Whakarongorau abdominal pain review

Matt Wright, Fiona Pienaar

ABSTRACT

AIMS: The purpose of this study was to compare the frequency and profile of abdominal pain calls to Healthline with that from other national healthcare providers; to evaluate the outcomes for this symptom against international telehealth providers; and to explore any inter-clinician variation in the response to abdominal pain that could be part of a quality improvement cycle.

METHODS: Data routinely collected about abdominal pain calls to Healthline from 2017 to 2019 were extracted, analysed, and compared to the literature, hospital, and ambulance data and international telehealth providers. A specialist group was convened to review the profile of Healthline callers and outcome data. Variation in outcome changes and acuity grouping was evaluated at an individual level.

RESULTS: Approximately 50,000 abdominal pain calls to Healthline over three years were analysed, with three-quarters from women, mostly of childbearing age. The majority call afterhours, with NZ European and, to a lesser extent, Māori, and callers from smaller geographical areas are over-represented. One quarter of patients had a hospital outcome (including 4% receiving an ambulance), which was found to be less acute than comparable health systems. Whakarongorau’s Clinical Governance Committee and the Specialist Group both supported the relative distribution of outcomes given by Healthline for abdominal pain. There was found to be variation in the outcomes given to abdominal pain callers at an individual clinician level. This was both in their changes to the disposition given by the Odyssey decision support tool and in their overall outcome distribution.

CONCLUSION: Healthline should be considered a key part of New Zealand’s healthcare system, as illustrated by the volume of calls that it receives and the fact that presentation types are similar to general practice and emergency departments. Given that abdominal pain is a difficult symptom to accurately address without in-person examination and investigation, the findings support Healthline’s outcomes as appropriate with hospitalisation rates lower than comparable healthcare systems. Whakarongorau’s (the organisation which runs Healthline) ability to identify individual clinician behaviours gives it a unique opportunity to improve care through decreasing variation.

Abdominal pain is a common emergency department (ED) and primary care presentation, and is recognised as one of the most common reasons for a New Zealander to require services from any healthcare organisation. Abdominal pain is a challenging symptom due to the large number of possible causes.

Healthline is a 24-hour phone line service provided by Whakarongorau Aotearoa to enable all New Zealanders access to free healthcare advice from registered nurses or paramedics, with some medical support. Healthline is delivered as part of New Zealand’s National Telehealth Services (NTS), alongside other phone triage lines/services such as GP (general practitioner) Out of Hours service, Ambulance secondary triage and PlunketLine. As with most other services, abdominal pain is the number one presenting symptom to Healthline with over 5% of all calls to the service being focused on this issue. On average, there are 4,300 calls per quarter (around 44 per day) with this symptom. Nurses and paramedics triage utilising “Odyssey”, an internationally validated clinical decision support tool.

The Odyssey decision support tool offers up to 20 questions to be answered for each presenting issue. Questions are prioritised by urgency and the combined response of the answers then provides an outcome. The Odyssey triaging tool for abdominal pain includes the standard SOCRATES questions on pain, associated symptoms, any indication of an injury or toxin causing the pain, relevant past medical history, and medications. Of note, the abdominal pain question set did not screen for psychological conditions causing or contributing to this symptoms presentation when it was first reviewed.

At the end of the consult, the nurse or paramedic can accept the outcome from Odyssey or change it, upgrading to a heightened acuity or downgrading to a less acute outcome, and if the latter, they record the reason. Clinicians are encouraged to use their experience to change the disposition in some situations if the patient’s history suggests they need a different outcome, but to use the outcome recommended by Odyssey most of the time. Based on the timeframe identified that the patient be seen in (e.g., within six hours), the clinician then works with the patient on deciding which facility they should present to, and their mode of transport.

The purpose of this study was to compare the frequency and profile of abdominal pain calls to Healthline with that from other national healthcare providers; to evaluate the outcomes for this
symptom against international telehealth providers; and to explore any inter-clinician variation in the response to abdominal pain that could be part of a quality improvement cycle.

**Methods**

We reviewed all consecutive calls from 2017 to 2019 that were one of 33 different patient phrases that trigger a triage of abdominal pain. We identified demographics of callers, the time and day of the calls and the clinicians involved, as well as the outcome that each caller was given. We specifically identified whether the final disposition was changed from the initial disposition given by the decision support tool, Odyssey. Although the triage lines consist of Healthline, GP Out of Hours, Plunketline and Ambulance secondary triage, only Healthline calls were examined for the purposes of this study.

We also identified the patients who called frequently with abdominal pain, and their profile and pattern of utilisation of Healthline for abdominal pain. We requested data from a national emergency department and from similar international telehealth providers, to understand their call flows and outcomes for abdominal pain.

Synergia, a Healthcare consulting company, completed a literature review of telehealth for abdominal pain.

Oversight of this project was provided by the Whakarongorau Clinical Governance Committee (CGC), and a specialist group with representatives from gastroenterology, general surgery, emergency medicine, gynaecology, psychiatry, and paediatrics.

It is noted that the time period of this work was before the first and subsequent COVID-19 outbreaks in New Zealand, so the results and discussion are most relevant to the work done before 2020.

**Results**

**Demographics, frequency and timing of calls**

Abdominal pain is the most common primary symptom to Healthline and accounted for 5.1% of the 1,000,000 calls to this triage line from November 2017 to 2019. There tends to be no seasonal variation for abdominal pain, being a common symptom over the entire year.

Almost three quarters of patients calling Healthline with abdominal pain were aged between 13 and 64, the majority (75%) were female and in the child-bearing age bracket.

Compared with all symptoms, abdominal pain callers are more likely to be NZ European (10% greater) or Māori (2% greater). NZ European made up 60%; Māori 20%; Pacific peoples 6%; and 4% were of Asian descent (the four main ethnic groups).

Only 25% of abdominal pain calls are during normal business hours, with the remainder after 5pm on weekdays and over weekends (so-called “after hours”).

Those with abdominal pain who were calling from less populated geographical areas seemed to be over-represented in Healthline calls, with seven of the nine highest proportion of calls about abdominal pain being from those living in small to medium sized DHBs. There was no ability to easily understand whether callers from these DHBs lived in the cities or the more semi-urban and rural areas.

There were 274 patients who called with abdominal pain more than three times—for a total of 1,297 calls. In one particular month, 83 (35%) of these patients called, accounting for 25% of all abdominal pain calls in that time period. Thirty-nine percent of these patients that frequently called about abdominal pain were 20–29 years of age, with a further 16% being 30–39 and 8% for each of the age brackets 13–19 and 40–44, combining to give a total of 71% in the 13–44 age bracket. The proportion in this age distribution for frequent callers was similar for all callers with abdominal pain, again with a female predominance.

Similar data to that which is available at Whakarongorau Aotearoa (demographics, presenting complaint and outcome) were available from one New Zealand hospital. This was used as a proxy for emergency department use by patients with abdominal pain, noting that populations in the DHBs in New Zealand use emergency departments in different ways and so robust conclusions cannot be drawn.

For this hospital, those presenting to the emergency department with abdominal pain had a similar female predominance, of which the majority were of childbearing age and, if anything, a little younger than those calling Healthline. However, for this hospital, there was also a higher elderly cohort presenting with abdominal pain than ring Healthline.

Those presenting to this ED with abdominal pain were more likely to be Māori or Pasifika, especially if they were of childbearing age. The majority were triage 3 and the rest triage 4, and only one third had a length of stay less than six hours. Forty-one percent were admitted for 24 hours or longer, as
Figure 1: Abdominal pain calls by broad age brackets; % of total over three years.

Figure 2: Abdominal pain callers compared to all symptoms, by ethnicity (2018 and 2019).
were the older patients, where the outcome was more likely admission—true of four out of five over 80-year-olds. Interestingly, specifically for females 18–45, abdominal pain presentations to this ED increased by 30% per year over a similar three-year period.

Outcomes

Over the three-year period before COVID-19, Healthline triaged 4% of abdominal pain to receive an ambulance, 20% were directed to the ED (via their own transport) and 30% were advised of an outcome of either an urgent care clinic (UCC) or GP on call (GPOC). This combines to give a total emergency department (Ambulance and ED) outcome of 24% and a total urgent outcome (addition of UCC/GPOC) as 54%.

At the other end of acuity scale, 32% of callers with abdominal pain were given the outcome of GP, and a further 9% were advised to self-care. This meant that the primary care percentage (urgent care and GP) was 62%, and the non-urgent percentage was 41%.

Half of those over 85 received an ambulance, and half of the elderly (over 65) were directed to the ED. In contrast, less than 15% of patients with abdominal pain who were under the age of six received this advice. There was little difference between the proportion of ED outcome for patients in the two young and middle age brackets, 13–29 (30%) and 30–54 (35%).

Whakarongorau has a close relationship with the ambulance service and a data sharing agreement in place. This allows understanding of further information for those that receive an ambulance through Healthline. Abdominal pain calls transferred to St John Ambulance across New Zealand are mostly requested as Orange (urgent care and GP) was 62%, and the non-urgent percentage was 41%.

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International comparison

During 2019, one of Whakarongorau’s clinical leads met virtually with various international providers, to understand their call flows and compare their approaches to abdominal pain. It was found that Australia, Wales and Canada all had very similar patient demographics to Healthline for those calling with this symptom, and all also had a nurse-led triage service, supported by a (different) decision support tool. Scotland and England; however, used medical practitioners to deal with undifferentiated abdominal pain (i.e., not obvious urinary tract infection or gastroenteritis), due to the varying descriptions on presentation, and the potential significant conditions which cause it. Therefore, these NHS providers are felt to be less comparable for abdominal pain, but overall outcomes are still comparable for all triages.

In 2019, 24% of Whakarongorau Aotearoa service users presenting with abdominal pain were referred to the ED, compared to 31–39% for Australia, Wales and Canada. The two NHS services (Scotland and England) had <5% ED use, primarily because, as described above, they use GPs to assess most people calling with this complaint.

Canada had 20% more calls with abdominal pain having an ED disposition than its average. Australia had 16% more ED use for those calling with abdominal pain, while Wales and New Zealand’s Healthline had a smaller increase of 8%. The NHS lines for England and Scotland decreased the number sent to ED by 17% and 7%, respectively, by using the model of GP-led triage for this symptom.

Clinicians

There were 121 individual clinicians who each took more than 100 abdominal pain calls over the time period examined. Their call outcomes were grouped into three acuity bands: “emergency care” refers to ambulance and emergency department outcomes; “urgent care” is urgent care clinic and GP On Call outcomes; and “routine care” is GP, self-care, and information outcomes. The descriptive statistics for these clinicians are shown for each acuity band in Table 2.

For all acuity bands, there was significant variation at the maximum and minimum levels, with specific individual clinicians having both very high, and very low, proportions in each of the three bands. The majority of clinicians had outcomes for abdominal pain in the following order: routine care (43%), urgent care (30%) and emergency care (27%).

There were 18 clinicians who had emergency care outcome proportions more than one standard deviation from the mean, and eight of these were greater than two standard deviations.

For these latter individuals, they sent an ambulance or directed the patient to self-transport to the ED over two thirds of the time. In comparison there were six clinicians who only sent one in fourteen callers with abdominal pain to hospital, and there were no clinicians less than one standard deviation from the mean in this acuity
**Table 1:** National emergency department and international telehealth providers data, comparing population treated and outcomes given for abdominal pain.

<table>
<thead>
<tr>
<th>Country (Area)</th>
<th>NZ</th>
<th>Australia</th>
<th>Wales</th>
<th>Scotland</th>
<th>England</th>
<th>Canada</th>
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<tr>
<td>Outcomes overall</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>ED</td>
<td>16</td>
<td>23</td>
<td>22</td>
<td>12</td>
<td>22</td>
<td>19</td>
</tr>
<tr>
<td>Primary care</td>
<td>63</td>
<td>51</td>
<td>26</td>
<td>38</td>
<td>56</td>
<td>35</td>
</tr>
<tr>
<td>Self-care</td>
<td>20</td>
<td>15</td>
<td>9</td>
<td>48</td>
<td>4</td>
<td>46</td>
</tr>
<tr>
<td>Total</td>
<td>99</td>
<td>89</td>
<td>57</td>
<td>98</td>
<td>82</td>
<td>100</td>
</tr>
<tr>
<td>Abdominal pain</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ED</td>
<td>24</td>
<td>39</td>
<td>31</td>
<td>5</td>
<td>5</td>
<td>39</td>
</tr>
<tr>
<td>Primary care</td>
<td>67</td>
<td>53</td>
<td>45</td>
<td>40</td>
<td>94</td>
<td>41</td>
</tr>
<tr>
<td>Self-care</td>
<td>9</td>
<td>6</td>
<td>10</td>
<td>50</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>98</td>
<td>86</td>
<td>95</td>
<td>100</td>
<td>90</td>
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<tr>
<td>Difference between abdominal pain and overall</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ED</td>
<td>8</td>
<td>16</td>
<td>9</td>
<td>-7</td>
<td>-17</td>
<td>20</td>
</tr>
<tr>
<td>Primary care</td>
<td>4</td>
<td>2</td>
<td>19</td>
<td>2</td>
<td>38</td>
<td>6</td>
</tr>
<tr>
<td>Self-care</td>
<td>-11</td>
<td>-9</td>
<td>1</td>
<td>2</td>
<td>-3</td>
<td>-36</td>
</tr>
</tbody>
</table>

**Table 2:** Maximum, minimum, average and interquartile range.

<table>
<thead>
<tr>
<th></th>
<th>Emergency care</th>
<th>Urgent care</th>
<th>Routine care</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum</td>
<td>86%</td>
<td>65%</td>
<td>86%</td>
</tr>
<tr>
<td>Upper quartile</td>
<td>35%</td>
<td>40%</td>
<td>56%</td>
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<tr>
<td>Average</td>
<td>27%</td>
<td>30%</td>
<td>43%</td>
</tr>
<tr>
<td>Lower quartile</td>
<td>12%</td>
<td>20%</td>
<td>29%</td>
</tr>
<tr>
<td>Minimum</td>
<td>2%</td>
<td>1%</td>
<td>5%</td>
</tr>
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</table>

**Table 3:** Clinician outcome proportion deviations.

<table>
<thead>
<tr>
<th></th>
<th>Emergency</th>
<th>Urgent</th>
<th>Routine</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 SDs above</td>
<td>8</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>1 SD above</td>
<td>10</td>
<td>18</td>
<td>16</td>
</tr>
<tr>
<td>Between 1 SD either side</td>
<td>97</td>
<td>77</td>
<td>80</td>
</tr>
<tr>
<td>1 SD below</td>
<td>6</td>
<td>22</td>
<td>20</td>
</tr>
<tr>
<td>2 SDs below</td>
<td>0</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>
The majority (80%) of clinicians were within one standard deviation of the mean in the emergency outcome group.

There were around 20 clinicians who both advised a routine outcome more and less frequently, statistically, than the mean (greater than one standard deviation different), with only two thirds of the clinicians within one standard deviation above. Five clinicians were two standard deviations different in the proportion of routine care they advised.

Individual clinicians were also evaluated on how frequently they upgraded (increased the acuity) or downgraded (decreased the acuity). The descriptors for upgrades and downgrades for abdominal pain by individual clinicians are shown in Table 4.

Around one in six abdominal pain questions have their acuity heightened (an upgrade) with only 4% “downgraded” to a less acute outcome. In total around one in five outcomes from the decision support tool, Odyssey, are changed.

However, there are individuals who both upgrade and downgrade far more than the average, four times and eight times at maximum, respectively.

There were 14 clinicians who had upgrade proportions more than one standard deviation from the mean, and three of these were greater than two standard deviations. For these latter individuals they upgraded over 40% of the time. In comparison there were eleven clinicians who infrequently upgraded—less than one in twenty-five callers with abdominal pain.

There were 18 clinicians who had a downgrade proportion more than one standard deviation from the mean, and four of these more than two standard deviations. This meant that for this latter group, one in four calls were downgraded.

There were no clinicians more than two standard deviations below the mean for either their upgrade or downgrade proportions. Seventy-two percent and 80%, respectively, of clinicians were similar to the mean for upgrades and downgrades.

It is known from previous work that, in relation to upgrades and downgrades for abdominal pain, those patients that are upgraded to ambulance are 8% more likely to be transported, those that are upgraded to ED are 20% more likely to be admitted, and those that are downgraded to self-care and GP are 5% more likely not to present anywhere within the next week. Hence, changes often result in more consistent outcomes.

**Discussion**

Healthline’s callers with abdominal pain were found to be similar to in-person provision at EDs, where patients with abdominal pain was found...
to be a frequent presentation, as is found in primary care. The profile of the patient calling most often with abdominal pain—a young to middle aged female, is also similar to that presenting to the ED. It would make sense that calls would more commonly be from women given the prevalence of gynaecology conditions that cause abdominal pain and the potential underlying social factors, which might mean that a free phone call is easier than a trip to the hospital or GP, less time consuming than the former and cheaper than the latter. The time-of-day analysis supports this—with most calls coming afterhours, and from patients based in less populated regions, where there may also be distance barriers to accessing traditional in-person care. Healthline’s free service and large volume of calls seems to be increasing access to healthcare for New Zealanders.

The literature review reminds us that a lot of abdominal pain has a psychological component, and that a patient’s presentation of depression or anxiety can be recurrent abdominal pain. There were less than 300 individuals calling Healthline who fell into this category but, even so, in some months that contributed to a large proportion of the total abdominal pain calls. Recognising this and leveraging the fact that Whakarongorau has a mental health and addiction arm to the organisation, there has been an additional question set added in Odyssey to screen frequent callers for depression and anxiety. The patient management system flags if someone has called multiple times over three or more months, and prompts the clinician to screen them, and provide feedback to the GP if the screen is positive.

Despite the wide range in causes of abdominal pain, the majority of callers do not receive an ambulance nor are directed to hospital. Just under half of all abdominal pain callers to Healthline are reassured they do not need to see a doctor that day—the literature would support this, confirming that most abdominal pain is benign. The specialist group recognised that for abdominal pain it can be difficult, even in person, to identify pathological causes, let alone in a phone consult (without an examination). The formation of the group helped Whakarongorau in two ways; by using the specialists experience to optimise the abdominal pain question set and also giving them an understanding of how Healthline works to take back to their own organisations.

The cautious approach that Healthline takes for abdominal pain, in that there is a higher ED use than for general symptoms, is felt to be appropriate. When Healthline is examined against comparable healthcare systems which also have abdominal pain as their most common symptom to be triaged, less patients in New Zealand are sent to ED than those countries with similar workflows. The specialists supported that Healthline has less hospital outcomes than these other countries because it mitigates risk by increasing the outcome of semi-urgent primary care.

The nurses and paramedics on Healthline come from a wide range of backgrounds and experience, and many will not have dealt with a lot of abdominal pain in their previous roles, nor had to be the decision-making clinician for patients with this complaint. Therefore, it is not surprising that many naturally err on the side of caution, sending more to hospital than is considered normal. These risk adverse nurses and paramedics often add to this by upgrading more frequently and seldom downgrading. However, this review found that there were a few clinicians who are more confident in their triage and have a distribution of outcomes that are “higher risk”, both offering less ambulances and ED attendances, and also having more “self-care” than routine GP. The calls from these clinicians have been listened to, and their proportion of outcomes monitored over time, as these are the individuals most likely to have a worrying outcome.

Because the data at Whakarongorau are at clinician level and organised by team, there is a natural structure to disseminate information for quality improvement. The team leaders will be supported to evaluate and coach those in their team who are markedly different from the average, so that this information is given in a constructive manner, as it is recognised that poor feedback can cause more harm than good.

Conclusion

This article supports the notion that Healthline is a significant contributor to the healthcare system, with ~50,000 abdominal pain calls fielded from 2017–2019, which is only 5% of the total volume of the service. The types of patients calling can be similar to those presenting to any general practice or ED, but without the luxury of examination, observation time and investigations. Despite these barriers, the New Zealand specialists (who frequently deal with abdominal pain) supported the distribution of outcomes given to patients by Whakarongorau over that from the countries that have
the most similar call flows, Australia and Canada.

Through these findings and actions, Whakarongorau is hopefully demonstrating that it is investing in clinical excellence and in identifying and reducing variation in a structured way. Abdominal pain is the place where this has started, but this approach can readily be applied to all other common symptoms and the findings for abdominal pain are likely to positively influence outcomes for all presenting complaints.

With abdominal pain being such a frequent complaint, optimising the care of this is likely to have a substantial benefit for the New Zealand healthcare system.
COMPETING INTERESTS
Nil.

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