

# Establishing a New Zealand brain tumour registry: understanding clinical registry formation in New Zealand

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## ABSTRACT

**AIMS:** To explore the development of clinical registries in New Zealand, examine the New Zealand neuro-oncology system and assess factors relevant to establishing a national brain tumour registry in New Zealand.

**METHODS:** A literature review was conducted on the establishment of clinical registries in New Zealand. Key registries were consulted to gain insights into their construction and function. Consultation with neuro-oncology clinicians was conducted to ascertain the structure of New Zealand's neuro-oncology system and to identify relevant considerations for registry development.

**RESULTS:** Analysis of five clinical registries highlighted preferences for: 1) simple, single-tiered registry structures, 2) utilisation of existing registry infrastructure, and 3) inclusion of essential data fields only. Consultation with neuro-oncology clinicians revealed that New Zealand's neuro-oncology system comprises five neurosurgical centres through which brain tumour patients receive care via a consistent pathway. From a clinical perspective, important considerations include the wider New Zealand healthcare system, the Treaty of Waitangi (Te Tiriti o Waitangi), Māori data sovereignty and establishing a registry governance framework.

**CONCLUSIONS:** Establishing a national brain tumour registry in New Zealand will require attention to registry structure, existing registry infrastructure, key data fields, integration with the healthcare system, Māori data sovereignty and governance, with adherence to Te Tiriti o Waitangi.

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Brain tumours are a complex group of diseases often associated with significant morbidity and mortality. This group of diseases comprises many rare tumour types that are grossly understudied. For any group of diseases, the collection of reliable data is crucial for the understanding of natural disease course, prognosis and treatment outcomes.<sup>1</sup> In rarer conditions, this becomes even more vital; given the infrequency of these disorders, data are often incomplete and lack detail, hindering advancements in research and thus preventing improvements in patient outcomes.<sup>1,2</sup> Importantly, data on rare disorders are often not routinely collected by governments due to limited awareness, inequitable resource allocation and underfunding of research. One potential solution to this issue is the establishment of a clinical registry. Clinical registries are databases that systemically collect, store and provide health-related information for specific diseases or conditions.<sup>1</sup> These databases have proven invaluable in advancing the understanding of

a wide range of diseases, particularly complex ones such as brain tumours.<sup>1-3</sup> Clinical registries, therefore, allow the landscape of diseases to be better understood, permitting more targeted research, healthcare service improvement and stronger advocacy efforts. This paper describes the first phase of research conducted into the feasibility of establishing a national brain tumour registry—assessing existing clinical registries in New Zealand, ascertaining the structure of New Zealand's neuro-oncology system and evaluating how these insights could inform the formation of a brain tumour registry.

## Methods

This review was conducted in two phases. Firstly, a literature review was conducted to identify and evaluate several existing clinical registries in New Zealand, focussing on construction and function. This was achieved through the identification of published studies involving

New Zealand clinical registries using PubMed and Google Scholar. The initial search was run using “registry OR register” AND “New Zealand”. This search was further refined independently through addition of the following terms using AND: “cancer”, “clinical”, “database”, “outcomes”, “patient”, “adult” and “paediatric”. Several case studies were identified and further investigated through both the references identified and broader internet searches. Additional information was collected through consultations with key contacts from these registries, including founding members, co-ordinators and data managers.

In the second phase, neuro-oncology clinicians across New Zealand were consulted to ascertain the structures and pathways of the neuro-oncology system. This involved informal discussions with clinical nurse specialists, neurosurgeons, medical oncologists, radiation oncologists and pathologists across the country, as well as researchers and patient advocacy groups. The findings from both phases were combined to highlight key considerations for developing a national brain tumour registry in New Zealand.

### **The need for a national brain tumour registry**

There are many international examples of brain tumour registries that have allowed for a better understanding of the brain tumour landscape in those countries. For example, the Central Brain Tumor Registry of the United States (CBTRUS) gathers and reports on data from around 90,000 brain tumour patients each year, facilitating research and raising awareness for this group of diseases.<sup>3</sup> However, in New Zealand there is no national brain tumour registry, limiting our capacity to both accurately assess the quality of neuro-oncology services and to conduct research that is aligned with the needs of the population. As a consequence, international datasets are often used to inform research and clinical practice in New Zealand, which notably lack data from Māori and Pacific populations. Under the *Cancer Registry Act 1993*, the New Zealand Cancer Registry (NZCR) curates and reports statistics on cancer cases across the country, including brain cancer.<sup>4</sup> Importantly, these data do not include non-malignant brain tumours and are limited in detail to basic incidence and mortality statistics.<sup>4</sup> For this service to be relied on, advocacy to include both primary malignant and non-malignant brain tumours, as well as more comprehensive information, would need to be achieved. This

is likely to take a significant amount of time; in the United States of America (USA) and Canada, for example, such changes were advocated for and took over 10 years before legislation was put into place.<sup>3,5</sup> It is therefore imperative to determine how a registry with such capabilities can be established sooner, without the need for legislative changes. As such, the New Zealand Aotearoa Neuro-Oncology Society (NANOS, <https://nanos.co.nz/>), a consortium of neuro-oncology clinicians, researchers and patient advocacy groups, has identified the establishment of a New Zealand brain tumour registry as a key priority. This registry must be comprehensive in its detail and include all paediatric and adult primary brain tumours. Further, we plan to build relationships with existing cancer registries to determine the feasibility of including secondary brain metastasis data. This registry must also prioritise comprehensive population coverage, with a particular emphasis on ensuring complete national brain tumour data collection for Māori and Pacific populations. Overall, this registry aims to provide complete and accurate brain tumour data to clinicians, researchers and the wider community. By assessing disease burden, the quality and efficacy of brain tumour treatments and patient outcomes, this resource will facilitate improving brain tumour services in New Zealand.

### **Existing clinical registries in New Zealand: key findings**

Despite being a small country, New Zealand has several clinical registries for a variety of medical disorders. These registries provide valuable data that are not only of interest to New Zealand, but also internationally, given our unique patterns of population diversity. The analysis of several existing registries in New Zealand was conducted to identify key considerations for the construction of the forthcoming national brain tumour registry.

#### **Registry structure**

One of New Zealand's largest non-governmental organisation (NGO) clinical registries, Te Rēhita Mate Ūtaetae—the New Zealand Breast Cancer Foundation National Register (NZBCFNR) has collected comprehensive data on over 45,000 New Zealand breast cancer patients, promoting improvements in patient survival and the narrowing of ethnic survival disparities between Māori, Pacific and European patients.<sup>6</sup> This registry initially existed as four regional registries: the Auckland regional register (established in 2000),

Waikato (2005), Christchurch (2009) and Wellington (2010).<sup>6</sup> While this regional approach allowed data to be collected sooner, it only achieved 63% coverage of the New Zealand breast cancer patient population.<sup>6</sup> In 2018, these registries were amalgamated, forming a single central registry with nationwide data submission starting in 2020.<sup>6</sup> The NZBCFNR now achieves near 100% coverage of diagnosed breast cancer patients in New Zealand, with <1% of eligible patients opting out of the register.<sup>6</sup> It is important to note that the earlier regional registers did not include all of New Zealand's hospitals, and, at the time, operated under an opt-in consent model, requiring individual approval for patient inclusion, which likely limited population coverage.<sup>6</sup> Further, findings from the Auckland regional register revealed an upward bias in survival data under the opt-in consent model; patients who opted out were more likely to have greater disease extent, less treatment and subsequently a lower survival.<sup>7</sup> However, the Prostate Cancer Outcomes Registry Australia and New Zealand (PCOR-ANZ) has also seen difficulties in achieving complete population coverage despite an opt-out model of consent, likely due to its complex structure (see Table 1). While such multi-tiered, regional registry structures can facilitate the timely execution of clinical registries, this model may not be suitable in the long term if full population coverage is desired.

### Data fields

The New Zealand Trauma Registry (NZTR) is a relatively small registry compared with the NZBCFNR, yet demonstrates how simple, single-tiered registry structures can succeed from inception (Table 1). The NZTR has collected retrospective data on all trauma patients admitted to hospitals meeting eligibility criteria since 2015.<sup>8</sup> The NZTR *Major Trauma National Minimum Dataset*<sup>8</sup> outlines the fields collected for the registry. The dataset consists of fewer than 80 data fields, which is small compared to other registries.<sup>8</sup> Despite this, the NZTR has gathered data on around 13,000 trauma cases from 2015–2023,<sup>9</sup> demonstrating that the size of the registry—both in terms of structure and number of data fields collected—does not necessarily influence its capacity to record cases and, therefore, how valuable of a resource it is. Today, NZTR data have been instrumental in developing and implementing several quality improvement initiatives, including in the management of severe traumatic brain injury and

critical haemorrhage nationwide.<sup>9</sup>

### Existing registry infrastructure

Finally, the New Zealand Children's Cancer Registry (NZCCR) demonstrates how a registry can effectively leverage existing registry infrastructure to complement data collection (Table 1). The NZCCR collaborates with the NZCR, the Late Effects Assessment Programme (LEAP) national database and the Mortality Collection (MORT) to gather accurate and comprehensive data on paediatric cancer cases in New Zealand.<sup>10</sup> The NZCR and MORT are primarily used to validate the NZCCR dataset, ensuring its accuracy.<sup>10</sup> The LEAP national database is used to track paediatric cancer cases to better understand long-term outcomes and to collect more complete treatment data.<sup>10</sup> This integrated approach not only improves the quality and comprehensiveness of the NZCCR, but also reduces the data collection burden. Of particular importance to the forthcoming national brain tumour registry, the NZCCR collects data on both malignant and non-malignant paediatric brain tumours, demonstrating that such comprehensive inclusion is feasible.

### Neuro-oncology service provision in New Zealand

Consultations with neuro-oncology clinicians, researchers and patient advocacy groups across the country were conducted to gain an understanding of the neuro-oncology system in New Zealand. It is important to note that, in this context, the term “neuro-oncology” encompasses all primary brain tumours, including non-malignant tumours, as these patients also receive treatment from oncology services. Service provision for secondary brain tumours is more complex and often dictated by the primary tumour site. Therefore, this paper focusses primarily on neuro-oncology service provision related to primary brain tumours.

Neuro-oncology services are typically divided into five key components: neuroradiology, neuropathology, neurosurgery, radiation oncology and medical oncology. Neurosurgery serves as the central hub in the neuro-oncology system through which all brain tumour patients will pass. Te Whatu Ora – Health New Zealand provides public health services to New Zealand. There are five Te Whatu Ora neurosurgical centres in New Zealand, as well as seven smaller private sites, which provide neurosurgery services for brain tumour treatment (Figure 1). Patients requiring

**Table 1:** Summary of selected clinical registries in New Zealand, outlining key characteristics and lessons that may be useful in the establishment of a national brain tumour registry.

Registry	Key characteristics	Key lessons
<b>New Zealand Cancer Registry (NZCR)</b>	<p>A government registry of all primary cancers diagnosed in New Zealand, functioning under the <i>Cancer Registry Act 1993</i>, which mandates the reporting of cancer cases.<sup>4</sup></p> <p>Gathers incidence and mortality data on all patients diagnosed with cancer (excluding non-melanoma skin cancer).</p>	<p>Data on secondary brain metastases and benign tumours are not collected; lobbying to include this information would be required if the NZCR data were to be relied on.</p> <p>Data on treatment and non-fatal outcomes are not collected; additional information would be required if the NZCR data were to be relied on.</p>
<b>New Zealand Breast Cancer Foundation National Register (NZBCFNR)</b>	<p>Established in 2018 when four regional registries, each with their own governance groups, were amalgamated.<sup>6</sup></p> <p>Funding from Breast Cancer Foundation New Zealand.</p> <p>Near 100% coverage of eligible breast cancer patients in New Zealand, increased from 63% prior to amalgamation.<sup>6</sup></p> <p>Aims to use data to reduce inequities, improve patient outcomes and monitor progress through the provision of breast cancer data to clinicians, health workers and researchers.<sup>6</sup></p> <p>Opt-out model of consent.</p>	<p>Such a comprehensive registry requires a team of data managers throughout the country to manually manage data collection.<sup>6</sup></p> <p>100% coverage can be achieved with an opt-out consent model (opt-out rate &lt;1%).<sup>6</sup></p> <p>A regional registry structure is unlikely to cover the entire patient population of interest.</p> <p>The NZCR can be used to validate datasets.</p> <p>Charities and advocacy groups can be an effective and important resource for expertise and funding opportunities.</p>
<b>Prostate Cancer Outcomes Registry Australia and New Zealand (PCOR-ANZ)</b>	<p>An Australia and New Zealand registry focussed on patient outcomes.</p> <p>The Movember Foundation invited groups to express their interest in establishing state prostate cancer registries in 2013.<sup>11</sup> New Zealand was recruited in 2015.<sup>11</sup> Each regional register has their own governance structures.<sup>11</sup></p> <p>Substantial funding from the Movember charity allowed the project to get underway.<sup>12</sup></p> <p>State-based registries submit data to the national registry. Population coverage is 59% across Australia and 78% across New Zealand.<sup>12</sup></p> <p>Opt-out model of consent.</p>	<p>Collaboration with neighbouring countries can facilitate registry implementation through greater access to resources.</p> <p>Multi-tiered, complex registry structures are slower to implement and slower to reach full coverage.</p> <p>Charities and advocacy groups can be an effective and important resource for expertise and funding opportunities.</p>

**Table 1 (continued):** Summary of selected clinical registries in New Zealand, outlining key characteristics and lessons that may be useful in the establishment of a national brain tumour registry.

<p><b>New Zealand Trauma Registry (NZTR)</b></p>	<p>A database of every major trauma patient admitted to acute hospitals across New Zealand.<sup>8,9</sup></p> <p>Data collection dating back to 2015.<sup>8</sup></p> <p>Sponsored by the Ministry of Health and the Accident Compensation Corporation (ACC).<sup>8</sup></p> <p>A single, web-based website for data entry by clinicians and data managers.<sup>8</sup></p> <p>Opt-out model of consent.</p>	<p>A close relationship with government bodies can help fast-track initiatives.</p> <p>A close relationship with all participating centres is vital for buy-in.</p> <p>A simple registry structure and relatively small minimum dataset can still yield strong, valuable data.<sup>8,9</sup></p>
<p><b>New Zealand Children's Cancer Registry (NZCCR)</b></p>	<p>A paediatric cancer registry established in 2000 that collects demographic, diagnostic and treatment information.<sup>10</sup></p> <p>Under the governance of the National Child Cancer Network (NCCN).</p> <p>Data collected from the two specialist paediatric oncology centres in New Zealand.<sup>10</sup></p> <p>Collaborate with the Late Effects Assessment Programme (LEAP) national database for comprehensive chemotherapy, radiotherapy and long-term follow-up details.<sup>10</sup></p> <p>Both malignant and non-malignant paediatric brain tumours are included.</p> <p>Opt-out model of consent.</p>	<p>Targeting the specialist clinical centres allows for accurate data collection without involving every hospital across New Zealand.</p> <p>Collection of data on non-malignant brain tumours can be achieved.</p> <p>Can use the NZCR and Mortality Collection to validate cancer cases.</p> <p>The use of existing registries, government structures and databases can prevent unnecessary data duplication and provide supplementary information.</p>

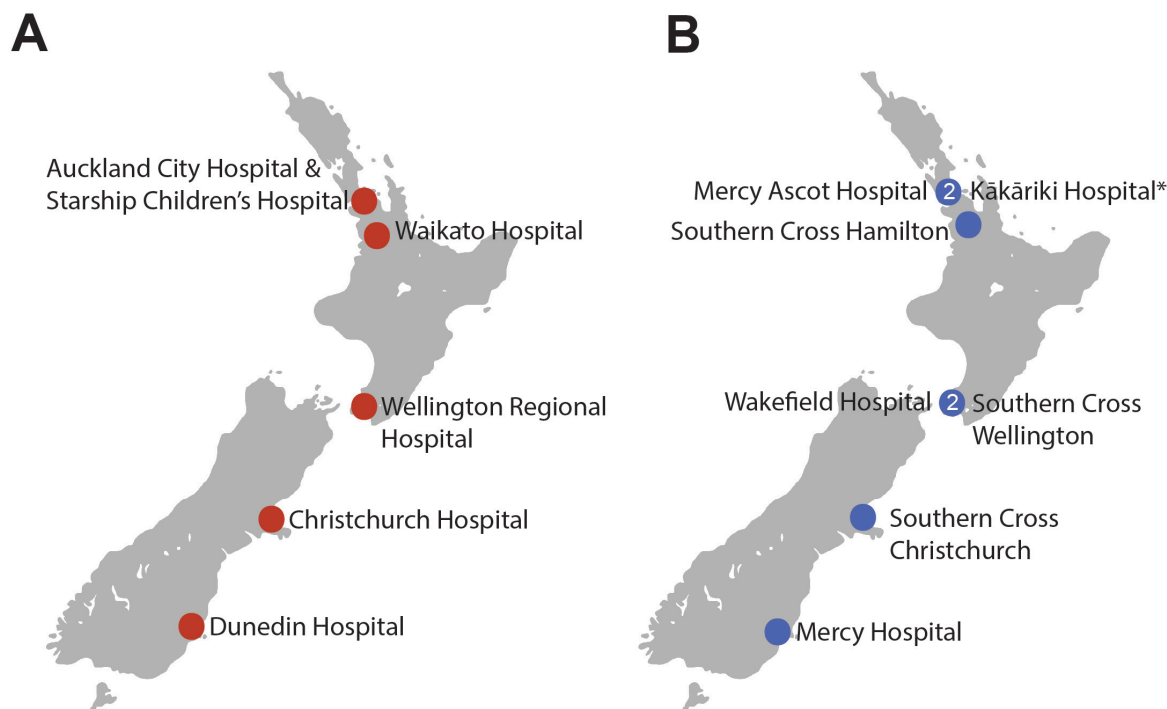
chemotherapy and/or radiotherapy may access these services at the five Te Whatu Ora centres, or through other Te Whatu Ora and private facilities. Based on international findings, around 85% of brain cancer patients undergo surgery, as evidenced by the proportion of patients with histopathologically confirmed disease.<sup>3</sup> However, just 40% of those with non-malignant brain tumours receive histopathological confirmation.<sup>3</sup> It is important to note that these patients will still likely undergo neurosurgical review at major neurosurgical centres. Most brain tumour patients will be discussed at regional neuro-oncology multi-disciplinary meetings (MDM) held at one of these major neurosurgical centres, regardless of whether treatment occurs at Te Whatu Ora or

private facilities. Therefore, these five neurosurgical centres are expected to be the primary sources of data for the brain tumour registry. However, it is important to include data from all private neurosurgery sites and other relevant chemotherapy and radiotherapy treatment centres to ensure complete coverage of the brain tumour population.

### The brain tumour patient pathway

Consultations have also revealed the typical pathway brain tumour patients follow throughout the neuro-oncology system. Understanding this pathway will allow for the appropriate identification of data sources and data fields. The brain tumour patient pathway (BTPP; Figure 2) is divided into

**Figure 1:** Locations of the A) five Te Whatu Ora – Health New Zealand and B) seven private neurosurgical centres in New Zealand.



\*Kākāriki Hospital is a new private hospital, opened in 2024.

three key stages: the pre-investigation phase, the investigation phase and the treatment and management phase.

### 1. Pre-investigation

A patient in the pre-investigation phase of the BTTP may experience symptoms that require investigations, but the patient is yet to access the healthcare system. The symptoms may include headaches, dizziness, impairments in co-ordination, blurred vision, nausea, vomiting, seizures or loss of consciousness.<sup>13,14</sup> Not all patients present with symptoms, as some brain tumours are discovered incidentally.

### 2. Investigation

Patients with symptoms will access the healthcare system for investigations. Data from the United Kingdom suggest over 50% of brain tumour patients are diagnosed by emergency department (ED) services, with the remainder presenting to their general practitioner (GP), other outpatient services or as an inpatient.<sup>15,16</sup> When a brain tumour is suspected, a series of investigations will be conducted, including neuroimaging. Neuroradiology, therefore, typically serves as the

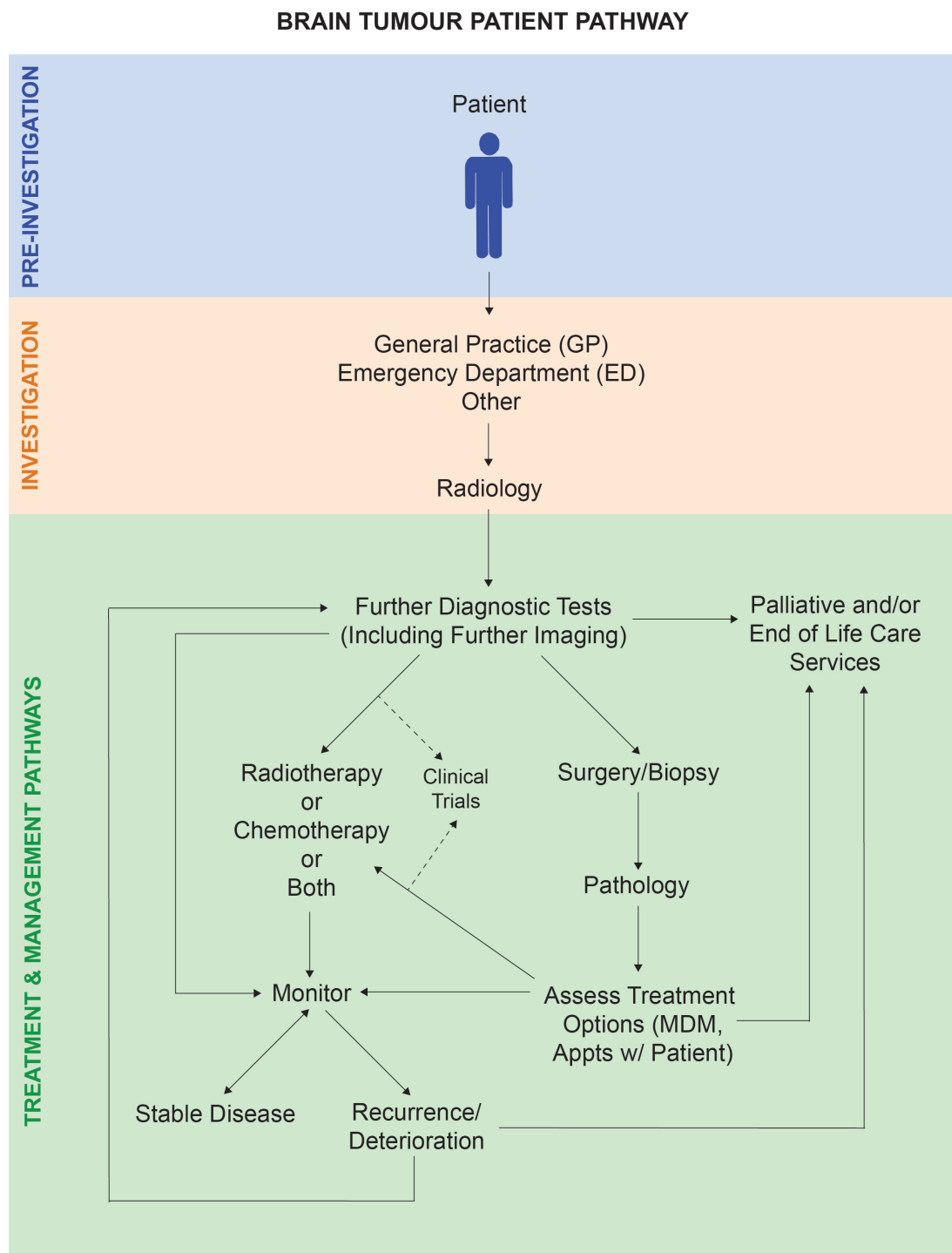
initial point of identification for brain tumours.

### 3. Treatment and management

Once a brain tumour is diagnosed, the patient will be referred to a neurosurgical service for further diagnostic testing and management. From this point, the patient may follow one of four potential paths:

1. Best supportive care: If the patient is particularly unwell, elderly, has significant co-morbidities and considering their wishes, they may receive best supporting care without invasive interventions.
2. Active surveillance: If the patient is not yet suitable for neurosurgery, radiotherapy or chemotherapy they may be placed under active surveillance, where they are monitored until treatment can be commenced at a later date.
3. Neurosurgery: The patient may undergo neurosurgery for maximal tumour resection or biopsy. Tumour samples will be subjected to neuropathological analysis for a formal diagnosis. Treatment options will be discussed at an MDM and the patient

**Figure 2:** The brain tumour patient pathway, which describes the progression of a brain tumour patient throughout New Zealand’s neuro-oncology system.



may then be referred for supportive care, chemotherapy, radiotherapy or active surveillance.

4. Radiotherapy/chemotherapy: The patient may be referred for radiotherapy and/or chemotherapy. Ongoing monitoring will assess for any evidence of tumour recurrence or progression. Patients experiencing recurrence or progression may be referred to palliative care services or undergo further investigations. The patient, therefore, re-enters the treatment cycle, potentially including clinical trials.

This pathway is not exhaustive; it does not include every MDM that may occur, every possible entry point into the neuro-oncology service or referrals to supportive services such as speech-language therapy, physiotherapy or counselling. This pathway also does not include the small subset of patients who seek care overseas.

### **A New Zealand brain tumour registry: key considerations**

#### ***New Zealand's healthcare system***

Before the major healthcare reforms in 2022, the New Zealand healthcare system was organised into 20 district health boards (DHBs), each responsible for providing health services to specific localities.<sup>17,18</sup> Some DHBs served much larger populations compared to others, leading to a top-heavy system where specialist healthcare services were concentrated in major cities.<sup>17</sup> This is evident in the neuro-oncology system, with publicly funded neurosurgery services located only in major urban areas. While this phenomenon is common globally, New Zealand's large geographic area relative to its small population exacerbates geographic disparities in healthcare access, resulting in significant inequities in healthcare services depending on location.<sup>15</sup> In 2022, the 20 DHBs were formally disestablished and replaced by Te Whatu Ora – Health New Zealand.<sup>19</sup> Despite this change, the healthcare system remains fragmented, with healthcare service provision still organised according to the previous DHB boundaries, perpetuating the postcode lottery. Recently, the New Zealand Government announced that Te Whatu Ora will be organised into four health regions—Northern, Te Manawa Taki, Central and Te Waipounamu,<sup>20</sup> it remains to be seen whether this new arrangement will improve these geographic inequities.

#### ***Te Tiriti o Waitangi***

Achieving total population coverage is crucial to ensure all New Zealanders are represented in a national clinical registry. New Zealand's healthcare system, designed in the mid-twentieth century, was oriented around the needs of the then majority population—New Zealand Europeans.<sup>21</sup> This historical system has contributed to ongoing inequitable healthcare outcomes for Māori.<sup>21</sup> In 1975, the *Treaty of Waitangi Act* was passed, which allowed for the establishment of the Waitangi Tribunal.<sup>21</sup> This judicial body investigates breaches of the Treaty of Waitangi/Te Tiriti o Waitangi—New Zealand's core founding document.<sup>21</sup> Te Tiriti o Waitangi outlines three articles, with several references to health and wellbeing.<sup>21</sup> The New Zealand government has been found in breach of its obligations under Te Tiriti o Waitangi regarding Māori health, resulting in persisting disparities in health outcomes.<sup>22</sup> These systemic issues are well demonstrated by the postcode lottery system described above—a higher proportion of Māori reside in rural areas, where access to specialist services is limited. Consequently, the specialist service landscape in New Zealand may reinforce these inequities. In this context, studies indicate that Māori are more likely to be diagnosed with aggressive meningiomas,<sup>23,24</sup> and Māori children experience a significantly higher incidence of medulloblastoma.<sup>25,26</sup> Whether inequitable provision of neuro-oncology services alongside these inequities in brain tumour incidence are disproportionately affecting outcomes for Māori is unclear. Learnings from existing clinical registries can guide the development of a population-level registry and begin a thorough assessment of these inequities.

#### ***Māori data sovereignty***

Another important consideration for the forthcoming national brain tumour registry is Māori data sovereignty (MDS). On a broader scale, concepts of Indigenous data sovereignty describe the right of Indigenous peoples to manage and control their own data, including collection, management, use and storage.<sup>27</sup> This emphasis on autonomy allows the determination of what information is gathered and used to achieve their own objectives.<sup>27</sup> It is a multifaceted concept, involving legal and ethical considerations related to data storage, ownership, access and utilisation of data.<sup>27</sup> In New Zealand, MDS is particularly important in relation to tino rangatiratanga (self-determination), a core principle guaranteed

by Te Tiriti o Waitangi.<sup>27</sup> Te Tiriti o Waitangi guaranteed self-determination for Māori and their taonga (treasures), including Māori data.<sup>27</sup> In line with broader Indigenous data sovereignty principles, the collection, storage, ownership and use of Māori data should be subject to Māori governance and should benefit Māori.<sup>27</sup> Te Mana Raraunga's *Principles of Māori Data Sovereignty*<sup>28</sup> and Statistics New Zealand's *Ngā Tikanga Paihere*<sup>29</sup> are two culturally centred frameworks that organisations can utilise when considering how to approach MDS. These frameworks will be invaluable in establishing a data governance structure for the national brain tumour registry, ensuring Māori data are managed according to their principles and priorities.

### **Governance framework**

The forthcoming national brain tumour registry will require a governance framework to ensure the registry's objectives are met, resources are secured and distributed appropriately, data quality is maintained and all ethical and legal requirements are met.<sup>30</sup> The governance structure will provide guidance and oversee decisions related to the design, construction, functioning and ongoing maintenance of the registry. There are a range of possible models for a clinical registry governance framework. Typically, such frameworks will involve a project management team, a clinical/scientific committee comprising several advisory groups of interest and a quality assurance committee.<sup>30</sup> Additionally, teams focussed

on data security and collection may also be established. In New Zealand, it is particularly important to include dedicated committees representing Māori and Pacific peoples to ensure that the registry aligns with their specific needs and values. The registry will be able to leverage the expertise of over 100 members of the NANOS, who bring a diverse range of clinical, scientific and patient advisory perspectives that can contribute to this governance framework.

### **Conclusions**

With treatment options and survival for brain tumour patients remaining largely unchanged over the last 30 years, there is an urgent need for a brain tumour registry in New Zealand. The forthcoming national brain tumour registry will enable the collection of comprehensive and accurate data on brain tumours nationwide, enhancing clinical decision-making, improving patient care and facilitating targeted research and advocacy efforts. This initial research and planning phase has identified several important considerations for the registry's development, including its structure, integrating with existing registry infrastructure, data fields of interest, alignment with the national healthcare system, Te Tiriti o Waitangi, Māori data sovereignty and the establishment of a governance framework. Further, this work has provided a clearer understanding of New Zealand's neuro-oncology system and the typical pathway a brain tumour patient follows throughout this system.

**COMPETING INTERESTS**

CH is co-chair of the New Zealand Aotearoa Neuro-Oncology Society and a Medical Advisory Board member for Brain Tumour Support NZ.

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MD is chair of the Māori Advisory Board Centre for Brain Research.

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TP is co-chair for the New Zealand Aotearoa Neuro-Oncology Society.

FZ is a New Zealand Aotearoa Neuro-Oncology Society committee member.

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