Report to the Faculty of Pain Medicine

The Problem of Chronic Pain and Scope for Improvements in Patient Outcomes

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Executive summary

Chronic pain is a significant problem for both individuals and society. In this analysis, we highlight the economic and other costs to society of chronic pain and outline potential improvements in patient outcomes and reductions in societal costs that might result from additional investment focused on chronic pain.

Epidemiological studies from around the world estimate chronic pain to affect around 20 to 40 per cent of the population (McGhie & Grady, 2016). Chronic pain is complex, poorly understood by the community, and highly prevalent in New Zealand. In New Zealand, one in five people aged over 15 report chronic pain. Prevalence is higher for Māori and European/Other, and increases with age and with lower socio-economic status. Injury is a major contributor to chronic pain. However, chronic pain often occurs in the absence of obvious tissue injury. People often have chronic pain in multiple sites. Chronic pain has psychological, social, and biomedical dimensions.

We have examined the costs imposed on society from chronic pain, and the potential for further investment in pain medicine services in New Zealand to achieve better patient outcomes and economic benefits to government and society. The objective of the investment is to elicit change to the way patients with chronic pain are managed and treated currently. To the extent that additional investment brings about change to the model of care towards "best practice", the current costs of chronic pain to individuals and society in general are likely to reduce. This report uses available information to estimate the:

- prevalence of chronic pain
- current models of care for chronic pain
- state of the pain medicine workforce
- costs imposed by chronic pain, and
- potential cost-reducing impacts of further investment in pain medicine services.

Our main conclusion is that chronic pain deserves more consideration and attention due to the substantial costs that it imposes.

We summarise the key points from our analysis below.

1. Despite being highly prevalent, chronic pain does not garner attention from healthcare planners

Chronic pain is like an iceberg – only the tip is visible, with the vast bulk remaining out of sight. We speculate this is because pain may result from a wide range of contributors, or because addressing disease-specific contributors is the first priority. However, chronic pain often continues after initial triggers resolve and consequently becomes a significant contributor to reduced patient quality of life.

2. Chronic pain imposes substantial costs on society, which will rise in future

The burden of chronic pain is similar in size to that of anxiety and depressive disorders, accounting for five per cent of total disability adjusted life years (54,000 years). Chronic pain was estimated (using inference and extrapolation of available evidence) to result in total costs of $13 to 14.9 billion in 2016, and is predicted to rise to $21.2 to 24.3 billion in 2048. These costs are greater than those estimated for diabetes, dementia, smoking, and musculoskeletal disorders respectively.

In 2016, the major cost component was the monetised value of lost wellbeing (i.e. disability adjusted life years), followed by indirect costs associated with productivity losses. Costs to the health sector is the final cost component. The total cost per person with chronic pain in 2016 was $17,283 to 19,343. The largest component was wellbeing costs of $11,246 to 12,489 per person.

3. The current treatment and management of chronic pain is diverse and variable

Many treatment options are available in New Zealand, not all of which involve a specialist pain medicine physician. Primary care and other community providers are responsible for a significant volume of care for those with chronic pain. There is anecdotal evidence of a significant demand for pain specialist treatment, but hard data was largely unavailable or difficult to access. Patients with chronic pain following injury appear to follow a different pathway from non-injury patients. Non-injury chronic pain patients are likely to cycle through the health system and may be subject to unnecessary or ineffective treatments, consuming considerable resources in the process.

4. There are issues with the size of the specialist pain medicine physician workforce and the workforce is ageing compared to general medicine

New Zealand has an estimated 11 fulltime equivalent specialist pain medicine physicians (from 35 Pain Medicine Fellows). Based on the internationally recommended ratio of one fulltime equivalent specialist pain medicine physician per 100,000 patients and New Zealand's current population, around 47 fulltime equivalent specialist pain medicine physicians would be required. In addition, the pain medicine workforce is ageing with around 65 per cent aged over 50, compared with around 40 per cent of the general medical workforce.

5. Specialist pain medicine physicians bring particular capabilities to managing chronic pain

Specialist pain medicine physicians apply an approach that is based on a socio-psycho-biomedical framework of assessing and treating patients with chronic pain. They bring a multidisciplinary focus with the objective of restoring functionality and enabling individuals to live as independently as possible despite their pain. Specialists provide education, innovation and research insights, as well as a co-ordinating role among other team members and clinicians.

6. Additional investment in pain medicine services can reduce costs

There is a range of evidence from overseas studies and expert interviews that suggest some of the costs of chronic pain are avoidable. Specialist pain medicine physicians are integral to potential cost reductions. To the extent that better data and information becomes available in future, more precise estimates of potential cost reductions would be possible. Without further investment, pressure on current services will continue to increase, service levels will decline, wider health system costs may increase, and patients' quality of life will likely deteriorate more than is acceptable.

7. Additional research would be useful in future

No New Zealand studies of the cost of chronic pain existed prior to this report. Future studies would benefit from using primary data on health system use, ACC claims cost, welfare receipt, and productivity effects of chronic pain. In the future, electronic Persistent Pain Outcomes Collaboration (ePPOC) data will be useful once a time series is well established. Surveys of treatment providers, mapping of patient pathways, labour market impacts and further detail of the ACC case management approach would also be helpful to establish more accurate estimates of costs and potential benefits.

1. Introduction

The Faculty of Pain Medicine (FPM) of the Australian and New Zealand College of Anaesthetists (ANZCA) commissioned Sapere to undertake a health economic analysis and report on the prospect of investment in the pain medicine workforce and pain management services in New Zealand. The intention of the analysis is to highlight the economic and other costs to society of chronic pain and outline potential improvements in patient outcomes and reductions in societal costs that might result from additional investment focused on chronic pain.

1.1 What is chronic pain?

The research brief for this work defined chronic pain as *"[P]ain that has lasted more than six months and is present every day."* Further, the research brief details that chronic pain entails *"[S]evere biological, psychological and social consequences for patients, including: anxiety; depression; insomnia; interference with work; fear avoidance behaviour; loss of employment; family and relationship disruption; risk of suicide; and adverse drug effects."*

Pain itself is an experience, necessarily subjective, and individuals develop their own experience of pain over a lifetime. Although chronic pain may be a feature of many conditions, it is also recognised as a distinct problem in its own right. (Henderson et al 2013). Unlike acute pain, which serves the purpose of attracting attention to and encouraging protective behaviour from its cause, which is usually associated with tissue damage, chronic pain is often not associated with active disease or damage (Middlemiss, undated). Many people report pain in the absence of tissue damage or any likely pathophysiological cause. Moreover, the degree of pain experienced is not necessarily correlated with injury.

Chronic pain is in fact a complex set of conditions, variably influenced by a range of biological, psychological, and social factors. This is captured in the socio-psycho-biomedical framework that informs the discipline of Pain Medicine. Given this complexity, it is perhaps not surprising that no definition currently captures all of its elements. Similarly, there is no single or typical characterisation of a chronic pain sufferer.

1.2 Towards a "best practice" model of care

Historically approaches to pain management have primarily relied on the biomedical view of pain. More recently however, in general, the literature related to the management of pain identifies the need for more effective management of pain, particularly for chronic pain. There has also been increasing recognition that pain, particularly chronic pain, is a multidimensional phenomenon which requires a comprehensive, integrated, and multifaceted model of care that includes the traditional biomedical approach but is far broader. The 2015 FPM pain medicine curriculum and roles in practice model is based on a socio-psycho-biomedical philosophy.

Chronic pain is very different from acute pain in terms of its aetiology and complexity; the emphasis on pain as a multidimensional experience that needs to be viewed and managed through a biopsychosocial lens is important (Conway and Higgins, 2011).

1.3 Appropriate practice is well established

The approach to management of pain is well established. A literature review undertaken in NSW [Source: NSW Literature Review: Models of care for pain management, 2011] as part of developing a new model of care identified issues associated with the current approaches to pain management. These included:

- an over-reliance on the biomedical view of pain and a concomitant lack of services within the socio-psycho-biomedical approach to responding to chronic pain
- limited timely access to existing services for a range of reasons
- a need to develop capacity to respond to increasing demand for pain management, particularly chronic pain, as people survive conditions which are associated with or lead to persistent pain, and
- a need to better target services to clients experiencing pain who have differing needs.

The current care delivery processes for the management of pain suggested a need to:

- better define the type of services for specific populations who experience pain
- promote pain medicine as a specialty area of practice that works collaboratively with other specialities (multi-level intervention) to optimise patient experience and outcomes, and
- continue to ensure care processes are founded on research related to the socio-psycho-biomedical view of pain.

Because many people with pain do not receive the best available care, there is an opportunity to substantially improve outcomes in pain management by translating existing knowledge into practice through a defined, evidence-based model of care.

In NSW, a tiered model of care was adopted with specialist pain medicine physicians and tertiary pain services involved in more complex cases and more simple cases are treated in primary care. Preventative approaches are also relevant to the model of care.

2. Chronic pain as a societal and economic problem

Chronic pain is estimated to account for five per cent of the total health burden each year (Ministry of Health, 2013), yet relatively little attention has been given to the prevalence and incidence of chronic pain in New Zealand in the last 25 years (Dominick et al, 2011). The volume of overseas studies has risen and the burden of chronic pain has become more visible. As this has happened, more attention has been paid to understanding chronic pain in New Zealand.

2.1 Prevalence of chronic pain

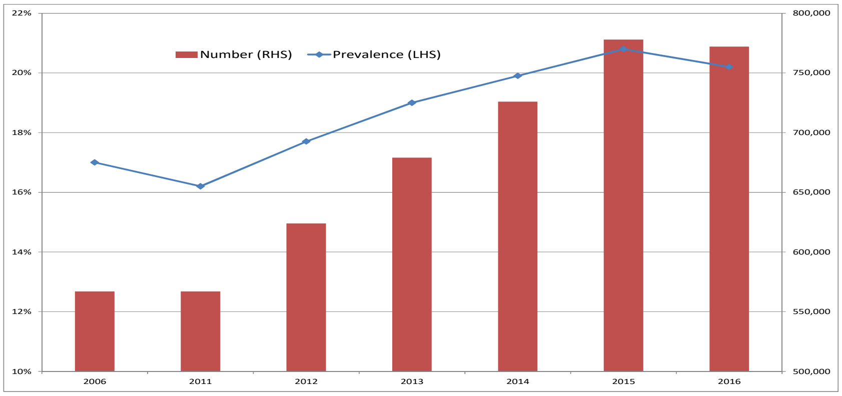
Chronic pain is multifactorial, with a range of contributors (including no obvious tissue injury contribution), and sites of pain. It is defined mainly in terms of time rather than a specific illness or injury. Publicly available information on ACC claims and benefit receipt does not categorise recipients by reference to chronic pain. The best information we have in New Zealand comes from two health surveys.

The most recent source of epidemiological information regarding chronic pain is the New Zealand National Health Survey 2016/17. Adult respondents (aged ≥15 years) were defined as having chronic pain if they reported that they experienced pain that was present almost every day, and that had lasted or was expected to last more than six months, irrespective of its intensity.

2.1.1 More than one in five adults experience chronic pain

The National Health Survey 2016/17 estimates 20.2 per cent (95 per cent confidence interval, 19.3 per cent to 21 per cent) of adults experienced chronic pain, compared with 17 per cent (95 per cent confidence interval, 16.1 per cent to 17.9 per cent) a decade earlier. In 2016/17, about 770,000 adults currently experienced pain almost every day (see Figure 1).

Figure 1 Number and prevalence of chronic pain in New Zealand by year, 2006–2016

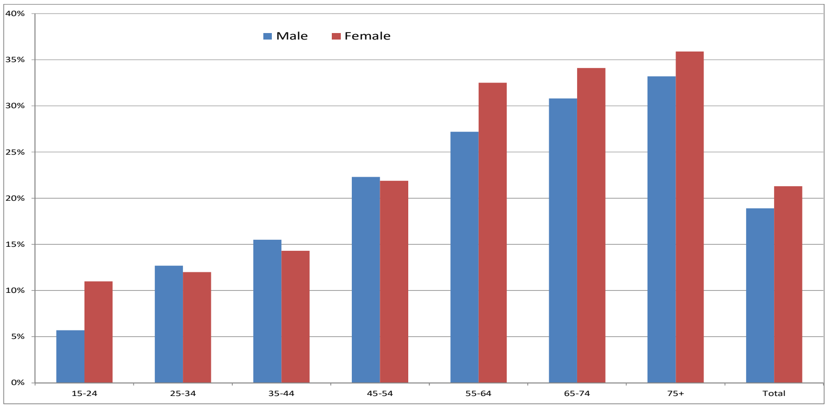


Source: Ministry of Health (2017)

2.1.2 The proportion of people with chronic pain increases with age

Figure 2 shows increasing prevalence by age group, from eight per cent in those aged 15 to 24 years to 35 per cent in adults aged 75 years and over. There was a statistically significant increase in rates of chronic pain in all groups aged 55 years and over since 2006/07.

Figure 2 Prevalence of chronic pain by age group and sex, 2016

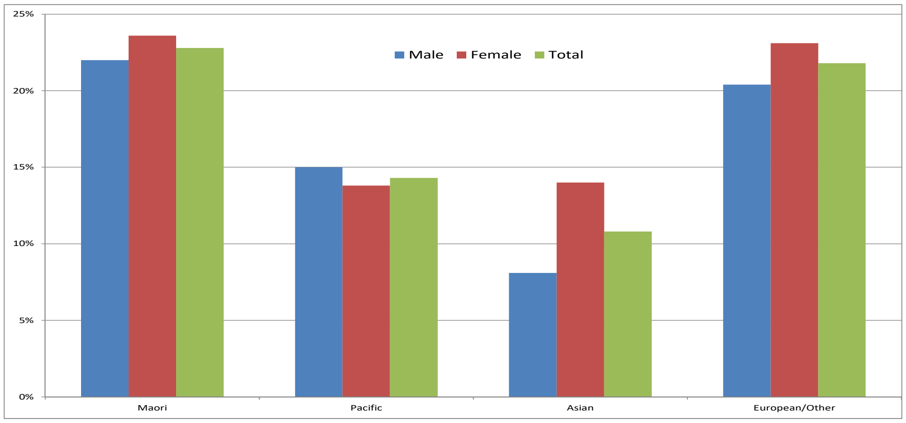


Source: Ministry of Health (2017)

2.1.3 Māori and the European/other ethnic groups had a higher proportion with chronic pain

Māori (23 per cent) and European/other (22 per cent) adults had the highest rates of chronic pain, followed by pacific (14 per cent) and Asian (11 per cent) adults. After adjusting for age and sex differences, Asian adults were less likely to experience chronic pain than non-Asian adults.

Figure 3 Prevalence of chronic pain by ethnic group, 2016



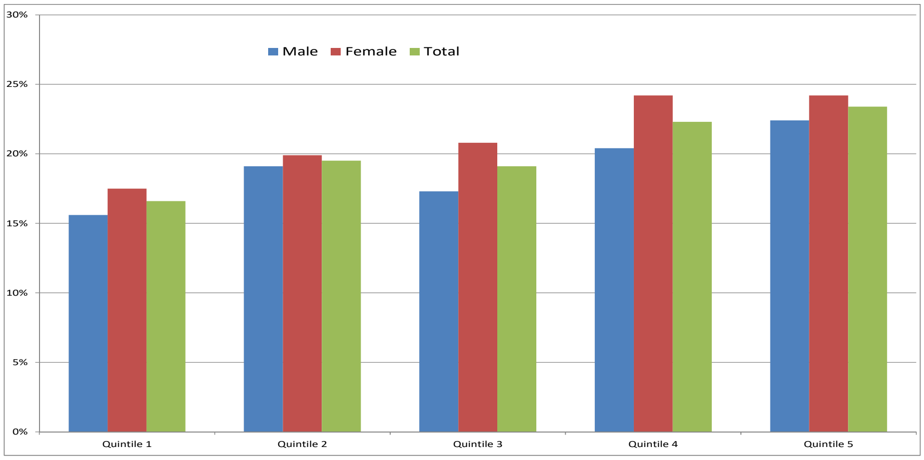
Source: Ministry of Health (2017)

2.1.4 Areas of high socioeconomic deprivation have a higher proportion of people with chronic pain

Chronic pain affected a higher proportion of adults living in the most socioeconomically deprived area (i.e. quintile 5) than those living in the least deprived area (i.e. quintile 1). In the most deprived area, 23.4 per cent (95 per cent confidence interval, 21.2 per cent to 25.7 per cent) of adults experienced chronic pain. The equivalent proportion for adults in the least deprived area is 16.6 per cent (95 per cent confidence interval, 14.3 per cent to 19.1 per cent).

After adjusting for age, sex and ethnic differences, adults living in the most socioeconomically deprived areas were 1.7 times more likely to experience chronic pain than adults living in the least deprived areas.

Figure 4 Prevalence of chronic pain by socioeconomic deprivation and sex, 2016



Note: Quintile 1 is least deprived and quintile 5 most deprived

Source: Ministry of Health (2017)

2.2 Numbers of those in chronic pain will increase as population ages

The number of chronic pain sufferers is projected to increase as the population ages from around 770,000 New Zealanders in 2016 to around 1.26 million by 2048 (see Table 1). We calculated this number by combining prevalence rates from the New Zealand Health Survey 2016/17 annual update with projections of New Zealand's population by age and sex from 2016 to 2048. This represents a slight rise in the overall adult prevalence rate from 20.2 per cent to 22.2 per cent by 2048. These estimates are based only on the ageing of the population and do not include any interventions or change in risk factors that might affect the prevalence of chronic pain.

Table 1 Baseline and projected number of chronic pain sufferers in New Zealand by age and sex

Age group (years)	Male		Female	
	2016	2048	2016	2048
15–24	20,121	25,183	35,893	44,946
25–34	40,818	57,607	39,288	48,948
35–44	43,943	71,610	43,658	60,603
45–54	68,952	104,476	72,839	93,272
55–64	73,603	109,752	93,308	130,878
65–74	60,984	88,365	71,201	105,574
75+	43,392	135,556	60,276	179,823
Total	**351,813**	**592,548**	**416,463**	**664,044**

Source: Ministry of Health (2017), Statistics New Zealand National population projections, 95th percentile, Sapere calculations

2.3 Eight major causes, otherwise "not sure"

There is relatively little New Zealand data available on the known range of conditions associated with chronic pain, irrespective of known cause.

The 2010 New Zealand Chronic Pain Survey distributed paper and online surveys to GPs, hospitals, and pain clinics asking for people with chronic pain to respond. The survey was open for six weeks and aimed to gather information from respondents about their pain, mental health, disabilities, and acceptance of pain. There were 142 responses, with the vast majority (86 per cent) being from women. The authors acknowledge that self-selection might mean that the results were not representative of all chronic pain sufferers, but they are likely to represent the group of people who will be seeking support for their pain experiences (Swain and Johnson, 2014).

Participants were asked to identify the cause of their pain. While 45 per cent of respondents identified only one cause of their pain, 34 per cent listed two causes and 21 per cent listed three or more causes. The average number of causes per person was 1.8. The largest response was "not sure" (23 per cent), followed by injury (21 per cent), and arthritis (20 per cent) (Table 2).

Table 2 Causes of chronic pain identified in the New Zealand Chronic Pain Survey, 2010

Cause	% (n)
Not sure	23 (32)
Injury	21 (29)
Arthritis	20 (28)
Endometriosis	19 (27)
Multiple sclerosis	18 (25)
Surgery	16 (23)
Neuropathic	14 (20)
Irritable bowel	11 (14)
Fibromyalgia	9 (12)
Other	31 (44)

Source: Swain and Johnson (2014)

Injury and accident may play a major role in the development of chronic pain (see Table 3 below). This is consistent with Australian experience where injury was identified as a major antecedent of chronic pain, particularly sports injuries. However, root cause of pain is difficult to identify; almost a third of respondents in one New South Wales study could not identify a preceding event (injury or health problem) that might have caused chronic pain (Blyth et al, 2003).

Table 3 Possible causes of chronic pain

Cause	%
Injury or accident	41.5
Health condition	27.7
Age-related	11.1
Other	5.1
Work-related	4.1
Not known	3.5
Operation	3.0
Lifestyle of habit	2.7
Physical activity	1.3

Source: Dominick, Blyth and Nicholas (2011)

Data for New Zealand is slightly different with a higher weighting to health condition as root cause. A 2012 survey of people with chronic pain in New Zealand by the pharmaceutical company Pfizer found that 47 per cent of the respondents attributed it to a diagnosed health condition, such as arthritis or an inflammatory condition. Thirty-eight per cent attributed it to a specific event, such as an accident or operation, and ten per cent said the source of the pain was unknown to doctors (Pfizer, 2012).

2.4 Chronic pain is commonly experienced in more than one site

The New Zealand Chronic Pain Survey looked into the issue of number of pain sites. Table 4 shows that the total percentage figures for pain sites sums to well over 200, indicating pain in at least two sites.

Table 4 Sites of chronic pain

Pain site	% (n)
Lower back	59 (84)
Pelvis/abdomen	49 (69)
Joints	39 (56)
Neck	34 (48)
Muscle	31 (44)
Headache	31 (44)
Foot	28 (39)
Upper back	23 (32)
Wrist	12 (17)

Source: Swain and Johnson (2014)

The 2012 Pfizer survey in New Zealand indicated that the most common sites of chronic pain were musculoskeletal such as:

- Lower back pain (with or without associated leg pain)
- Neck pain (with or without arm pain)
- Whole-body pain (fibromyalgia)

2.5 Disability from chronic pain is high

Disability from chronic pain reported in the 2010 New Zealand Chronic Pain Survey was high. The majority in the survey respondents had trouble walking (76 per cent), sleeping (75 per cent), concentrating (64 per cent), and maintaining relationships (56 per cent) due to their pain (see Table 5). Again, most people had multiple disabilities, with the average number (from ten choices) being five.

Table 5 Disabilities associated with chronic pain reported in the 2010 New Zealand Chronic Pain Survey

Disability	% (n)
Difficulty walking or moving	76 (110)
Inability to sleep	75 (108)
Inability to concentrate	64 (91)
Strained relationships with family/friends	56 (79)
Inability to meet family commitments	42 (59)
Inability to drive	28 (39)
Inability to care for self	25 (35)
Loss of a job or chance of promotion	24 (34)
None of these	0 (1)

Source: Swain and Johnson (2014)

3. The current costs of chronic pain

Internationally, chronic pain is recognised as a major health problem that has considerable impact individually, socially, and economically. People with chronic pain have poorer health related quality of life and limitations in daily functioning (Dominick, Blyth and Nicholas, 2011). In particular, the experience of chronic pain has severe social, psychological, and biological dimensions, including:

- anxiety (Shipton et al, 2013)
- depression (Shipton et al, 2013)
- insomnia (Wilson et al, 2002)
- interference with work, including premature retirement (Schofield et al, 2015)
- fear avoidance behaviour (Shipton, 2018)
- loss of employment (Shipton, 2018)
- family and relationship disruption (Shipton, 2018)
- risk of suicide (Shipton, 2018), and
- adverse drug effects (Blyth, March and Cousins, 2003; Faculty of Pain Medicine, 2015).

3.1 A cost-of-illness approach to estimating the cost of pain

Cost-of-illness studies highlight the importance of health issues in society and show the potential savings, even if elimination of a condition is unrealistic or impossible.

Table 6 cost categories in cost-of-illness approach

Cost type	Description
Direct	Costs the health system, community, whānau and individuals bear directly (e.g. the costs of hospital stays, investigations, pharmaceuticals, ACC payments, social welfare benefits payments, and outpatient and general practitioners' visits).
Indirect	Costs largely associated with lost productivity as a result of the illness incurred by the individual and informal carers.
Intangible	Costs associated with changes in the quality of life of individuals and carers as a result of their illness (e.g. the cost of pain, grief and suffering on individuals and their families/whānau).

Source: Ministry of Health (2009)

3.1.1 The ideal dataset is not available

Ideally, estimation of costs/impacts of health and disability problems is based on data collected directly from relevant entities. Set out below is a list of data/information (and its applicable sources) that a study of this nature would look to utilise, if possible. However, as shown in the table below, not all data is collected by official sources. Thus, even in an ideal situation some degree of primary data gathering (sampling and surveying) is required.

Table 7 Cost classification and sources

Cost type	Categories	Sub-types	Possible source
Direct	Health system costs	Inpatient Outpatient General Practitioners' Pharmaceuticals Pathology and imaging Allied health Consultants	Ministry of Health Ministry of Health RNZCGP/major PHO Pharmac, Ministry of Health RNZCGP, DHBs Survey of providers Survey
Indirect	Welfare costs	Supported living payment cost Rehabilitation costs for chronic pain relating to injury	Ministry of Social Development (MSD) ACC
	Productivity costs	Lower long-term employment rates Temporary absence from work Reduced capability while still working	NZ Health Survey, Ministry of Health Surveys, published studies, ACC (relating to injury), MSD Pain clinics, surveys, published studies
	Informal and formal care	Friends and family Formal care in the community	NZ Health Survey Other studies, surveys
Intangible	Burden of disease	Premature death Disability adjusted life years Quality adjusted life years	New Zealand Burden of Disease Study

3.1.2 Paucity of data is something to address

The relative paucity of official data collection in New Zealand has been highlighted in previous studies. Bossley and Miles (2009), in a study on musculoskeletal conditions in New Zealand, lamented:

> *"[U]nfortunately, few statistics relevant to musculoskeletal disorders are routinely collected with the health sector."*

These authors were unable to put a value on the costs of chronic pain relating to musculoskeletal conditions, due to data limitations.

Similarly, an investigation into the fitness for work of people with musculoskeletal disorders claimed that calculating the exact costs of musculoskeletal disorders was not straightforward and obtaining accurate, reliable, and consistent figures is almost impossible. The authors posit that one of the reasons for early diagnosis and treatment of musculoskeletal disorders not being a priority in New Zealand is the absence of comprehensive data. Finally, the authors highlight the difficulty posed by the lack of standardisation and validation around the terminology and classification of musculoskeletal disorders (Bevan et al, 2012). Clearly this is a matter to address at some point in time.

3.1.3 We necessarily rely on inference and extrapolation

We adapt data and parameters from existing studies and knowledge. We translate overseas information on chronic pain costs (particularly Australian material) to its New Zealand equivalent, as well as insights from New Zealand studies of conditions other than chronic pain. We draw on two key papers authored by Access Economics to determine our range of estimates:

- The first is a 2007 paper that calculated the total economic impact of persistent pain in Australia at AUD34.3 billion, or AUD10,847 per person with chronic pain. The financial cost was estimated at AUD28.8 billion and included productivity losses (51 per cent), health system costs (31 per cent), deadweight losses associated with use of the tax/transfer system (11 per cent), carer costs (six per cent), and other indirect costs (one per cent). The remainder of the estimated impact (AUD11.5 billion) relates to the burden of disease (reduced quality of life for those with chronic pain).
- The second paper, produced in 2010, estimated that the total financial costs of arthritis in New Zealand in 2010 were NZD3.2 billion, or 1.7 per cent of Gross Domestic Product (GDP). The largest component of these costs related to lost earnings, NZD1,501.5 million (48 per cent), followed by informal carer costs of around NZD752 million (24 per cent), while total health system costs were NZD695 million (22 per cent).

Any dollars expressed in further sections are NZD unless otherwise stated.

3.1.4 Estimation of direct costs

Translating overseas parameters to New Zealand equivalents involves the following steps:

- express values in relevant year terms – update values calculated in previous years for inflation and any changes in prevalence using source country inputs, and
- adjust for inter-country differences in population, income, and purchasing power.

Translating New Zealand studies for other conditions involves the following steps:

- express values in relevant year terms – update values calculated in previous years for inflation and any changes in prevalence, and
- scale by a factor that represents the extent to which the other condition correlates with chronic pain.

Estimate from 2007 impact of chronic pain study[1]

We first derive 2016 values by adjusting for inflation and projected prevalence:

- The direct health system costs in Australia in 2007 as a result of chronic pain were estimated to be AUD6.981 billion. We adjust this figure for health inflation of 3.5 per cent per annum (the midpoint of the three to four per cent used by Access Economics in its report, and also the PHARMAC discount rate), to estimate the inflation-adjusted 2016 value of AUD9.514 billion.
- Next, we account for estimated changes in the prevalence of chronic pain between 2007 and 2016 by interpolating projected prevalence figures in the Access Economics report. The number of people with chronic pain rises by around 455,000, from almost 3.2 million people in 2007 to just over 3.6 million in 2016.
- The estimated health system cost of chronic pain in 2016 was calculated at AUD10.883 billion following these adjustments, a rise of some AUD3.902 billion (56 per cent). This equates to direct health system costs of around AUD3,006 per person with chronic pain in 2016.

We then convert this derived direct cost to New Zealand dollar equivalents:

- The 2016 per person New Zealand dollar equivalent of AUD3,006 is $2,606. This New Zealand dollar estimate was derived by adjusting the AUD estimate for differences in income levels between Australia and New Zealand as well as exchange rate differences. The calculations were performed on a Purchasing Power Parity (PPP) basis for both GDP and exchange rates using World Bank and OECD data.[2]

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[1] As this section contains values expressed in Australian dollars, we follow Australian National University guidance and use 'A' and 'NZ' prefixes to denote the respective currencies of Australia and New Zealand (https://services.anu.edu.au/marketing-outreach/storytelling-writing/writing-style-guide#M). Elsewhere, where there is no prefix used, the values relate to New Zealand dollars.

[2] World Bank https://en.wikipedia.org/wiki/List_of_countries_by_GDP_(PPP)_per_capita
https://stats.oecd.org/index.aspx?datasetcode=sna_table4#

- The adjustment for relative income levels was based on the general proposition that a positive relationship is thought to exist between income and healthcare expenditure. Failure to adjust for relative income levels could lead to overstated values. The use of a PPP basis is to account for differences in price levels between Australia and New Zealand.

As outlined above, in 2016 there were around 770,000 people in New Zealand with chronic pain. Multiplying that number by the direct health care cost per person of $2,606 results in an inferred cost of $2.002 billion in 2016.

Estimate using 2010 cost of arthritis study

This approach also involves two steps. We derive 2016 values by adjusting for inflation and projected prevalence:

- We adjust the amended 2010 direct health system cost of $671.5 million ($695 million minus $23 million due to differences in the age profile)[3] for health related inflation. In the absence of a New Zealand figure and for consistency reasons, we use the same annual health inflation rate of 3.5 per cent that was applied to the Australian figures above.[4] The 2016 value for direct health costs was estimated to be $825.5 million.
- Again, we account for a rise in prevalence in arthritis between 2010 and 2016, using the same approach as previously. The number of people with arthritis grew by around 72,000, from around 530,000 in 2010 to around 602,000 in 2016.

The estimated health system cost of arthritis in 2016 was calculated at around $937.4 million following these adjustments, a rise of some $266 million (40 per cent). This equates to direct health system costs of around $1,556 per person with arthritis in 2016.

We scale this per person estimate to reflect relativity to chronic pain. The total number of people with chronic pain in New Zealand in 2016 was around 770,000, while the estimated number of people with arthritis was around 602,000. A simple scaling-up of the arthritis-specific numbers by the ratio of chronic pain to arthritis sufferers results in inferred health system costs of chronic pain in 2016 of $1.118 billion.

3.1.5 Indirect costs

The same process was used to approximate indirect costs arising from chronic pain. However, for the purposes of this report, we remove one indirect cost element that was used by Access Economics in its previous work.

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[3] Specifically, a greater number of older people are affected by arthritis than chronic pain, according to available data. The number of people aged 65 and above with arthritis is around 36 per cent greater than that for chronic pain. As a result, we scale down the direct costs of aged care by that factor. This has the effect of reducing the initial health system costs by about $23 million.

[4] Health sector inflation is generally thought to run at about twice the rate of general (consumer price) inflation. The compound average annual rate for the general category of the consumer price index in New Zealand between the last quarter in 2010 and the last quarter in 2016 was 1.1 per cent, suggesting that our adjustment could be on the high side. https://rbnz.govt.nz/monetary-policy/inflation-calculator

Both earlier studies included deadweight costs, also known as the marginal excess burden, associated with the use of the tax and transfer system. While these deadweight costs are pure economic costs and would usually be included in an economic cost-benefit analysis, they are less relevant to a study with a financial cost saving emphasis and therefore we have not included such costs in this analysis. This removes A$2.57 billion from the 2007 study, and NZ$130 million from the 2010 study.

Indirect cost estimate from 2007 impact of chronic pain study

Again, we derive 2016 values by adjusting for inflation and projected prevalence[5]:

- The relevant indirect costs in Australia in 2007 as a result of chronic pain were estimated to be AUD13.269 billion. We adjust this figure for general inflation of 1.75 per cent per annum (i.e. half the health-related inflation rate), to estimate the inflation-adjusted 2016 value of AUD15.511 billion.
- Next we account for estimated changes in the prevalence of chronic pain between 2007 and 2016 by interpolating projected prevalence figures in the Access Economics report. The number of people with chronic pain rises by around 455,000, from almost 3.2 million people in 2007 to just over 3.6 million in 2016.

The relevant indirect cost of chronic pain in 2016 was calculated at AUD17.742 billion following these adjustments, a rise of some AUD4.473 billion (34 per cent). This equates to relevant indirect costs of around AUD4,901 per person with chronic pain in 2016. The vast majority (around 88 per cent) of these costs are productivity-related absences from work or lower performance while at work.

We then convert to New Zealand dollar equivalents and multiply this estimate by the number of people in New Zealand with chronic pain:

- The 2016 per person New Zealand dollar equivalent of AUD4, 901 is $4,248.[6] The adjustment for relative income levels is undertaken as for direct costs, set out above.
- In 2016, there were around 770,000 people in New Zealand with chronic pain. Multiplying that number by the indirect cost per person of $4,248 results in an inferred indirect cost to society of $3.264 billion in 2016.

Indirect cost estimate using 2010 cost of arthritis study

This approach also involves two steps. After adjusting for inflation and prevalence change, we use a simple scale factor to reflect the larger numbers of people who report chronic pain as opposed to arthritis. In addition, we apply a scale factor to reflect the difference in age profile of those with arthritis to those with chronic pain.

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[5] As this section contains values expressed in Australian dollars, we follow Australian National University guidance and use 'A' and 'NZ' prefixes to denote the respective currencies of Australia and New Zealand (https://services.anu.edu.au/marketing-outreach/storytelling-writing/writing-style-guide#M). Elsewhere, where there is no prefix used, the values relate to New Zealand dollars.

[6] World Bank https://en.wikipedia.org/wiki/List_of_countries_by_GDP_(PPP)_per_capita https://stats.oecd.org/index.aspx?datasetcode=sna_table4#

We derive 2016 values by adjusting for inflation and projected prevalence:

- We adjust the amended 2010 indirect cost of $2.142 billion for general inflation. We use the same general inflation rate of 1.75 per cent per annum that was applied to the Australian figures above.[7] The 2016 value for indirect costs was estimated to be $2.374 billion.
- We account for a rise in prevalence in arthritis between 2010 and 2016 using the same approach as previously. The number of people with arthritis grew by around 72,000, from around 530,000 in 2010 to around 602,000 in 2016.

The estimated indirect cost of arthritis in 2016 was calculated at around $2.699 billion following these adjustments, a rise of some $557 million (26 per cent). This equates to indirect costs of around $4,481 per person with arthritis in 2016.

The number of people with chronic pain in New Zealand in 2016 was around 770,000, while the estimated number of people with arthritis was around 602,000. A simple scaling-up of the arthritis-specific numbers by the ratio of chronic pain to arthritis sufferers results in inferred indirect costs of chronic pain in 2016 of $3.220 billion.

3.2 Intangible costs are significant

In this section, we consider the health burden of chronic pain. The Ministry of Health (2013) attributes five per cent of the health burden each year to chronic pain. In 2016, this equates to an estimated total of 54,000 disability adjusted life years (DALYs)[8] from the consequences of chronic pain. This means the burden of chronic pain is similar in size to that of anxiety and depressive disorders.

There is strong support from government officials for all impacts in analyses like these to be monetised (Treasury, 2015), including monetisation of DALYs.

Access Economics monetises the estimated burden of disease using values of AUD162,561 in 2007 and $177,683 in 2010. These values are determined using the concept of the Value of Statistical Life (VoSL), which is the value of life in terms of the amounts that individuals are prepared to pay to reduce risks to their lives. This value can range widely, from $3.9 million to $10.1 million (Access Economics, 2010).

Using this VoSL, the Value of a Life Year (VLY) can be calculated by assuming an average life span and discounting future costs to present values. On this basis, Treasury suggests that

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[7] Health sector inflation is generally thought to run at about twice the rate of general (consumer price) inflation. The compound average annual rate for the general category of the consumer price index in New Zealand between the last quarter in 2010 and the last quarter in 2016 was 1.1 per cent, suggesting that our adjustment could be on the high side. https://rbnz.govt.nz/monetary-policy/inflation-calculator

[8] DALYs represent the disability adjusted life years which are lost from chronic pain, which is similar to the quality adjusted life years (QALYs) that could be gained if chronic pain is avoided. While QALYs and DALYs are separate measures, conceptually they are largely equivalent and for the purposes of this study are interchangeable.

the VoSL in New Zealand is $4.62 million currently.[9] A VLY based on a VoSL of $4.62 million would be around $160,000, which is approximately the same as $177,683 estimated by Access Economics in 2010. We use these two figures as the range for the VLY in our calculations.[10]

3.3 Total costs of chronic pain in 2016 were $13 to 14.8 billion

Total direct and indirect financial costs are between $4.4 billion and $5.3 billion, while the burden of disease costs was $8.6 to 9.6 billion. The total cost is estimated at $13.0 to 14.8 billion, or $17,283 to 19,343 per person with chronic pain, given the number of people with chronic pain is around 770,000 (see Table 8).

These are material numbers and we show them in the context of other studies, on other disease states. New Zealand studies on well-known conditions show the predicted economic costs of:

- musculoskeletal disorders (excluding chronic pain estimates) was $5.6 billion in 2009 (Bossley and Miles, 2009)
- diabetes in 2016/17 was estimated at $1.310 billion (Ministry of Health, 2009)
- dementia was estimated to be $1.7 billion (financial costs) and burden of disease costs of $5.0 billion in 2016 (Deloitte/Access Economics, 2017), and
- tangible costs associated with smoking totalled $2.5 billion in 2014, with burden of disease costs of $3.1 to 11.2 billion (Ministry of Health, 2016).

Table 8 Cost summary, 2016

Type of cost	Total ($m)	Per person ($)
Health system	$1,119–2,002	$1,556–2,606
Indirect	$3,220–3,264	$4,248–4,481
Total financial	*$4,339–5,266*	*$6,037–6,854*[11]
Burden of disease	$8,640–9,595	$11,246–12,489
Total costs including burden of disease	***$12,979–14,861***	***$17,283–19,343***

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[9] Treasury CBAx model, available on their website: http://www.treasury.govt.nz/publications/guidance/planning/costbenefitanalysis/cbax

[10] We note that Treasury also provides a value for a QALY gained of $59,722. In our view, this is too low to be consistent with a VoSL of $4.62 million. This inconsistency is perhaps not surprising given the figures are derived from different sources.

[11] These totals do not sum perfectly from the preceding figures, as they are derived using two different methods and cannot be combined.

3.4 Total costs could rise to $21.2 to 24.3 billion by 2048

A combination of factors suggests the cost of chronic pain in the future will continue to grow:

- The projected number of people with chronic pain in New Zealand will rise from 770,000 in 2016 to around 1.26 million by 2048, just on the basis of population ageing.
- The estimated direct and indirect costs using that figure (without adjusting for inflation) would be $1.830 to 3.274 billion and $5.267 to 5.338 billion respectively.
- The burden of disease costs would be $14.132 to 15.693 billion.

It is clear that chronic pain currently imposes significant costs on society, and that cost is set to grow in future.

4. Delivery of care for patients with chronic pain in NZ

In this section, we consider the extent to which investment in the management of chronic pain would impact the costs associated with chronic pain in New Zealand. While we acknowledge the role played by primary care (and interface between primary care and the secondary/tertiary sector, particularly relating to training) our focus is on potential reductions in the costs associated with chronic pain that could result from a well-functioning multidisciplinary approach to assessment and management of chronic pain. There are loss of patient welfare and wider societal costs in addition to direct health system costs.

We conclude that with an ageing workforce, limited opportunities for trainee numbers, and essentially no prospects for international recruitment, New Zealand is a very long way indeed from achieving recommended numbers of specialist pain medicine physicians.

4.1 Why specialist pain medicine physicians matter

McGhie and Grady (2016) claim that the responsibility for pain management does not rest solely within specialist pain services; the management of pain transcends specialty and location of delivery – every clinician has a responsibility to identify and manage painful symptoms. However, they go on to state that chronic pain is a complex condition in its own right and specialist care must be available when necessary to manage it effectively and safely. An overview of why Specialist Pain Medicine Physicians (SPMPs) are necessary follows.

4.1.1 Specialist pain medicine physicians have in-depth knowledge

As the field of medicine learns more about the complexities of pain, it has become more important to have physicians with specialised knowledge and skills to treat these conditions. An in-depth knowledge of the physiology of pain, the ability to evaluate patients with complicated pain problems, appropriate prescribing of medications to varying pain problems, and skills in psychotherapy as well as in performing procedures (such as nerve blocks, spinal injections and other interventional techniques) are all part of what a SPMP brings to the treatment of chronic pain.

In addition, the broad variety of treatments available to treat pain is growing rapidly and with increasing complexity. With an increasing number of new and complex drugs, techniques, and technologies becoming available every year for the treatment of pain, the SPMP is uniquely trained to use this new knowledge safely and effectively to help his or her patients.[12]

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[12] https://www.asra.com/page/44/the-specialty-of-chronic-pain-management

4.1.2 Specialist pain medicine physicians provide a spectrum of care

The spectrum of care provided by a SPMP includes assessment of complex pain conditions, prescribing medication, co-ordinating rehabilitative services, performing pain relieving procedures, counselling patients and families, directing a multidisciplinary team, co-operating with other healthcare professionals, and liaising with public and private agencies. While there are also other treatment options such as invasive therapies and group programs, these are far less commonplace.

Specialist pain medicine physicians work in the context of a socio-psycho-biomedical framework of assessment and treatment. This recognises that pain is a multi-faceted biological, psychological, and socio-environmental experience. In managing particular patients, the many non-biomedical factors contributing to the suffering of individuals with persistent and complex pain problems must be evaluated, as well as taking account of associated medical conditions. Sociological assessment identifies factors in the patient's environment related to family and other relationships, work, life events, housing, sleep, activity, and nutrition.

Without assessment of factors in addition to purely physical factors, there is a major risk of a potentially inappropriate focus on treatments targeted only on treatment of physical aspects.

4.1.3 Specialist pain medicine physicians use evidence-based best practice care

The comprehensive education and training of SPMPs means that they will be able to pass on to medical, nursing, and allied health professionals in the public and private sectors the knowledge and resources to deliver such care. Education in the biopsychosocial processes underpinning acute and chronic pain will give health professionals an accurate conceptualisation of pain and underpin care (National Pain Summit, 2010).

Moreover, research activities undertaken by SPMPs would contribute to identifying gaps in knowledge and practice. Research into clinical, social, and economic outcomes, and an evaluation focus would follow.

Broadening a multidisciplinary team approach, with greater access to pain clinics, specialists and allied health professionals, and with standardised guidelines to reaffirm judicious prescribing, will support general practitioners in their clinical practice and enhance pain management for patients (Henderson et al, 2013).

There is also the possibility of secondary prevention of chronic pain by better understanding the relationship between acute and chronic pain.

4.1.4 Specialist pain medicine physicians can play a co-ordinating role

Evidence from New Zealand and elsewhere shows that SPMPs take a multidisciplinary team approach to managing patients with chronic pain, facilitating consistent communication between various practitioners involved in patient care. SPMPs play an important role in co-ordinating additional care such as physical therapy, psychological therapy, and rehabilitation programs in order to offer patients a comprehensive treatment plan with a multidisciplinary approach to the treatment of their pain.

In addition, the involvement of those with a medical degree is likely to garner additional trust and confidence from patients/consumers, which would increase the likelihood of adherence to plans and strategies developed for the management of their pain.

SPMPs directly contribute to improved knowledge and understanding of pain to other healthcare professionals, due to increased access to specialists for both managing patients with chronic pain directly and providing advice to ACC or other health practitioners about managing patients with chronic pain.

4.2 A paucity of specialist pain medicine physicians in New Zealand

There are currently 35 active Pain Medicine Fellows in New Zealand (defined as members of the Faculty). A Faculty of Pain Medicine (FPM) survey in April 2016 indicated that there were 11 FTE Specialist Pain Medicine Physicians (SPMPs) nationally. Responses to a recent Fellowship survey (combined Australia and New Zealand data) indicated the average number of clinical pain medicine sessions undertaken each week is six – with around one in three fellows working five to six sessions (38 per cent of respondents) or six to ten sessions (three per cent).

There is a paucity of pain medicine specialists and this situation is likely to worsen due to a growth in need, and likely retirement from the workforce:

- Internationally, the recommended ratio is one pain medicine specialist physician for every 100,000 of population (Association of Anaesthetists of Great Britain and Ireland, 1993). This suggests New Zealand should have approximately 47 FTEs rather than its current 11; a deficit of 36.
- This situation is likely to worsen. The pain medicine workforce in New Zealand is ageing, with approximately 65 per cent of specialists currently aged 50 years and over. This is a much larger proportion than the overall medical workforce in New Zealand, where approximately 40 per cent of doctors are aged 50 years and over (Shipton, 2018). Survey data indicates that approximately 46 per cent of the FPM fellowship plan to retire in the next ten years. If this were to happen, then New Zealand will need to find further FTEs.
- In 2048, the population is projected to be 5.8 million, meaning that to meet recommended international guidelines, 58 FTE pain specialists would be required.

If the current rate of training continues, in 2048 there would be an additional 45 pain medicine specialists. Even if these were all fulltime, there would still be a shortfall given the current pain specialist FTE is about 11 pain medicine specialists. Moreover, the effect of retirement by existing SPMPs would exacerbate the shortfall.

4.2.1 Only four funded trainee positions in Pain Medicine

Training for SPMPs is provided through the Faculty of Pain Medicine (FPM) of the Australian and New Zealand College of Anaesthetists (ANZCA). The Faculty accredits multidisciplinary pain medicine units to provide approved training in the core training stage of the pain medicine training program. Across New Zealand there are currently three accredited training units: The Auckland Regional Pain Service (TARPS), Burwood Hospital, Christchurch, and the Wellington Regional Pain Unit.[13]

Across these units, there are only four funded positions for the two-year pain medicine training program. These positions are mainly funded by district health boards (DHBs). Demand for training positions regularly exceeds supply. Currently, we understand that there are eight active trainees across New Zealand:

- four are currently training in accredited units (Auckland has two, and Wellington and Christchurch one each), and
- four others who have completed training time, but have assessments outstanding (one each in Auckland, New Plymouth, Dunedin and Hamilton).

There is very limited ability to increase New Zealand's pain medicine workforce by recruiting international medical graduates, as there are very few comparable pain medicine training programs internationally.

4.3 Tertiary pain services in New Zealand are under pressure

Tertiary pain services exist to restore functional ability and enable individuals to live as independently as possible despite their pain. Pain management involves learning different ways of thinking and acting so that pain interferes less with life.

A self-management approach requires an individual to play an active role in their pain management and emphasises an improvement in quality of life and function, rather than a cure.

Key objectives of a tertiary pain service include:

- To improve understanding of chronic pain
- To maximise individual functioning and enhance quality of life
- To reduce distress
- To promote self-management to increase personal skills and productive activity
- To reduce reliance on the use of medication and healthcare providers

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[13] FPM by-laws for accredited units require at least two FPM Fellows as part of the fulltime-equivalent staff, which the Wellington unit was unable to meet at the time of the last accreditation visit and as a result accreditation for this unit is effectively suspended. The Wellington unit is unable to advertise for a trainee until it meets the by-law requirements.

Typically tertiary pain services offer a multidisciplinary comprehensive pain assessment (or "triple assessment"), including but not limited to:

- medical assessment by the SPMP
- psychosocial assessment, which explores impact of pain
- physiotherapy assessment, which current abilities and any challenges regarding movement and daily activities

The SPMPs are distributed (by residential address) around the country as follows: Auckland (19), Christchurch (4), Hamilton (3), Dunedin (2), Wellington (2), Cambridge (1), Hastings (1), New Plymouth (1), Tauranga (1), and Timaru (1).

4.3.1 Access to pain management services are by referral

Access to a pain medicine service is by a referral from a general practitioner, consultant or other health professional, or through the acute pain team of a hospital. The management plan made will include the general practitioner. There is usually a waiting time before the pain clinic appointment. Wait times could be between 60 days and six months. All the referrals are prioritised by a triage committee. Based on the triage, they are allocated for either a multidisciplinary assessment or medical only assessment. ACC patients will be referred to a multidisciplinary provider and only on to a tertiary provider, if the case manager approves.

4.3.2 We identified a number of capacity issues in two tertiary pain centres

Issues identified to us by two pain services are as follows, and are likely to be representative of other pain services:

- The Auckland Regional Pain Service (TARPS) services the people of Auckland and beyond. It provides outpatient clinical assessment and management of acute and chronic pain utilising a multidisciplinary approach. TARPS receives approximately 80 referrals each month (around 1000 referrals each year). TARPS has a target to see people within 30 days of referral, but this is often difficult to meet; capacity constraints often mean waiting times of 60 days (the Ministry of Health stipulated that from time of referral to being seen should be less than 120 days, so TARPS are well inside that interval). TARPS waiting times are shorter than most other services, which can be up to six months. TARPS has a pain specialist to population ratio of 1:125,000 (i.e. 4 FTE pain specialists and 4.5 FTE psychologist to the Auckland DHB population of just over 500,000 people). This is the highest pain specialist to population ratio in New Zealand.
- The Burwood Pain Management Centre (PMC) was established in February 1988 and provides a multidisciplinary approach that is tailored to meet the complex needs of individuals with chronic pain. The PMC saw 421 new patients (and 573 follow-up attendances) in the 2017/18 financial year up until May 2018. This translated to 566 new patient appointments and 3,361 follow-up attendances respectively. Historically, around 65 per cent of appropriate referrals were declined due to capacity constraints, suggesting there is significant unmet need due to lack of funding.

4.3.3 Two major implications of being under-capacity; waiting lists and specialist burnout

For patients, a consequence of this shortage will likely be longer waiting times for treatment. This can directly impact on morbidity from the underlying problem. Not being able to access a service is an unmet need and sometimes results in treatment by providers who are not appropriately trained. They can worsen the underlying problem by providing inappropriate advice and non-evidence-based biomedical treatments.

A shortage of specialists would also have significant impact on specialists themselves, resulting in increased work stress and risk of burnout.

4.4 Approximating best practice

Unlike Australia, New Zealand does not currently have a National Pain Strategy. As such, pain medicine services across New Zealand vary, with some being provided privately and others through DHBs.

4.4.1 What can we learn from Australia's approach?

Australia is a world leader in Pain Medicine, which is established as an independent medical specialty, with internationally recognised research and training programs. Australia was the first country in the world to develop a National Pain Strategy which has been a catalyst for major change in the way pain – especially chronic pain – is understood and managed in Australia and the provision of pain services (National Pain Summit, 2010).

The Australian National Pain Strategy, which addresses acute, chronic and cancer-related pain, is the result of collaborative work of health professionals, consumers and funders, who agreed that an integrated approach was needed to improve care for all types of pain. It is recognised that potentially vast gains can be made through prevention, community awareness, early intervention, and better access to pain management services.

What works – key principles

The Australian National Pain strategy identifies the following principles:

- **Knowledgeable, empowered consumers and carers:** There is good evidence, from both within the pain area and outside it, that having consumers, carers, and other supporters armed with knowledge can reduce health care costs and the impact of illness. For example, there is solid evidence that the use of mass media to deliver health messages to the general community works as a preventative health strategy, and can be much more cost effective than strategies that focus on individual patients or health care professionals. The self-management approach encourages patients and their carers or other supporters to take an active part in the management of their conditions.
- **Skilled professionals and evidence-based care:** The following research and experience show that upskilling health professionals improves outcomes:
    - systematic reviews of randomised controlled trials, especially multidisciplinary approaches
    - evidence-based guidelines

  - recent experience with Medicare changes for psychological treatment of depression/anxiety.

- **Multidisciplinary care at all levels:** There is solid evidence of the benefits of multidisciplinary care from experience internationally and in Australia. Controlled trials show that integrated medical, physiotherapy, and psychological interventions using cognitive-behavioural methods can be more effective than usual care in limiting the impact of recent onset back pain, especially in selected cases where psychological and social risk factors are present. Multidisciplinary pain clinics are essential for dealing with more complex and chronic cases for a short period only. Then care should be returned to the local community level (and the individual patient) for maintenance.

5. The reasons for investing in pain medicine training

In this section, we attempt to measure the possible impact on the burden of pain through increasing the number of pain medicine specialists. There are some clear points of reference, however, which we set out before we draw out a number of scenarios. We provide a brief conclusion at the end of this section.

5.1 Possible outcomes and their magnitude

The heterogeneous nature of pain conditions, patient symptoms, and social financial support system makes it difficult to generate comparison groups from which to extrapolate true cost-effectiveness data (McGhie and Grady, 2016). Inputs we have been able to glean from available literature on a "best practice" model of care, such as multidisciplinary pain management and our discussions with experts, are as follows:

- there is strong evidence that intensive multidisciplinary biopsychosocial rehabilitation with functional restoration improves function when compared with outpatient or inpatient non-multidisciplinary rehabilitation (Guzman et al, 2001)
- there is moderate evidence that intensive multidisciplinary biopsychosocial rehabilitation with functional restoration reduces pain when compared with outpatient non-multidisciplinary rehabilitation or usual care (Guzman et al, 2001)
- there is contradictory evidence regarding vocational outcomes of intensive multidisciplinary biopsychosocial rehabilitation (Guzman et al, 2001)
- following completion of comprehensive pain programs, return to work rates were 66 per cent on average, compared to 27 per cent for conventional medical treatments (Gatchel and Okifuji, 2006)
- annual medical costs following a comprehensive pain program are reduced by 68 per cent (Simmons et al, 1988)
- an increase of 65 per cent increase in physical activity following comprehensive pain program treatments, compared to a 35 per cent increase for patients receiving conventional medical care (Gatchel and Okifuji, 2006)
- participants in a comprehensive pain program reduced their opioid use 47 percentage points (from 69 per cent at admission to 22 per cent at one-year follow-up); whereas opioid use for those who never participated in a comprehensive pain program reduced by only 6 percentage points, from 81 per cent on admission to 75 per cent a year later (Tollison et al, 1985)

- a 43 per cent reduction in the number of visits to the Emergency Department (ED) for people in a pain program, reduced suffering, enhanced quality of life, and greater patient satisfaction after five years of a multidisciplinary pain clinic with specialist care in Oregon and Washington, USA (Lau, 2007, cited in National Pain Summit, 2010)[14]
- waiting times reduced and confidence levels for general practitioners managing patients with chronic care rose in Nova Scotia after chronic pain became a priority (Cousins, 2009, cited in National Pain Summit, 2010)
- about six months after participation in a pain management program at Auckland Regional Pain Service:
  - significant reductions in the proportion of people who are depressed
  - a reduction of about 70 per cent in usage of opioids
  - a reduction of around 51 per cent reduction in use of all medications
  - an improvement of around 40 per cent in terms of "work readiness"
- available data from ePPOC on outcomes does not cover a sufficiently long time period for conclusions to be drawn and does not allow comparison to a consistent baseline, but tends to indicate strong gains in terms of opioid use (reduction), reported wellbeing, with ability to work outcomes largely inconclusive. Given changes implemented early in 2018 seeking more detailed information on work capacity, we expect the resulting data will be more insightful in future.

5.1.1 Other corroborating, but weaker evidence

In addition, our interviews with some pain specialists and other interested parties indicated that additional investment would likely lead to:

- more patients being seen, and consequently a reduction in unmet need
- greater possibility of innovative approaches, such as telemedicine training, given there is likely to be more time available to specialists
- reduction in wait times (although not all patients are time sensitive)
- enhanced promotion of the rehab model with consequent reductions in opioid use
- reductions in attendances at ED, for some by a factor of six, and
- training to other doctors and advice to clinicians on patients.

5.2 Health costs are significant if pain management is ineffective

Chronic pain also results in higher use of health care. International evidence demonstrates that patients with pain-related disability reported over twice as many primary care visits, and three times as many hospital admissions and ED visits as those with no pain (Blyth et al,

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[14] Note that following funding cuts, the average waiting time has grown to 100 days from an initial wait time of 14 days.

2003). Chronic pain can incur significant medical costs for patients, from repeated visits to GPs, specialists and allied health professionals, medications, hospitalisations and, in some cases, repeated but ineffective surgery.

Mismanagement of pain conditions and inappropriate prescribing of opioids and other drugs is also a risk. Long-term opioid use is associated with unemployment and/or receipt of government benefit, low income, multiple pain conditions, depression, suicidal ideation, childhood abuse or neglect, and alcohol addiction.

Adverse effects of opioids and other drugs include falls, cognitive impairment, gastrointestinal problems, misuse, addiction, overdose, death, sleep apnoea, and driving impairment (Faculty of Pain Medicine, 2015). Given the increase in recent publicity about the rising opioid issue in Australia and the United States, we take a look at the situation in New Zealand.

5.2.1 Opioid usage in New Zealand is a concern

There are a number of issues associated with the long-term use of opioid analgesics for the treatment of patients with chronic non-cancer pain, including an unproven efficacy for this use, adverse effects, tolerance, aberrant behaviour and addiction (Best Practice Journal, 2014).

It has become widely recognised that non-pharmaceutical pain management approaches (e.g. socio-psycho-biomedical approaches), if applied skilfully, are much safer and more effective for most people.

The combination of the limited number of SPMPs, long waiting times, and challenging travel arrangements to attend pain management clinics may mean that many chronic pain sufferers are unable to access the most effective care.

In Australia, there has been a recent increase in the prescribing of pharmaceutical opioids to chronic non-cancer pain patients, which has led to increasing professional and public concern about the use and harms that may be related to such use. Despite this, there is very little known about the magnitude of risk for adverse events and previous research has been limited.

In New Zealand, the dispensing rate of oxycodone increased by 249 per cent between 2007 and 2011, before slowing in 2012-13 (Ministry of Health, 2014). However, like Australia there is a lack of data in this area and obtaining an accurate estimate of the rate of opioid dependence/addiction in New Zealand is difficult, as there is limited data available. However, data from a number of sources show that the rate of opioid misuse in New Zealand is increasing.

The increase in use and misuse of oxycodone and other strong opioids in New Zealand highlights two main points – firstly, that these medicines should be avoided in patients with chronic non-cancer pain, and secondly, that patients who are taking opioids long-term, with no plan for stopping or controls around dispensing should be re-assessed (Best Practice Journal, 2014).

5.3 Measuring the impact of training is difficult

There is a less than easy step from burden (which is clear), to best management (which is well evidenced), to the impact of training (which is more speculative). We make the following points about the scenarios we posit below:

- Impact measurement is usually done either on a "before and after" or "with and without" basis. That is, impact measurement is relative to some baseline. In the case of prospective assessment the baseline is the status quo, while for retrospective assessments the baseline is what happened prior to the implementation of the proposal being evaluated.
- Our analysis is prospective in nature, and we have to predict the likely effect of reinforcing the existing model of care.

In future, it may be possible to use outcomes data collected by the electronic Persistent Pain Outcomes Collaboration (ePPOC) to determine the extent to which patient outcomes might have changed over time and apply that to the situation in New Zealand in the future. Currently, there is no baseline data against which to compare more recent outcomes. In addition, the collection process took some time to bed down and therefore robust outcomes data only exists for the last two to three years. While these data are informative, they are not sufficient to make a reliable prediction of likely outcomes of a pain medicine investment in New Zealand.

We undertook a range of interviews with experts and sought relevant data from FPM Fellows and trainees to try to estimate the likely impact (reduction in societal costs) of a well-functioning pain medicine service in New Zealand. Again, the available data was either not routinely collected (e.g. work status) or would involve significant time and costs to estimate (the degree of unmet need that could be addressed with better pain medicine services). As a result, we rely on qualitative/descriptive analysis and insights from elsewhere.

What follows are hypothetical scenarios, based on known data and estimates. While we acknowledge that SPMPs generally work as part of multidisciplinary teams, we focus on SPMP training due to their role in the provision of both comprehensive assessment of patient need and the education of other health care professionals.

5.3.1 "Break even" per trainee comes reasonably quickly

In this scenario, we calculate the point at which the training costs for an additional trainee are offset by the predicted benefits associated with chronic pain reduction.

The base for our scenarios is the cost per pain medicine specialist trainee:

- As pain medicine is a post-specialisation qualification, pain medicine trainees are employed at the level of Medical Officer of Special State, in accordance with section 12.4 c of the New Zealand District Health Boards' Senior Medical and Dental Officers Collective Agreement 1 July 2017 to 30 June 2020.
- The base salary scale in the collective agreement is $118,866 to 177,706 per annum (depending on the step the trainee is on in the pay scale). Employee overheads such as

Kiwisaver, ACC levy, Annual Leave, and continuous medical education can add 30 per cent to the DHBs costs.

This means the cost per trainee position is $154,526 to 231,018. We know from the previous section that chronic pain entails costs of $10,235 to 17,918 per person (including the burden of disease wellbeing-based costs). Thus, the "break even" point for the investment in an additional trainee position is equivalent to between nine and 23 patients with chronic pain per year. That is, the annual cost associated with an additional trainee position would be offset by the effective management of pain in the equivalent of nine to 23 patients.

We "back-solve" for the number of patients and the improvement in outcomes:

- We understand an FTE pain specialist would see around 200 new patients with chronic pain per year, at a minimum. The improvement in outcomes (e.g. lower direct health system costs, greater patient wellbeing and quality of life), from treatment would need to be between four per cent and 11 per cent per patient for the costs of training to be offset by benefits to the patient, the health system, and society in general.
- Restricting our attention to direct health sector costs, the cost per person to the health sector of chronic pain is estimated to be $1,556 to 2,606 per year (see Table 8). Given the same training costs per trainee, the annual cost associated with an additional trainee position would be offset by improved outcomes for the equivalent of 89 to 99 patients.
- This 89 to 99 patients represents between 44 per cent and 49 per cent of an existing workload for a pain specialist of 200 patients a year.

This is a very conservative result and does not take into account reductions in indirect cost or improvements in patient wellbeing. We point out the improvement in outcome is likely to be cost-saving rather than needing to pay for wellbeing; the wellbeing comes free.

5.4 Maintaining the existing pain specialist workforce requires an additional 23 trained specialists in the next 15 years

To maintain the existing pain specialist workforce (i.e. replacing those who are due to retire) would require an additional 23 trained specialists in the next 15 years. This assumes there are currently 35 Pain Medicine Fellows and 65 per cent are aged over 50, so would retire within 15 years. At its maximum, the existing training allocation would produce four specialists every two years, meaning that the current training system should produce the required amount of pain specialists in 15 years (up to 30 specialists) to maintain the existing workforce available.

However, progress towards reaching the internationally recommended ratio of one specialist per 100,000 patients would still be slow. For a population of around five million in 2033, approximately 50 FTE SPMPs would be required. The current FTE of around 11 for the 35 existing pain specialists suggests that around 31 per cent of specialists' time is spent on chronic pain management.

Holding that rate of work constant means in 2033, the number of pain specialists would be 42 (around 30 newly trained specialists and around 12 of the current cohort who had not yet retired), which is 37 FTE short of the recommended number. Even if we were to assume all of the newly trained specialists worked fulltime in chronic pain and that there were jobs for them once training was completed, there would still be a shortfall of around 16 FTEs.[15]

5.4.1 Doubling the number of available training positions

This scenario involves increasing the number of training positions from four to eight per year. The calculations are linear, meaning that the calculations in the "break even" scenario for an individual trainee are multiplied by the number of additional trainees. Therefore, improvements of the order of 44 to 49 per cent would be needed to offset the additional costs of training.

5.4.2 Achieving the recommended international ratio of specialists to patient numbers in 15 years requires even more effort

This scenario combines elements from the previous scenarios. With a projected population of five million in 2033, 50 FTE pain specialists would be required to achieve the internationally recognised ratio of 1:100,000. At the existing percentage of time pain medicine specialists dedicate to chronic pain (31 per cent), this would mean the total number of pain specialists required in 2033 is 159. Allowing for retirement, the existing rate of training and the residual FTE from the current cohort of specialists, an additional 117 pain specialists would be needed in 2033.[16] Given the training takes two years, this means that an additional nine trainees per year would be needed.

In this scenario, we have a time constraint that needs to be factored into the calculations; the recommended ratio is to be achieved in 15 years. From the start of the investment, costs will be incurred in the first two years, while training is underway. We have assumed that no offsetting benefits arise in the first two years. This has the effect of raising the "break even" improvement required in each of the remaining 13 years to offset the costs.

In the case of total costs, improvements in patient outcomes of around seven to nine per cent are needed to offset the costs of additional trainees over 15 years. This still seems to be an achievable goal.

When considering only the direct health costs, improvements in the order of 51 to 57 per cent would be needed to offset the costs to the health system of the additional training positions required to achieve the recommended 1:100,000 specialist to patient ratio.

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[15] 30 FTEs from new trainees and a residual of 3.85 FTEs from the existing cohort, means total FTE available in 15 years is 33.85 FTEs.

[16] 159 total pain specialists minus the remaining 12 specialists from the current cohort who have not retired minus 30, the number of specialists that the current training system would produce in 15 years.

5.5 In conclusion

Our work has led to the following findings.

- Chronic pain is a significant and complex condition, highly prevalent in older people, Māori, and those with lower socio-economic status.
- Prevalence will rise in future.
- The pain medicine workforce is currently below recommended numbers given New Zealand's population, and is older than the general healthcare workforce.
- Chronic pain has not been widely studied in New Zealand and there is no relevant pain strategy in place nationally.
- Models of care used overseas (particularly Australia) provide useful insights around a "best practice" model of care.
- Specialist pain medicine physicians play a crucial role in a multidisciplinary approach to assessing and treating patients with chronic pain and in the development of integrated models of care that bridge between primary care and the secondary/tertiary sector.
- Data useful to estimate the costs of chronic pain are limited, but extrapolation of other studies shows that the costs to individuals and society in general are greater than costs associated with diabetes, smoking, dementia, and musculoskeletal disorders.
- The potential exists for investment in pain medicine services using a multidisciplinary approach to reduce the estimated costs of chronic pain. That investment would appear to pay-back reasonably quickly.
- Better data collection by government agencies (e.g. ACC, the Ministry of Social Development, and the Ministry of Health) would complement ePPOC data so that in future, more precise estimates of societal costs of chronic pain will be possible.

Our main conclusion is that chronic pain deserves more consideration and attention due to the substantial costs that it imposes.

Appendix 1 Faculty training description

Eligibility criteria for entering the training program

Fellowship of the Faculty of Pain Medicine is a post-specialisation qualification. This means that to be eligible for the training program, applicants must already hold a primary specialist qualification acceptable to the board of the Faculty of Pain Medicine, or have completed at least three years FTE of training towards a primary specialist qualification acceptable to the board.

Primary specialist qualifications acceptable to the board include:

- Fellowship of the Australian and New Zealand College of Anaesthetists.
- Fellowship of the Royal Australasian College of Physicians, or its Faculty of Occupational and Environmental Medicine, or its Chapter of Addiction Medicine, or its Chapter of Palliative Medicine.
- Fellowship of the Royal Australasian College of Surgeons.
- Fellowship of the Royal Australian and New Zealand College of Psychiatrists.
- Fellowship of the Australasian Faculty of Rehabilitation Medicine (RACP).
- Fellowship of the Royal Australian College of General Practitioners or of the Royal New Zealand College of General Practitioners.
- Fellowship of the Royal Australian and New Zealand College of Obstetricians and Gynaecologists.
- Fellowship of the College of Intensive Care Medicine of Australia and New Zealand.
- Fellowship of the Australian College of Rural and Remote Medicine. Fellowship of the Australasian College of Emergency Medicine.

The board may also recognise, on a case-by-case basis, qualifications not listed above, including international qualifications.

As well as the above requirements, doctors interested in completing the Faculty's training program must first pass the Foundations of Pain Medicine examination (usually held in November and January) and have secured work in a training position at a Faculty-accredited hospital or training site.

Structure of the training program

The training program involves two stages:

The core training stage: this stage is a highly structured 44 week period in a unit accredited for pain medicine training, with a focus on the pain medicine roles in practice of clinician, professional, scholar, communicator, and collaborator. Trainees must spend a minimum of 22 weeks in a level 1 accredited training unit during the core training stage. It is expected that the core training stage be continuous.

The practice development stage: this stage is a 44-week period of approved clinical activity directly relevant to the field of pain medicine. The practice development stage may be completed in a Faculty-accredited training unit, but this is not mandatory.

The training program usually takes a minimum of two years to complete, but trainees have up to a maximum of five years to complete all requirements of the program. Among other requirements, trainees must pass a Fellowship examination (held in November) consisting of written and viva voce stations. The pass rate for the examination is approximately 75 to 80 per cent annually, and trainees have up to five attempts to pass the examination.

Recognition of prior experience (RPE) may be granted, up to a maximum of six months, as credit towards the Practice Development Stage of training in pain medicine. Such experience must be directly relevant to pain medicine. Any RPE will be provisional and contingent upon satisfactory performance during the Core Training Stage.

How the Faculty supports trainees

The Faculty supports trainees by:

- Providing Basic and Advanced Clinical Skills courses for trainees in the core training stage, covering topics such as communication, patient assessment and case formulation, and facilitating patient self-management.
- Offering a mentoring facility for trainees and newly graduated specialists.
- Providing a suite of online learning resources covering essential topic areas from the curriculum, including:
  - neuropathic and related pain
  - acute pain
  - spinal pain
  - problematic substance abuse
  - visceral pain
  - pain related to cancer
  - head and orofacial pain, and
  - complex regional pain syndrome.
  - chronic widespread pain

  The interactive online learning modules are accompanied by case studies, quizzes, reading lists and facilitated discussion forums.

The curriculum and further information about the Faculty's training program is available here: http://fpm.anzca.edu.au/training/2015-training-program.html

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