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*a retrospective descriptive analysis of Accident Compensation Corporation-funded low back pain healthcare service usage*

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# New Zealanders with low back pain seeking health care: a retrospective descriptive analysis of Accident Compensation Corporation-funded low back pain healthcare service usage

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## ABSTRACT

**Introduction.** Most New Zealanders experience low back pain (LBP) at least once throughout their lifetime and many seek help from the large range of health providers in primary care. Accident Compensation Corporation (ACC) funds a significant proportion of those claims, but which services are they funding and what are the costs? **Method.** This was a retrospective audit and descriptive analysis of ACC-funded, non-public hospital healthcare service use by people with LBP in New Zealand (NZ). Outcome measures were the healthcare services accessed by people with ACC-funded LBP, the claims (all occurrences for a service that has generated a payment/year), single contact (with a service), and costs (NZ\$) for services between 2009 and 2020. **Results.** The number of claims for services were 129 000 for physiotherapy, 105 000 for general practitioner and 59 000 for radiology services. Per single contact, elective surgery and radiology services were the most expensive. During 2009–2020, there were 3.3 million ACC claims for LBP with a total cost of NZ\$4 billion. Over this time, there was an increase in claims, costs and single contacts. Costs decreased slightly during 2010 due to changes in healthcare funding and in 2020 due to the COVID-19 pandemic. **Discussion.** Consumers have considerable choice in where they access health care for ACC-funded LBP services. This study shows the services they use most frequently and the cost to NZ for those services. These data can inform service planning for ACC-funded LBP health care in NZ.

**Keywords:** ACC, claims, costs, disability, general practitioner, healthcare services, low back pain, physiotherapy.

## Introduction

Low back pain (LBP) is considered a global health concern,<sup>1</sup> it is the leading cause of disability worldwide and affects more than 560 million people annually.<sup>2</sup> In New Zealand (NZ), LBP is the largest cause of disability, affecting most New Zealanders in their lifetime.<sup>3</sup> Most acute episodes of LBP will recover quickly,<sup>4</sup> however, recurrence is common<sup>4–6</sup> and the condition can become chronic, contributing to the large cost of LBP health care.<sup>7,8</sup> The estimated overall cost of LBP in NZ in 2015 was almost NZ\$3 billion,<sup>7</sup> with healthcare services accounting for NZ\$325 million. The remaining amount comprised indirect costs such as disability payments and decreased work productivity.<sup>7,9</sup> More recent figures (2021–2022)<sup>10</sup> indicate the health care portion has increased to over NZ\$500 million. The direct health care costs in NZ are funded by several sources (Fig. 1).

This study will focus on the ACC-funded direct healthcare costs of LBP in NZ (see Fig. 1, shaded area). ACC is a no-fault accidental injury compensation scheme unique to NZ. If an injury occurs due to an accident, ACC may provide compensation for time off work and healthcare service usage (direct healthcare) costs. These equated to an estimated NZ\$110 million for LBP in 2015.<sup>7,11</sup> In NZ, the first healthcare contact for a person with LBP is a primary healthcare provider. This could be a general practitioner (GP), a physiotherapist or any healthcare professional registered to accept a direct referral.<sup>12,13</sup> This means in NZ the GP is frequently not involved in the management of LBP.<sup>14</sup> This is in

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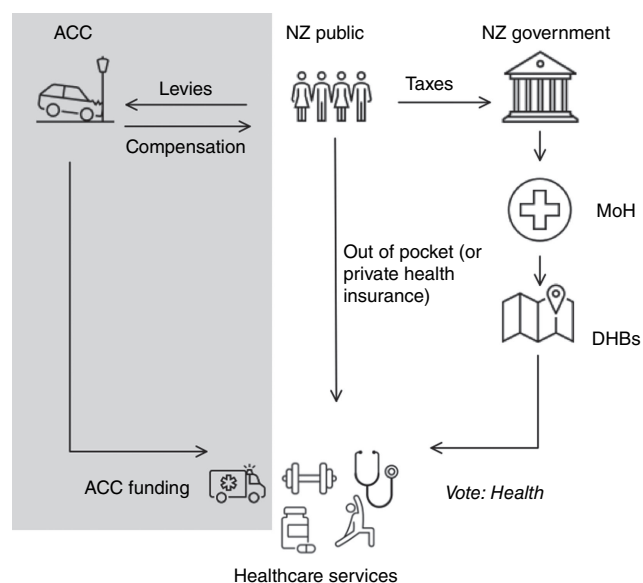
**What is already known:** Over 50% of people with LBP seek care.<sup>15</sup> There is a global rise in LBP disability, often with inappropriate and unnecessary use of healthcare resources.<sup>16</sup>

**What this study adds:** In NZ, there are many services available for people with LBP and this study reports on the most used services and the associated costs for ACC-funded LBP health care.

contrast to most developed countries, where the most used healthcare provider for LBP is the GP.<sup>17</sup> This study adds to a recent publication of GP service costs from July 2013 to the end of 2020 for people with LBP in NZ.<sup>18</sup> The unique healthcare funding model and range of primary healthcare providers means NZ's pattern of healthcare usage may differ from other countries.

The research questions are:

1. to determine the most frequently used ACC-funded healthcare services by people with LBP in NZ
2. to explore trends over time and the associated costs. Data from 2009 to 2020 were included; this is a similar period to those used in other LBP studies which have been able to identify trends over time.<sup>19–22</sup>



**Fig. 1.** Simplified representation of the New Zealand health system until 2022. Note: NZ, New Zealand; ACC, Accident Compensation Corporation; MoH, Ministry of Health; DHBs, District Health Boards. Arrows represent the flow of money/management (for example, the NZ public pays taxes to the NZ Government, which funds and oversees the MoH). Adapted from Gauld.<sup>53</sup> \*Te Whatu Ora weaves the functions of the 20 former DHBs into regional divisions and district offices allowing national planning to improve continuity of healthcare delivery.

## Methods

This was a retrospective audit and descriptive analysis of ACC-funded, non-public hospital healthcare service use by people with LBP in NZ. ACC retains data from individual claims including the type of injury, the individual healthcare service used and associated costs.<sup>23</sup> The data are de-identified,<sup>24</sup> so neither ethical approval nor informed consent from participants was required for this study. Data were requested directly from ACC in accordance with the Official Information Act (1982), which allows individuals or body corporates to request information held by NZ government agencies.<sup>25</sup> The team agreed on data to capture musculo-skeletal LBP and selected READ codes to reflect this. Conditions omitted were those primarily involving bony injury (traumatic fractures), neurological damage (spinal cord injury) and dermatological injury (bites and burns). See Supplementary Table S1 for the list of included READ codes. Information requested included healthcare services used (by single contact, claim and cost) from 2009 to 2021. Data from 2021 were incomplete and therefore omitted from the analysis. We have used the terms 'claims' and 'single contacts' to measure healthcare service use; the difference between them is outlined in Table 1.

After initial data exploration, the decision was made to analyse the five most used individual healthcare services, the two services which are most costly per single contact, and the two services which focus on improving quality of life and return to work. The five most used services were physiotherapy, acupuncture, osteopathy, GP and chiropractic. Radiology and surgery had the highest cost per single contact.<sup>26,27</sup> Pain management and return to work services were chosen as they have been shown to have a large impact on the quality of life for people with LBP.<sup>28,29</sup> Data for the selected healthcare services were extracted from the overall data and similar services were combined. For example, 'physiotherapist,' 'physiotherapy services' and 'endorsed physio' were originally reported as distinct services in the data but were combined as 'Physiotherapy' for the analysis. See Table S2 for a complete list of combined terms for healthcare service descriptions.

Descriptive analysis of the healthcare services was undertaken. Trends were considered from 2009 to 2020 and an analysis of the most recent full year of data (2020) was completed. Graphs were plotted in R (The R Foundation for Statistical Computing, v4.1.0) using package ggplot2 (version 3.3.3). Inflation from each year to the subsequent year was calculated using the Reserve Bank of New Zealand inflation calculator.

Ethics approval and consent to participate were not applicable to this study.

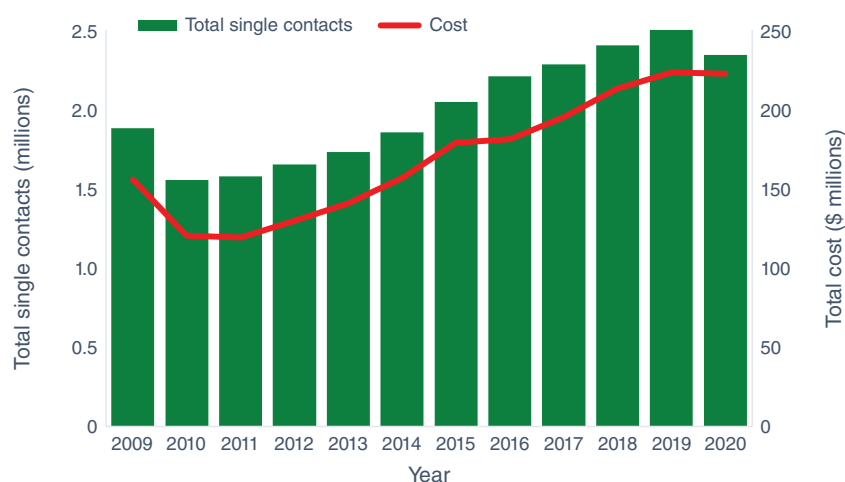
## Results

From January 2009 to the end of December 2020, there were 3.3 million ACC-funded LBP claims (this number

**Table 1.** Definitions used in this study.

Term	Definition
Claims	An ACC claim for injury can cover multiple years. A claim which lasts longer than 1 year is counted as 'active' once for each year covered. For example, a claim which lasted from 2017 to 2020 would be counted a total of four times, once for each year.
Single contacts <sup>A</sup>	The number of occurrences for each service type. A client may receive multiple service types, such as radiology or physiotherapy and receive multiple sessions of one service type. Therefore, five physiotherapy sessions = five single contacts or one claim.
Costs <sup>A</sup>	These are exclusive of GST and based on payment date. Payment date may be different to the date of service. All costs in this study refer to New Zealand dollars (NZ\$) and have been inflation-adjusted to 2020.
Low back pain (LBP)	When the injury site on the ACC45 form is equal to lower back/spine as defined in READ codes.

<sup>A</sup>In-text, rounded to the nearest hundred thousand.

**Fig. 2.** Total ACC-funded LBP single contacts and costs, 2009–2020.

included claims spanning multiple years; eg an active claim from 2013 to 2017 would be classed as five claims, one for each year; see Table 1) with an approximate cost of NZ \$4 billion. Fig. 2 shows the total single contacts and costs for ACC-funded LBP health care during that period. In the most recent year of collected data (2020), there were 304 000 claims, 2.35 million single contacts and a cost of NZ\$223 million for ACC-funded LBP healthcare services. When weekly compensation is included, annual costs are NZ\$467 million.

Figs 3, 4 and 5 show the trends in costs, single contacts and claims from 2009 to 2020 for the healthcare services of interest. Between 2009 and 2020, there was an increase in single contacts and total claims (Figs 4 and 5). For the single contacts data, the three most frequently used services in 2020 were physiotherapy (633 000), chiropractic (306 000) and acupuncture services (222 000) (Fig. 4). In 2020, the top three services by claims were physiotherapy (129 000), GP (105 000) and radiology services (59 000) (Fig. 5). Fig. 6 shows the proportion of healthcare service with respect to all claims. The costliest services in annual total cost were elective surgery (NZ\$38.2 million), physiotherapy (NZ \$29 million) and radiology (NZ\$24.5 million) (Fig. 3). Per claim, elective surgery, acupuncture and radiology services were the most expensive (Table 2), and per single contact,

elective surgery and radiology were the most expensive. Each healthcare service claim can be made up of several parts. However, these cannot be extracted from the ACC data (detailed data in Tables S3–S6).

As shown by the trends in Figs 3, 4 and 5, most services had increased costs, single contacts and claims from 2009 to 2020. The largest growth over this period was seen in acupuncture (claims and costs increased by 157 and 98%, respectively). Pain management had a large increase in costs (claims decreased by 46% but costs increased by 79%).

Claims and costs decreased in 2010 for included healthcare services; total claims reduced by 12% and costs decreased by 19%. Physiotherapy experienced the largest changes (claims decreased by 17% and costs decreased by 42%). Notably, acupuncture did not experience a decrease in 2010 (claims and costs increased by 11 and 0.3%, respectively).

In 2020 (during COVID-19 pandemic), there was a large decrease in both claims and costs for most healthcare services. The largest decreases were for return to work (claims decreased by 22% and costs decreased by 21%) and acupuncture (claims decreased by 8% and costs decreased by 19%). In contrast, surgery had fewer claims but an increase in costs (claims decreased by 2% but costs increased by 15%) and radiology had a small increase in claims (<1%) and costs increased by 6%.

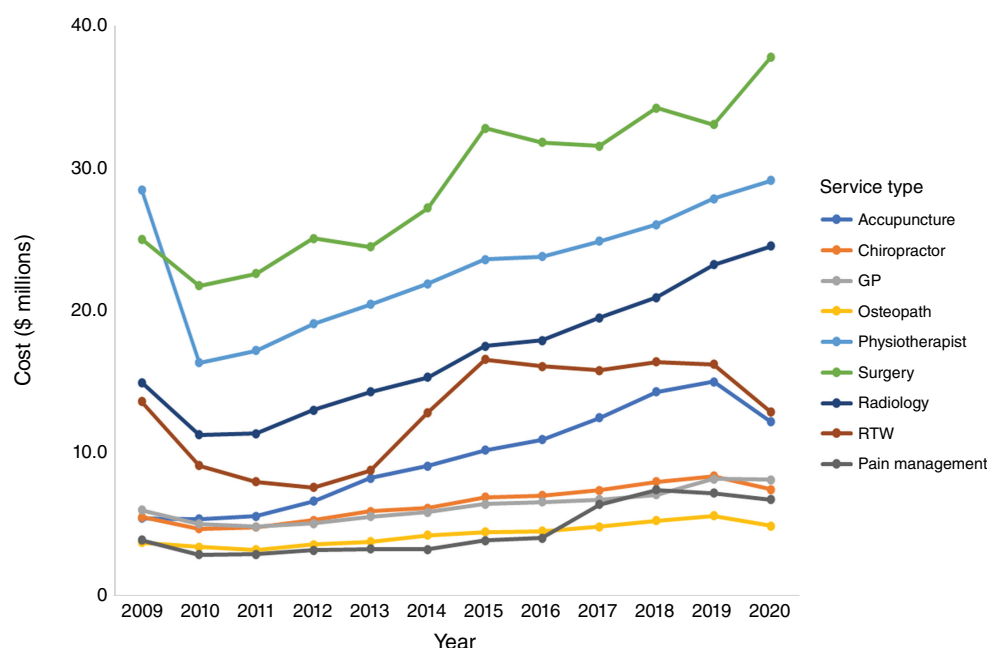


Fig. 3. ACC-funded LBP costs by healthcare service, 2009–2020.

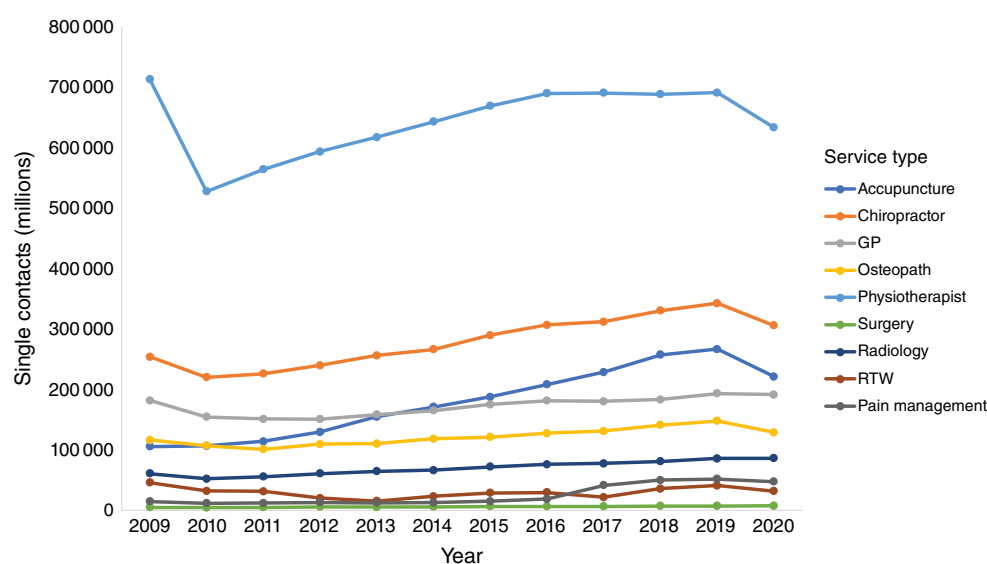


Fig. 4. ACC-funded LBP single contacts by healthcare service, 2009–2020.

## Discussion

There were 3.3 million ACC claims for LBP between 2009 and 2020 at a total cost of NZ\$4 billion. Claims, costs and single contacts increased during this time. The choice of services selected for analysis in this study reflects the need to reduce these costs. In this study we looked at highly used services, high-cost services and services that affect quality of life, which is an important factor affecting recovery from LBP. Elective surgery and radiology services were the most expensive per single contact. Physiotherapy, general practice

and radiology were the services with the highest number of claims. This has some similarity to findings from an international systematic review and meta-analysis,<sup>14</sup> which indicated that GPs were the most frequently used service internationally. Higher physiotherapy than GP claims can be explained by the direct access agreement unique to NZ, which means patients do not require a GP referral to access physiotherapy.<sup>12–14,30</sup> Physiotherapy, general practice and radiology have the highest claims (Fig. 5), whereas physiotherapy, chiropractic services and acupuncture have the highest single contacts (Fig. 4), which can be explained by

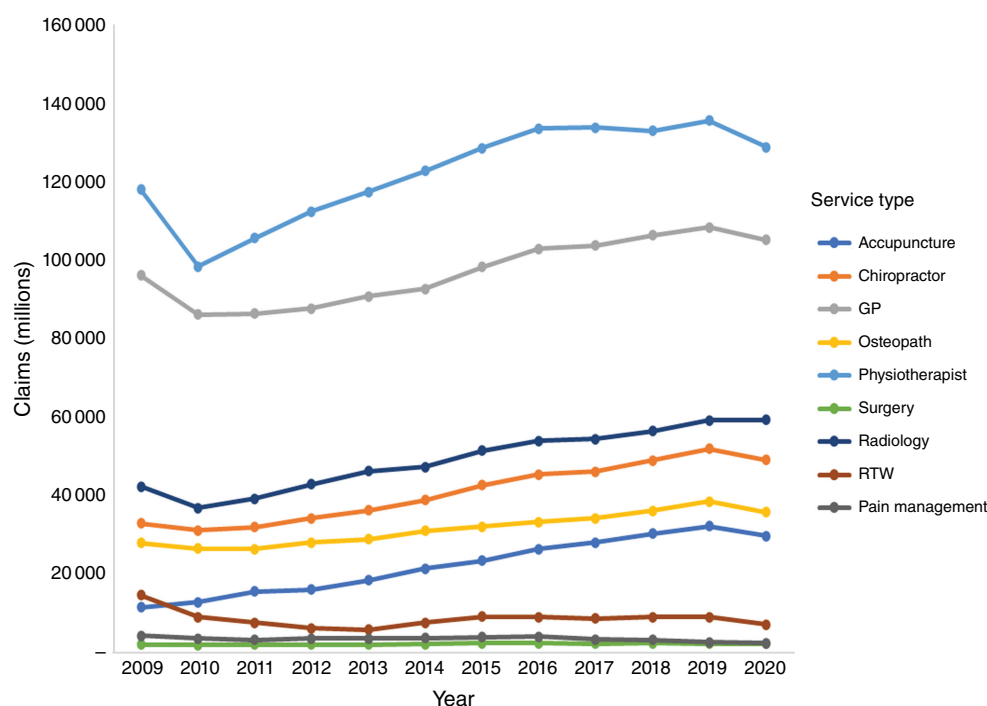


Fig. 5. ACC-funded LBP claims by healthcare service, 2009–2020.

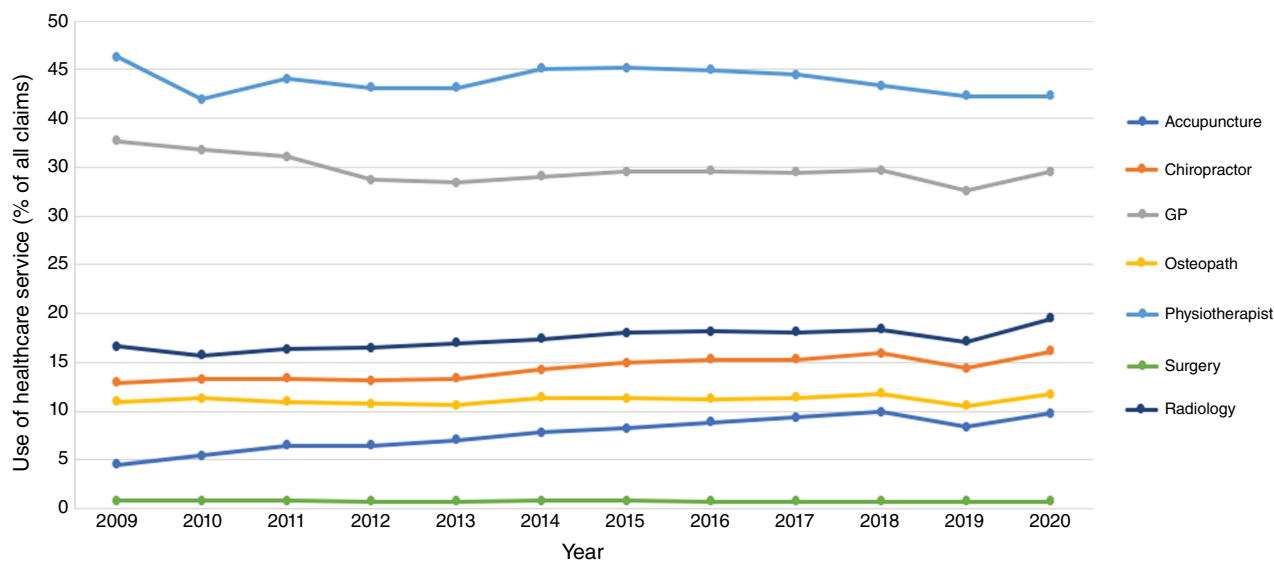


Fig. 6. Proportion (%) of healthcare service with respect to all claims, 2009–2020.

the ongoing nature of their services. It would be useful in future research to request data that include new claims lodged by healthcare service, to track the trends over time of the choice of first point of care.

In the period from 2009 to 2020, there was a 23% increase in the total number of ACC-funded LBP claims and a 52% increase in costs. From 2009 to 2010, there was a decrease in costs, then from 2010 to 2020 there was a 70% increase in costs. In the most recent year of data

(2020), the ACC-funded healthcare service costs of LBP were approximately NZ\$223 million. When weekly compensation is included, costs were almost NZ\$466 million. Many other studies have considered the costs of LBP for ACC.<sup>3,7,18,31–34</sup> Our study is the only one to consider LBP over this time-frame and to include a range of healthcare providers. However, the heterogeneity in LBP diagnosis, definitions and types of costs makes it difficult to compare the results to this study.<sup>7,35</sup> The most recent and comprehensive



**Table 2.** Costs per claim and single contact for LBP healthcare services (average of costs for 2009–2020).

Service	Cost per claim (NZ\$)	Cost per single contact (NZ\$)
Elective surgery	13 465	4472
Acupuncture	431	53
Radiology	340	238
Physiotherapy	188	36
Chiropractice	158	23
Osteopathy	135	35
GP	64	36

research, published in 2015 by the National Health Committee, estimated that LBP direct healthcare costs ACC NZ\$110 million annually.<sup>7</sup> The economic effect related to LBP is comparable to other prevalent high-cost conditions, such as cardiovascular disease and cancer.<sup>1</sup> The current study, using data directly from ACC, found ACC-funded LBP healthcare service costs were NZ\$223 million annually. Even in 2015, actual costs derived from raw data were NZ \$179 million, much higher than the National Health Committee's estimation of \$110 million.

Two of the key findings from the current study were the high use and associated cost of radiology, and the high cost of surgery. The consensus from recent clinical practice guidelines and literature is that radiology should be used prudently and is recommended only in the case of suspected serious pathology.<sup>27,36</sup> However, significant gaps exist between guideline recommendations and implementation to practice.<sup>26,37</sup> Several systematic reviews and meta-analyses have concluded that radiology is used frequently<sup>26,37</sup> and often inappropriately,<sup>38</sup> resulting in higher medical costs.<sup>39,40</sup> In the current study, radiology made up a large proportion of total costs (17%) and was the third most frequently used service in terms of claims. This raises the question of whether NZ is following international trends. In a systematic review by Downie *et al.*<sup>38</sup> approximately 25% of patients with LBP received imaging. However, this review included LBP from accidental and non-accidental causes. A review by Foster *et al.*<sup>36</sup> showed significantly higher rates of between 40 and 50%, which also included LBP of accidental and non-accidental origin. Our data showed that around 20% of patients with ACC-funded LBP received imaging, but as this is related only to LBP from accidental causes it is hard to draw firm comparisons. The international consensus, however, is that there is inappropriate overuse of radiology for LBP. Similarly, it is widely regarded that surgical management of LBP is expensive<sup>41–43</sup> and should only be considered in select cases and following failed conservative management.<sup>27</sup> The current study found that surgery was the costliest service overall (NZ\$38.2 million in 2020) and in cost per claim (NZ\$13 378), whereas all other services

cost markedly less per claim ( $\leq$  NZ\$500). The high cost of surgery per claim is not surprising given the resources required for such procedures. The actual number of surgical claims is low (see Table S5 for the number of claims by healthcare service and Table S3 for cost by healthcare service). This demonstrates a large contribution to total costs. These findings fit with the expectation of judicious consideration by health practitioners for surgical intervention.

In 2009, ACC experienced large increases in total costs (57% increase from 2006) and an annual deficit of NZ \$4.8 billion.<sup>44,45</sup> In response, the government directed ACC to contain costs through altering levies and introducing cost-saving initiatives such as new client co-payments for physiotherapy services.<sup>46,47</sup> These changes seemed to be successful, as the data indicate that medical treatment costs were 11% less in 2010–11 than 2009–10 and NZ\$95 million (16%) less than budgeted.<sup>44</sup> These changes seem to have influenced LBP-specific claims and costs as shown in the trend from 2009 to 2010 in Figs 3, 4 and 5. From 2009 to 2010, overall LBP claims and costs decreased by 12 and 19%, respectively. This reduction was largest for physiotherapy (LBP claims decreased by 17%, single contacts decreased by 26% and costs decreased by 42%). These results reflect the costs to ACC. The decrease in claims and single contacts could be explained by the introduction of co-payments and could help explain the 19% reduction in costs. However, there was a significant reduction in the use of ACC-funded physiotherapy by people with LBP. The data collected in this study do not enable us to capture those who sought privately funded treatment.

In 2020, there was a decrease in the use of most healthcare services for LBP. The trends observed in Fig. 2 for LBP are similar to trends in ACC claims for all injuries, which reduced by 8%.<sup>48</sup> This is due to the extraordinary impact of the COVID-19 pandemic, which first reached NZ on 28 February 2020 and resulted in multiple restrictions to activities outside the home. Healthcare provision was greatly affected, non-essential procedures were reprioritised, and many services were unable to occur in person and were cancelled or completed via telehealth.<sup>48,49</sup> During the period of highest restrictions, ACC claims reduced by ~50%.<sup>48</sup> Telehealth was an effective substitute for traditional healthcare<sup>50,51</sup> and may have prevented the number of ACC claims from decreasing even further.<sup>48</sup> Overall, our findings are similar to trends observed internationally.<sup>52–54</sup> A study from the USA found that the use of conservative treatments for chronic LBP such as acupuncture, exercise and massage therapy reduced due to COVID-19.<sup>54</sup>

Despite decreases in claims for LBP and other injuries over the period of the pandemic, ACC costs for both experienced a minor increase.<sup>48</sup> This finding may be explained by ACC clients accessing fewer low-cost primary care services (physiotherapy and osteopathy) due to COVID-19 restrictions.<sup>48,55</sup> Changes in operational approaches and the costs



of goods and services<sup>48</sup> may have contributed to increased costs for essential services such as surgery (reflected by a 15% increase in LBP surgical costs during 2020).

A key strength of this study was that the data were obtained directly from ACC, so they were comprehensive, recent and accurate. Limitations include difficulties with the datasets, as shown in Table S7; obtaining data from ACC was an iterative process, as not all the information of interest was included in the initial dataset. Another limitation was the data itself; within the ACC datasets, there was 'undefined' healthcare service usage (>17 000 claims and >NZ\$240 million), which was omitted from all our analyses. We also did not request information on new claims by year, which would have added additional useful information. The healthcare services are unknown for these claims and could have been included if they had been correctly reported. A further limitation is that acute public hospital services, for example ACC-funded surgery, are bulk funded by ACC and therefore not included in these data.

The results of this study do not represent LBP in NZ overall, as only ACC-funded LBP healthcare service costs and usage were included. However, the costs covered by ACC are estimated to constitute approximately one-third of overall direct LBP healthcare costs, so they represent a significant proportion of the funding<sup>7</sup> (Fig. 1). The next step in our research plan is to investigate government and privately funded healthcare usage and costs for LBP. We are also unable to capture the many indirect costs, including the personal and societal burden of LBP. These non-healthcare-related costs are also important to consider and account for an estimated NZ\$2.6 billion in NZ LBP expenditure annually.<sup>7</sup>

The de-identified data used do not allow us to distinguish those who have multiple claims and for whom LBP is a recurrent disabling condition. They also do not allow us to identify who refers patients for radiology or the reasons why. The relatively low number of single contacts and claims for pain and return to work services seem to be at odds with the growing level of chronic disability from LBP as reported in the Global Burden of Disease Study.<sup>56</sup> The prevalence of LBP continues to climb but services which have been shown to improve quality of life appear to be under-utilised.

The cost of ACC-funded LBP healthcare services in NZ continues to increase despite ongoing attempts to reduce prevalence and the cost of managing symptoms. The large number of services available gives consumers a wide choice, and this study defines where people seek ACC-funded health care for LBP and the cost to the country of this care. This research shows that not all healthcare services are delivering services consistent with evidence-based practice guidelines. For example, the high number of radiology referrals does not appear to conform to best practice guidelines. The reasons services are used in direct contradiction to best practice guidelines warrants closer scrutiny.

## Supplementary material

Supplementary material is available [online](#).

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**Data availability.** The data that support this study were obtained from ACC by permission/licence. Data will be shared upon reasonable request to the corresponding author with permission from ACC.

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