encompass and address these issues, that the idea of ethnic dermatology was born.

## Defining ethnic dermatology

Ethnic dermatology was a term coined by Dr Dadzie because she felt strongly that 'if you don't name an issue, it becomes very hard to find ways to change things'. It is an area of interest within dermatology that 'is dedicated to the presentation, diagnosis and management of skin disorders in patients who have richly pigmented skin with similar cutaneous characteristics'.<sup>3</sup> Literature from the USA uses the analogous term of 'skin of colour dermatology'.<sup>3</sup> In comparison to the term 'skin of colour', ethnicity is defined as 'the ethnic group or groups a person identifies with or has a sense of belonging to. It is a measure of cultural affiliation, in contrast to race, ancestry, nationality, or citizenship'.<sup>5</sup> Ethnicity is self-identified, and an individual may belong to more than one ethnic group.<sup>5</sup> Dr Dadzie uses the term 'ethnicity' because she recognised that 'ethnicity does not pertain to race and genetics, but it also encompasses culture. And there are some cultural aspects that we need to consider in dermatology'. To demonstrate this, Dr Dadzie highlights the example of Central Centrifugal Cicatricial Alopecia (CCCA), which causes alopecia, scarring on the scalp, and often permanent hair loss. Importantly, CCCA is more prevalent in people with afro-textured hair but is also partially related to hair-grooming practices such as braids and cornrows.<sup>3</sup> In this way, ethnic dermatology highlights the importance of genetics, biology,



and cultural practices on the skin conditions that we see.

However, the term of 'ethnic dermatology' does not come without its limitations. The term 'ethnic' can be controversial in terms of its meaning.<sup>6</sup> Should patients be considered in the ethnic groups that they self-identify with? For research purposes, how can we make statements of measure when people are able to identify with more than one group?<sup>6</sup> Ethnic dermatology is a non-specific term that is meant to represent an incredibly heterogeneous group who share the sole commonality of having darker or non-Caucasian skin.<sup>7</sup> Furthermore, skin colour is really a continuous, rather than categorical variable.<sup>2</sup> At what point can someone be considered to have 'ethnic' or 'richly pigmented' skin? It is indeed difficult to find a term that addresses these issues and still encompasses the cultural considerations of ethnicity.

There is comparably very little research and emphasis on ethnic dermatology outside of the UK and USA. However, it is a greatly applicable topic in NZ. We are a country with incredible diversity in skin colour. Our Māori population is a unique part of this. At the time of the 2013 Census, Māori made up 14.9% of the population.<sup>5</sup> Aside from Māori, the number of people in NZ from other ethnic backgrounds is also notable. The Asian ethnic group made up 11.8% of the population in 2013, increasing from 9.2% in 2006.<sup>5</sup> The Pacific ethnic group was the fourth largest in 2013 after the European, Māori, and Asian ethnic groups.<sup>5</sup> The ethnic mix of our population is increasing as well. In 2013, 25.2% of people in NZ were born overseas, which was an increase of 303,159 people since 2001.<sup>5</sup> The ethnic diversity in NZ is therefore considerable and is continuing to grow. This has immense implications for the skin presentations that we see in medical care.

### Skin presentations

It is now worth considering some of the differences in skin presentations across ethnicities. Melanin encompasses several biological pigments and is the key determinant of skin colour. It is synthesised in the basal layer of the epidermis by melanocytes. All skin has melanin, but the darkness of the skin is dependent upon variation in the amount and composition of that melanin.<sup>1</sup> In darker skin, the size, shape, and production rate of melanocytes is greater than in lighter skin.<sup>1</sup> The enzyme tyrosinase catalyses the production of melanin and has higher levels of activity in darker skin.<sup>3</sup>

When recognising the dermatological differences between ethnic groups, skin colour has several implications. Skin colour influences the diversity in the structure of the skin. For example, darker skin tends to have a thicker dermis layer and smaller collagen fibres.<sup>8</sup> Darker skin provides greater protection from ultraviolet (UV) exposure than fairer skin, because there is a larger amount of melanin in keratinocytes.<sup>2</sup> Skin colour also correlates with aging patterns for ethnic groups. Darker skin has more melanin contained in larger melanosomes. These tend to be degraded slower and with enzymes acting differently upon melanosomes of darker skin.<sup>2</sup>

There are other notable features of interest in skin between ethnicities. The effects of socioeconomic status (SES) on ethnic dermatology must be considered. The literature is consistent in the phenomenon that members of an ethnic majority in a country will tend to experience better health, including a lower prevalence and severity of skin conditions, than ethnic minorities.<sup>8</sup> Differential access to adequate nutrition, early dermatology care for skin presentations, and the ability to afford treatment as necessary are all factors that contribute to this inequity.<sup>9</sup>

The differences in skin presentations between ethnicities can be illustrated with the example of atopic dermatitis or eczema. Eczema is a common skin condition in NZ and manifests as itchy, dry skin, with erythema visible in fair skin. Erythema occurs due to dilated capillaries that cause subsequent reddening of the skin. This is a classical description of eczema. However, in more pigmented skin, eczema more commonly

presents as patches of darkened skin colour. This is because inflammation in darker skin results in the release of inflammatory mediators that can increase the melanogenic function of the melanocyte.<sup>7</sup> This subsequently causes an overproduction of melanin, resulting in post-inflammatory hyperpigmentation.<sup>1</sup> Hyperpigmentation that is instigated by inflammation tends to be more distinct and persistent in ethnic skin.<sup>4</sup>

Research indicates that darker-skinned and Asian children are more likely to develop eczema during the first six months of life than European children.<sup>3</sup> Eczema appears to be more prevalent in darker skin.<sup>1</sup> Dr Dadzie describes how the severity of eczema can be underestimated in richly pigmented skin. This is owing to the difficulty of perceiving erythema, as well as post-inflammatory hyperpigmentation being more common than the classically described erythema. This has tremendous implications for the impacts upon the sufferer's quality of life.<sup>3</sup> Thus the aim of managing eczema in ethnic skin relies on knowledge of how presentation may differ in ethnic skin, as well as early initiation of treatment to prevent post-inflammatory hyperpigmentation.<sup>7</sup>

### Skin cancer

Skin cancer is a topic where ethnic dermatology is highly relevant. NZ has high rates of skin cancers, including the greatest incidence of melanoma in the world.<sup>10</sup> Due to the greater protection from UV exposure that darker skin is afforded, a misconception is often made that darker skin is not at risk of skin cancer.<sup>2</sup> In reality, ethnic skin faces a significantly higher risk of mortality from certain skin malignancies than Caucasian populations.<sup>9</sup> Skin cancers in ethnic populations often present at an advanced stage with subsequent poorer prognosis than skin cancers in lighter-skin populations.<sup>2</sup> It has also been found that skin cancers will often present atypically in ethnic populations.<sup>2</sup> Here in NZ, the Māori and Pacific populations have a lower incidence of melanoma than NZ Europeans, but their melanomas are often thicker and more extensive at the time of diagnosis.<sup>10</sup> The thickness of the tumour is the major prognostic indicator of melanoma.<sup>9</sup> A study by Sneyd and Cox analysed all melanoma registrations in NZ between 1996–2006. It was found that the geometric mean tumour thickness of melanoma was 1.28 mm and 2.06 mm in Māori and Pacific groups respectively, compared to 0.91 mm in the European group.<sup>10</sup> Māori in this study were also more likely to present with thicker melanomas with a nodular pattern, and to have regional or lymph spread.<sup>10</sup> Despite the misconception that skin cancers do not affect populations with darker skin, ethnicity remains an important consideration in skin cancer in NZ due to the higher rates of delayed diagnosis and mortality.

### Skin colour and skin lightening products

An important aspect of ethnic dermatology is the perception of skin colour. Cultural definitions of beauty vary from culture to culture. The perception that lighter skin is more socially desirable is notable, particularly amongst Asian and African cultures. Fair skin is often viewed as a sign of greater SES in several cultures.<sup>2</sup> Dr Dadzie explained that these are often deeply entrenched beliefs within an ethnic population, with historical events preceding them. 'I think the stem behind these beliefs is the remnants of colonialism. A lot of these countries where these ethnicities originated from had a history of colonialism – where the European population were in a better place, in positions of greater status. So, the longstanding view is that lighter skin is associated with doing better in life. There is that legacy there.' Despite changing times, that legacy sadly continues with advertising amongst several of these ethnic groups, promoting lighter skin as a standard of wealth, power, modernity, and well-being.<sup>2</sup> For instance, actors within Indian film industries tend to have fairer skin than the average population. They are commonly sought after for their endorsement of products ranging from cookware to beauty products, thereby cultivating the association between skin colour and SES.

Arising from these perceptions of skin colour is the existence of skin

lightening or bleaching products. Skin lightening involves cosmetic use of a range of agents to lighten normal pigmented skin.<sup>2</sup> Dr Dadzie considers the use of these to be a worldwide public-health issue. In Bamako, Mali, a prevalence study estimated that 25% of the female population currently used skin-lightening agents.<sup>11</sup> Products especially marketed for skin lightening are widely available in the Middle East, Asia, and South America.<sup>11</sup> Several of these products are easily obtainable here in NZ, sold in several ethnic stores and supermarkets with no legal restrictions.

The two agents used in these skin-lightening products are hydroquinone-based compounds and steroids, most commonly 0.05% clobetasol propionate. Mercury and caustic agents were formerly key components, but are becoming less common.<sup>2</sup> These components of skin-lightening products come with their own profile of adverse effects. Paradoxically, periorbital hyperpigmentation is the most common side effect of applying hydroquinone on the skin.<sup>11</sup> Application of high-dose steroids on the skin can also result in immunosuppression of the skin, with subsequent skin infections including cellulitis, scabies, and superficial bacterial pyoderma.<sup>2</sup> Steroid-induced acne and skin atrophy are also complications linked with the long-term use of steroids.<sup>11</sup> Systemically, high dosages of topical steroids have been linked with reports of a negative feedback on endogenous cortisol secretion, as well as induced hypercortisolism and adrenal insufficiency.<sup>11</sup>

Some literature reports concern about skin-lightening creams being used in pregnancy and on children.<sup>4</sup> Alarmingly, Dr Dadzie has heard of cases where these products have been used on infants.<sup>11</sup> Dr Dadzie feels that awareness exists about some of the adverse effects of these products, but that people are willing to face these risks due to the perceptions of skin colour as described previously: 'When you have these deeply entrenched messages in a society, everyone wants a better life. So, if they think they will have a better life by using these skin-lightening agents, they partake in it even though they may scar or have side effects. It is so much about social advantage.' Awareness of these products and their side effects is an important consideration when assessing a skin presentation, such as persistent acne. Dr Dadzie recommends going back to the basics of good history-taking technique. This includes asking open-ended questions and using a flexible non-judgmental approach to enquire about the use of alternative medications and treatments. 'Be aware that for some people, there is shame associated with usage and even shame with confessing to using these products to a doctor.' Dr Dadzie also stresses the importance of having the willingness to ask and learn about unfamiliar treatments that your patient may mention. Being able to elicit these details greatly improves management plans and eventual outcomes for these patients.

### The future

Dr Dadzie's focus for the future of ethnic dermatology lies with ongoing research and specific training in ethnic dermatology for doctors. In a survey conducted amongst UK trainees in dermatology in 2013, 95% acknowledged that unique, specific dermatological conditions existed in ethnic skin.<sup>12</sup> However, only 49% of the respondents believed that they would be competent in treating the ethnic population of the UK at the end of their vocational training.<sup>12</sup> Dr Dadzie's views on the impact of the UK's evolving population on dermatology are easily applicable to that of NZ. 'We need to appreciate the fact that our population is changing and that there is a lot of genetic diversity. It is not just about migrants from different countries coming here, it is also admixture – so about generating new genotypes and phenotypes on a daily basis.' Ethnic dermatology encompasses the unique presentations, biological features, and cultural issues pertaining to skin in ethnic groups. But what underlies ethnic dermatology, in the words of Dr Dadzie, is 'a willingness to get to know and understand different cultures'.

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### Conflicts of Interest

Dushianthi Rasanathan is a student reviewer for the NZMSJ. This article has gone through a double-blinded peer review process applied to all articles submitted to the NZMSJ, and has achieved the standard required for publishing. The author has no other conflict of interest.

### Correspondence

Dushianthi Rasanathan: dushi@windowslive.com



# Finding other ways to communicate: A journey with a patient and his very special wife

## Brittany Park-Ng

School of Medicine  
Faculty of Medical and Health Sciences  
University of Auckland

> Brittany is a fourth-year medical student. Her hobbies include trying to find a hobby. The only one she has managed to maintain over her university years is a stable long-term relationship with Netflix.

It was Wednesday, week one of general medicine. I was with my registrar admitting patients down in medial assessment. He was holding the resus pager. It went off. "Are you coming?" he asked. As we raced through the wards he told me that a woman had collapsed while tending to her baby on the neonatal ward. I'd never followed someone to a resus event before and felt both excited and nervous. When we arrived, the room was full of people. I hung around the edge of the curtain, trying to stay as out of the way as possible. Next moment we were on the move down to resus, and I raced after my registrar desperate not to get lost. On arrival at resus, the pager went off again. "She's going to be okay", my registrar said to me as we walked across the ward to another room.

This room was also full of people. Through a glass door at the back of the room I could see an ambulance unloading an unconscious man. A woman was with him, hysterically holding on to his hands as they pushed his bed through the door. "That's his wife. She's already performed CPR on him twice", a paramedic told my registrar, as they transferred the man onto the resus bed.

"Now who do we have here", the ED doctor in charge asked the paramedics. They explained that the man and his wife, who were in their mid-fifties, had been on holiday from Korea. The couple had been travelling around New Zealand in a rented car for the past few weeks. They were due to fly back to Korea tomorrow, but a few hours ago the man had collapsed on his hotel bed. He had a known history of heart problems, but the couple had decided to go ahead with the trip anyway, as he managed with medications, and was otherwise fit and well.

"The husband speaks some English, but the wife speaks very little" was the next set of information provided. When the ambulance had been called, the husband was still conscious and somewhat able to explain their situation. Now he was lying on the bed unresponsive, and his wife was looking around desperately for help. One of the house officers who spoke Korean was called into resus, despite not holding a pager. He acted as the sole communicator between the wife and the medical team looking after her husband.

The protocols and procedures of what happened next went over my

head. ECG strips lay across the bed, monitors screeching for attention whenever there was a moment of quiet. My eyes stayed with the wife, who had been sat in a chair in the corner and looked petrified. At one point it was requested that I hunt down a pharmacist called Peter\* who spoke Korean, to come and look at the husband's medications. As though this were my one mission in life, I charged down the wards to find him. On returning, within the next few minutes we were rushing to CCU (coronary care unit). I gravitated towards the wife, grabbing her bag and ushering her along with the big group. Her expression remained that of a deer caught in headlights. She grabbed onto my arm and asked me "what is happening?" When we arrived at CCU the crowd of people barged through the doors, including the house officer who spoke Korean, and suddenly we were on the outside.

A sterile waiting room was the end of the road. She sat on one of the black chairs and seemed to fold into herself. A few minutes later my registrar returned. "What's going on?" I asked. "He's become unstable, but they're doing everything they can" he said. "Who's waiting with her?" I asked. "I have to go back to admitting. You can stay if you want, but it's 4.30 so you're free to go home." I sat down on one of the black chairs, telling myself I'd wait for a while. "What is happening?" she asked me again. I pulled out my phone and brought up google translate. We struggled to communicate with the app. I still don't know what I said to her, or if it gave her any comfort. We also figured out how to connect her phone to the hospital Wi-Fi, and she used WhatsApp to contact her children.

After half an hour, I swiped through to CCU and asked one of the nurses what was happening. They told me that he was stable, and that they were planning to transfer him to ICU. I went back out and told his wife. She nodded, and we waited for another half an hour. I put my head back in and was told the same thing. We were both reassured but wondering why the process was taking so long. Some children came and sat on two of the seats. The older girl did her homework while the little boy played with a toy plane. Then they left.

Sometime later a flurry of people came in and out of the doors. One more time, the woman asked me "what is happening?" "I don't know", I

said again. Then two important looking doctors walked out of the doors, with the house officer. Their pace had changed. Anyone entering or exiting the CCU in the past few hours had had a focused, urgent walk and look about them. The pace now was somber and slow. One of the men crouched down next to the woman and put a hand on her knee. "We need to tell you something. Can we go somewhere to talk?" The house officer translated this, and the woman looked at him and at me. She stood up to follow, then turned back and took my hand. "Is it alright to come?" I asked, and the man nodded.

We went into a small room with more comfortable seats and tissue boxes. There wasn't an official translator, so the house officer translated for the man. "Your husband has passed away. I'm so sorry. We did everything we could." The woman was not looking at the man, but instead at the house officer. Afterwards we found out that she had already asked him if her husband had died when they were walking into the room, and he had said yes. Erupting into tears, she sunk to her knees and grabbed the house officer's hands. "Why, why, why?" she cried, rocking, burying her eyes in her hands. Then she turned to me and asked me, "why?"

The next step was for us to congregate to the 'cath lab', where her husband was. Any amount of mental strength had left me by this point. It was a dizzy and blurry situation. I didn't mean to cry, it wasn't about me. But the house officer cried too, and some tough nurses came and gave us both hugs. The woman went and sat next to her husband. She tore at his hands, grabbing him, howling. Sobbing the word over and over again, "why?" The important man who had brought us in said some compassionate and meaningful words to me and the house officer, but I will never remember what they were.

And then the house officer had to leave. And the man had to leave. And the translator and embassy representatives would not arrive for a while yet. So, I stayed with the woman, and a nurse Shelly\*. It was so nice to have Shelly there, someone to talk to. We hugged each other and sat next to the woman, rubbing her back, offering her tissues and sweets. Shelly told me that she had had a brother who died while overseas, and that it was the worst thing in the world to be the solitary person with someone when they died in another country. She said that even though it might not feel like it, staying with this woman so that she was supported was the most important thing that we could do.

Eventually, the translator came. I was finally able to communicate with the woman, to tell her how sorry I was. She told me through the translator that she could tell from my face how sorry I was. Having me had been a blessing, like an angel, because I reminded her of her daughter. Her thanks touched my heart, and I was so grateful to have been able to talk with her properly before we parted ways. The translator then took her to speak with the embassy. We hugged tightly, and she touched my cheek before she left.

Then Shelly told me that she would stay with the body, and that I should leave. I asked her how late she would stay, to which she told me she'd just wait until the husband's body was moved to bereavement care, so he didn't have to be alone. Then she'd do a clean-up and head home. I asked her what time she was supposed to leave that afternoon, and she said 4pm. When I asked if she had someone to talk to about this stuff, she said her husband wasn't that good at understanding. But maybe she'd ring her sister: "You're very good at looking after other people, but you need to look after yourself." I told her: I felt terrible to leave her, but I needed to get out of there.

That night I caught the train home in the dark. I imagined Shelly sitting in the room alone with his body. The house officer down in admitting, trying to get on with his late-night shift. I imagined the woman sitting in a room with people she didn't know, with them trying to 'organise things'. I don't know if a family member flew over to join her. I hope so.

The next morning, I went back to the hospital. Ironically, I had a teaching

session at 10am in the CCU. But I didn't go. I couldn't. I don't know what happened to the woman I sat with. But her story has touched me forever. It still makes me feel sad to think about it. All I can hope is that the wonderful efforts of Shelly and the house officer, as well as me being there next to her, made a small difference to her during such a terrible event in her life. I will always remember her.

*\*Names have been changed to preserve anonymity.*

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The other people who were involved in this story.

## Correspondence

Brittany Park-Ng: [Brittany.park09@gmail.com](mailto:Brittany.park09@gmail.com)



# Syphilis: A fresh Persian perspective

## Shilpan G Patel

School of Medicine  
Faculty of Medical  
and Health Sciences  
University of Auckland

## William Barnes

Formerly Department of  
Classics and Ancient History  
University of Auckland

## S. Ali Mirjalili

Department of Anatomy  
and Medical Imaging  
University of Auckland

## Masoud Kasiri

Department of History  
University of Isfahan

> Shilpan Patel is a final year medical student. He is interested in both anatomy and neurology. In particular, he enjoys focusing on teaching and learning. His research interests aim to further enrich the knowledge base and learning opportunities for other students.

Syphilis is an infamous disease. Its legacy extends across much of our recorded human history. The route of transmission of syphilis has been fiercely debated for many decades. The literature is continuously evolving. In this article we examined the literature and found that there appear to be some inconsistencies in the evidence base for the newer pre-Columbian hypothesis in contrast to the evidence base for the older 'Columbian hypothesis'.

We explored the earlier experiences of physicians in the 15th and 16th centuries who first encountered syphilis in the Old World. Physicians and philosophers, such as Fracastoro, through their literary works gave us a unique perspective of their world view of this disease. Elements of their scientific thinking were admirable and demonstrated great insight into the disease process and its impact upon the lives of humans during this time period.

Our article also provides, to the best of our knowledge, the first modern day translation of two ancient Persian texts that highlight how syphilis was perceived, diagnosed, and managed by early Persian physicians in the late 15th century. The physicians presented their findings for signs and symptoms of syphilis, general management advice for patients, as well as treatment options and prognosis. These texts are, to the best of our knowledge after conducting a literature search and physical search at the National Library of Iran, some of the earliest recorded pieces of work in which physicians suggested that syphilis was a sexually transmitted disease based on clinical observation.

## Introduction

Syphilis has been associated with mankind throughout the ages. Its evolution, development, and transmission has been intertwined with human civilisation for centuries. It is an infamous disease, well known around the world for its pestilence before the advent of penicillin. Venereal, or sexually transmitted, syphilis is a disease that has long been associated with much stigma and shame. It has thus gathered great interest over the centuries in terms of its characteristics, management, and its route of transmission across the globe. This article aims to further explore the origins and transmission of syphilis between the Old and New World. This was completed by performing a literature search

using the Google Scholar and Pubmed databases, with the keywords 'Syphilis OR "Treponema pallidum" AND "history" AND "transmission" OR "route" OR "origin". Google Scholar results were limited to the first ten pages. We also viewed the physical texts on record at the National Library of Iran. This article also aims to translate two ancient Persian texts from the literature search that describe physician accounts of syphilis. In doing so, we provide a fresh perspective from a Persian viewpoint that adds to the tale of this legendary disease.

## Background and origins of syphilis

Venereal syphilis is classified within a class of diseases collectively known as the treponematoses. These are a group of diseases caused by the Treponema bacteria. Venereal syphilis is caused by Treponema pallidum, whilst yaws, bejel and pinta are caused by other bacteria from the Treponema class.<sup>1</sup> While these four forms of treponematoses are solely linked to disease in humans, there is evidence to suggest that the earliest strain of Treponema bacteria arose potentially during 10,000 BC to 15,000 BC.<sup>2</sup> The bacteria then evolved across the millennia until the more commonly recognized venereal syphilis was first documented in the 14th century.<sup>2</sup> From this point in time however, there are competing theories as to how venereal syphilis was spread around the world.

The name syphilis originates from the poem across three books by Girolamo Fracastoro in 1530.<sup>3</sup> Fracastoro tells us that the name syphilis is in reference to a shepherd Syphilus from the New World who abused the Sun God and instead chose to worship his king. He subsequently was the first person thought to be plagued with syphilis. In his works, Fracastoro describes the suspected origins of the disease, its presentation and management, and finally he devotes his third book to a tree discovered in the New World that the natives used to treat syphilis. In Fracastoro's mythology, he believes that the origins of syphilis are spontaneous. In book three he described it as a punishment from Apollo. However, in book one he has described how he believes that syphilis is a part of nature, and that the gods have approved of this fate for humankind where syphilis spontaneously came to be from the very air itself. Interestingly enough, he predicted that syphilis would plague humankind for many years to come and he believed that after they had managed to eradicate it that it would one day return to infect humans



once more.<sup>3</sup> Those in the Old World tried many different remedies such as exercise, certain herbal potions, and finally mercury, which appeared to be effective. Fracastoro describes a mythic tale in which a goddess under the earth in Syria revealed mercury as a cure to humankind.<sup>3</sup> Mercury was indeed used for many years after this as a cure for syphilis, however was replaced by penicillin more recently with the advent of antibiotics.

### The transmission of syphilis around the globe

Fracastoro noted that syphilis was rampant everywhere in the New World. He also wrote that this disease had begun its outbreak in the Old World more recently. Fracastoro did not explicitly attribute this to Columbus and his travels, and furthermore, appears to reject the idea of the disease originating from the New World in book one. Rather, he believed that the 'origins of the evil are firmly fixed in the very air'<sup>3</sup>, which is to say he believed that contaminated air fuelled the spontaneous creation of this disease.

Some researchers believe in the pre-Columbian or similar unitarian hypotheses. These argue that venereal syphilis, and potentially the other treponematoses, were already widespread amongst the Old World and New World prior to Christopher Columbus's travels. Those supporting these theories argue that there is evidence of syphilis and indeed the other treponematoses in the New World almost 50 years before Columbus's journey there, amongst the slave trade within Africa.<sup>4</sup> They also argue evidence that amongst the Old World in Europe, syphilis may have often been misdiagnosed as leprosy.<sup>5</sup> This is an example of one of the limitations that arise when using historical documents and records to draw conclusions about the history and route of transmission of syphilis.

In contrast to this, an older theory that has also amassed a large following is the Columbian hypothesis. This theory argues that syphilis was not initially present in the Old World, and that it was only first introduced there by Christopher Columbus's crew in 1493 upon his return from his voyages.<sup>6</sup> This theory is supported by documents from two Spanish physicians who assessed Columbus and his crew at the time of their return from the New World.<sup>4</sup> They noted that several of the crew had an unknown disease that had not yet been seen in Europe. They also commented that this disease appeared similar to the disease that a few indigenous people from the New World seemed to present with.<sup>4</sup> As a result, there have been multiple attempts to disprove the Columbian hypothesis by demonstrating evidence of treponemal diseases in the Old World before 1493 when Columbus returned from the New World. A review carried out of 54 studies investigating this theory, found that while the evidence base for the pre-Columbian hypothesis is growing, there is much inaccuracy and inconsistency amongst the current evidence base and the studies did not demonstrate any reliable evidence for the presence of treponematoses in the Old World prior to Columbus's travels.<sup>7</sup>

Another factor that complicates the history of syphilis, is that studies often call into question which of the treponematoses were present at any given time. The clinical course of each of the four above-mentioned diseases share many similarities. Venereal syphilis in humans presents at one of four stages. The first stage after contact with disease presents with a genital or extra-genital chancre (9–90 days after contact). This is known as primary disease, and if left untreated can result in secondary disease in the patient, which presents with rash, warts, and other clinical manifestations such as hepatitis (4–10 weeks after primary disease). The disease enters a third, latent stage after 3–12 weeks. After this point it can manifest many decades later with tertiary disease, which has a wide range of complications such as neurological and cardiovascular disease.<sup>8</sup> It is not a stretch to imagine that these similarities can cause difficulties when attempting to identify which disease was actually implicated during the analysis of archaeological records. A study by A. Crosby made the argument that the different treponematoses were likely to have evolved separately within the contexts of their unique climates

around the world.<sup>9</sup> They argue that venereal syphilis would likely have evolved from its ancestor within the unique climate of the Americas and then have been transmitted to Europe via Columbus and his crew in 1493. Further supporting this argument is a more recent study in 2005 by B. Rothschild.<sup>10</sup> This study analysed evidence in the literature for the distribution of the treponematoses based upon the distinctive bone changes that each disease makes to the bone structure. The study concluded that these distinctive changes in venereal syphilis were not found in the Old World prior to Columbus's return.<sup>10</sup> It also concludes that there is evidence of treponemal diseases from 1493 onwards in the old Dominican Republic where Columbus landed, which suggests the potential primary site for the spread of syphilis throughout Europe.<sup>10</sup>

### A Persian perspective

Girolamo Fracastoro made significant contributions to both medicine and literature with his tales of syphilis. His perspective on syphilis, in our opinion, was revolutionary for his time. He displayed elements of the scientific curiosity and rigor that we expect from our modern day researchers. He mentioned that syphilis would once again rise to plague our civilisations, and as we know today it continues to be a sexually transmitted disease that has serious implications for individuals and new born infants who are left untreated.<sup>10</sup> It appears as though humans are doomed to forever bear the burden of disease, regardless of whether they are ancient cities brought down by syphilis or modern countries fighting to suppress human immunodeficiency virus (HIV).

Fracastoro focused on the impact of syphilis in his own country however, he did also make reference to other countries that were affected by other diseases. For example he makes reference to the 'Black Death', which '... attacked the people of Assyria and Persia...'.<sup>3</sup> Persia (currently known as Iran) was well known for its ancient scholars of philosophy, mathematics, and medicine, such as Ibn Sina (Avicenna) and Al-Razi (Rhazes). As the Persians were devoted to a thorough study of the field of medicine and philosophy, we wanted to further explore their perspective of syphilis. Through reading their ancient literature this allowed us to better understand how syphilis impacted their people. This affords us a new perspective into how syphilis was entwined with life in Persia.

### Persian translations

We have examined two pieces of Persian literature, which were obtained from the National Library of Iran. These ancient pieces of medical literature were some of the earliest Persian records first describing syphilis and they have given us great insight into how syphilis was understood by earlier physicians and scholars. One of our authors visited the National Library of Iran and reviewed the ancient Persian texts on record, which had not previously been viewed or loaned. As we have a particular research interest in syphilis both in the current age and its past history, our review of the literature yielded these two texts. They were initially translated from the old Persian language to modern Persian, and then finally to English. We translated these texts in conjunction with the Department of History at the University of Isfahan. It should be noted that these two texts have been discussed previously by P. Huard in *Histoire de la médecine* in 1956.<sup>15</sup>

The first text (Figure 1) was published in 1502 by Baha-Alduleh Razi and was within his book *Kholasat-al-Tajarob*.<sup>13</sup> This book sought to discuss many principles of medicine, with one page devoted to syphilis. Razi initially described syphilis as a type of 'European smallpox', which he observed in the Khorasan province.<sup>13</sup> Razi described a range of patient presentations of this disease. He mentioned that the initial lesion often manifested itself as small black dots or 'seeds', which would increase in size. The lesions would be present on all parts of the body, including the head. He would often see these lesions more prominently on the head, accompanied by a few lesions in other places such as the lower limbs. In some cases the lesions would present as multiple sores which could then coalesce. While some of these lesions did not express fluid, some



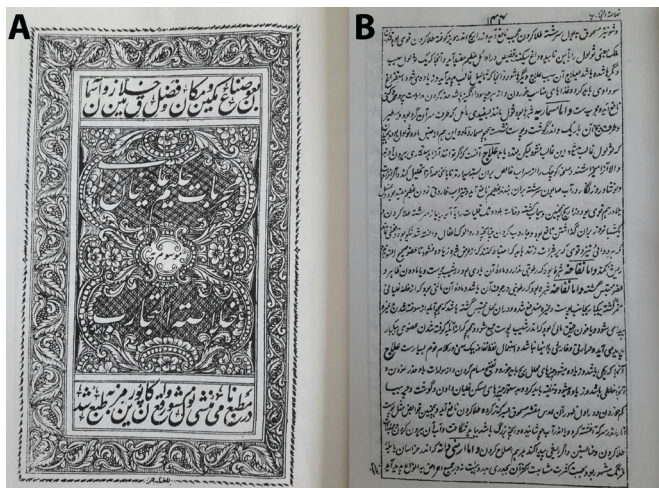


Figure 1 The title page from *Kholasat al-Tajroab* in 1502 (A) and a page from this text, which documents Razi's observations of syphilis (B). Graciously obtained with permission from the National Library of Iran.

became vesicular, which he described as 'juicy'.<sup>13</sup> Furthermore, a few cases also presented with pain or itching, some with one or both of these symptoms. The 'juicy' lesions would often progress to become inflamed and painful. He mentions that the lesion would sometimes progress to flaking skin or a patch of skin that he likened to alopecia. Razi found that even if the patient merely presented with a few dotted lesions, these could nevertheless be accompanied by intense itching, fever, and joint pain. He found that fewer lesions correlated with more joint pain. This joint pain was at times so severe that Razi describes patients committing suicide as a result, and one female patient who was unable to walk. He noted that some cases presented with inflammation of the eyelids accompanying the joint inflammation. Razi did observe that some patients who had these lesions did not experience any pain at all. Fracastoro also described in book one the symptoms and signs of this disease from the case history of a young man, which he personally observed. These were different to the observations made by Razi. Fracastoro described a likely advanced case of syphilis, which manifested as sores over the young man's body that expressed fluid, and eventually led to his disfigurement and death.

Interestingly, Razi noted that based on the patient histories he had taken, it appeared as though this disease was not transmitted in a 'casual relationship'. He instead noted the observation that it appeared to be transmitted via sexual relationships or the sharing of personal or bathroom materials, which often belonged to those who were engaged in more than a 'casual relationship'.<sup>14</sup> This, unlike Fracastoro's poem on syphilis, is one of the first clearly documented cases of the venereal nature of this disease. Razi's observations are further reinforced by the findings of another Persian scholar, which are discussed below.

The second Persian text which we have considered was written by a doctor named Imad al-Din Mahmud Ibn Mas'ud Shirazi in 1560 (Figure 2). The text is called *Atashak*, the name of which is a description for a small flame. A small flame when viewed from above is what the author described as the appearance of the lesions upon manifestation of the disease.<sup>14</sup> In this text he discusses in detail the symptoms, route of transmission, prevention, and finally the management of this disease, including his beliefs about the effectiveness of the 'China Root'.<sup>14</sup> In this text, he references the previous text written by Baha-Alduleh Razi to give weight and provide evidence to support to his own findings. His reports of the symptoms of this disease are similar to that of the previous author. He also emphasised that to his knowledge, no one had described this disease in Persia prior to its outbreak and that he believes it is a 'souvenir from the West'.<sup>14</sup>

Imad al-Din Mahmud Ibn Mas'ud Shirazi describes multiple patient histories where sexual relationships or frequenting public bath houses

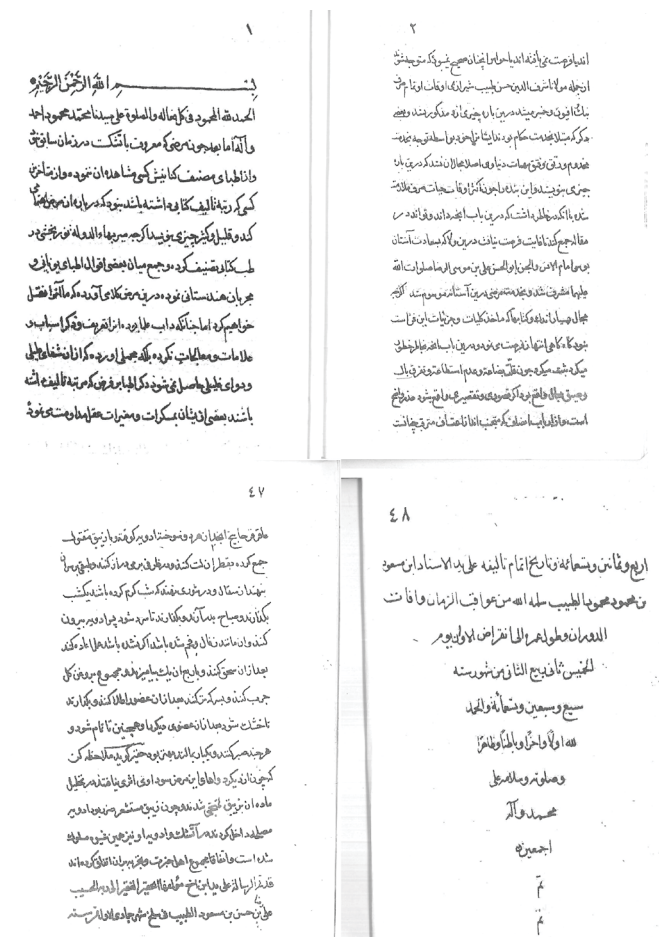


Figure 2 Pages from *Atashak*, which detail Shirazi's observations of syphilis in 1560. This figure includes the title page one (top left), page two (top right), page 47 (bottom left) and the final page 48 (bottom right). Graciously obtained with permission from the National Library of Iran.

were common observations. He described one particular case where the disease was spread via a blade used for shaving hair. He further emphasised that the disease could not be passed down to offspring. He did observe that offspring developed the disease when their parents were also infected, however he believed that this was due to contact rather than inheritance. He made recommendations that a diseased person's pants or shirts should not be worn by others.

## Discussion

The ancient Persian texts by Razi and Shirazi contrast when compared to the literary works of Fracastoro and even our modern day literature and understanding of syphilis. The modern day literature demonstrates conflicting viewpoints as to the origin and route of the transmission of syphilis. It appears that there are inconsistencies in the literature supporting the pre-Columbian hypothesis. The older theory that syphilis was initially transmitted from the New World appears to currently have a stronger and more consistent evidence base supporting it. Interestingly, this theory is also supported by the observations made by Fracastoro, Razi, and Shirazi. They have all documented in their ancient texts that prior to the outbreak of this disease, the likes of it had not been seen before in their country. A major limitation to concluding that the Columbian hypothesis is true however, is that many of the historical texts used as evidence can be riddled with inaccuracies or ambiguities. As alluded to previously, for example, it was suggested that syphilis may have been misdiagnosed as leprosy in the Old world. It is uncertainties such as this that make ancient literature more difficult to interpret. To clarify this uncertainty, further research that continues to analyse the genome and evolutionary history of syphilis as well as research further documenting

the archaeological changes as a consequence of this disease would be helpful.

As a result of our literature search, we would like to suggest that to the best of our knowledge, the ancient Persian texts written by Razi and Shirazi do indeed document some of the earliest evidence of the venereal nature of syphilis. Their accounts of syphilis describe case studies of multiple patients and this increases the reliability and validity of their texts. A limitation of this is that their accounts of syphilis appear to be describing syphilis at multiple stages of presentation (e.g. some patients presented with genital lesions whilst others presented with complications of secondary disease). This, in addition to a lack of a specified time period for the development of these symptoms, meant that confirming the identity of all of these cases as syphilis became more difficult. Fracastoro in particular appeared to focus his descriptions of syphilis on those patients with secondary or tertiary disease who experienced greater complications as a result of their infection. Thus his works contrast slightly with the observations made by Razi and Shirazi. It should be noted that Fracastoro later wrote, in 1546, a more scientific and detailed piece of work which discussed a range of contagious diseases including syphilis.<sup>16</sup>

History is an important facet of the literature that we as health professionals and medical scientists can draw upon to better understand the modern challenges that face us. In New Zealand alone, a report by the Institute of Environmental Science and Research demonstrated that the incidence of syphilis is once again increasing dramatically.<sup>12</sup> We believe it is important to take time to appreciate history and learn from the lessons provided to us by ancient scholars such as Fracastoro, Razi and Shirazi. Syphilis is a sexually transmitted disease that can have serious consequences for individuals and infants if left untreated. As Fracastoro prophesied, syphilis appears as though it is destined to be entwined, for many years to come, with the history of humanity.

## Conclusion

Syphilis is an infamous disease with a legendary history to follow. To our knowledge, this has been the first translation and publication of these Persian texts in modern day literature. This allows us to gain a fresh perspective on how syphilis impacted those in Persia and the way in which it was observed by early Persian physicians. The Persian descriptions displayed scientific rigor that made an attempt to be evidence based upon patient histories and clinical observations. These papers, to the best of our knowledge, were also some of the earliest papers to describe the venereal nature of syphilis. We hope that these texts will help to further illuminate the history of syphilis and add to the growing evidence base regarding the Old World versus New World hypotheses on the origin and route of transmission of syphilis. This article also serves as a timely reminder to look to history in order to better understand the modern day challenges we face, such as the increasing incidence of syphilis in New Zealand.

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## Correspondence

S. Ali Mirjalili: [a.mirjalili@auckland.ac.nz](mailto:a.mirjalili@auckland.ac.nz)



# What happens to those students who do not get into their desired programme? A personal reflection.

## Joseph Chen

School of Medical Sciences  
Faculty of Medical and Health Sciences  
University of Auckland

## Dr Marcus Henning

CLTA, DipTch, BA, MA, MBus, PhD  
Centre for Medical and Health Sciences Education  
School of Medicine  
Faculty of Medical and Health Sciences  
University of Auckland

> Joseph is a postgraduate research student. His interests include neuropsychopharmacology, student welfare, and science exposition. On the side, he avidly pursues musical ventures with his wooden violin.

In this article, we discuss the issues that emerge for students who do not get into their first choice option. This article directly addresses the issues faced by students studying in the first year Biomedical Common Year or Overlapping Year 1 programme at the University of Auckland, and who were aiming for the undergraduate pathway into the Bachelor of Medicine and Bachelor of Surgery programme (MBChB).

### The challenges posed by the highly competitive medical entry programmes

The Biomedical Common Year or Overlapping Year 1 programme consists of several core first-year courses and one general education course. The aim of the programme is to prepare students for a Bachelor of Health Science, Bachelor of Science majoring in Biomedical Science, Bachelor of Pharmacy, Bachelor of Optometry and the Medical programme.<sup>1,2</sup> This is a high-stakes year and is crucial for many students aiming to study medicine. For example, to have the opportunity for an interview for entry into the University of Auckland Medical programme, students need to attain overall grades of 'B+' or greater in the Biomedical Common Year or Overlapping Year 1 programme.<sup>2</sup> In a recent paper, conducted on this group of students, Henning and colleagues reported that 54% of their sample representing this group had a desire to study medicine.<sup>3</sup> If we extrapolate further, this would suggest that over 700 students studying in this year have a definite interest in studying medicine. This is alarming given that there are only approximately 270 places available.<sup>4</sup> This suggests that the programme creates a highly competitive learning environment with a large proportion of students aiming to gain entry into the Medical programme. A further finding from this study suggested that those students wanting to be selected into medicine were more likely to enjoy competition than those not aiming to go into this course of study. Houston, Harris, McIntire, and Francis (2002) describe enjoyment of competition in terms of those students who enjoy competing against each other and who aim to outperform their

peers.<sup>5</sup> With a high stakes level of intensity attributed to the Biomedical Common Year or Overlapping Year 1 programme, we wondered what would happen to those students who failed to gain entry into their first-choice course and, further, the implications for students not enjoying this level of high stakes competition.

The experience of failure will likely have many outcomes. Clearly, success or failure has an impact on a person's level of self-concept and self-efficacy both of which are crucial to gaining further academic attainment.<sup>6</sup> From this motivational perspective the students who fail to be selected may experience a loss of motivation which may have a deleterious effect on further learning. The links between perceived poor academic attainment and adverse mental health issues are well established. However, much of the literature considers the impact of early childhood mental issues on academic achievement.<sup>7</sup> Nonetheless, from a theory of continuity perspective,<sup>7</sup> life experiences are likely formative and likely to be linked to later life outcomes, whether these be educational, personal or professional. It is also probable that the earlier the life experiences are, the more indelible. Having a contingency plan will likely improve the probability of transforming challenges into opportunities. However, being faced with consistent failures may lead to a depletion of a person's reservoir and may lead to further and more damaging health issues.<sup>8</sup>

In their famous article, Dyrbye and colleagues investigated the general issue of medical student distress.<sup>9</sup> Even though our article pertains to those who are aiming to be selected into medical school, some of the ideas presented by Dyrbye and colleagues, are relevant for those students studying in the Biomedical Common Year or Overlapping Year 1 programme. For example, Dyrbye and colleagues provided useful information regarding the adverse consequences of competitive study regimens, such as depression, stress and burnout. Some of the solutions that may be useful for those students who are struggling with issues of stress, failure and burnout, may lie with the individual and the

institution. At an individual level, it is important to seek out help, and have contingency plans in place in case things don't work out as planned. At an institutional level, it is important to have easy access to career and personal counselling, and to provide mechanisms for identifying those at risk of academic failure, and to provide advice for students who are experiencing high levels of stress.

### My personal experience

As anecdotal evidence, I went through this experience as a first year Biomedical Science student. I intended to apply for Medicine after my first year of University and was unsuccessful in my undergraduate-pathway attempt. Given that many of my friends were aiming for medicine, it was very disheartening and demoralising. In retrospect, my reasoning for applying for the medical degree fell along the lines of: "all my friends are aiming for medicine, and I'd like to be with all my friends"; "I want to be personally impactful and helpful to other people"; and "the medical profession is a respectable degree with job security". My perception of failure gave me a lost sense of direction as to what would happen next.

Luckily, however, I knew a few other students who had gone through a Bachelor of Science (Biomedical Science) degree and they helped give advice on which papers to take in order to "maximise my chances" in applying for postgraduate medicine. This advice gave me some form of comfort as understanding both the procedure and realistic expectations at least gave me a goal to strive for. I commenced semester one of my second year with at least some motivation to strive towards a realistic goal of postgraduate application for medicine, but this motivation seemingly drained quickly.

During this time, I remembered how I had enjoyed the atmosphere and teaching of a first-year medical science course and wondered how I could get into teaching. I contacted the course coordinator of a core first year medical science paper and luckily scored a position as a teaching assistant for semester two of my second year. I found this experience to be thoroughly rewarding.

Coincidentally, in the same semester, I was fortunate to be part of a formative group of students for a student association. Given my prior experience being fortunately helped by other students, I wanted to pay it forwards and co-organised an event for my 'junior' colleagues in first year to guide them through the various other options. In preparation for this event, I tried to better understand the options to ensure I could deliver the information efficiently. Therefore, I consulted various resources and people such as my course coordinators, career advisors, and online career websites. Preparing this presentation for others simultaneously gave me the perfect opportunity to learn about the various other possibilities and to compile them into one easy-to-access information point. During this event, I interacted with many other students finding it an amazing experience to mentor students and help them along their journey and re-establishing my self-worth in finding something that was personally impactful and helpful to others. In trying to summarise and condense all details into a practically helpful article, I published an article through the aforementioned student association's website.<sup>10</sup>

I continued both the organisation of the student association along with more teaching assistant opportunities throughout my third year at University and, furthermore, was exposed to exciting cutting edge research undertaken in my courses. With further consultations with academics and understanding how research was undertaken, I became increasingly fascinated by the vast array of research fields offered by the many academics of the University. This curiosity-driven passion began to drive me to persist even through difficulty.

After completing my Bachelor degree, I continued with a Postgraduate Diploma in Science. During this time, I had the exciting opportunity to become an administrator for various student-related or community organisations; positions which I found also rewarding. Of course, I

continued to have many set-backs during this time such as rejections from summer research scholarships, failing a paper, and coping with disappointment. Nonetheless, my self-realisation of the values and work that motivated me began to actualise in my mind with clarity. This journey of self-discovery and reflection helped to shape my goals and enable me to persist even in moments of difficulty. At points where I wanted to turn back and give up, I turned to my respected mentors who gave invaluable encouragement and shared their moments of struggles and how they got through them – thereby highlighting the importance of perceived failure in shaping one's self-worth and self-motivation. For example, one of my mentors recommended that I set aside time to heal from emotional setbacks, and another mentor made a good point about not taking perceived failure too personally.

By the time I had finished my Postgraduate Diploma, I had realised just how pivotal my experiences were towards shaping my motivation; how my motivations helped me persist through times of trouble. Upon realising my main motivations involved education, mentorship, administration, cutting edge research and technology, I browsed through all the career pathways I had previously researched and found academia as the one most resembling my personal motivations and goals. I am currently continuing at the time of publishing to pursue this goal down the academic pathway whilst keeping in mind other alternative options should my current goal not work out.

In summary, salient learning experiences that could assist others in this situation include:

- Obtaining advice and seeking out an immediate goal to strive for
- Having a contingency plan in place in case things do not work out as planned
- Researching other career possibilities
- Experiencing as many different roles as possible to find out what other interests he possessed
- Consulting with mentors, particularly in difficult times, to obtain encouragement to continue

### Final thoughts

As alluded to with the number of students applying for medicine and the number of places, the disparity between expectation and reality leaves much room for disappointment and depletion of motivation. It is difficult to know more conclusively as to what happens to the students who do not get into their desired programme and how they managed to cope, however; we detail here the path of one such student who managed to replenish his motivation utilising various strategies. This would be a useful area for further research. As a final note, we are hopeful that students who face disappointment may be encouraged and can be equipped to perhaps repair any adverse effects happening to them; as the old adage goes, "hope for the best and plan for the worst".

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## Correspondence

Marcus Henning: [m.henning@auckland.ac.nz](mailto:m.henning@auckland.ac.nz)  
Joseph Chen: [joseph.chen@auckland.ac.nz](mailto:joseph.chen@auckland.ac.nz)





# Welcome to medical enculturation; let me witness your transformation

## Doris Zhang

School of Medicine  
Faculty of Medical and Health Sciences  
University of Auckland

## Dr Tanisha Jowsey

BA, (Hons), MA, PhD  
Centre for Medical and Health Science Education  
School of Medicine  
Faculty of Medical and Health Sciences  
University of Auckland

> Doris Zhang is a fourth-year medical student. During Year Three she took a medical anthropology course as her medical humanities elective. Doris met Dr Tanisha Jowsey, a medical anthropologist and a lecturer in health sciences education, during the course she took.

## Introduction

Medicine is a system of shared ideas, beliefs, and practices – a culture – that shapes students and is shaped by them over time.<sup>1</sup> During the past four years we have been increasingly submerged in this culture and over time our understanding has increased about what it is, how it manifests, and how medical culture informs students. In this paper we offer a crash course in medical anthropology by introducing several key concepts: culture; emic; etic; and discourse. Next, we explore how medical culture is discursively operationalised and made visible through rites of passage. Finally, we discuss Davenport's concept of 'witnessing' as an important aspect of medical culture that students can and should engage in.<sup>2</sup>

## Defining culture

Keessing and Strathern define culture as 'an ideational system: systems of shared ideas, systems of concepts and rules and meanings that underlie and are expressed in the ways that humans live'.<sup>3</sup> Culture has been described as the 'software of the mind'.<sup>4</sup> It 'is acquired, learned and constructed [...] not innate to a new born child'.<sup>6</sup> People are often not clear on the difference between culture and ethnicity. Ethnicity entails a sense of belonging to a social group based on ancestry, national, and/or cultural traditions. To illustrate, we might expect that someone of Chinese ethnicity will hold views deeply ingrained in Chinese culture. However, this expectation does not always hold true. Someone of Chinese ethnicity may have been raised in a Western country and/or according to Western cultural values and meanings. Napier writes that culture 'does not equate solely with ethnic identity, nor does it merely refer to groups of people who share the same racial heritage'.<sup>7</sup>

Hofstede suggests that just as there is no 'best' software, there is no 'best' culture.<sup>4</sup> While it is generally frowned upon to judge one culture to be better than another, in practice, we often make such judgments by aligning ourselves with one culture – or way of seeing and being – over another. For example, we may wear clothes that demonstrate our affiliation with a particular culture and by doing so, we are saying to ourselves and

others 'the culture associated with these clothes is one I want to be affiliated with'. By wearing these scrubs (instead of those ripped jeans) we also demonstrate our enculturation – our increasing embeddedness in the culture. Just as we become enculturated or informed by culture, so too is culture informed by individuals and by other cultures. We see evidence of this throughout the world in terms of cosmopolitanism of food. For example, following interaction between China and Western countries, China began to adopt Western foods, and vice versa.

Rapport writes, 'culture must always be understood in the plural and judged only within its particular context'.<sup>6</sup> Here he is referring to the fact that at any one time we are informed by many cultures. We do not just have one culture. A medical student, for example, may be informed by medical culture as much as coffee culture or Youtube culture. Today they may be informed by medical culture more than coffee culture, but tomorrow coffee and Youtube might dominate.

When we look closely at a particular culture, we do so either as an insider (someone within the culture) or an outsider. In anthropology these two different viewpoints are termed respectively emic and etic. While one way of life may be seen as 'abnormal' through the etic point of view, looking through an emic perspective, it is considered normal and makes sense. Thus, culture shapes how we perceive normality.

## Enculturation through discourse and rites of passage

Within medicine there is a shared perspective on how the person is viewed, which is informed by medical discourse. As defined by Foucault, discourse is the 'ways of constituting knowledge, together with the social practices, forms of subjectivity and power relations which inhere in such knowledges and relations between them'.<sup>8</sup> Discourse is, in broad terms, the communication of meaning and flow of understanding through time. Foucault argued that language in itself not only conveys, but creates meaning and has the power to influence the thoughts of individuals.<sup>8</sup>



Thus, discourse plays an instrumental role in the evolution of cultures over time. In medicine, the language used in medical textbooks (i.e. medical discourse) influences how medical students and doctors view patients. Medical-anatomy textbooks separate the person into organ systems for analysis, and in doing so disregard the individual to whom the organs belong to. Foucault coined this perspective on the person as the 'medical gaze', where the patient is no longer viewed as a living human being, but a conglomerate of pathologies and conditions assembled into a medical 'case'.<sup>9</sup> The 'medical gaze' is an enduring quality of medical culture.

As discourse informs the actions of individuals, the actions of individuals also inform discourse; as a medical textbook influences the beliefs of a student, awareness of the influence leads to change steered by the students themselves. Davenport stated the following observation: 'Though the structure of medicine influences these actors [medical students], it does not simply reproduce itself through them. Their actions can also transform it'.<sup>2</sup> While the actions of medical students are influenced by the medical culture, their actions in turn shape the nature of medical practice.<sup>2</sup> This is an example of how cultures can evolve over time. Furthermore, this idea of acquiring knowledge echoes that culture is learned, not innate; no doctor is born into viewing the human body as a vessel for pathologies. Instead, individuals enter medical school and are taught to view the world through a medical lens. This is enculturation into a medical gaze.

This enculturation transforms lay people into medical students. It mirrors Van Gennep's concept of the 'rite of passage', where an individual leaves one group to move to another; ultimately resulting in a change in status within society.<sup>10</sup> The transition is marked by a ceremony or ritual, which is a characteristic of cultures. Van Gennep described three phases: 'separation', before the ritual where the individual 'cuts away' from their former status; 'liminality', the phase between the two states; and 'incorporation', where the passage is consummated and the individual re-enters society with his/her new status.<sup>10</sup> Within medicine, these stages can be equated to an individual before entering medical school ('cutting away' from their former status as a layman), a freshman party held for the medical students (held ambiguously between the state of the student being a layman and becoming a medical student), and the individual fully taking on the status of 'medical student' (re-entering society as not layman, but medical student). The freshman party is one of many rituals marking student rites of passage.

## Witnessing

Inherent to medical culture is a power imbalance between doctors and patients. Historically, medicine undertook a paternalistic approach where the doctor led the medical interview and told the patient what to do, essentially as a father holds authority over a child. However, Kleinman and Benson argued that cultural factors underpin 'health-related beliefs, behaviours, and values' and largely influences the care that the patient receives.<sup>11</sup> In the present day, contemporary medicine in the Western world has shifted towards a patient-centred approach, and more recently to a person-centred approach.<sup>12-13</sup> This can be interpreted as a change in the culture of medicine. Wagner, Coleman, and Reid place a focus on increasing 'the patients' involvement in decision-making, care and self-management' as they believe this will 'see effective health care as being respectful of a patient's needs, preferences and values'.<sup>12</sup> Treatment acknowledges cultural values and is catered towards the individual. In other words, the medical gaze has shifted towards 'witnessing', an indigenous term explored by Davenport.<sup>2</sup> 'Witnessing' is described as having a 'focus on the entirety of a person's life situation, not merely on their ailment'.<sup>2</sup> Unlike the 'gaze', where the individual is impersonally separated into parts of a whole, 'witnessing' sees each patient as a living person with the entirety of their social and psychological background taken into consideration.

One example from the first author's own personal experience shows the importance of this approach. An elderly Chinese woman was prescribed warfarin, a blood thinning drug by her doctor, who failed to realise that she was taking a variety of Chinese herbal medicines that interact with the drug. She suffered a life-threatening haemorrhage as a result. It is clear that a more thorough understanding of the patient's background may have prevented this event. The doctor and the patient could have reached a compromise, allowing the use of certain herbal medicines that are unlikely to interact with warfarin. Cases like these serve as the impetus for the shift from 'gazing' to witnessing'.

This shift is driven by what Giddens calls 'social reflexivity', where an individual constantly scrutinises, evaluates, and subsequently alters their social beliefs and practices.<sup>14</sup> It is driven not only by the medical culture, but by the interaction between the multiple cultures of the doctor and patient. The willingness to inquire, listen, and acknowledge the patient's viewpoints means that the practitioner recognises the patient as an equal authority on their health and holding equal power in decision-making concerning their health. The desire and capacity of practitioners to revise their own actions in response to this new information (a concept described in anthropological terms as agency) lies at the heart of culturally-competent medical practice. In turn, given a new sense of authority and responsibility, the patient is also influenced to be active in decision-making, causing a change in their cultural views towards medicine. Thus, the culture of medicine is influenced by the cultures of patients within medical settings and vice versa.

## Conclusion

Medical culture plays an important role in shaping students into future doctors, manifesting in forms such as medical discourse and rituals throughout medical school. It underpins how they come to view illness, patients, and decision making in health care. However, individuals are far from powerless in their ability to change the culture that surrounds them. Medical students are a part of the shift towards person-centred care in modern medicine. As such, students should actively engage in 'witnessing', rather than 'gazing' and lead this movement as pioneers of the future of medicine.

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## Correspondence

Tanisha Jowsey: [t.jowsey@auckland.ac.nz](mailto:t.jowsey@auckland.ac.nz)

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Te Hautaka o ngā Akongā Rongoā



# An insight into the realities of life and health care in Tanzania

### Dr Amy Rankin

House Officer  
Middlemore Hospital  
Counties Manukau District Health Board

➤ Amy graduated from the University of Auckland in 2018. Prior to medical school she completed a Bachelor of Health Sciences degree. She has an interest in population health and preventative medicine.

### Introduction

Tanzania is a country in East Africa with a population of approximately 50 million people. The average life expectancy is 61 years and the Gross Domestic Product per capital is \$1700 USD.<sup>1</sup> I chose Tanzania as my elective destination as I wanted to experience the challenges of practicing medicine in a developing country and to gain exposure to diseases I would not encounter in New Zealand. Tanzania has a reputation for being a peaceful and safe country and the opportunity to do a safari made Tanzania an ideal elective location. I did internal medicine (infectious disease) and emergency medicine at Muhimbili National Hospital in Dar es Salaam. This hospital is the biggest national referral hospital and receives complex patients from throughout Tanzania. I did obstetrics and gynaecology at Amana Regional Hospital, also in Dar es Salaam, the maternity department is incredibly busy with an average of 50 deliveries per day. Finally, I spent a week at Kidodi Rural Healthcare Clinic, which is situated eight hours south-west of Dar es Salaam and serves a catchment of 40,000 people.

My elective was an incredible and eye-opening experience on both a personal and professional level. I was challenged with resource limitations and cultural differences in the Tanzanian health-care system and I experienced conditions I had never seen in New Zealand. Reflecting on my experiences made me appreciate the resources and opportunities that we have in New Zealand.

### Country profile

Tanzania is considered a developing country with a life expectancy of 61 years. Communicable disease accounts for the primary disease burden, however, the incidence of non-communicable diseases is increasing, resulting in a double burden of disease. Box 1 lists the most common causes of death in 2012, according to the World Health Organisation.<sup>2</sup>

### Emerging concerns

A lack of health-care funding is the most obvious concern regarding the health care system in Tanzania. Tanzania spends only \$44 USD per capita on health care, with 48% of the total expenditure on health being supported by donor aid.<sup>3</sup> Health care is not free in Tanzania, which substantially limits access. Patients must pay a significant proportion of their health care expenditure and only 12% of the population are covered by health insurance.<sup>3</sup> This has created significant problems for

#### Box 1 The most common causes of death in Tanzania in 2012.<sup>2</sup>

- 1) Human immunodeficiency virus (HIV) acquired immune deficiency syndrome (AIDS) (18.2%)
- 2) Lower respiratory infections (8.7%)
- 3) Diarrhoeal disease (5.2%)
- 4) Malaria (5.2%)
- 5) Stroke (3.6%)
- 6) Birth asphyxia and birth trauma (3.3%)
- 7) Preterm birth complications (2.8%)
- 8) Ischaemic heart disease (2.7%)
- 9) Road injury (2.7%)
- 10) Diabetes mellitus (2.3%)

health care implementation as health care is often not provided until a patient can pay and patients often miss out on best practice due to an inability to afford health care.

The increasing burden of non-communicable disease is further pressuring the health system of Tanzania. A lack of funding is evident in the poorly maintained and overcrowded hospital infrastructure. Some government initiatives are proving successful, such as free anti-retroviral treatments for patients suffering from HIV, which has helped reduce the morbidity and mortality from HIV.<sup>3</sup> Training enough health care professionals is a challenge, as is retaining them. Understaffing is at 50-70% across all levels of health care.<sup>3</sup> The average income for a doctor is very low, talking with the staff as little as \$350 USD a month and the hours are very long.

This means many doctors are considering entering the private sector or travelling overseas and there is generally a rather low morale.

## Determinants of health

### Economics and employment

A lack of health-care spending is a significant challenge for the health system. Tanzania is ranked 152 out of 186 countries in the United Nations Development Programme Human Development Index.<sup>1</sup> Unemployment is approximately 12% with widespread underemployment. These economic woes stem from colonisation, a failed experiment with socialism in the 1960s and a lack of international aid. Bureaucratic inefficiency permeates society, as does corruption, which limits economic development significantly.<sup>1</sup>

### Education, culture and access

Overall the quality and standard of education in Tanzania is relatively low. Drop out rates are high and the teacher to student ratio is approximately 54 to one at the primary school level. Only 15% of the population finish secondary school and less than 2% enrol in university.<sup>1</sup> Due to poor education, health literacy is also low. In rural areas, girls are often married young and are burdened with many children at a young age, further diminishing education and employment opportunities.

Misconceptions are rife regarding different diseases and many patients seek the care of traditional healers. We had the opportunity to visit a traditional healer who explained that he can heal disease and thus some people only visit him rather than seeking care at a hospital. There is also a culture of accepting one's fate and people do not engage in the preventative health care to the same extent as people in New Zealand. Unsafe sex is a major concern and this contributes to 80% of the heterosexual transmission of HIV.<sup>2</sup> To some extent the concept of safe sex is encouraged, however, there is a long way to go regarding this, as sex is a taboo concept.

At the village clinic it was great to see a large emphasis on preventative medicine. We vaccinated many children and provided nutritional supplements and worming tablets. One of the nurses has also instigated a cervical screening programme; it is not cytology based but instead detects visible lesions with acetic acid, which are then treated immediately with cryotherapy. There has been a good uptake of this. The methadone clinic at Muhimbili has also treated thousands of patients with opioid addiction, and a needle exchange programme has been established. Family planning is also encouraged and contraception is free.

The culture of inefficiency in the health system is significantly contributing to poorer health outcomes. The 'pole, pole' (slowly, slowly) culture has an adverse impact on patient care by reducing timely access to health care. There is also a lot of needless bureaucracy, which hinders efficient health-care delivery. Access to health care is significantly limited by the geographical distribution of health care. We had patients walking over 20km to access the rural health clinic in Kidodi. When speaking with a patient in Muhimbili, it had taken her over 16 hours by bus to reach the national hospital. Most people do not have access to a car and public transport is expensive for many.

### Ethnic inequalities

There are over 120 tribal groups living in Tanzania, with a relatively small Arab, Indian and Asian population. Approximately 95% of Tanzanians are of Bantu origin. Tanzania is the only country in Africa who has indigenous inhabitants from all of the continent's main ethnolinguistic families.<sup>1</sup> Tribal structures are relatively weak due to the abolishment of local chieftaincies following independence. No one tribal group has dominated politically, culturally or economically, which has meant there is no significant inequity between different groups in society. Therefore, ethnic inequalities are not

significant in Tanzania and there is not a marginalised indigenous group.<sup>1</sup> From my experience, the difference in health care received was reflected by someone's ability to pay, rather than discrimination on the basis of ethnicity.

### Culture

Julius Nyerere was the first president of independent Tanzania and he had a more socialist style of leadership. Nyerere's ideals of *ujamaa* (family-hood) that continue to permeate society have meant that religious and tribal tensions are minimal; Christians, Muslims and different tribes live peacefully side by side. This has created a peaceful and safe society, which I definitely experienced during my elective. An emphasis is placed on respect and politeness, which made Tanzania a pleasant place to live.

### Clinical experience

During my time in infectious diseases I saw cases of malaria, HIV, tuberculosis and tetanus. Malaria is endemic in Tanzania, with an estimated 7.7 million cases of confirmed malaria annually and more than 26% of all outpatient clinic attendance related to malaria.<sup>4</sup> The majority of malaria cases are due to *Plasmodium falciparum*, which is the most deadly subtype.<sup>4</sup> It was routine to rapid test for malaria for anyone presenting with fever. Approximately 5% of Tanzania's population is positive for HIV.<sup>1</sup> I learnt a lot about HIV during my elective and I learnt that it is no longer a death sentence but rather a chronic condition that can be effectively managed. However, there is still a stigma associated with HIV due to fear of transmission, poor education and a perception that a diagnosis is a punishment.<sup>5</sup> I encountered a number of patients with tuberculosis and I realised the significant burden tuberculosis has when combined with HIV.

Non-communicable conditions such as diabetes, hypertension and cardiovascular disease are becoming more prevalent in Tanzania, especially with increasing life expectancy.<sup>2</sup> People often present late with non-communicable conditions. The health system is not set up in a way that is conducive to continuity of care and most people do not have a general practitioner. Therefore people generally present to hospital only when they are seriously unwell. This is due to overstretched resources and underfunding. I noticed stroke and myocardial infarction were managed particularly poorly. These conditions are often diagnosed many hours after a patient presents to hospital and access to fibrinolysis and clot retrieval is almost non-existent, unless a patient can afford to go private and is located in Dar es Salaam. The reasons for this come down to financial, resource, and access constraints. Medications were very limited, they were often expired and had been donated by non-governmental organisations. Even the most basic lifesaving devices were in short supply, for example Kidodi Clinic did not even have access to a defibrillator. The main conditions I encountered during my emergency medicine attachment were end-stage heart, kidney and respiratory failure, cardiac arrest and trauma. At Kidodi Clinic I was engaged in preventative medicine such as weighing of children, providing nutritional supplementation and vaccinations.

Obstetrics and gynaecology was an especially eye-opening experience. Women have very limited access to antenatal and post-natal care. Most women do not have an ultrasound and it is largely unknown if there will be complications during delivery. I attended several antenatal clinics that involved measuring fundal height, listening to the foetal heart rate with a fetoscope and giving iron and folic acid supplementation and malaria prophylaxis. The delivery room at Amana Hospital was very chaotic. The room was overcrowded and several women deliver at the same time. I witnessed a woman die during labour, which was attributed to hypoglycaemia (which did not make sense but I was given no other information), as well as an unanticipated stillbirth. Neonatal resuscitation attempts are poorly coordinated and the correct equipment is not available. The neonatal resuscitation trolley was out of order during my attachment and I witnessed several babies having an extended period of hypoxia.

## Clinical and communication skills

### Communication

English is not widely spoken in Tanzania. My ability to engage with patients was limited by my lack of Swahili. I tried learning some Swahili, but I did not have the Swahili competency necessary for a full conversation regarding medical matters. In an effort to build rapport I would introduce myself and my role in Swahili, ensure I had a smile and warm and open body language. Staff and medical students were often too busy to play any role in translating, so I unfortunately had limited ability to take a history from patients. Medical records were all recorded in English, however, these were generally very brief. Most medical staff spoke English.

### Patient assessment and management

A lack of thorough patient assessment and management was something I struggled with throughout my elective. I would try and prompt staff with additional questions to be asked when appropriate. I found history taking was often conducted in a very brief and undirected manner in contrast to the significant emphasis we place on history taking in New Zealand. Patients were often referred from other hospitals with a simple referral letter on a piece of paper stating their diagnosis. Medical staff would generally accept this diagnosis and treat accordingly, rather than asking more information and considering other diagnoses. When a history was conducted it would generally be a few brief questions. Systems enquiries were not done and a patient's past medical history was rarely considered.

Physical exams were also conducted quite poorly and I noticed a lack of a systematic approach. The presenting system was generally the only focus for the exam and other systems were not reviewed. A lack of equipment also limited the ability for a comprehensive exam. During my obstetrics and gynaecology attachment they only had a fetoscope, there was no Doppler, cardiotocography or ultrasound. This meant when women went into labour, we were blind to potential complications and had limited ability to risk stratify women. I was very surprised after I delivered my first baby independently, when I got asked if I palpated to determine if there was a twin. I was just so used to women having ultrasounds in New Zealand to determine if there is a multiple pregnancy that an unexpected twin never crossed my mind. There was very little emphasis on taking vital signs regularly. It seemed that observations were only recorded once when the patient was admitted and then very sporadically, if at all, after this. A lack of early warning scores had a detrimental impact on patient care. A lack of resources and cost constraints limited the ability to carry out laboratory and radiological investigations.

### Clinical decision making

A lack of thorough history taking and physical examination really limited clinical decision making, as did a lack of access to investigations. I found doctors would often run through a list of differential diagnoses and just select the most likely option, which would often lead to confirmation bias, as other diagnoses were not considered. This was most evident in the emergency department. Emergency medicine as a speciality has only been present in Tanzania for the last eight years, which means a systematic way of managing patients and clinical decision making is still being established. I tried to get engaged where possible and raise the possibility of other differential diagnoses. For example, I saw an 80-year-old patient who presented with shortness of breath, who had been seen in clinic a few days earlier. I suggested that we review his clinical notes to determine the most likely diagnosis. However, I got firmly told that this would be a waste of time. He was treated for asthma without considering other causes in the context of his age and lack of past history of asthma.

There was also a noticeable lack of multidisciplinary team input. The different disciplines seemed to work in silos rather in the collaborative environment that I am used to in New Zealand. This is largely due to

poor development of other disciplines such as social work, occupational therapy and physiotherapy, and these disciplines were only really present at Muhimbili Hospital. Therefore, there was limited ability for different disciplines to contribute. This reduced the ability to provide holistic care, which I believe an essential component of good quality health care.

Clinical decision making and management plans were based around resource availability rather than best practice and evidence-based guidelines. Doctors also had the role of tallying up the cost of the health care being received. This took valuable time away from their role in clinical decision making as well as being ethically questionable. This made me appreciate being removed from the financial aspects of health care in New Zealand, as money does not confound our decisions. I often felt that money in Tanzania was given higher priority than a human life. For example, after being involved in a failed resuscitation of a 21-year-old female, the family were unable to see her body until after the bills had been paid. This was a particularly shocking experience and I tried to uncover the reasons for this by discussing this case with one of the junior doctors involved. Due to resource constraints, preventable deaths occur so often that staff become emotionally detached for their own well-being. Financial restrictions are also so pressing that the doctors have to prioritise recovering costs if they want to have the resources to treat future patients.

### Clinical skills

I had the opportunity to enhance my clinical skills. One of the most valuable experiences from my elective was learning how to prioritise investigations and treatments. In New Zealand I am used to ordering all relevant investigations and prescribing treatments based on best practice and clinical guidelines. In Tanzania you have to factor in finances and consider the cost-benefit analysis, which added a new dimension to my clinical decision making and taught me the importance of avoiding wastage. I learnt how to 'go back to basics' by using my clinical knowledge and examination skills, rather than relying on radiological investigations or laboratory investigations. A clear example of this was when we did a pleurocentesis and determined the location of the pleural effusion by percussion as we did not have access to ultrasound.

### Personal and professional skills

#### Professional qualities

In New Zealand there is a focus on efficiency and getting things done in a timely manner. An element I struggled with during my elective was everything was done 'pole, pole' (slowly, slowly). In some clinics I found there were often several people doing a job that could be efficiently done by one person. I also realised that there is no schedule. Ward rounds would start at sporadic times and meetings often began late or were cancelled.

There also appeared to be no sense of urgency – unwell patients would be left waiting a very long time. I strongly value empathy and providing adequate pain relief. I found this was not the focus during my elective. Patients were hastily seen, there was very little explanation given to patients regarding their condition and pain relief was almost non-existent. For example, labouring women have no pain relief and the midwives would often slap women on their leg if they were making too much noise. Privacy is also not prioritised – in the labour ward there would be several women lying naked without any screen covers or linen, with the windows wide open. I would try and be empathetic when possible, for example by holding a patient's hand or saying *pole sana* (I am sorry) and using empathetic body language. It is during these times I wished I had more knowledge of Swahili so I could do more to ease a patient's distress. These gestures went a small way to making patients feel better. There is also no concept of informed consent. Procedures are just done and local medical students engage in invasive procedures with very little informed consent or adequate supervision. Overall, I have a better





Figure 1 The poor state of hospital infrastructure, this photo is of the main ward at Kidodi Village Hospital.



Figure 2 The labour ward at Amana Hospital, this was an open ward with up to ten women labouring at a time.



Figure 3 The entrance to the General Medical Ward at Muhimbili National Hospital



Figure 4 The entrance to Kidodi Village Hospital.



Figure 5 Muhimbili Hospital



appreciation of attending to the humanistic needs of patients, as this can do a lot to relieve suffering, enhance recovery and build rapport.

## Challenges

Choosing a developing country, I knew I would experience a culture shock and face some challenges along the way. I struggled with the lack of investment in the public health system. The buildings were in very poor condition, wards were completely overcrowded with no infection control and resources were severely lacking. I also struggled when people were not given adequate health care because they could not afford it. It was also upsetting seeing people present with late-stage diseases that could have been prevented with adequate access to preventative health care.

I found the overt poverty of Tanzania quite distressing and this experience made me reflect on my privilege. As a mzungu (European), people assumed you must have a lot of money, which I thought was amusing since I considered myself a poor student. However, I realised the ability just to travel halfway around the world is an unimaginable luxury for the majority of Tanzanians and the price of my lunch at Pizza Hut would equate to more than a junior doctor's daily salary. Daily life is a struggle for most citizens, with low wages, poor employment opportunities and poor-quality education, housing and health care. If you face misfortune, there are poor societal safety nets, such as social welfare. However, because of this, communities are strong and there is a culture of helping out your neighbour. I realised how lucky I am to have had access to a quality education, health care, and housing, as these factors have shaped where I am today. Coming back to New Zealand, I was so grateful to have access to resources that would enable me to provide best-practice care for patients. The hospital environment in New Zealand is so much more pleasant due to a clean and modern environment. These were things I took for granted before my elective.

## Conclusion

Ultimately, the main objective of medical professionals in both Tanzania and New Zealand is to improve patient health outcomes and enhance health. The ability to do this in Tanzania is limited most significantly by resource constraints. The burden of health care in Tanzania is also heavily weighted towards communicable diseases. Poor access to the social determinants of health shapes the health outcomes of Tanzanians and their ability to access health care. I have realised the injustices of the world and that the right we have to health care is largely luck regarding the context into which we are born. I am so grateful for the resources we have in New Zealand. Ultimately, my elective has been a life changing experience and I would recommend Tanzania as an elective destination.

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## Correspondence

Amy Rankin: [aran096@aucklanduni.ac.nz](mailto:aran096@aucklanduni.ac.nz)



# The perfect cut: A combined clinical & research elective in Plastic and Reconstructive Surgery at Oxford

### Isabel See

School of Medicine  
Faculty of Medical and Health Sciences  
University of Auckland

Isabel is currently a Trainee Intern at the University of Auckland, mainly based at Middlemore Hospital. She is an aspiring plastic and reconstructive surgeon and is actively involved in several plastic-surgery related clinical research projects. She will be furthering her passion with another upcoming research stint at Cambridge University Hospitals National Health Service Foundation Trust in the United Kingdom after graduation. Outside of medicine, she is a competitive swimmer and triathlete who also enjoys expressing herself through arts and playing the piano.

### Introduction

My final-year elective was done at the Plastic and Reconstructive Surgery (PRS) Department at the Oxford University Hospitals (OUH) National Health Service Foundation Trust. As an internationally established teaching hospital, the OUH Trust not only provides world-class medical care in almost all medical and surgical fields, it also has strong links with the University of Oxford through education of medical students, research, and academic consultants. The main hospital of this trust is the John Radcliffe Hospital (JR) where I was primarily based. Through the various academic and hands-on experiences undertaken during my time at Oxford, I developed a greater appreciation of the work and challenges that plastic surgeons face on a daily basis.

Having set my heart on pursuing PRS upon graduation, I conscientiously aligned my interest with hands-on experiences by being involved in as much clinical and research work in the field of PRS, all aimed at bettering existing evidence-based medical practices. My interest for this field stems from a documentary series I watched back when I was 14 years old. This unconventional series offered me an interesting insight into the life of a plastic surgeon, the challenges he faced both at work and in his personal life illustrated the complexities of medical dilemmas and how these could be closely intertwined and influenced by one's personal values. What I especially liked about this series is its exploration of the multidimensional reasons and motives behind each patient's presentation.

As the title of my article, 'The Perfect Cut', suggests, I wanted to challenge the negative stereotypes and social stigma that mainstream media has popularised – equating plastic surgery solely as a tool for artificial beauty enhancements. To me, PRS is more than mere creation of artificial beauty. I feel strongly that reconstructive procedures not only restore the initial physical self, but also reaffirm self-confidence with the aid of a surgical

scalpel. Hence, the aim of this article is to consolidate my eight-week elective experience at Oxford, and also inspire readers to appreciate and understand of the beauty of PRS by unveiling the multiple dimensions of PRS, showcasing how a surgeon can help one recreate parts of their body and provide a new lease of life in the process.

Often, the job of a plastic surgeon is deemed as 'non-life-saving'. This way of thinking completely overlooks the close affiliation between reconstructive surgery and one's psychological and mental well-being. I have always believed that the opportunity to play a key role in helping someone regain his/her confidence is an extremely gratifying and provides a meaningful purpose in life, and hence the primary reason why I would love to make this my life's work.

### Overview of elective schedule

As PRS is a highly specialised field of study, the department does not have a prescribed structure for students. To maximise my own learning, I took the initiative to source for the Department's weekly rota – checking for interesting cases taking place in the operating theatre and out-patient clinics. Other than the time I spent in the hospital with clinical work, I spent a fair amount of my time at the various Bodleian Libraries, working on the four research projects I had on hand.

### Microsurgical skills training

During my time at the OUH PRS Department, I was pleasantly swarmed with an abundance of learning opportunities.

I attended several major surgeries involving free flaps where I asked to be involved in the microsurgery component of the operation. For the first time, I was appointed as the first assistant microsurgeon during the microsurgical repair of a contused radial artery that was only 2 mm in calibre on a five-year-old child who presented with a pulseless supracondylar fracture.



Figure 1 Practicing microsurgical skills under the microscope in a laboratory setting

I built on the basic principles of microsurgery and skills that I had previously picked up from laboratory practises and observing registrars assisting consultants. The view under the microscope was very different from when one operates macroscopically, or even from those laboratory practises under the microscope (Figure 1). I experienced first-hand the transition from practising on synthetic vessels to performing on real human vessels. This transition showed me the importance of taking laboratory practises seriously, as our basic surgical skills are a reflection of the repetitive execution of surgical techniques we practice before adapting them to each individual patient's situation. Practising in laboratory settings is a very safe environment to help trainees build confidence and competence, improving patient safety in the long run.<sup>1</sup>

### Outpatient clinics

Besides having my first go as the assisting microsurgeon, attending outpatient clinics was probably my next favourite thing to do. I attended a whole variety of subspecialty clinics – general plastic, breast, head and neck, cleft palate and lip, upper/lower limb and hand surgery, and polytrauma.

The breast out-patient clinic is one that I have attended the most frequently under a few different reconstructive surgeons – it is also the clinic that I have learnt from and enjoyed the most.

Being diagnosed with breast cancer is a devastating situation for many, as it comes with profound implications for both the individual and his/her family. Despite an increasing incidence of breast cancer, survival rates have dramatically increased over the years.<sup>2</sup> This can be attributed to improvements in screening techniques and treatment regimes. An increasingly common and viable option is to undergo a mastectomy.<sup>3</sup>

At OUH Trust, all individuals undergoing complete/partial mastectomy are routinely offered the option of undergoing breast reconstruction post-mastectomy. Existing literature shows that women are more vulnerable and at high risk of suffering from anxiety, depression, negative body image, and impaired quality of sex life post-mastectomy.<sup>4-6</sup> To this end, breast reconstruction has been proven to have a positive impact on an individual's physical and psychological rehabilitation, despite its inability to restore the 'femininity in its entirety'.<sup>7</sup>

With that in mind, patients are entitled to attend a consultation with the breast-reconstruction surgeon. Each consultation session will be specifically tailored to the needs, preferences, and also general health of the patient. During my time at JR, I had the privilege of being involved in several ladies' breast reconstruction journeys. However, there is one

particular lady Ms KT, who I had the privilege of following through her preoperative consultation, to her reconstruction surgery, and then her first post-operative visit – this forms the highlight of my eight weeks.

Ms KT was referred to the breast-reconstruction team for a consultation after receiving the diagnosis of right multi-focal breast cancer. From an oncology point of view, she was scheduled to undergo a right-nipple-sacrificing mastectomy with axillary clearance. During her first consultation, when I first met Ms KT, I recalled her being understandably very emotional, unable to really accept the fact that mastectomy is the most appropriate therapeutic management given her condition. Initially, she was adamant that she preferred her breast reconstructed with implants rather than using her own abdominal tissue, as she was very adverse to the idea of having a large abdominal scar following the 'tummy-tuck' (donor site closure). Prior to making this decision, she was briefed at length on the options available to her (e.g. breast implants versus using her own autogenous tissue).

Considering the fact that Ms KT would most likely require post-operative radiotherapy, she was highly encouraged to go for the autogenous tissue option rather than implants, as there is evidence to suggest that perioperative radiotherapy increases the risk of capsular contracture and causes slow healing. This could potentially result in a long sequelae of pain, poor cosmesis, or even implant extrusion.<sup>8-11</sup> The autogenous option was recommended in her case, as it has been shown that using the patients' own tissues will not only produce a more natural-looking breast, it is also associated with greater patient satisfaction as compared to implant-based reconstruction.<sup>4,12</sup>

This is consistent with the recommendations and findings of a study conducted at the local Breast Reconstruction Unit at Middlemore Hospital, which I was personally involved in. This recently-published paper showed that perioperative radiotherapy increases complication rates and reconstructive failure with implant-based breast reconstruction, which is consistent with existing literature.<sup>8,13</sup> In view of the study results, the current policy is to steer patients towards autogenous breast reconstruction if they are likely to undergo radiotherapy as part of their breast-cancer treatment. The study has also been reported by the New Zealand Herald.<sup>14</sup>

Ms KT heeded the surgeon's advice and proceeded with a ten-hour surgery, which I was present throughout. She recovered beautifully without any complications and returned to the follow-up clinic for her post-operative review. She gave me a big hug when I went to the waiting room to get her – she was extremely satisfied with the outcome and thanked the team profusely. She even told me that she did not regret heeding the surgeon's advice to opt for the autogenous option.

It was an amazing learning experience to observe the interactions between Ms KT and the surgeon – she was detailed in her explanation and consistently checked back to ensure that the patient understood what she said. She utilised drawings, tables, and photos to help her patients understand what they were signing themselves up for, and made it a point to take a meaningful pause to acknowledge the dilemmas the patient was facing. This was indeed an extrapolation of William Osler's famous quote, 'The good physician treats the disease, the great physician treats the patient who has the disease'.

### Theatre experience

Out of all the interesting cases and surgical techniques I observed, there were two surgeries that stood out. Apparently, each of the two innovative surgeries described below have been performed less than 20 times in the United Kingdom and have never been performed anywhere else in the world, as they are designed by the internationally-renowned reconstructive surgeon, Mr Henk Giele. These two novel methods are based on basic principles of medicine and plastic surgery. Mr Giele's team is currently collating more evidence before writing up a paper for

publication, so one might not be able to find much information from a basic Google search.

### **(1) New microsurgical vascularised bone flap: using coracoid as a free vascular bone graft for reconstruction of non-union scaphoid**

The scaphoid is one of the most commonly fractured carpal bones. Although most scaphoid fractures heal spontaneously, there are a number of nastier scaphoid fractures that will cause problems due to non-union.<sup>15</sup>

With this background knowledge in mind, Mr Giele utilised the coracoid as a free vascularised bone flap for patients with non-union scaphoid problems. Post operation follow up demonstrated good clinical and functional outcomes in all cases thus far – showing that the free vascularised coracoid is a reliable microsurgical vascularised bone flap.

### **(2) Sentinel flap in kidneys +/- pancreas transplant patients**

The most undesirable outcome for a transplant patient is the rejection of the transplanted internal organs. Existing literature reveals that current techniques used to monitor organ rejection are not adequately sensitive, hence contributing to late presentation of organ rejection. By that time, little can be done to salvage the situation.

With the knowledge that skin is one of the most immunogenic organs in our body, Mr Giele hypothesises that if a small segment of the donor's skin is transplanted to the donor together with the internal organs (pancreas in this case), early warning signs of organ rejection could be detected by monitoring the appearance of a rash on the patch of donor skin. The appearance of this rash will alert both the patient and medical team to start anti-rejection medication (in the early phases of detection), hence minimising the chances of total organ rejection.

Depending on where the patch of donor's skin is harvested, it will usually be transplanted onto the volar side of the recipient's forearm for easy monitoring. After a prolonged period of stability with no signs of organ rejection, the recipient can opt to have this patch of donor skin excised.

At the time of my elective, there were approximately 20 such sentinel flaps performed in the world by Mr Giele in collaboration with the Oxford Transplant Team over 3–4 years. If Mr Giele's hypothesis is proven to be true, the sentinel flap technique could represent a new paradigm in the world of organ transplantation – the birth of a new and reliable way of monitoring internal organs post-transplantation.

Using the word 'inspiring' to describe my working experience with Mr Giele is definitely an understatement. Mr Giele is also the author of the Plastic and Reconstructive Surgery Oxford Handbook – as a fan of his, I purchased the book from Blackwell's Bookshop and got him to autograph it (Figure 2).

Working with such an inspiration like Mr Giele has reinforced a very important lesson for an aspiring amateur surgeon like myself. Acquiring surgical skills and textbook knowledge is only one small part of the story, in fact, it is just the beginning. It is only when we start to utilise the concepts we learn and apply it to other fields that true learning really begins. Other than learning from Mr Giele's skilful surgical skills, the most important takeaway for me was a new way of thinking and learning.

Other reconstructive surgeries I observed include therapeutic reduction mammoplasties, correction of breast deformities, correction of congenital/acquired limb deformities, nerve graft implants, surgical correction of facial palsy, cleft palate and lip repair, reconstruction of traumatic limb injuries, and post-resection of head and neck cancers.



Figure 2 Photo with Mr Henk Giele, the legendary reconstructive surgeon who authored the Oxford Handbook and myself at the Nuffield Orthopaedic Centre Main Operating Theatre

### **Ward rounds**

Contrary to the popular belief that surgical-ward rounds are mainly business rounds, I managed to see a wide range of different cases.

A recurring concept that stood out was the intensity of post-operative flap monitoring, which is key to flap survival. Free flaps are an important reconstructive tool used in the world of PRS. Since their first use in the 1950s,<sup>16</sup> the use of free flaps to reconstruct defects has greatly increased. This was of particular importance, especially at my stage of medical training, because as a junior doctor, one could be left in charge of looking after wards full of post-operative patients. As such, I decided to do a proper literature review of the current post-operative flap monitoring techniques.

Studies have shown that the likelihood of a successful flap salvage is very much dependent on the time after initial flap surgery that the problem is recognised. Hence, the longer it takes to detect signs of a failing flap, the lower the salvage rates.<sup>16,17</sup> There is currently no standardised flap monitoring protocol, which explains the large degree of heterogeneity in the flap-monitoring techniques employed by different institutions. Most centres assess flaps by both subjective and objective measures, as shown in Table 1.<sup>16</sup>

Throughout my eight weeks, I was personally involved in closely monitoring a couple of flaps post-operatively. One memorable experience was a tubed forehead flap, performed to reconstruct the right cartilaginous portion of the alar after excising full-thickness skin due to a squamous cell carcinoma recurrence. This case stood out from the rest for me because I was actively involved in the patient's reconstructive surgery. I remember vividly that I was instructed by the operating surgeon to commit the appearance of the tubed flap to memory at the end of the surgery. At that point in time, I was not aware of how useful this 'photographic image' of the immediate post-operative view of the flap would be, until a few hours later one of the nurses from the recovery unit arrived in theatre commenting that the flap 'turned purple' – I was sent to assess the viability of the flap. I assessed the flap as I was taught, reported my findings to my registrar, and proposed to release alternate sutures to relieve the (external) tension. Soon after releasing the alternate sutures,



|                  | Arterial Compromise                                   | Venous Compromise                                     |
|------------------|---|---|
| Flap colour      | Pale, mottled or bluish                               | Cynotic, bluish or dusky                              |
| Capillary refill | Sluggish (>2 seconds)                                 | Brisker than normal                                   |
| Tissue turgor    | Flat, decreased turgor                                | Tense, increased turgor                               |
| Temperature      | Cool (>2 degrees of difference compared with control) | Cool (>2 degrees of difference compared with control) |
| Pinprick test    | Scant amount of dark blood/serum                      | Rapid bleeding of dark blood                          |
| Doppler signal   | Absence of pulsatile arterial signals                 | Absence of continuous venous signals                  |

Table 1 Signs of arterial and venous compromise<sup>16</sup>

the flap re-perfused nicely with good venous outflow, and regained its original healthy colour.

## Conclusion

My elective experience at Oxford has been nothing short of amazing. My enthusiasm was met with an abundance of opportunities to learn and contribute to patient care. I was very privileged to be actively involved in the work of various world-renowned reconstructive surgeons – this includes scrubbing in with the author of the Plastic & Reconstructive Oxford Handbook who pioneered novel techniques that are performed exclusively in Oxford and nowhere else in the world. Working in an internationally-reputable institution also facilitated access to a wide range of research facilities, not forgetting that the Bodleian Libraries are within a stone's throw away.

In addition to my maiden experience assisting in a microsurgical repair of a 2 mm wide vessel, I met great mentors who enabled me to author four publications. Immersing myself wholeheartedly into the Oxford experience, I presented on two fundamental plastic surgery topics, attended two full-on call weekends, and joined the Oxford Transplant Team to retrieve organs from a brain-dead patient, where I also performed the mortician stitch after the organs were harvested. None of these would have been possible if not for the kind help and assistance everyone I met at OUH provided me with.

As the quote goes, 'Many surgeons can manipulate anatomy, but very few can revitalize hope with a human touch'. Words cannot express how grateful I am to have met such a brilliant, yet humble surgeon like Mr Henk Giele during my time at Oxford – he walked the talk and exemplified the values I hope to embody as an aspiring plastic and reconstructive surgeon.

Ending this off with an extremely thought-provoking quote that Mr Giele autographed in my copy of the Oxford Handbook, 'you only find what you look for; but only look for what you know!'.

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## Correspondence

Isabel See: [isabelsee.jiale@gmail.com](mailto:isabelsee.jiale@gmail.com)



# New Zealand Medical Students' Association Conference: Transcend 2018

**Seung Il (Sam) Choi**  
Christchurch School of Medicine  
Otago School of Medicine  
University of Otago

➤ Samuel Choi is a Trainee Intern. He has found most rotations during medical school engaging and interesting, so has no idea in which direction to specialise, but he does hope to be involved in research in his future medical career. When not in hospital, he stays active playing football and basketball, and is a strong proponent of work-life balance.

For 13 years, the New Zealand Medical Students Association (NZMSA) conferences have adapted to the present climate of medical students and the issues we face both now and in the future. *Transcend 2018* was no exception to this, providing a weekend of laughter, contemplation, and even a few tears.

As the name suggests, this year's conference focused on developing its delegates to become more than they initially believed themselves to be. Acknowledging that providing quality care for our patients requires cognisance of our limitations, but also an understanding that we have the ability to overcome them.

The conference began on a wonderful, windy Wellington afternoon with the inaugural A-MAS-ing race – a 12-station adventure where teams ran through hipster alleys, rode up the famous cable car, climbed hastily up rock walls, and even jumped into the frigid harbour off the diving platform. Team costumes were themed around different medical specialties, from active wear (sports medicine) and cardigans (geriatrics), to construction gear (orthopaedics) and spectacles (ophthalmology).

The evening Welcome Soirée was held at Mac's Function Centre along the picturesque waterfront. The local craft beer on tap and lively atmosphere made meeting our counterparts from other schools effortless. We quickly formed a bond over our experiences of medical training, with no shortage of entertaining anecdotes and unofficial tips for surviving and thriving. With the presentation of prize hampers to the afternoon's champions, the conference team offered a warm welcome to our nation's capital.

To begin the first day's academic sessions, a beautiful karakia was delivered by Te Oranga President and Wellington student, Chayce Glass. This was followed by an inspiring address from the NZMSA President, Jibi Kunnethadam, who reminded us the privilege to be in such positions of influence and benefit to society. This is something that we do not always recognise, and it set a tone of appreciation and humility – a healthy mind-set to engage with the programme ahead.

The first keynote speaker was Daniel Flynn, founder of the company,

ThankYou™. Employing a sophisticated pay-it-forward approach, their profits from selling bottled water, food, baby products, and hygiene products fund initiatives in developing countries. They focus on providing immediate food and water-sanitation aid to these people, but also develop sustainable community-based projects tackling nutrition, hygiene education, and obstetric outcomes. Although ThankYou™ has won awards for its innovative business model, things have not always been smooth sailing. Recounts ranged from crucial supply chains pulling out of deals, to retailers refusing to stock their products in an over-saturated market. While tough to listen to, it quickly dispelled any notion that ThankYou™ became what it is today easily, reiterating the necessity for perseverance in the face of adversity.

Next, the political panel invited Dr Liz Craig (Labour) and Michael Woodhouse (National) to discuss pertinent issues around the state of health care in New Zealand. Each opening statement focused on the upcoming budget and the tension between ideological approaches to health care and the realities of working with limited resources. Topics often discussed among medical students, such as the implications of the 8.0 equivalent full time student loan cap, the impending introduction of the national bowel cancer screening programme, and the complexities of District Health Board (DHB) and Primary Health Organisation responsibilities, were tackled by both members. The atmosphere was electric as the speakers volleyed the issues, while being peppered with punishing audience questions.

At this point the first breakout sessions began. Keynote speakers were open to all delegates and often had an overarching theme. This contrasted with the breakout sessions, which covered a variety of topics from suturing skills and emergency department trauma, to helpful tips for getting involved in rural medicine. The inclusion of breakouts allowed delegates to tailor their conference experience and to more readily participate in the smaller group discussions.

My first session was with anaesthetist Dr Siva Namasivayam, who shared his experiences with Médecins Sans Frontières (MSF). While being unsure of what initially led him to MSF (his family thought it was a mid-life crisis!), he has been on numerous missions since, and described



each of them as incredibly fulfilling and equally difficult. Because his anaesthetic skills were best suited to treating warzone surgeries, he was often working in active conflict areas, to the fear of himself and his family. To a captivated audience, the harrowing and deeply personal stories of patients contrasted with medicine in New Zealand so starkly that it sounded like a different profession altogether.

Keynote speaker, Dr John Wyeth, contrasted his practice in gastroenterology with his other, very different role as Medical Director of PHARMAC. Highlighting the varied possibilities open to medical graduates, he provided a timely reminder for us to be open to any opportunity. We were lucky enough to find out the secret to his success: to be adaptable. Which, although simple, was the perfect advice for medical students who were all too familiar with the question 'have you figured out what specialty you'll be going into?'.

Luckily there to give us some ideas, were representatives from many of the specialty training colleges and the New Zealand Defence Force, as well as key support organisations like MAS and the Medical Protection Society. As we enjoyed the smorgasbord of food made possible by their generosity, our questions were answered with smiles and plenty of merchandise. There were so many good pens that the conference's Instagram prize was won by a delegate's post about the pens' various positive and negative traits.

Following a day jam-packed with new perspectives and unexpected experiences, we were all ready to unwind at the Gala Dinner. We dined in Te Papa, from which a sublime view of the city and the waterfront could be seen. Myriad ideas and thoughts from the day's programme darted across the tables, we posed for endless 'professional' photos, and we had seconds of the buffet. During the festivities, the inaugural SMO and RMO NZMA teaching awards were presented by the chair, Dr Kate Baddock, and Jibi Kunnethedam, to Dr Helen Pike (General practitioner in Blenheim) and Dr Aaron Ooi (Paediatric registrar from Waikato DHB), respectively. Hearing about the dedication and willingness of these doctors fostered an appreciation and humility that left a lasting impact.

After a long night of celebration, Sunday morning began full throttle with keynote speaker Associate Professor Nikki Turner, the head of the Immunisation Advisory Centre of New Zealand. Assoc Prof Turner challenged us with the realities of primary care in New Zealand, specifically the impact of socioeconomic factors on our potential as a nation to be healthy. Her explanation of the subtle interactions between elements of our culture, both as a nation and in the medical profession, was intriguing and certainly thought provoking.

This was followed by another breakout segment. I was able to hear from Dr Pippa Mackay, the current NZMA President, a practicing general practitioner and a part-time practicing abortion doctor. A quick overview of the legal terms and logistics of abortion in New Zealand was covered, before the floor was opened to a battery of questions covering everything from Ireland's recent abortion referendum, the ethical aspects of remuneration of abortion papers, and even the difficulties of having pro-life protests being held outside your house!

Before we knew it, it was already time for the final keynote speaker to take the floor. Mr Mat Brick shared his story of 'accidentally' becoming a world class duathlete. Stunned by his achievements at such a young age, we anxiously waited to hear his formula for success. Instead, he disclosed his development of substance abuse, culminating in a letter from the Medical Council informing him that he would be deregistered for a minimum of a year. While a self-admitted low point, Dr Brick persevered and subsequently healed broken relationships, a family, and an incredible career as a pioneering arthroscopic hip surgeon.

The well-being panel picked up where Mr Brick left off, with two students sharing their challenges with anxiety, depression, and substance use. Sofie Rose, one of the panellists, emphasised the importance of

prophylactic well-being, reminding us that it is easiest to forget about ourselves when things feel good or we are distracted. Often, we ignore the signs of imbalance until they are staring us right in the face, just as a patient might. Don Laing articulated the intricacies of his relationship with alcohol as a mechanism to cope with stressors in a candid and very moving way. He reminded us to be grateful for supports we have in our lives and to protect one another and others within a field of numerous pressures. Dr Tony Fernando closed the panel with the bold comment, 'we are all crazy', and encouraged us to remember that 'it is alright to not be alright'. Pausing for lunch, it was clear to see that the well-being panel had impacted everyone deeply. The feeling of compassion in the room had exponentially increased as we sat with the discomfort of fallibility, seen not only in our peers and in respected clinicians, but in ourselves.

NZMSA Conference *Transcend 2018* was enlightening, provocative, and deeply sobering. We were challenged to look beyond what lies in our hands, to look for the potential in ourselves and the world we live in, and to face the future with burning conviction. To borrow Daniel Flynn's words to summarise the weekend, we need to 'get out and stay out' of our comfort zones because 'we all have the power to change stuff'.

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## Correspondence

Seung Il (Sam) Choi: [samuelchoi94@gmail.com](mailto:samuelchoi94@gmail.com)



# Australasian Students' Surgical Conference 2018

### Vanshay Bindra

School of Medicine  
Faculty of Medical and Health Sciences  
University of Auckland

➤ Vanshay Bindra is a third year medical student. He is currently interested in medical education and surgery. Outside of medicine he is an avid guitarist and enjoys leading an active lifestyle.

The Australasian Students' Surgical Conference (ASSC) enables New Zealand and Australian medical students to congregate and share their passion for surgery. On 4–6 of May 2018, a contingent of ten New Zealanders went to Sydney, with all but one from the University of Auckland. The first evening comprised of registration and an opportunity for our New Zealand delegates to mingle with fellow health professionals who shared a common interest in surgery. Delegates then had the privilege of attending a careers evening, where various surgeons gave talks regarding the paths they had taken to get to where they are today.

The first speaker was Professor Mohamed Khadra, a urologist currently practicing in New South Wales, who was appointed an Officer of the Order of Australia in 2017. Following Professor Khadra, a panel of consultant surgeons from orthopaedics, neurosurgery, cardiothoracic, plastics, vascular, colorectal, and paediatrics talked about what drew them to surgery and why they still thought they had the best jobs in the world. The common theme between all the guest speakers was the passion they shared for their respective livelihoods. Each could pinpoint a mentor, a team, or a moment when they knew which specialty they wanted to enter. The talks concluded with an opportunity for networking with fellow students and surgeons. During the networking session, it was a pleasure to be able to go up to these surgeons and ask them questions, even though as a pre-clinical student it was a little intimidating. Not having been around consultants, it was a pleasant surprise to experience the kindness and understanding they showed towards what may have seemed like amateurish questions.

Saturday morning involved a speech from Dr James Toh, a colorectal surgeon. He talked about how we could define evidence-based health care through innovation and research. As a pre-clinical student, I felt that we had not had enough exposure to these kinds of talks, with our main learning focus on the basic medical sciences. It was refreshing to think about our future and the environment we would be working in. The next keynote featured Professor Peter Neligan, a plastic surgeon who spoke about the recent advances in his field, and discussed the diversity of surgeries that could now be done. His interests lie in reconstructive microsurgery, lymphatic surgery, and facial reanimation, among other subspecialties. The two keynotes enabled me to see two different perspectives on medicine. One focussed on research and how it would help future patients, while the other looked at medicine from a completely surgical lens, seeing the benefits to a patient as, for all intents and purposes, instant. It made me consider both and question whether

I saw myself as heading down either of those paths. After this, we had a research presentation competition that involved Liam Ferguson and Eve West, two students from the University of Auckland. Ferguson presented on surgery around the lymphatic system and ischaemia causing multiple organ failure, while West presented on ophthalmology, and was the winner of the research competition.

The afternoon consisted of a variety of skills sessions that allowed us to talk to surgeons in a small group environment. We also tried our hands at some surgical techniques and listened to other surgeons talk about their experiences in the profession. One of the sessions was on laparoscopic surgery where the task included picking up beads using the laparoscopic instruments. The lack of depth cues made performing this feat no easy task, which reinforced my appreciation of the skill and dexterity required by surgeons that use this technique. One of the more hands-on workshops, led by neurosurgery registrars from Sydney, involved learning how to create emergency burr holes to reduce intracranial pressure. Simulation tools were available and everyone was given a turn to try and create a hole without damaging the dura mater. Other practical workshops included learning how to replace heart valves, and an orthopaedic-led discussion on the steps involved in performing a hip replacement. As always, there was a session on suturing. The patience exhibited by the surgeons who lead these workshops fostered a fantastic learning environment that enabled us to clarify any doubts we had and refine our suturing skills. They were informative, exciting, and a great challenge. Saturday night involved the gala ball, which was held at the Hyatt Regency in Darling Harbour. The venue overlooked the harbour bridge and the night was topped off by great company with excellent food.

The next morning was the Golden Scalpel Games. This is a competition with teams from the different schools in Australia and one New Zealand team. The New Zealand team consisted of Aditya Arora, Cameron Wells, James Penfold, Liam Ferguson, and Vanamali Joseph. Although they did not take the trophy home, they undertook different tasks such as laparoscopic simulation, diagnosing a patient in a trauma scenario, selecting and applying a cast, suturing, and conducting a wound debridement.

In the afternoon, we had a panel of surgeons who conducted a question and answer session, touching on the barriers to becoming a surgeon. A pertinent question that was asked was regarding the mental health of

those undertaking surgical training and whether the different colleges had a responsibility to support them. It received a large round of applause and it was clear that this was an issue that sat in the minds of many of the delegates who might have been considering surgery as a future career. The surgeons did their best to answer it and recognised mental health was a significant issue in the field. They acknowledged that the various training colleges did have a supporting role to play and that they intend to improve the reintegration process for those trainees who take time out of their respective programmes. One of the last keynotes was given by Dr Adil Haider from Harvard, who spoke on unconscious bias and how it influences our decisions. His charisma captivated the audience and encouraged us to think about the implicit biases that we might carry and what we could possibly do about them.

In short, the weekend was one of self-discovery, learning, and networking. The interactions with delegates and surgeons made this conference a stand-out as we were all keen to learn from world leaders and our fellow students that we would be working with in the future. The conference enabled me to look beyond the lecture theatre and potentially see myself one day in the operating theatre. I came home with a new energy and enthusiasm for the privileged medical training that we receive. In 2019, the ASSC will be held in Melbourne and I encourage all medical students, regardless of their interest in surgery, to attend.

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### **Correspondence**

Vanshay Bindra: [Vbin805@aucklanduni.ac.nz](mailto:Vbin805@aucklanduni.ac.nz)



# New Zealand student participation in the Australia and New Zealand Association for Health Professional Education (ANZHPE) Conference 2018

### **Rachel Matthews**

Christchurch School of Medicine  
Otago Medical School  
University of Otago

### **Steven Ling**

School of Medicine  
Faculty of Medical and Health Sciences  
University of Auckland

### **Roshit Bothara**

Christchurch School of Medicine  
Otago Medical School  
University of Otago

We attend school to obtain an education. But how often do we get a chance to consider how that education is provided to us? Have you ever wondered why we are taught in certain ways and how effective some of those ways are? Or perhaps what the future direction of medical education should be? Several New Zealand medical students had the opportunity to participate in discussions about these very topics when they were invited to present at the Australia and New Zealand Association for Health Professional Education (ANZAHPE) Conference in Hobart, Australia, earlier this year. In this article we describe our contributions to the conference, as well as highlights of the event.

ANZAHPE is an organisation of health-professional educators from all medical and allied health professions, working towards curriculum development and progress. The ANZAHPE Conference is held annually, and brings faculty staff and students from across Australia, New Zealand, and beyond to present their research. The curricular challenges in many cases are common across schools and by having open discussions and debate, the potential for collaborative efforts is enhanced.

ANZAHPE 2018 was hosted by the University of Tasmania, Hobart on 1-4 July 2018, and the authors are thankful for the wonderful show of Tasmanian food and culture throughout the conference. The conference opened with an indigenous welcome, paying respect to the history of the indigenous populations, acknowledging the elders of the past, present, and emerging. New Zealand was well-represented this year, with staff and students from a diverse range of professions presenting research.

- Rachel Matthews is a fourth-year medical student. The summer-studentship research she presented at ANZAHPE investigated the professional identity development of older medical students - students who had worked prior to attending medical school. Her supervisor for this research was Dr Kelby Smith-Han. Before entering medical school, Rachel had worked for more than seven years as a Speech Language Therapist.
- Steven Ling is a fourth-year medical student based in Tauranga. He was supervised by Professor Phillippa Poole to explore the impact of student debt on the future choices of health professional graduates, which was presented at the ANZAHPE Conference, and plans to continue pursuing research in this area. When not engaged in medicine or research, he enjoys surfing, hiking and making music on the guitar and piano.
- Roshit Bothara is a fourth-year medical student, and the current Education Officer for the NZMSA. Last year, Roshit's BMedSc(Hons) project developed the Global Health Classroom, a global health learning model connecting medical students in Nepal, Samoa and New Zealand via videoconferencing to learn about their health systems, challenges and culture. The project won the Undergraduate Student Award at the Australia and New Zealand Association for Health Professional Education (ANZAHPE) Conference. He has a strong interest in global health, medical education and social accountability.

The overarching theme of the conference was sustainability, a theme well elaborated on in the opening plenary session, and a particular highlight for the authors. Associate Professor Katherine Barraclough, a nephrologist at the Royal Melbourne Hospital, challenged all delegates with regard to sustainability in health care, discussing the links between health and the environment, as well as how environmental change was impacting health. She discussed the *primum non nocere* (do no harm) concept of medicine regarding the medical contribution to the national carbon footprint (in Australia, this has been calculated at 7%). Practical ideas were suggested, primarily around workplace preparedness, advocacy, and use of telehealth.<sup>1</sup> One audience member bravely asked about the sustainability of a conference that gathers people from all over the globe; her response to this was that nothing can quite replace the networking and seeding of ideas that come from such a conference.

The authors each had the opportunity to present their research, with presentations divided into different streams under the umbrella theme of sustainability, and multiple streams occurring at the same time. Roshit Bothara presented his BMedSc (Hons) project 'developing the Global Health Classroom', where medical students in different countries learned about each other's health care systems and challenges, culture, and determinants of health, via videoconferencing.<sup>2</sup> This collaboration currently involves the Otago Medical School in partnership with medical schools in Nepal, Samoa, and Fiji.

Rachel Matthews presented her summer research project exploring the challenges of professional identity development experienced by older medical students. Also known as the 'supergrads', these are students who have developed a professional identity before enrolling in medical school. As a supergrad with a clinical background herself, she was interested to find that participants had unique experiences with regard to their own professional identity development, and few students sought out support for this. Students with previous experiences in the health care sector learned to think more broadly about diagnoses when approaching patients, while students with non-health backgrounds tended to highlight the passions they had developed in their previous careers as strengths to guide themselves and their future careers. Her presentation was presented in a stream entitled 'Learning Culture – Professionalism and Ethics', with both of these facets being significantly important in medical education. This stream included presentations on the ethical challenges faced by medical students and with social media usage, as well as professional identity development.

Steven Ling was first introduced to health education through his summer studentship, looking at whether student debt had a significant impact on the future career preferences of new graduates entering the health-care sector. Students with higher debt levels tended to prefer a rural location of practice, whilst debt levels made little difference with regards to preferred health specialty. He found the opportunity to network and discuss with leaders of health-professional education an invaluable learning experience. Although being involved in health-professional education can be frustrating at times for those who want to see immediate results, he has found the impact of ideas and innovations many years down the line in this area to be astounding.

There is an overarching consensus among the authors that having the opportunity to present at ANZAHPE, particularly as students, has been a valuable learning experience. As relatively inexperienced conference presenters, nerves were a big feature in the run-up to each presentation. However, overall they received very positive feedback. The presentations resulted in thoughtful discussions with other delegates and it was encouraging to see how much interest each topic garnered during the conference. One thing the authors have had impressed on them is the importance of medical-education research in training the next generation of health-care professionals. Knowing there are others working tirelessly to further develop and improve health-care education for future students has been a great inspiration.

While the scope of learning during the conference was massive, there were many opportunities to network and socialise. A particular social highlight was the 'Meet the Maker Networking Dinner', an informal stand-up function with food stalls featuring some of the best Tasmania has to offer. There were delicious cheeseboards and juicy oysters, a live band, and an opportunity to converse with other delegates or dance the night away. The authors found some of the more experienced delegates surprisingly difficult to keep up with, and learned a thing or two about Australian line dancing!

The diversity of presentations and interests present at the conference was truly remarkable. Each author came back to New Zealand with a greater understanding of the meaning of sustainability as it pertains to medical education. All three authors felt privileged to be able to engage in medical-education discussions and learn about the future direction of medical education. As students and members of the future health-care system, it will be up to us to continue pushing for improvements and innovations that will not only be beneficial for the present, but also sustainable for future generations to come. The authors would highly encourage any student interested in this field to not only consider being involved in medical-education research, but also consider attending ANZAHPE in the future.

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## Correspondence

Rachel Matthews: [matra718@student.otago.ac.nz](mailto:matra718@student.otago.ac.nz)  
Roshit Bothara: [botro358@student.otago.ac.nz](mailto:botro358@student.otago.ac.nz)  
Steven Ling: [slin669@aucklanduni.ac.nz](mailto:slin669@aucklanduni.ac.nz)



# NZMSA Clinical Leadership Forum Hackathon Abstracts

As part of NZMSA's Clinical Leadership Forum this year, we held three Hackathon challenges - one on wellbeing, one on evidence-based medicine, and one on racism. The delegates were divided amongst the challenges, with each team having four to six students. Each team was given the questions two weeks before the Forum and were required to give a short presentation of their solution. We were very impressed with the solutions the teams and hope to see them implemented in our medical community in the future. Below are abstracts of the solutions from a selection of teams.

### Wellbeing Hackathon

#### Challenge Question:

How do medical students look out for/stay in touch with each other's wellbeing on a national level?

*The healer education, assessment and referral (HEAR) program and how it can help medical students in NZ (winner)*

Hasini Atulwage<sup>1</sup>, Charlotte Dumble<sup>1</sup>, Marcia Zeng<sup>1</sup>, Tom Knight<sup>2</sup>, Vinesh Nair<sup>3</sup>

1. University of Auckland
2. University of Otago, Wellington
3. University of Otago Christchurch

Beginning at the UCSD School of Medicine, the HEAR Program will help make wellbeing more accessible to medical students in New Zealand, if implemented effectively. This program involves providing students with an online questionnaire that screens for signs of stress, burnout, depression, and more. On completion, you will be referred to online or community resources (for example counselling) tailored to your specific responses. This questionnaire would be compulsory for every medical student to complete once during the year. After this, the questionnaire will still be available for students should they need it. Getting every student involved will help to create more conversation between students about mental illness, helping to tackle the stigma and allowing us to support each other. Additionally, it specifically targets those students who may not seek out resources on their own, or those who feel their issues are not serious enough to ask for help.

*Mental Health First Aid: Empowering medical students (runner-up winner)*

Ben Scott Hoatson<sup>1</sup>, Sarah Liu<sup>2</sup>, Juliette Meyer<sup>2</sup>, Sung-Min Jun<sup>2</sup>, Maia Gourlay-Gudex<sup>3</sup>

1. University of Otago, Dunedin
2. University of Auckland
3. University of Otago, Christchurch

Medical students commonly seek mental health support and advice from their fellow students. However, students are often challenged by not knowing what to do or how to provide help. Mental Health First Aid (MHFA) utilises the same concepts as physical first aid, by providing first responders with a framework to follow and key signs to look for when approaching a situation in which they are concerned about the (mental) health of someone. We propose MHFA be implemented into the preclinical program and revisited in the clinical program within tutorials or online. MHFA will give students a framework for situations e.g., with a patient or colleague, and strategies consistent with their school's referral pathways. The integration of MHFA into the medical curriculum will hope to reduce the stigma of mental health, improve mental health literacy, and empower students to confidently support and appropriately redirect their peers in mental health crises.

### Evidence-Based Practice Hackathon

#### Challenge Question:

How can we bridge the gap between research outcomes and clinical practice in order to ensure that all doctors in New Zealand apply evidence-based practice?

*Bridging the gap between medical research and clinical practice (winner)*

Carneshika Hettiaratchi<sup>1</sup>, Caitlin Evans<sup>1</sup>, Ryan Ord-Speed<sup>2</sup>, Greer Mahoney<sup>3</sup>, Kate Fitzmaurice<sup>3</sup>

1. University of Auckland
2. University of Otago, Dunedin
3. University of Otago, Christchurch

\* Joint first authors

Our solution to bridging the gap between research and clinical practice comprises a two-pronged approach. On a broader scale, we propose the development of research subcommittees within medical colleges, which would appraise and select appropriate practices for implementation. This will help filter existing research to promote the dissemination of valid and applicable findings. To enhance uptake amongst practitioners, member reaccreditation would require the completion of annual online modules or workshops to help integrate these findings into practice. Ideally, District Health Boards would also attend these to ensure they



remain up to date. Meanwhile, we also propose to increase research literacy amongst medical students through the provision of mandatory training courses integrated into the curriculum. These aim to equip students with the skills necessary to appraise and implement research findings, and ultimately hopes to increase the capacity of upcoming doctors to be involved in evidence-based decision making.

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*The development of a New Zealand doctors evidence-based practice (NZDEBP) database*

**Oliver Dugena<sup>1</sup>, Victoria Fookes<sup>2</sup>, Megan Thurlow<sup>3</sup>, Nicky Dunn<sup>4</sup>**

1. University of Otago, Wellington
2. University of Otago, Dunedin
3. University of Otago, Christchurch
4. University of Auckland

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To ensure research is translated to evidence based practice, we propose creating a database to collate critical appraisals from throughout New Zealand's healthcare system. An appointed committee formed of stakeholders will have overall responsibility for the database. Writing a critical appraisal will become a requirement for doctors in order to complete their run in each specialty. Each critical appraisal will be submitted to the database and the blinded committee will screen appraisals to determine which are suitable for publication to the database based on quality, originality and current gaps in the database. The selected appraisal will then be peer-reviewed by expert clinicians and researchers prior to publication.

Having a trusted source of New Zealand-focused, evidence-based information will ensure the provision of effective care to the diverse Aotearoa demographic. Implementing regular research analysis into clinical practice will hone doctor's skills and promote a culture that values evidence based practice.

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*Bridging the gap*

**Vithushiya Yoganandarajah<sup>\*1</sup>, Nicole Withers<sup>1</sup>, Barney Rathnayaka<sup>\*2</sup>, Devon Lowyim<sup>3</sup>, Thomas Seaton<sup>3</sup>**

1. University of Otago, Dunedin
  2. University of Otago, Wellington
  3. University of Auckland
- \* Joint first authors

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There exists a significant gap between research findings and clinical outcomes that results in a lack of quality healthcare for patients. In the hospital context, a potential solution to bridge the gap is via the establishment of a Hospital Research Implementation Team that will oversee the implementation and audit of procedures. Junior doctors within each team in a department will utilise their critical appraising techniques taught extensively in medical school to present new research to their respective teams to encourage active discussion about clinical utility of said research. It is expected that through collaboration and local evaluation, pre-existing guidelines/protocols will be altered to render them actionable. Monthly auditing is recommended to gauge the outcome, the results of which can be published to disseminate findings or collated in a database where doctors from around the country can access it or add to it to improve practice.

## **Patua te Whakatakētanga – Fighting Racism Hackathon**

### **Challenge Question:**

As future doctors, what can we do to eradicate racism, in all its forms, from the healthcare sector?

All four groups were awarded as winners for this challenge.

*Time for a cuppa... Solving racism over a cup of tea*

**Ellie Baxter<sup>\*1</sup>, Hermaleigh Townsley<sup>1</sup>, Taylor Pennell<sup>\*2</sup>, William Xu<sup>2</sup>, Alexander Torrie<sup>3</sup>**

1. University of Otago, Wellington
  2. University of Auckland
  3. University of Otago, Dunedin
- \* Joint first authors

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Four people sit around a table to have a cup of tea. Wiremu has a pretty standard cup of tea, with a splash of milk and two sugars. Jack has a black tea. Jessie pours half a cup of milk into her tea. "Is that even tea?" asks Jack. When does tea not become tea?

Everyone can take their cup of tea differently, but tea is still tea regardless of how light or dark. Similarly, a patient's ethnicity is what they tell you it is, and appearances are never substitute for asking the question. The only way to make the right tea for the person in front of you then is to ask them - how do you like your cup of tea?

We challenge all medical students to ask all patients how they like their cup of tea. We propose that asking where our patients' cultural affiliations lie should be treated like a standard question you'd ask over a cuppa.

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*Strategies for reducing racism in the health sector*

**Amy Rankin<sup>1</sup>, Sophia Stewart<sup>1</sup>, Dong Hyun Kim<sup>1</sup>, Bree-Anna Langton<sup>2</sup>, Nikky Fraser<sup>3</sup>, Harris Sciascia<sup>4</sup>,**

1. University of Auckland
2. University of Otago, Wellington
3. University of Otago, Christchurch
4. University of Otago, Dunedin

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Racism within the health sector contributes to inequitable poorer health outcomes for Māori. Several strategies have been adopted at Lakes District Health Board to reduce racism and enhance the health outcomes of Māori. These initiatives could be implemented nationwide to improve the health of Māori throughout New Zealand.

Manawa Pou is a kaupapa Māori service that helps Māori patients navigate inpatient health services, provides cultural support, and advocates on behalf of Māori patients. Rotorua Hospital has been designed to incorporate Māori designs and carvings, and signs are in both English and Te Reo, which encourages dialogue in Te Reo. Waiata and karakia sessions for staff and patients are also held daily. The culture at this hospital encompasses Māori values and strives towards reducing inequity for Māori.

However, there is still more work to be done. A higher representation of Māori staff combined with increasing staff capacity to adopt a kaupapa Māori framework will further reduce inequities.

**Paulin Kanabar<sup>1</sup>, Christi Bower<sup>1</sup>, Jaime Newton<sup>1</sup>, Bryony Harrison<sup>2</sup>, Hugo Messer<sup>2</sup>, Francesca Dalzell<sup>3</sup>**

1. University of Auckland
  2. University of Otago, Dunedin
  3. University of Otago, Wellington
- 

The disproportionate burden of mortality and morbidity amongst ethnic minorities is evidence of ongoing racism within the healthcare setting. The proposed solution addresses the disconnect observed by students between preclinical education around culturally safe practice and norms within clinical settings. It has been noticed that many supervisors provide minimal feedback to trainees in cultural competency, while several doctors have difficulty with correct pronunciation of patient names. Our solution to this was twofold. Firstly, we propose the introduction of sharing a karakia prior to commencing ward rounds. Meanwhile, brief teaching of Te Reo to team members during handovers is also under trial. These aim to normalise culture and Te Reo as part of everyday teaching and behaviours in the clinical environment. Whilst this approach focuses on integrating Te Ao Māori into clinical practice, it will hopefully promote culturally safe practice principles that can be applied across ethnicities.

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*A reality check to promote change*

**Aqeeda Singh<sup>1</sup>, Kara Hamilton<sup>1</sup>, Jenny Yoon<sup>2</sup>, Bernard Kim<sup>2</sup>, Simone Besseling<sup>3</sup>, Michaela Mullen<sup>3</sup>**

1. University of Otago, Dunedin
  2. University of Auckland
  3. University of Otago, Wellington
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Our solution for eradicating racism orientates around increasing awareness of the extent of the problem, followed by working towards reforming peoples' views. Often, many people in the healthcare setting make discriminating references and unknowingly perpetuate the issue of racism. Some continue to disregard the cultural etiquette that exists in certain groups of patients, especially in Māori. To combat this, our ideas were to first bring this issue to the forefront by projecting commonly-used racial phrases and explanations of why they are unfair generalisations on screensavers or posters in the hospital and thus encourage a change in thought-process. The aim is to also portray the goal of eradicating the use of racist terms or actions. Often, people need, in colloquial terms, a 'reality check', and broadcasting the issue of racism publicly can provide that. Following this awareness, it is expected that individuals will inherently realise that their actions need changing and thus will ignite a turn in the positive direction.



# The Good Doctor by Dr Lance O'Sullivan

## Michaela Rektorysova

School of Medicine  
Faculty of Medical and Health Sciences  
University of Auckland

Michaela Rektorysova is a third-year medical student. For her clinical years she hopes to be based outside of Auckland. In her free time, Michaela is an Army combat medic and enjoys hiking with heavy weights, sleeping in the bush and reading the occasional book.

I first heard of Dr O'Sullivan a few years ago as the man who challenged the anti-vaxxer movie screening. When I recently stumbled upon his book and read the prologue, I was hooked:

*'One of the teachers in a secondary school staffroom is struck by a memory of a former pupil.*

*'Whatever happened to that O'Sullivan boy?' she asks. 'I supposed he's in jail by now.'*

*A friend of the O'Sullivans overhears the conversation and can't resist. 'You mean Lance?' she replies. 'Lance is at medical school.' Cue stunned silence.'*

That was not the opening one would expect from the biography of a doctor who had been named New Zealander of the Year. Lance was a troubled child who didn't know who he was. 'Too white to be Māori, too brown to be white'. Due to his identity crisis, he struggled throughout his childhood until he was accepted into Hato Petera College, an Auckland high school with strong Māori character. Here, he embraced his Māori heritage and began to thrive. Lance's story proves that it is not the potential of a child that determines success but their desire to achieve this potential. For Lance, this was fuelled by feeling like he found his identity, like he belonged and, as he says, this was the difference between him becoming a doctor and ending up in prison.

When he reached his last year of high school he was told that he could do 'something more' and that he could be a doctor. As with most children who are born into families of a low socioeconomic status, who are raised with the aid of the benefit and who do not 'fit in' to the traditional Western schooling system, this was not an option he had ever considered. Until one day when he met a Māori doctor at the marae. This was a significant turning point in his life. He was so inspired by this meeting; from that point he had decided he was going to be a doctor. It wasn't an easy path, but he was eventually accepted into medical school, became a doctor, and moved to Kaitiaki.

Soon, Lance became dissatisfied with the way the clinic he worked at treated their patients. If they had outstanding fees or missed appointments, he was not allowed to see them. The paradox was that these patients were often the ones who needed to be seen the most. They would instead wait until the situation worsened so that they could go to the emergency department for free.

With his wife Tracey, Lance eventually established a medical clinic: Te Kohanga Whakaora. In the new clinic, patients were seen even if they had outstanding fees or could not pay for the appointment, and some days the clinic did not require appointments – the patients could simply walk in when they had the time or money. As Lance says, 'These people don't have \$5 for a visit or a prescription. They live day to day. And no, they aren't all angels. Some of them don't have money for prescriptions because they bought a box of beer. But if you've bought a box of beer, does that mean you don't deserve help? Does that mean their children don't either?'

Lance is determined to give Northland Māori children a better start in life and show them that they also can rise above the disadvantage that disease and poverty creates for them. But the main theme of the book is clear: Māori children from poor families can escape their disadvantages, but they shouldn't have to in the first place.

The book is written in simple language and therefore reads very easily. In contrast to many other books describing health issues, *The Good Doctor* describes the issues most prevalent in New Zealand and therefore hits close to home. For this reason, it is a must-read for all Kiwi health professionals. After all, the health of our people is everyone's issue.

## References

1. O'Sullivan, L, 2015. *The Good Doctor*. Penguin UK.

## Conflict of Interest

Michaela is a student reviewer for the NZMSJ. This article has gone through a double-blinded peer review process applied to all articles submitted to the NZMSJ, and has achieved the standard required for publishing. The author has no other conflict of interest.

## Correspondence

Michaela Rektorysova: michaela.rektorysova@gmail.com



# The Immortal Life of Henrietta Lacks

## by Rebecca Skloot

### Sarah Maessen

School of Medicine  
Faculty of Medical and Health Sciences  
University of Auckland

> Sarah is a third-year medical student with a passion for research. If you don't find her working in the Liggins Institute, she's probably planning her next holiday or testing the limits of her flatmates' patience with a new hobby

Imagine discovering that your mother, who died when you were a child, was still alive somewhere. Imagine being told that she was helping to cure disease, that she had been to space, and that every day she had been subjected to numerous physical and chemical assaults in the name of science. Imagine these parts of your mother were making scientists billions of dollars, while you and your siblings were separated, poor, hungry, and abused after your father realised he could not afford you. For the Lacks family, this was a disturbing and confusing reality.

Development of the HeLa cell line was a major breakthrough for medical science. It was the first time that human tissue could be reliably grown outside the human body, and paved the way for incredible advancements in health care. It was essential in the development of the polio vaccine, as well as making crucial contributions to research into other myriad diseases, vaccinations, and treatments. *The Immortal Life of Henrietta Lacks* reminds us that these cells first existed as part of a woman who was treated at Johns Hopkins University hospital in the 1950s. Moreover, Henrietta Lacks was not aware that her cells were famous as she slowly died from the cervical tumour from which they were taken without her consent.

The book begins by describing Henrietta's life and the illness that led to both the immortal HeLa cells and her own death. Skloot offers a frank account of what it was like to be black and poor in the United States of America (USA) in the earlier part of the 20th century. Health care was segregated, and options for black citizens were limited. Many simply did not have access to any medical care – if they got sick they either got better, or they died.

Living in Baltimore, the Lacks family had access to medical care from Johns Hopkins, but were exposed to some questionable ethical choices, which were accepted as common practice at the time. The book describes the many abuses of power by medical professionals that resulted in a widespread mistrust of the medical establishment. This mistrust persists in many communities in the USA, and was fuelled by an attitude epitomised by the quote 'If the whole profession is doing it, how can you call it "unprofessional conduct"?'.<sup>1</sup>

The heart of the story is the Lacks family, who were largely in the dark about HeLa cells. Lacking scientific education, Henrietta's daughter Deborah struggled with fear and confusion after learning about the

cells through their sensationalist news coverage. Although she does not initially trust the author, who is a journalist, Deborah gets to know Skloot as she conducts research for the book. The story of them learning about Henrietta Lacks together is almost as interesting as the story they are uncovering.

As well as telling a fascinating tale about one of many casualties of the advancement of medicine, this book tackles many ethical quandaries that exist at the centre of medical practice and research from a lay perspective. Some of these issues are still ongoing conversations. For example, laws surrounding the use of human tissue in research have changed since the book's publication, but the argument is far from resolved – particularly as advances in genetic sequencing make anonymity difficult, if not impossible. Skloot frames this central issue in the context of the journey she went on to discover Henrietta Lacks' story. We are left with many questions unanswered such as: What is the cost of progress? Is it more important to protect the rights of individuals, or to save the lives of the majority? The book calls on medical professionals to question their conduct, and readers to consider the complexities of the many grey areas at the intersection of medicine, ethics, and law.

### References

1. Skloot R. (2010). *The immortal life of Henrietta Lacks*. New York: Crown Publishers.

### Conflict of Interest

Sarah Maessen is the NZMSJ Academic Events Officer and a student reviewer. This article has gone through a double-blinded peer review process applied to all articles submitted to the NZMSJ, and has achieved the standard required for publishing. The author has no other conflict of interest.

### Correspondence

Sarah Maessen: Smae727@aucklanduni.ac.nz



# Living In Emergency: Stories of Doctors Without Borders, directed by Mark N. Hopkins

### Sylvia Duncan

Dunedin School of Medicine  
Otago Medical School  
University of Otago

> Sylvia Duncan is a Trainee Intern at the University of Otago. She has a passion for emergency medicine and spends far too much time “studying” on Netflix watching documentaries.

Wasting no time, the film opens with grainy news footage depicting violence without reprieve in war-torn Congo. A doctor in scrubs laments the limited resources available to them. ‘The need is pretty much infinite’, he says, holding his head in his hands. Images of neonates with eyes swollen shut and adults carried over rubble on makeshift stretchers flood the screen as if to prove his point.

You would be forgiven for feeling a little shell-shocked at the opening of *Living in Emergency: Stories of Doctors Without Borders*.<sup>1</sup> The Oscar-nominated documentary, released in 2008, pulls no punches and exposes its audience to the truly horrifying environment that the medical volunteers of Médecins Sans Frontières (MSF) find themselves in. It is not the illnesses themselves that this film provides insight into however; rather, it follows several new recruits and seasoned veterans as they navigate daily life and medical practice in restricting and often dangerous conditions. Their stories, often tales of suffering patients and little sleep, are haunting.

One of the clinicians we follow is an Australian doctor as he becomes the first medical professional a village in Liberia has seen for 15 years. At first he loves it; the independence and rewarding nature of his work keeping him motivated to work non-stop. Quickly the isolation and stress of the job fall heavy upon him, leaving both him and the viewer feeling utterly helpless. We watch him quarrel with local medical personnel, who make it clear they do not like the way they are being treated by a foreigner. We watch as he argues with staff on a brief visit to the capital because they implore him not to treat patients without gloves, a decision that leaves him limited by the availability of this rare and expensive commodity. He explains to the camera over lunch that people are dying as he is eating, but he can not do anything about it – he has to eat. This unsettling course of events takes only a few minutes to unfold for the viewer, immersing us in the same disorientating environment as the new recruits.

The naivety and rapid decline in morale of young clinicians is contrasted skilfully with the expertise and attitude of senior volunteers, all of whom are very familiar with MSF. One recurring face is that of Klara, an MSF doctor who has been with the organisation for nearly ten years. In one scene she sits in a wicker chair by an open window in downtown

Monrovia, smoke trailing from her cigarette as she speaks nonchalantly about the things she has seen in her time there. She frequently compares workloads there and in France, her home nation. ‘Here’, she says, ‘I have thirty patients. They’re all mine. They’re all life threatening’. She shrugs. You can not help but feel that she has been hardened by her years of service, an uncomfortable feeling that makes you wonder what sort of hell she has been through.

This documentary is compulsory viewing for medical students with an adventurous streak that have ever considered volunteering overseas once qualified. Although this documentary may not be representative of all volunteer placements, students should be prepared for the realities they could be facing one day.

*Living in Emergency* can also provide some insight into working in clinical practice, and for that reason I implore students to watch this film during their clinical years. While the nature of the diseases and overwhelming poverty present in these countries are far from what we face here in New Zealand, some of the core workforce issues of the medical profession that the MSF team experience invite comparison to our own. A blasé and sometimes crude attitude from seasoned health professionals, overwhelming burnout in new recruits, and the seemingly infinite and thankless task of treating patients make this documentary highly relatable for students placed in the clinical environment.

### References

1. *Living in Emergency: Stories of Doctors Without Borders* [film]. USA: Red Floor Pictures; 2008.

### Correspondence

Sylvia Duncan: Dunsy878@student.otago.ac.nz





## Midnight Reflections

**Anne Chiang**

Christchurch School of Medicine  
Otago Medical School  
University of Otago



> Anne is a fourth-year medical student based in Christchurch. She is a keen photographer and likes to get out and about with her camera when the weather plays ball. Great things never came from comfort zones, so get out there, live life and challenge yourself!

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# A long day

### Fardowsa Mohamed

Dunedin School of Medicine  
Otago Medical School  
University of Otago

> Fardowsa is a Trainee Intern at University of Otago, Dunedin. She has written poetry for most of her life and has recent publications in *Landfall 233* and *Poetry New Zealand 2018*. She sees herself landing in a surgical career in the future.

I look out on to the empty street from the eighth floor;  
houses darken into silhouettes. My sneakers creak  
through the hollow hallways, my yawn echoes. I hear  
the man in the solo room cough weakly. His chest,  
a cathedral drowning from the basement to the highest mural,  
and soon, all of Rome will be swallowed by the rising tide.  
He knows that, I think, at least I do, the doctor does, his wife  
with her head hung, back bent forward in pre-emptive grief, does.  
When I went into his room I was the last new face he'd see.  
I asked him if he wanted anything and  
he said, another day.

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## Friend Bequest (From a Modern Cad)

### Emily Adam

Christchurch School of Medicine  
Otago Medical School  
University of Otago

> Emily is a fifth-year medical student based in Christchurch. She is relatively new to Christchurch, so on weekends she tries to get out and go tramping/snowboarding and generally explore the surrounding area. In terms of career goals, she thinks she is relatively boring in the fact that she is still enjoying experiencing the wide range of potential roles one can have within the field of medicine, and so rather than knowing what field she wants to work in, she is instead currently ticking off what she definitely does not want to do career-wise.

I am vein  
I am art-  
er I ole.  
They read me as they would Facebook;  
Fingers track my spine,  
Just like they scroll through the newsfeed.  
I can't hear them-  
As no hair have I.  
I like to think I am thick skinned;  
But their ribbing  
(Because I appear caged)  
Is not gentle.  
Their Comments on my Profile,

Cut me  
Strip me  
Preserved  
(In cyberspace).  
They are superficial,  
Tongue and cheek they are,  
But they will delve deeper  
To stalk my history further down:  
I had a heart attack as-  
They have come to (the) real eyes  
(A shin?)  
I am just 'Like'  
Any body





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