

Understanding disparities in post-operative mortality for Indigenous patients

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ABSTRACT

There is an urgent need for high-quality evidence regarding post-operative mortality among Indigenous peoples. Our group recently published a national audit of 4,000,000 procedures conducted between 2005–2017, which identified considerable disparities in post-operative mortality between Indigenous Māori and non-Indigenous New Zealanders. Understanding the primary drivers of these disparities—for Māori, but likely also other Indigenous populations worldwide—requires us to consider the multiple levels at which these drivers might arise. To that end, in this paper we breakdown these drivers in detail, conceptualising these drivers as operating in layers with each factor leading to the next. These layers include structural factors, care system factors, care process factors, care team factors and patient factors. Each of these factors are presented within a framework that can be used to begin to understand them—with a view to rousing action and inspiring intervention to address inequities in post-operative outcomes experienced by Indigenous peoples.

In 2014, a Lancet commission was launched to investigate the state of global surgery. Stating that “*surgery is an indivisible, indispensable part of health care*”,¹ the Commission re-confirmed the importance of safe, affordable and equitable surgical care for all, and highlighted the rights of underserved populations not currently being met.²

Around this time, New Zealand’s Perioperative Mortality Review Committee (POMRC) published a report on the state of post-operative mortality in New Zealand.³ Examining all surgical procedures conducted between 2009–2013, the POMRC report showed Indigenous Māori New Zealanders were over 60% more likely to die than non-Māori within 30 days following an elective or waiting list procedure under general anaesthetic (adjusted odds ratio [OR]: 1.62, 95% CI 1.33–1.97)—despite adjusting for factors including age, gender, deprivation and a measure of pre-operative risk (an American Society of Anesthesiologists Classification [ASA] score). Māori were also more likely to die following an acute procedure (OR: 1.23, 95% CI 1.18–1.36). In their concluding remarks, the POMRC highlighted the urgent need for further research into the drivers of this unacceptable disparity, emphasising the need for future work to assess the impact of comorbidity.³

In order to build on this evidence base, our group recently conducted a national audit of 4,000,000 procedures conducted between 2005–2017.⁴ We examined 30- and 90-day mortality, separately for acute

and elective/waiting list procedures, and focussed explicitly on comparing the risk of post-operative mortality between Māori and European (as the majority non-Indigenous population) patients. We began by examining disparities by procedure specialty, and then examined key common individual procedures.⁴

The results of this audit were stark. Māori patients were more likely to die post-operatively than European patients for all examined procedure specialties, with the sole exception of neurosurgery (where no difference was found). The disparity was most prominent when examining elective/waiting list procedures, although some disparity remained in the acute setting. When we looked at key individual procedures, this pattern of disparity was still apparent – in the elective/waiting list setting, even after adjusting for differences between Māori and European patients in age, sex, socio-economic deprivation, rurality, comorbidity, ASA score and anaesthetic type, Māori were:

- 40% more likely to die following a cardiac valve repair or replacement
- 50% more likely to die following a coronary artery bypass graft (CABG)
- 90% more likely to die following a small intestinal or colorectal resection
- 104% more likely to die following lower-limb amputation.⁴

Drivers of ethnic differences in post-operative mortality—peeling the layers of inequity

Understanding the causes of these disparities is not straightforward. The POMRC reports,^{3,5} our own recent systematic review⁶ and subsequent observational studies^{4,7} offer some clues as to the key proximal drivers. First, we know that the relative disparities are worst for elective/waiting list procedures, which suggests that the experience of pre-operative preparation for surgery may differ between Māori and European patients that are on the waiting list for surgery. Second, we learned from our ethnicity-focussed study that some of the disparity can be explained by differing burdens of comorbidity (to a greater extent) and deprivation (to a lesser extent). However, as noted above, strong disparities remain despite adjusting for these factors.⁴ Third, we learned that these disparities exist more-or-less wherever we look across the surgical spectrum, suggesting that whatever is driving these disparities is probably universal rather than context-specific.

Our observations led us to develop a framework for understanding the probable drivers of inequities in post-operative outcomes for Māori in New Zealand (Figure 1). The elements of this framework build on our key findings, and also incorporate observations from other international contexts regarding drivers of post-operative mortality. When developing this framework, we first considered the factors that increase or decrease the risk of post-operative mortality in a general sense. We then considered whether it was feasible that these factors may be acting differentially for Indigenous patients broadly, and Māori patients specifically. We conceptualised the drivers of inequities in post-operative outcomes as operating in layers, with each factor leading to the next. These are outlined here and discussed in detail below: structural factors, care system factors, care process factors, care team factors and patient factors.

Structural factors

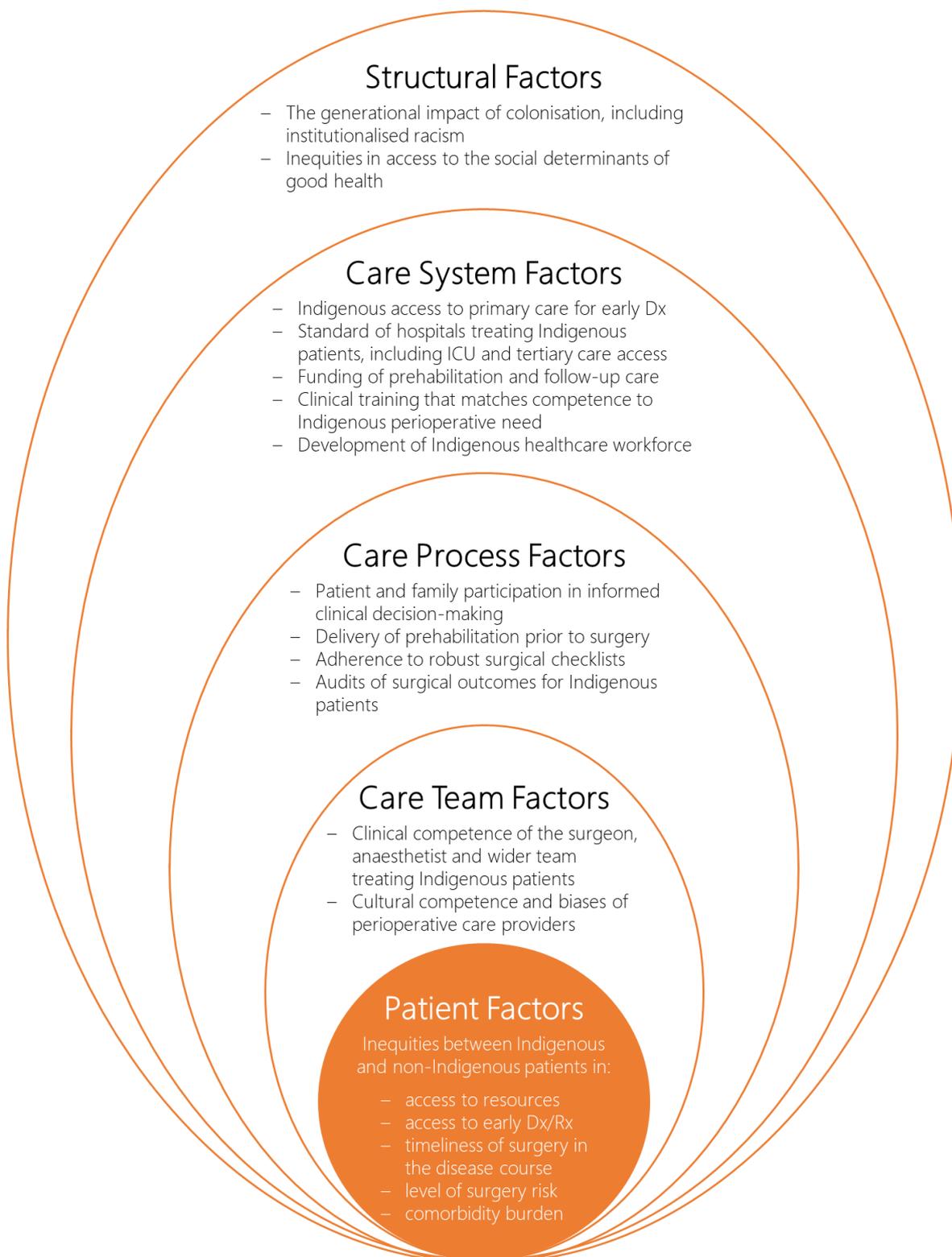
Structural factors modulate the risk of post-operative mortality by increasing or decreasing access to the social determinants of good health. In our recent article focussing on the key outcomes of our audit, we briefly highlighted the role of structural factors as putative drivers of disparities in post-operative mortality.⁴

The outermost layer influencing disparities in

health outcomes for Māori is the generational impact of colonisation. This includes the downstream ramifications of massive confiscations and misappropriations of Māori land by colonial settlers and the early New Zealand Government in the mid- to late-nineteenth century. Within 100 years of the signing of the Treaty of Waitangi (Te Tiriti) in 1840 (which ushered in British governance over New Zealand), Māori ownership of land had reduced from nearly 100% to less than 10%.⁸ This loss of land, combined with civil war and non-adherence to the principles of Te Tiriti on the part of the Government, including the prevention of Māori from having the right to self-govern,⁹ resulted in substantial upheaval, impoverishment, morbidity and mortality for Māori.^{10,11} It became Government policy to assimilate Māori into British culture (including destruction of the use of Te Reo Māori, or Maori language), with little consideration of mātauranga Māori (Māori knowledge) or tikanga Māori (Māori ways of doing things) that had existed in pre-colonial New Zealand since at least the thirteenth century.⁹ This process of rapid westernisation and deculturalisation has been repeated internationally, as Indigenous peoples around the world have been colonised by other nation states.¹²

Loss of land, sovereignty and status left Māori as strangers in their own land, forced to navigate alien European systems and norms. This experience is best described as institutionalised racism, a bias whereby the systems that underpin society operate preferentially for some groups (in this case, Europeans) than they do for others (in this case, Māori).¹³ Institutionalised racism impacts on healthcare delivery and receipt by ensuring that our health system is organised in a manner that works better for Europeans than it does for Māori. It also ensures that Māori have poorer access to the broader social determinants of good health, including economic affluence and stability, access to a nutritious diet and physical activity and ultimate decision-making power over societal choices that could impact the health and wellbeing of them, their whānau and their community.¹⁰ In New Zealand, there is evidence that links experiences of racism to poorer access to housing and employment^{14,15}—meaning that racism is, in itself, a social determinant of health. The systematic and deliberate stripping of access to the social determinants of good health explains the direct line between colonisation and perioperative outcomes for Māori, and encapsulates all other layers within our framework.

Figure 1: The structural, system, process and clinical team factors that likely underpin disparities in post-operative mortality between Indigenous Māori and European patients.



Care system factors

New Zealand's system of universal healthcare delivery is similar to that of the National Health Service in the United Kingdom. However, the term "universal" does not necessarily refer to a system that is universally accessible. For example, there is evidence of differential access to best-practice and timely cancer treatment for Māori,^{16–20} which likely impacts on disparities in survival outcomes.²¹ Under this heading we will consider pre-operative engagement, regional variations in provision of surgery (that align with regional variations in the distribution of the Māori population), and the issue of training for clinicians and support staff.

In the context of post-operative mortality, there are a number of system-related factors that could be driving disparities in post-operative mortality for Māori. Firstly, the level of pre-operative engagement with patients (whether with a GP, anaesthetist, surgeon or other provider) is an important component of risk stratification²² wherein patients can be categorised as being low risk, or of higher risk requiring additional pre-operative preparation (also known as prehabilitation), specialist engagement and procedure planning. There is evidence that Māori experience poorer access to primary and secondary care services,²³ meaning that Māori may be less likely to experience a high level of pre-operative engagement – or not be referred for surgery at all – despite being more likely to have a higher risk profile due to increased comorbidity burden relative to non-Māori patients.^{4,24}

There are various pathways by which Māori could receive reduced pre-operative engagement relative to non-Māori patients, including cultural safety of the service, or whether the service is available in rural locations (Māori are less likely to live in main urban centres than non-Māori²⁵). Also, the variable funding of prehabilitation and follow-up care within the public healthcare system in New Zealand means that having access to privately funded pre-operative care through private care providers could materially drive differences in access between ethnic groups, since Māori are substantially more likely to live in socio-economic deprivation.²³

Linked to this issue of funding is variation in provision of care across hospitals that typically treat Māori patients, including whether these hospitals are tertiary (i.e., high volume) centres that have access to an intensive care unit (ICUs) with capacity to rescue. While most Māori live in urban

areas, regions such as Te Tai Tokerau (Northland) and Tairāwhiti (Gisborne/East Coast) have large Māori populations that are principally served by non-tertiary hospitals.²⁶ This disproportionately limits surgical care options available to Māori, and also means that Māori are disproportionately required to travel to main centres to receive perioperative care and those surgical procedures that are only delivered in tertiary centres.

Finally, there is the system that trains and employs the clinicians and support staff to work within the health system, which affects how well suited that system is for creating a workforce that is culturally safe for (and reflective of) Māori. From primary to secondary and tertiary care, it is our nurses, GPs, anaesthetists, surgeons and other staff who are the face and hands of our healthcare system; and as such, it is crucial that our clinical training and professional development programmes prepare these staff with the tools that they need to deliver best-practice and culturally safe care to their Māori patients, both from a clinical and patient-centred perspective.²⁷ Entwined within this is the dire need for more Māori on the clinical frontlines. Despite a disproportionate need for healthcare, less than 4% of New Zealand's medical doctors are Māori—while Europeans (either NZ Europeans or other Europeans) comprise more than 80%.²⁸ In terms of specific placements, less than 8% of nurses, 4% of GPs, 3% of anaesthetists, 5% of general surgeons and 2% of cardiothoracic surgeons are Māori.²⁸ In order to create a perioperative care system that works for Māori, our system must continue to address disparities in access to medical training through affirmative action policies, while simultaneously ensuring that our medical workforce is culturally safe and competent. It has been noted that Māori representation is becoming more evident in graduating classes from New Zealand's medical schools,²⁹ but this needs to persist through to opportunities within specialist training and positions within hospitals: recent data from the United Kingdom show that white doctors in London are six times more likely to be offered a job than black doctors.³⁰

Care process factors

A high-functioning healthcare system should deliver best-practice care in a standardised manner, but should also have sufficient flexibility to ensure that this care reaches the people who need it the most, in a format that works for them. Given the geographic and socio-demographic

diversity of New Zealand's population, delivering this care equitably is a challenge. New Zealand's health system has disproportionately left Māori behind when it comes to access, quality of care and outcomes.^{31,32} Improving our system to address this requires us to examine the processes that underpin our delivery of perioperative care. The health reforms currently underway in New Zealand, including the development of a new Māori Health Authority with resourcing powers, will provide renewed opportunity to systemically re-design the care pathway in a manner that reflects Te Ao Māori (a Māori world view). In addition, the Waitangi Tribunal inquiry known as Wai 2575 recommended the implementation of five Te Tiriti principles to drive the future delivery of healthcare in New Zealand: tino rangatiratanga (self-determination), equity (e.g., ensuring equitable health outcomes for Māori), active protection (e.g., taking active steps to achieve those equitable outcomes), options (e.g., providing care options that work for Māori) and partnership (e.g., partnership with Māori in the governance and delivery of those care options).³³ Below, we outline some key specific examples of process factors that could contribute to better perioperative outcomes for Māori patients.

Firstly, as demonstrated by the POMRC report(s) and our own studies,^{3-5,7} disparities between Māori and European patients in post-operative mortality are considerably larger for elective/waiting list procedures than for acute procedures, even after adjusting for factors including procedure type and comorbidity. This suggests that Māori are reaching the day of their procedure in a poorer state of preparation for the procedure's challenges than their European counterparts, which in turn suggests poorer access to high-quality and early pre-operative care. While still an area of burgeoning research, multiple clinical trials have shown the benefits of tailored prehabilitation programmes on recovery following surgery.³⁴⁻³⁶ These findings, combined with our own in the elective/waiting list context, suggest that we further consider the role of prehabilitation, extending access to high-risk clinics and improving clinical outreach to Māori patients in order to improve the pre-operative environment for Māori. We should make this care business-as-usual, and resource the right people (including Māori health providers) to ensure that the care is delivered in a responsive manner that works for Māori.

Secondly, and entwined with our observations

regarding the need for better care delivery for Māori patients prior to surgery, there is a need for robust patient and whānau participation in informed clinical decision-making prior to surgery. Ensuring that all options are discussed and understood by the patient and their supporters—including the option to not have surgery, treatment options outside of surgery and options around procedure type (if relevant)—is essential for building trust, clarifying risks, planning for how to minimise those risks and enabling adequate wrap-around supportive care preparations ahead of the procedure.³⁷

Thirdly, there is the need for robust, standardised processes around the surgery itself and to ensure that those processes are equally applied to Māori and non-Māori patients. Surgical Safety Checklists are thought to reduce the risk of post-operative mortality and morbidity,^{38,39} and involve checking factors such as whether the correct procedure is being carried out, that the patient is prepared for the procedure and that any concerns are raised and discussed prior to the procedure being undertaken. New Zealand's Health Quality & Safety Commission (HQSC) has developed a New Zealand adaptation of the World Health Organization's (WHO's) Checklist, although district health boards (DHBs) and surgical teams around the country often operate from their own customised checklist.⁴⁰ The existence of such checklists does not assure their optimal use, and it is unclear whether these processes are any less robust for Māori patients than they are for European patients. Overall adherence to a best-practice checklist would likely serve to reduce the risk of post-operative mortality in general, which could disproportionately benefit Māori due to the underlying higher rate of mortality observed in our studies.^{4,7}

Finally, there is a need for ongoing audit of surgical outcomes for Māori patients. Our audits were funded by the Health Research Council (HRC) as part of an investigator-led project. In order to monitor the disparities discussed above, such audits must be resourced in an ongoing manner, so that they become business-as-usual, rather than requiring researchers and stakeholders to seek one-off funding. Monitoring disparities in outcomes experienced by Māori (and other population sub-groups) will allow us to identify areas across the perioperative pathway that require intervention, and to any observe changes in disparities that occur over time as a result of such intervention.

Care team factors

The implementation of good processes around perioperative care relies entirely on clinical care teams, and the clinical competence of the surgeon, anaesthetist and wider team is an essential element of care quality. There is some evidence that Māori patients may have poorer access to the most experienced surgical care. In the context of stomach cancer treatment, we previously found that Māori patients were more likely to undergo surgery in a smaller care centre, and also less likely to have a specialist upper-gastrointestinal surgeon than non-Māori patients, even when treated in main centres such as Auckland.⁴¹ Previous evidence suggests that Māori patients receiving surgery for colon cancer may also have less lymph nodes assessed than non-Māori patients, and were more likely to have a palliative bypass or stoma formation (despite no ethnic difference in stage at diagnosis), indicating suboptimal and/or under-treatment.²⁰ These findings echo those experienced by other ethnic minorities outside of New Zealand.⁴²

Socio-economic deprivation is more common among Māori and is one pathway through which Māori may be less likely to be treated by experienced clinicians. Māori patients are less likely to be able to choose private care: for example, Māori breast cancer patients are substantially less likely to have their primary surgery in a private hospital than non-Māori patients.^{17,43} However, evidence regarding the experience of clinicians treating Māori patients is currently ad hoc; robust, ongoing monitoring of disparities in the experience of clinical teams treating Māori patients is required in order to understand this potential driver of perioperative outcomes more fully. Such monitoring will require the systematic collection of high-quality national data on clinician experience—the facilitation of which will be a challenge.

Beyond clinical competence, there is the issue of the cultural safety and biases of perioperative care providers. Implicit and explicit beliefs and stereotypes among clinicians negatively impact on clinical decision-making,^{44,45} and it is plausible that these factors impact on the quality of perioperative care received by Māori patients. Providing the perioperative care that Māori need in order to achieve outcome parity requires a workforce with a diverse skillset. In a recent systematic review by Koea and Ronald, this skillset included an understanding of Māori culture and values, ongoing critical evaluation of how a clinician's own culture and biases impact on clinical decision-making

and a willingness to act as advocates for Māori patients in order to maximise access through the care system.³⁷

Patient factors

At the centre of our framework, we have the patient. It is true that the disparities in perioperative outcomes experienced by Māori can at least partially be related back to disparities between Māori and European patients in income,²³ or in access to early diagnosis and the timeliness of surgery in the disease course,^{16–20,46} or in the underlying comorbid burden of comorbidity.^{4,24}

However, these patient-level factors are consequences of the factors that surround them: differential access to financial resources has its roots in racism, colonisation and land confiscation; early access to diagnosis and treatment is strongly related to the way in which our system is structured to work preferentially for European patients, or others who have access to resources; and the level of risk associated with surgery is related to the type of surgery being conducted and the comorbid burden of the patient, which both relate to inequitable access to the social determinants of good health experienced by Māori. We suggest that actions taken to address these patient-level factors should be directed towards creating a care system that is more responsive to Māori; towards embedding processes that target areas where Māori have traditionally been underserved, such as pre-operative preparation; and towards creating and fostering care teams and environments that are clinically and culturally competent, safe and effective for Māori patients. In terms of care teams, it is imperative that Māori are resourced to provide healthcare for their own people—including involvement in perioperative service provision, management, measurement and facilitation. The health reforms currently underway in New Zealand, including the implementation of a Māori Health Authority, are a key opportunity to achieve these objectives.

Conclusions

There is now conclusive evidence that Indigenous Māori New Zealanders experience poorer post-operative outcomes than European patients across most surgical contexts. In this manuscript, we presented a framework that can be used to begin to understand the drivers of this widespread disparity, with a view to rousing action and inspiring intervention. While the key structural factors

that determine access to the social determinants of good health are difficult to address – at least in the short to medium term – the current health reforms underway in New Zealand offer a prime opportunity to revise elements of the care system and processes that are likely contributors to disparities in post-operative outcomes. The reforms

also offer an opportunity for significant action in the area of workforce development and cultural safety, to ensure that the clinical teams providing care to Māori patients are well-equipped to do so in a manner that both provides best-practice care and works well for Māori, rather than relying on a one-size-fits-all approach to care delivery.

COMPETING INTERESTS

Nil.

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