

Could comprehensive cancer centres improve cancer outcomes and equity in New Zealand?

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In the midst of the present Covid pandemic it is easy to forget that we have an ongoing cancer pandemic that will not be ameliorated by a generic vaccine. Globally, based on 2013–2015 data approximately 40% of men and women will be diagnosed with cancer during their lifetime, meaning that most of us can be expected to be affected by cancer, either directly or indirectly.¹

In New Zealand, cancer is now the leading cause of death, with cancer deaths making up 30.2% of all deaths, ischaemic heart disease 15.8% and cerebrovascular disease 7.8% in 2015.² More people are developing cancer in New Zealand, mainly because the population is growing and ageing. In 2016, 24,086 people in New Zealand were diagnosed with cancer; an increase of 21% since 2007.³ By 2040, the number of cancer diagnoses is predicted to double to around

52,000, or 142 people a day.⁴ The cancer burden is not evenly distributed in any community with a disproportioned effect on indigenous people and those on lower incomes. In New Zealand, Māori are 20% more likely to get cancer than non-Māori, and nearly twice as likely as non-Māori to die from cancer.⁵

Internationally, survival trends for cancer are generally improving, with New Zealand's five-year survival rates, similar to those of the US, Canada, Australia, Finland, Iceland, Norway and Sweden.⁷ New Zealand does have a lower cancer survival compared to our neighbour Australia, and this difference is increasing.^{8,9} For example, Australia showed significant improvements (6% in men, 3% in women) in comparing the periods 2000–05 and 2006–10, while New Zealand had only a 1.8% increase in cancer

Figure 1: Provisional New Zealand cancer mortality rates, 2016, selected cancers, Māori vs non-Māori, non-Pacific.⁶

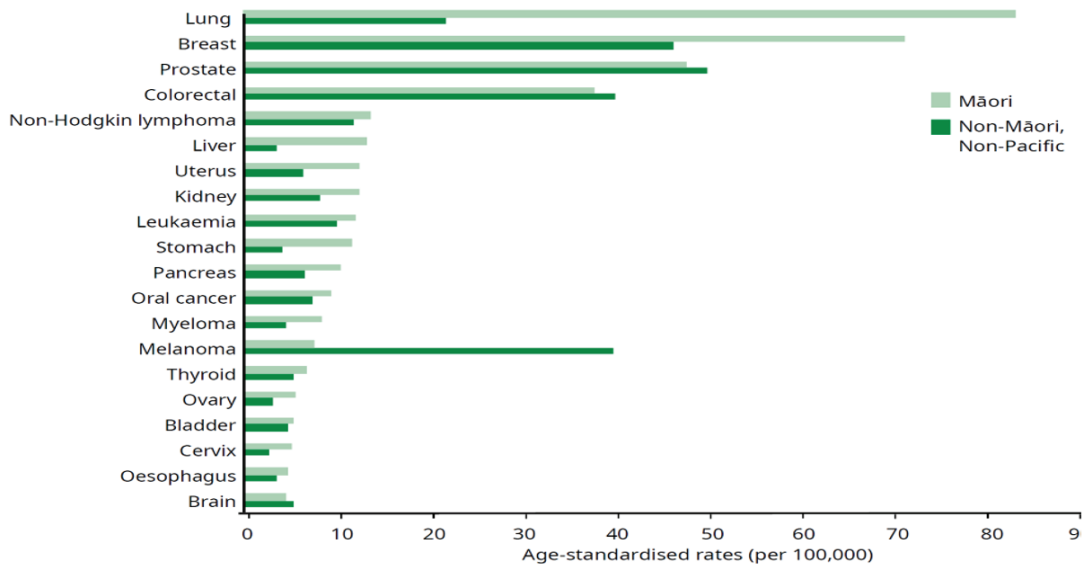
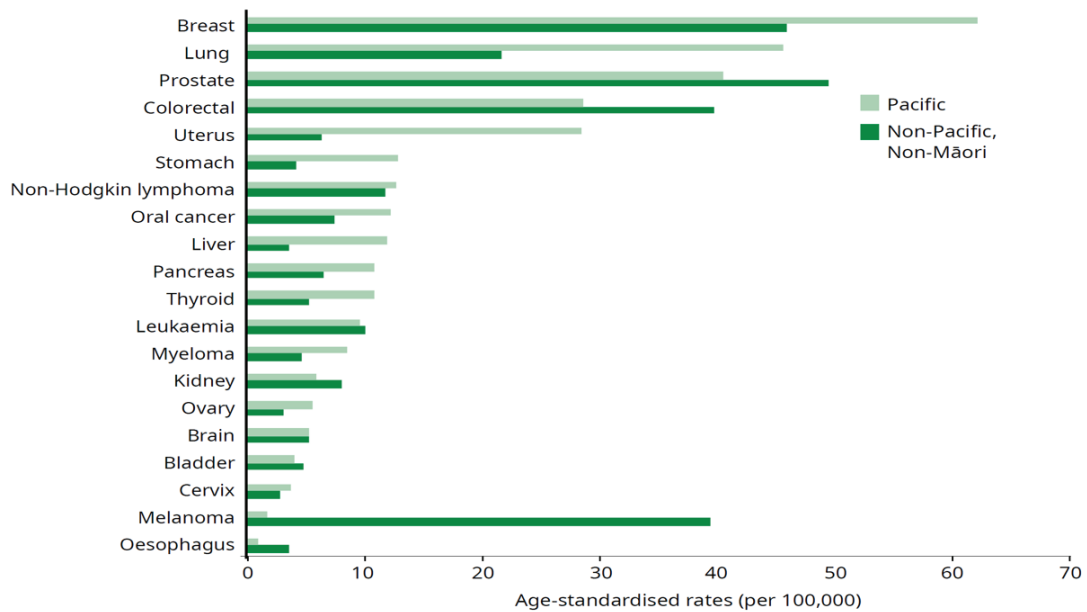


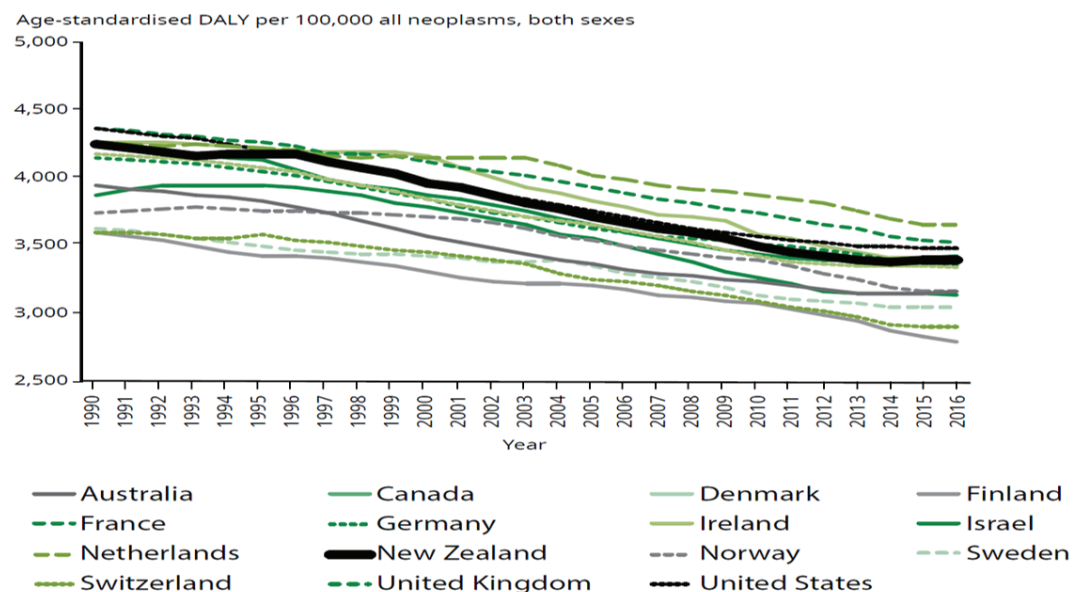
Figure 2: Provisional New Zealand cancer registration rates, 2017, selected cancers, Pacific vs non-Pacific, non-Māori.⁷



survival in men and 1.3% in women.⁹ The five-year survival rates for these common cancers for Australia and New Zealand are, respectively: colorectal: 70.9% (Australia), 65% (New Zealand); lung: 19.4%, 15.3%; breast (women) 89.5%, 87.6%; prostate: 94.5%, 90.3% and melanoma: 92.9%, 91.8%, from 2000–05 to 2006–2010. Differences in cancer survival trends are thought most

likely to, due to healthcare-related factors such as early diagnosis and optimum treatment.⁹ This demonstrates that our survival rates from cancer are now falling behind those of our comparable countries and has not been improving at the same rate as elsewhere.⁷⁻⁹ The impact as measured by disability adjusted life years lost by cancer is illustrated below.

Figure 3: Age-standardised disability-adjusted life years lost per 100,000, all neoplasms, both sexes, selected countries, 1990–2016.⁶



In response to the increasing demand for cancer treatment, the Ministry of Health has developed the New Zealand Cancer Action Plan 2019–2029 to provide a pathway to improve cancer outcomes.⁶ On 1 December 2019, the Government launched the Cancer Control Agency (Te Aho o Te Kahu) to lead the implementation of this plan.¹⁰ Key priorities for the agency include providing accountability, coordination of various agencies involved in cancer, and working to implement the Cancer Action Plan. Te Aho o Te Kahu has been charged with working closely with people impacted by cancer, including their whānau and healthcare professionals, as well as with Māori and Pacific leaders to ensure that they inform them on how best engage with them to meet their needs.

The New Zealand Cancer Action Plan 2019–2029 sets out the four main goals required over the next 10 years to ensure better cancer outcomes:⁶

- New Zealanders have a system that delivers consistent and modern cancer care
- New Zealanders experience equitable cancer outcomes
- New Zealanders have fewer cancers
- New Zealanders have better cancer survival, supportive care and end-of-life care.

This plan has a strong focus on achieving equity of outcomes and contributing to wellness for all, and recognises different people with different levels of advantage require different approaches and resources to get equitable health outcomes. The plan states that it is guided by four overarching principles;

- Equity-led
- Knowledge-driven
- Outcomes-focused
- Person and whānau-centred.

Given that Māori have the poorest overall health status in New Zealand, have higher rates of most cancer and worse outcomes for most stages than others and are significantly disadvantaged in terms of health inequities, it is essential that we ensure the rights and meet the needs of Māori people; new approaches to the diagnosis

and delivery of cancer care is needed to be considered with the integration of research and especially clinical trials into clinical practice in a manner that promotes support. Māori involvement at all levels is critical to improving the cancer outcomes for all New Zealanders.

The present model has led us to where we are today and continuing the delivery care in the same model will likely keep the disparity in outcomes growing. A change, not just in philosophy (which we have seen) but in the model we use to deliver care is required. The integration of clinical practice and research is well established as providing better outcomes across a range of outcome measures, including survival with comprehensive cancers centres across the world.

The Comprehensive Cancer Centre (CCC) model, initially established by the US Government was developed to improve cancer outcomes. A hallmark of a CCC—comprehensive and multidisciplinary care—means that specialists from different medical disciplines collaborate to plan, evaluate and deliver accurate cancer-specific diagnosis treatment, with integration of basic and clinic research pushing to improve outcomes. CCCs are places of excellence for cancer management and have now been adopted at least in part in most developed countries. In the UK The Maggie cancer centres have developed as a charity independent of the NHS, yet linked to the provision of care to provide the support and care needed to help patients with cancer. This culturally appropriate integration of comprehensive multidisciplinary clinical care, research and psychosocial support is a model that may meet the needs of New Zealand to achieve its cancer outcome goals and help close both the outcome and the equity gap.

Below, New Zealand's most famous cancer surgeon (Professor Sir Murray Brennan) tells his perspective of working in such a centre and how this might work in New Zealand.

From a New York perspective

I have spent almost 40 years at one of the most visible cancer centres in the world, Memorial Sloan Kettering Cancer Center in New York City. If I did not believe in the mission, the achievements and the relevance, I would never have stayed.

In the 1880s, J Marion Sims was the person who originally proposed the idea of a cancer centre in New York City: "...a cancer hospital (should be built) on its own foundation, wholly independent of all other hospitals... Its medical board ought to be men who go in to it with zeal, determined not only to give temporary relief to human suffering, but to do something toward discovering better methods for treatment..."

A visionary, Sims' interest grew from the difficulty of women with gynaecological cancer to be treated in general hospitals in the mid-to-late 19th century. No paragon, Sims was a controversial figure having left New York at the time of the American Civil War to avoid fighting for his home in the North or his birthplace in Alabama. Immensely successful in Europe, he returned to New York with zeal for his work. President of the American Medical Association, he was honored by his peers and a statue erected in his name in Central Park. This statue was recently removed as it represented a symbol of a man who performed surgery on African American slaves in the 1840s without consent and in the absence of anaesthesia—a conflicting story of competing ethics.

Sims died in 1883 aged 70, before the Memorial Hospital was opened in 1884 with benefaction from the rich and famous of the day, including John Jacob Astor III and his wife Charlotte, Elizabeth H Cullum, John E Parsons and other prominent New Yorkers.

But what has happened in the 136 years since the opening of what is now MSKCC? The buildings and the staff have proliferated across the upper East Side and on out to the suburbs, with a total staff approaching 20,000 with 1,000 volunteers, and an education programme that embraces almost 2,000 residents and clinical fellows, and an operating revenue which would have reached \$5 billion in 2020 had not COVID-19 brought that to a halt or at least a slow walk.

Across the US there are 71 cancer centres, 51 comprehensive, 13 clinical and seven basic—a cancer centre for every 2.5 million people, a comprehensive centre for every six million people. Australia has an admirable institute built on clinical care—the Peter MacCallum Cancer Centre. Founded by Peter MacCallum, a Scottish-born oncologist raised in childhood by his New Zealand father in Christchurch! One might

conjecture it was the relative ill health of Peter MacCallum from exposure to nitrogen mustard gas in 1918 that led him to a career in research and pathology. Ironically, it was nitrogen mustard that was the first cancer therapeutic used in the management of leukaemia and lymphoma because of its hematopoietic toxicity.

What are the real and potential benefits of such a disease-specific focus? The original mission of excellence in clinical care, research and education are embodied in the MSK logo—Research, Treatment, Education. For MSK this statement has been recently modified to read "To lead in the prevention, diagnosis, treatment, and cure of cancer through programs of excellence in research, education, outreach, and cost-effective patient care" to reflect and address the socioeconomic problems of healthcare in the US.

The pyramidal building of a cancer centre begins with integrated patient care, integrated from diagnosis to demise. Few appreciate how difficult it is to embrace the idea that cancer is not one but a myriad of diseases. When asked how many cancer types there are, I answer obliquely that "one day there will be as many different cancers as there are different people with cancer." With rapid evolution and characterisation of the human genome we know the genetic variation that calls us each a person. With molecular diagnosis we know, at least in part, the ever-evolving genetic definition of each cancer, and as we put your cancer into you, we have that unique identifier. But that demands a high degree of research which, you will say, belongs in the basic labs of any university or research facility. I would argue that that challenge can be admirably met by juxta-positioning the patient and the science in the one place. "Know then thyself, presume not God to scan; The proper study of mankind is man."¹¹

Again, that is no reason for a cancer centre alone. Any competent clinical facility with a translational research arm can do that. In many places that is how an institution, clinic, hospital or university division begins and evolves into a designated cancer centre.

Outcomes for cancer patients treated at varying sites have been long studied.¹² A multitude of studies have demonstrated that for surgical outcomes, volume, especially for

complex cancers, improves with centralisation.^{13,14} Not all cancer patients will benefit from referral centres; such a concentration is neither necessary nor realistic. We are in the process of deciding how many is enough for complex cancers to get results comparable to those best available.

But do cancer centres deliver better comprehensive cancer care, better long-term survival outcomes?

It is now clear that not only short-term but long-term survival can be improved if patients are treated from diagnosis at focused referral cancer centres.^{15,16}

And what of the benefits in research and education? Research, both clinical and basic, are integral to any progress in the management of the cancer patient. Without a fundamental understanding of the etiology, initiation, progression and the metastatic process, ultimate control and cure is impossible.

New Zealand has a remarkable resource in their National Health Care data bases. The utilisation of such a data base is a potential rich source for identifying variations in the delivery of healthcare by variables such as site, race and ethnicity. As in other societies, the use of such data is often limited not by the value of the information but by the political ramifications of transparency.

The newly formed New Zealand National Cancer Programme is focused on “access to high quality screening and care”. Without access to screening and early diagnosis for potential cure it is hard to improve cancer outcomes for all citizens. The focus by the New Zealand National Cancer Programme on regional networks would allow such screening programmes to translate to expedited timely care. While many cancer centres do focus on screening, the majority do not, as that is better left to the community with selective referral to regional centres, reserving complex and less common cancers to be referred to a comprehensive cancer centre. Despite not having the benefit of screening programmes, cancer centres do have better short- and long-term outcomes, corrected for all stages.

Cancer centres cannot survive only on integrated cancer care; they must provide innovation and progress. That cannot occur without sound basic and translational research and opportunities to educate the brightest and the best.

The rapid adoption of telemedicine brought about by the Covid-19 pandemic has opened a new opportunity for cancer centres. Clinical trials and clinical research are no longer necessarily confined to cancer centres. It is progressively clear that the former mandatory relocation to a centre to participate in a clinical trial may not be necessary. With telehealth, clinical trial oversight will allow trials to be extended with remote patient participation. That requires a centralised cancer centre infrastructure but could portend an option for New Zealand to participate and initiate clinical trials on a national and international platform.

Financing of all cancer centres is a challenge. The Peter MacCallum is Australia's only public hospital dedicated to cancer care. In the US, cancer centres rely predominantly on revenue from patient care, albeit often private insurance rather than federal support by programmes such as Medicare and Medicaid. All centres rely on philanthropic and competitive grant support to advance their research mission. This is different from what I understand of the New Zealand health system; however, support from research grants and healthcare are not that different. When I look at our own financial base, with a \$4.9 billion operating revenue, 80% is derived from patient care revenue, 7% from grants and contracts, 12% from contributions, investment income and royalties.

So, is it time for New Zealand to consider a national cancer centre? The building blocks of the new cancer programme would suggest that could be the next step. No doubt there are unique challenges in New Zealand that I have not appreciated. However, great the challenges, the benefits for the cancer patient, the physicians, the research scientists and the public are real.

Competing interests:

Nil.

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www.nzma.org.nz/journal-articles/could-comprehensive-cancer-centres-improve-cancer-outcomes-and-equity-in-new-zealand

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