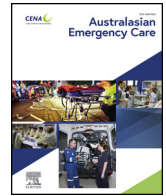




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Research paper

Effect of COVID-19 on management of patients with low back pain in the emergency department



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ABSTRACT

Background: Patients presenting to Emergency Department (ED) with non-specific low back pain can receive more unnecessary, intensive and costly care than is recommended. The COVID-19 pandemic has provided an unprecedented opportunity to examine how health systems prioritise necessary care that provides clear benefits to patients. The purpose of this study was to examine the impact of COVID-19 on care of low back pain in the ED.

Methods: We performed a retrospective analysis of electronic medical record data on care for low back pain from three public hospitals in Sydney. We included patients diagnosed with spinal conditions who presented between March and May in 2019 and in 2020. Outcomes were the total number of patients presenting with spinal conditions to ED, the proportion diagnosed with non-specific low back pain, and the proportion receiving potentially unnecessary aspects of care (ambulance use, imaging, opioids, hospital admissions). We calculated relative risk with 95% CIs and examined plots with locally weighted smoothed curves.

Results: Presentations for spinal conditions over a three-month period to three EDs reduced from 694 in 2019 to 475 in 2020 (31% reduction, 95% CI = 26%–37%). The proportion of patients diagnosed with non-specific low back pain (83% in 2019 vs 86% in 2020), or receiving potentially unnecessary care were similar in 2019 and 2020 (Imaging = 25% vs 25%; Opioids = 54% vs 56%; Admitted = 18% vs 20%; pathology test = 24% vs 23%). The proportion of patients arriving by ambulance was higher during the pandemic; 29% in 2019 vs 41% in 2020 (RR = 1.39, 95% CI = 1.19–1.63).

Conclusions: ED presentations for low back pain associated with spinal conditions decreased substantially during the COVID-19 pandemic. Use of potentially unnecessary aspects of care did not change or increased during the pandemic.

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Background

COVID-19 has had a significant impact on non-COVID related health services. It has been suggested that since the pandemic started, millions have missed out on appropriate treatment for health problems such as cancer, cardiovascular disease and diabetes [1]. A recent study conducted in Veteran Affairs hospitals in the US found that the number of patients admitted to hospital for urgent conditions such as stroke, COPD, and heart failure reduced by over 40% early in the COVID-19 pandemic [2]. A recent

systematic review found that during COVID-19 healthcare utilisation around the world reduced by one third, but a higher reduction was seen in patients with non-urgent problems [3].

Non-urgent problems such as low back pain associated with common spinal conditions are frequent reasons for visiting an Emergency Department (ED) in Australia. There were 120,219 back pain presentations out of 8,017,492 total presentations (1.5%) to Australian EDs in 2017/2018 [4]. Patients who present to ED with common spinal conditions such as non-specific low back pain receive more unnecessary, intensive and costly care than is typically recommended by clinical guidelines [5,6]. For example one recent study found 1 in 3 received imaging, 2 in 3 received opioid(s) and 1 in 5 were admitted to hospital [7]. For many patients who attend ED this care is unnecessary: it provides little benefit to patients or the harms tend to outweigh the benefits. There is

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evidence that patterns of unnecessary care such as imaging and prescription of opioids may be unchanged or worsening over time [8–10].

The COVID-19 pandemic has provided an unprecedented opportunity to examine how health systems prioritise necessary care that provides clear benefits to patients [11]. At the same time, health systems and individuals facing the threat of COVID-19 could find themselves avoiding care unless it was absolutely necessary. In the systematic review by Moynihan and colleagues, diagnostics reduced by 31% during the pandemic, with large reduction seen in people with milder or less severe condition [3].

An evaluation of the care provided for low back pain during the pandemic could provide insights into how avoidable some of this care might be. In Milan from March 8, 2020 to April 8, 2020 there was an 87% reduction in patients presenting with acute low back pain to hospitals compared to the same period in 2019 [12]. Interestingly, the proportion of people presenting with serious spinal conditions (e.g. cancer, fracture or infection) remained similar in both years, suggesting that the pandemic discouraged ED attendance irrespective of the seriousness of the underlying condition. More recently Finland saw a 31% reduction in back and limb pain presentations during the pandemic [13]. However, it was unclear whether the patterns of care for those conditions had changed.

There is little data available on factors that influence the patterns of care provided in hospital EDs for low back pain. During the pandemic, the capacity to provide services such as hospital admission and imaging may have decreased because of new hospital policies and procedures. Administration of strong opioids – although discouraged for low back pain – may have increased due to pressure to discharge patients to reduce their risk of contagion and the potential for opioids to serve as a tool to manage patient flow [14]. Conversely, a reduction in patient load during lockdown may have given staff more capacity to adhere to clinical guidelines.

The aims of this study were to:

- 1 Describe the impact of COVID-19 on presentations for low back pain to Australian public hospital Emergency Departments.
- 2 Describe the impact of COVID-19 on the patterns of care provided for low back pain (e.g. ambulance care, medicine administration, diagnostic imaging, any pathology test, and hospital admissions).

Methods

We performed a retrospective analysis of routinely collected electronic medical record data from three major metropolitan hospitals within the Sydney Local Health District, New South Wales: Royal Prince Alfred, Concord Repatriation General and Canterbury Hospitals. There are more than 200 hospitals that provide care for the 8 million inhabitants of New South Wales. Royal Prince Alfred Hospital has approximately 700 beds and is the largest hospital in the Sydney Local Health District, Concord hospital has 500 beds, and Canterbury hospital has 217 beds. Throughout the pandemic all three hospitals have provided care for patients with COVID-19. We included patients diagnosed with spinal conditions in the three hospitals from March–May 2019 and March–May 2020. We extracted data from the Sydney Local Health District Targeted Activity and Reporting System (STARS). [15] STARS is a data analytics program that tracks hospital service use and clinician performance [16]. We extracted the following data on people presenting with spinal conditions using STARS for periods before and during the COVID-19 pandemic: (i) demographic information (eg age, gender, postcode), (ii) ED presentation month and year (2019–2020), (iii) mode of arrival, (iv) number admitted, (v) imaging referrals, (vi) pain medicine administered, (vii) discharge diagnosis, (viii) any pathology test, (ix) triage categories. We

reported the study in accordance with the STROBE checklist. [17] Ethics was approved by the Sydney Local Health District, Research Ethics and Governance Office, Royal Prince Alfred Hospital zone (Protocol number: X17-0419 & LNR/17/RPAH/631).

Patient and public involvement

Patients or the public were not involved in the design, or conduct, or reporting, or dissemination plans of our research.

Outcomes

Key outcomes were the total number of patients presenting with spinal conditions to ED, the proportion of patients diagnosed with serious spinal pathology, non-specific low back pain, and radicular low back pain; and the proportion of patients receiving key aspects of care in the ED. Key aspects of care included the proportion of patients who: arrived by ambulance, were administered an opioid medicine, received imaging, were admitted to hospital; or received any pathology test. We recorded opioid administration as ‘weak’ (eg, tramadol, codeine, and paracetamol-codeine) or ‘strong’ (eg, oxycodone, morphine, buprenorphine, fentanyl, hydromorphone, oxycodone plus naloxone, and tapentadol) [18]. We also recorded the number and proportion of patients who received any imaging, simple radiographs, CT or MRI. We collected data from 1st March to 31st May 2020 because this was the period when COVID-19 peaked in Sydney and most major COVID related events occurred (Fig. 1). For comparison we examined the same period from 2019.

Analysis

We described trends in the number, type, clinical and demographic characteristics of patients presenting with spinal conditions to ED (i.e. with discharge diagnosis of non-specific low back pain, radicular low back pain, or serious spinal pathology) during a period of the COVID-19 pandemic (March–May 2020), compared with the same period in 2019. We computed mean (SD) where appropriate for continuous variables. Categorical variables are presented as frequency (%). We calculated the relative risk of receiving each type of care i.e. arrive by ambulance, admission to hospital, receive any imaging, receive any opioid, any pathology test) in 2019 vs 2020 and associated 95% confidence intervals.

We presented total weekly presentations, and care outcomes as plots with smoothed curves produced with a locally weighted smoothing (LOESS) using R [19]. We used the LOESS curves to visualise the data and compare the total weekly presentations, the proportion diagnosed with non-specific low back pain, and the proportion receiving any imaging, being admitted to hospital, receiving opioids, any pathology test or arriving by ambulance in 2019 vs 2020 (Fig. 2).

Results

There were 694 and 475 presentations for low back pain associated with spinal conditions to the three EDs over a 3-month period in 2019 and 2020, respectively (31% reduction, 95% CI = 26%–37%). The mean age of patients was 51 years in 2019 and 52 years in 2020. Gender distribution was similar in both years (female = 52% in 2019 and 51% in 2020). The majority of the patients were from higher socio-economic status in both years (60% in 2019 and 70% in 2020 were in the top quartile) (Table 1).

In both years the number of people in urgent triage categories (1 and 2) was similar (Table 1). The vast majority of patients had a discharge diagnosis of non-specific low back pain (83% in 2019 and 86% in 2020, RR = 1.03, 95% CI = 0.98–1.08) (Table 2 and Fig. 2). A small

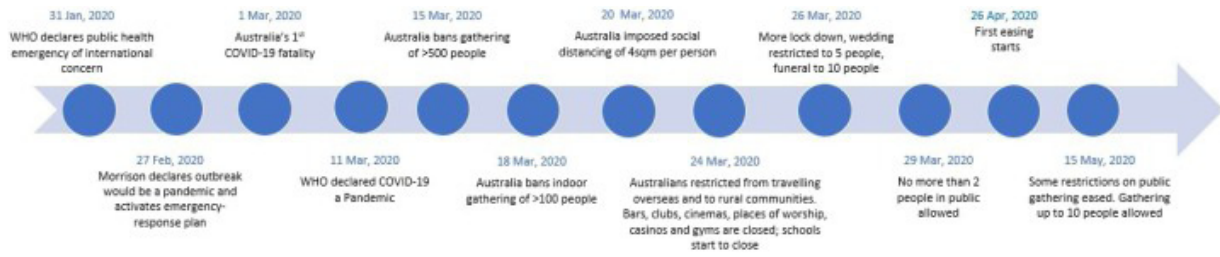


Fig. 1. COVID-19 related events in Australia. Following the announcement by the WHO on 11 March declaring COVID-19 a global pandemic, Australia began imposing restrictions such as limiting the number of people gathering indoors and outdoors and social distancing of 4 sqm per person. Restrictions started to ease in the last week of April.

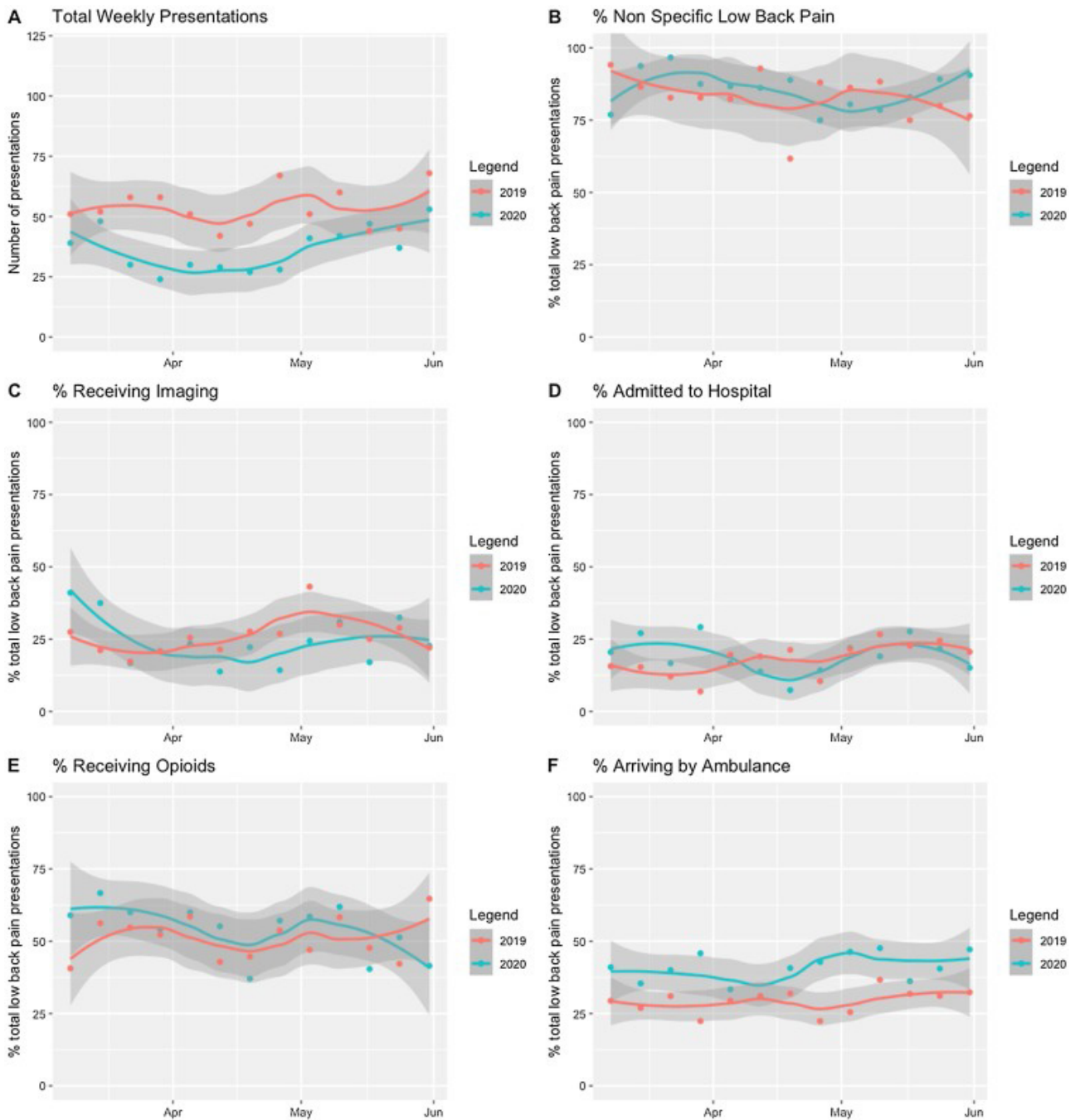


Fig. 2. Emergency department presentations and care for people with spinal conditions in 2019 vs 2020. (A) the total weekly number of patients with spinal conditions, (B) proportion of patients diagnosed with non-specific low back pain, (C) proportion of patients receiving imaging, (D) proportion of patients admitted, (E) proportion of patients receiving opioids, (F) proportion of patients arriving by ambulance. The dots represent the weekly data and curves represent smoothed trends over time using a LOESS function.

Table 1
Patient characteristics.

	2019 (n = 694)	2020 (n = 475)
Age, mean (SD)	50.9 (20.8)	51.9 (19.4)
Gender, female n (%)	362 (52.2)	244 (51.4)
Socioeconomic status (quartiles 1–4, 1 denotes higher SES) ^a		
1	416 (59.9)	333 (70.1)
2	97 (14.0)	66 (13.9)
3	124 (17.9)	52 (10.9)
4	20 (2.9)	6 (1.3)
Triage category, n (%) ^b		
2	13 (1.9)	12 (2.5)
3	292 (42.1)	218 (45.9)
4	375 (54.0)	240 (50.5)
5	14 (2.0)	5 (1.1)
Discharge Diagnosis, n (%)		
Serious spinal pathology	29 (4.2)	28 (5.9)
Non-specific LBP	576 (83.0)	407 (85.7)
Radicular pain	89 (12.8)	40 (8.4)

^a Socioeconomic status was derived from the patient's postcode from the Australian Bureau of Statistic's Socio-Economic Indexes for Areas 2016 and reported as quartiles, with the highest quartile designating areas with the highest socioeconomic advantage.

^b Australasian Triage Scale, where 1 = life threatening conditions, 2 = emergency cases, 3 = urgent cases, 4 = semi-urgent cases, 5 = less urgent cases.

Table 2
Care received in ED.

	2019 (n = 694)	2020 (n = 475)
Mode of arrival, n (%)		
Ambulance	203 (29.3)	194 (40.8)
Self-presented	490 (70.6)	280 (58.9)
Number admitted, n (%)	124 (17.9)	94 (19.8)
Lumbar imaging referrals, n (%)		
Simple radiograph (Xray)	137 (19.7)	86 (18.1)
MRI	9 (1.3)	6 (1.3)
CT	64 (9.2)	45 (9.5)
Any imaging	179 (25.8)	120 (25.3)
Pain medicine administered, n (%)		
Simple analgesics (eg paracetamol)	339 (55.1) ^a	278 (58.5)
NSAIDs	290 (47.2)	228 (48.0)
Weak opioids (eg Tramadol, codeine)	51 (8.3)	41 (8.6)
Strong opioids (eg Oxycodone, morphine)	282 (45.9)	237 (49.8)
Any opioids	331 (53.8)	268 (56.4)
Muscle relaxants	8 (1.3)	11 (2.3)
Benzodiazepines	30 (4.9)	23 (4.8)
Antiepileptics	36 (5.9)	27 (5.7)
Antidepressants	12 (2.0)	12 (2.5)
Corticosteroids	12 (2.0)	13 (2.7)
Other	5 (0.8)	5 (1.1)
Laboratory tests referral, n (%)		
Any pathology test	163 (23.5)	107 (22.5)

^a Denominator for pain medication data in 2019 period was 615.

proportion had a discharge diagnosis of serious spinal pathology (4% in 2019 vs 6% in 2020). The proportion presenting with radicular low back pain was 13% in 2019 vs 8% in 2020. See appendix Table 1 for weekly data.

Table 2 and Fig. 2 (Panels C–F) show the care provided for low back pain in the same three month period in 2019 and 2020. The proportion of patients who were administered any opioid medicine was similar in both years (54% in 2019 vs 56% in 2020). A small proportion received weak opioids (8% in 2019 vs 9% in 2020). A substantially larger proportion received a “strong” opioid and proportions were similar in both years (46% in 2019 vs 50% in 2020). The proportion of patients receiving any lumbar imaging was identical in both years: 25% of patients received lumbar imaging. The proportion of patients receiving simple radiographs, MRI and CT were similar in 2019 compared with 2020 (Simple radiographs =

Table 3
Differences in care in 2019 vs 2020.

	2019 (n = 694)	2020 (n = 475)	2019 vs 2020 Relative Risk (95% CI)
Arrive by ambulance	203/694 (29.3)	194/475 (40.8)	1.39 (1.19–1.63)
Admission	124/694 (17.9)	94/475 (19.8)	1.10 (0.87–1.40)
Any Imaging	176/694 (25.4)	120/475 (25.3)	0.99 (0.81–1.21)
Any Opioid	331/615 (53.8)	268/475 (56.4)	1.04 (0.94–1.16)
Any pathology test	163/694 (23.5%)	107/475 (22.5%)	0.96 (0.77–1.19)

20% in 2019 vs 18% in 2020; MRI = 1% in 2019 vs 1% in 2020; and CT = 9% in 2019 vs 10% in 2020). The proportion of patients being admitted was 18% in 2019 and 20% in 2020. The proportion of patients receiving any pathology test was 24% in 2019 and 23% in 2020.

The proportion of patients arriving by ambulance was 39% higher in 2020 compared with 2019 (Relative Risk = 1.39, 95% CI = 1.19–1.63). There was no difference in the proportion of patients being admitted, receiving imaging or receiving an opioid in 2019 compared to 2020 (RR for admission = 1.10, 95% CI = 0.87–1.40); RR for imaging = 0.99, 95% CI = 0.81–1.2; RR for opioid = 1.04, 95% CI = 0.94–1.16) (Table 3 and Fig. 2).

Discussion

Main findings

Between March to May 2020 the COVID-19 pandemic in Australia appeared to cause fewer patients with non-serious spinal conditions to present to the Emergency Department. Aspects of care which could be avoidable did not appear to decrease (imaging, opioids, any pathology test and hospital admissions), or increased (arriving by ambulance) during the pandemic. The COVID-19 pandemic and associated lockdown did not appear to affect the number of people with low back pain presenting for care of a serious underlying spinal condition.

Comparison with previous research

Our findings confirm that the number of ED visits reduced substantially as a result of COVID-19. A study by Jeffery et al. found large decrease in ED visits for any condition in the US during the pandemic, in the magnitude of over 40% [20]. Studies in New South Wales and London also found decline in overall ED presentations for any condition during COVID-19 of around one quarter, similar to what we found for low back pain [21,22]. Borsa et al. found a much larger reduction in presentations to hospital for low back pain (87%) [12] but this could be explained by the inclusion of outpatient department presentations.

The effects of COVID-19 on the care provided in hospital may be variable. Jeffrey observed an increase in hospital admissions for any condition [20]. Others have found decrease in hospital admission for conditions including stroke and myocardial infarction [2,22]. We found no change in the proportion admitted which could be explained by the nature of admissions for spinal conditions; many admissions could be considered ‘avoidable’ [23]. Surprisingly however, we did not observe a reduction in the proportion of admissions for back pain even during a period when hospitals were under pressure from COVID-19.

Mode of arrival to the ED appears to have been affected by the lockdown. A larger proportion presented to ED by ambulance in 2020 (41%) compared to 2019 (29%). Our 2019 data was similar to what Ferreira et al. found in their study of 14,024 low back pain presentations: 31% arrived by ambulance [7]. It is possible that restrictions being imposed on people leaving home due to COVID-19 or concerns about public transportation caused this increase.

Another explanation could be that those presenting in 2020 had more severe pain and less support to attend a health service.

Implications for future research and practice

We observed a decline in the total number of people presenting for care of low back pain in ED. This may be cause for less concern than the reduction observed for other conditions because the majority of spinal conditions can be managed at home or in primary care [24]. The absolute number of people diagnosed with a serious underlying condition was remarkably similar in both years (29 people in 2019, 4.2%; 28 people in 2020, 5.9%). Unlike in previous work [12], the pandemic lockdown did not appear to discourage those with a serious underlying spinal condition to seek care. This requires confirmation in future research.

Of concern is the fact that the use of potentially unnecessary care for the ~95% with non-serious conditions remained unchanged or increased. Future research is needed to understand why opioids, imaging, and admissions for low back pain have become entrenched aspects of ED care for low back pain. Our findings also suggest a need for a cost-effective alternative to ED care for low back pain such as better use of primary care, telehealth or services to support self-management in the community [25]. Interventions that educate both clinicians and the wider community about necessary and unnecessary care for spinal conditions, could redirect ED resources to where they are most needed.

Strengths and limitations

To our knowledge this is the first study to determine the impact of the COVID-19 pandemic on ED presentations and healthcare utilisation for patients presenting with spinal conditions in Australia. We included data on all patients diagnosed with a spinal condition who presented to one of three EDs in Sydney. Two researchers independently analysed the datasets and reproduced the results in R.

This study had limitations. First, we did not have access to medication data for one of the hospitals (Canterbury Hospital) for the period of March and 1st week of April in 2019. However, this comprised only 11% of our data on medicines and was assumed to be missing at random. Second, we did not look at the adverse events that patients may have experienced during their presentation. We also did not have data on patient reported outcome measures such as pain and disability [7]. This means we cannot determine the severity of symptoms leading to a presentation. However, we analysed Australasian Triage Scale categories allocated by triage nurse, which provides some idea on pain intensity [7], and this suggested that the urgency of presentations was similar in both years. Also, since all hospitals were involved in care of patients with COVID-19, we do not know about the situation of low back pain care in non-pandemic hospitals in Sydney. Finally, we did not have access to detailed clinical information to formally evaluate the appropriateness of the care provided e.g. against clinical care standards.

Conclusions

There was a substantial decrease in the number of ED presentations for spinal conditions in three large Sydney hospitals during the COVID-19 global pandemic. Potentially unnecessary aspects of care for low back pain remained unchanged or increased. These data suggest that unnecessary care for low back pain may be more entrenched than previously thought.

Contributionship

Concept and design: all authors.

Acquisition, analysis, or interpretation of data: all authors.

Drafting of the manuscript: Sharma, Traeger.

Critical revision of the manuscript for important intellectual content: all authors.

Administrative, technical, or material support: None.

Supervision: Traeger, Maher.

Ethics approval

Approved by Sydney Local Health District, Research Ethics and Governance Office, Royal Prince Alfred Hospital zone (Protocol number: X17-0419 & LNR/17/RPAH/631).

Data availability statement

All data relevant to the study are included in the article or uploaded as supplementary information

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Conflict of interest

Prof Chris Maher is supported by a Principal Research Fellowship from Australia's National Health and Medical Research Council (APP1103022) as well as a Program grant (APP1113532) and 2 Centre for Research Excellence grants (APP1134856 and APP1171459). He has received research grants from various government and not-for-profit agencies. Flexeze provided heat wraps at no cost for the SHaPED trial that he is an investigator on. His expenses have been covered by professional associations hosting conferences he has spoken at. Dr Adrian Traeger is supported by an Australian National Health and Medical Research Council Early Career Fellowship (APP1144026) and an NHMRC Program Grant (APP1113532). The remaining authors have no conflicts of interest to declare.

Acknowledgement

None.

Appendix 1

Patient demographic and clinical characteristics, by month.

	Before COVID-19			Total (n = 694) ^c	During COVID-19			Total (n = 475)
	March 2019 (n = 244) ^a	April 2019 (n = 219) ^b	May 2019 (n = 231)		March 2020 (n = 150)	April 2020 (n = 138)	May 2020 (n = 187)	
Age, mean (SD)	47.3 (20.4)	51.1 (21.3)	54.2 (20.6)	-	52.4 (21.4)	49.8 (17.6)	53.6 (19.2)	-
Gender, female n (%)	126 (51.6)	116 (53.0)	120 (51.9)	362 (52.2)	83 (55.3)	70 (50.7)	91 (48.7)	244 (51.4)
Socioeconomic status (quartiles 1–4, 1 denotes higher SES)*								
1	140 (57.4)	129 (58.9)	147 (63.6)	416 (59.9)	106 (70.7)	92 (66.7)	135 (72.2)	333 (70.1)
2	38 (15.6)	29 (13.2)	30 (13.0)	97 (14.0)	22 (14.7)	26 (18.8)	18 (9.6)	66 (13.9)
3	46 (18.9)	35 (16.0)	43 (18.6)	124 (17.9)	10 (6.7)	14 (10.1)	28 (15.0)	52 (10.9)
4	8 (3.3)	7 (3.2)	5 (2.2)	20 (2.9)	4 (2.7)	1 (0.7)	1 (0.5)	6 (1.3)
Triage category, n (%)								
2	4 (1.6)	4 (1.8)	5 (2.2)	13 (1.9)	2 (1.3)	3 (2.2)	7 (3.7)	12 (2.5)
3	91 (37.3)	100 (45.7)	101 (43.7)	292 (42.1)	68 (45.3)	62 (44.9)	88 (47.1)	218 (45.9)
4	144 (59.0)	112 (51.1)	119 (51.5)	375 (54.0)	78 (52.0)	72 (52.2)	90 (48.1)	240 (50.5)
5	5 (2.0)	3 (1.4)	6 (2.6)	14 (2.0)	2 (1.3)	1 (0.7)	2 (1.1)	5 (1.1)
Discharge Diagnosis, n (%)								
Serious spinal pathology	9 (3.7)	11 (5.0)	9 (3.9)	29 (4.2)	5 (3.3)	7 (5.1)	16 (8.6)	28 (5.9)
Non-specific LBP	209 (85.7)	182 (83.1)	185 (80.1)	576 (83.0)	134 (89.3)	114 (82.6)	159 (85.0)	407 (85.7)
Radicular pain	26 (10.7)	26 (11.9)	37 (16.0)	89 (12.8)	11 (7.3)	17 (12.3)	12 (6.4)	40 (8.4)
Mode of arrival, n (%)								
Ambulance	66 (27.0)	61 (27.9)	76 (32.9)	203 (29.3)	59 (39.3)	55 (39.9)	80 (42.8)	194 (40.8)
Self-presented	178 (73.0)	157 (71.7)	155 (67.1)	490 (70.6)	91 (60.7)	83 (60.1)	106 (56.7)	280 (58.9)
Number admitted, n (%)	31 (12.7)	39 (17.8)	54 (23.4)	124 (17.9)	34 (22.7)	19 (13.8)	41 (21.9)	94 (19.8)
Lumbar imaging referrals, n (%)								
Simple radiograph (Xray)	43 (17.6)	43 (19.6)	51 (22.1)	137 (19.7)	37 (24.7)	16 (11.6)	33 (17.6)	86 (18.1)
MRI	4 (1.6)	5 (2.3)	0 (0.0)	9 (1.3)	0 (0.0)	4 (2.9)	2 (1.1)	6 (1.3)
CT	14 (5.7)	26 (11.9)	24 (10.4)	64 (9.2)	15 (10.0)	9 (6.5)	21 (11.2)	45 (9.47)
Any imaging	53 (21.7)	65 (29.7)	61 (26.4)	179 (25.8)	47 (31.3)	24 (17.4)	49 (26.2)	120 (25.3)
Pain medicine administered, n (%)								
Simple analgesics (eg paracetamol)	81 (47.9)	127 (59.1)	131 (56.7)	339 (55.1)	89 (59.3)	74 (53.6)	115 (61.5)	278 (58.5)
NSAIDs	77 (45.6)	107 (49.8)	106 (45.9)	290 (47.2)	72 (48)	59 (42.8)	97 (51.9)	228 (48.0)
Weak opioids (eg Tramadol, codeine)	21 (12.4)	23 (10.7)	27 (11.7)	51 (8.3)	13 (8.7)	12 (8.7)	16 (8.6)	41 (8.6)
Strong opioids (eg Oxycodone, morphine)	78 (46.2)	91 (42.3)	113 (48.9)	282 (45.9)	84 (56.0)	66 (47.8)	87 (46.6)	237 (49.8)
Any opioids	92 (54.4)	106 (49.3)	133 (57.6)	331 (53.8)	93 (62.0)	76 (55.1)	99 (52.9)	268 (56.4)
Muscle relaxants	1 (0.6)	3 (1.4)	4 (1.7)	8 (1.3)	3 (2.0)	5 (3.6)	3 (1.6)	11 (2.3)
Benzodiazepines	11 (6.5)	11 (5.1)	8 (3.5)	30 (4.9)	7 (4.7)	4 (2.9)	12 (6.4)	23 (4.8)
Antiepileptics	9 (5.3)	12 (5.6)	15 (6.5)	36 (5.9)	7 (4.7)	9 (6.5)	11 (5.9)	27 (5.7)
Antidepressants	2 (1.2)	5 (2.3)	5 (2.2)	12 (2.0)	3 (2.0)	1 (0.7)	8 (4.3)	12 (2.5)
Corticosteroids	3 (1.8)	4 (1.9)	5 (2.2)	12 (2.0)	6 (4.0)	1 (0.7)	6 (3.2)	13 (2.7)
Other	0 (0.0)	2 (0.9)	3 (1.3)	5 (0.8)	2 (1.3)	2 (1.4)	1 (0.5)	5 (1.1)
Laboratory tests referral, n (%)								
Any pathology test	48 (19.7)	48 (21.9)	67 (29.0)	163 (23.5)	39 (26.0)	20 (14.5)	48 (25.7)	107 (22.5)

*Socioeconomic status was derived from the patient's postcode from the Australian Bureau of Statistic's Socio-Economic Indexes for Areas 2016 and reported as quartiles, with the highest percentile designating areas with the highest socioeconomic advantage.

^ADenominator for medicine data was 169. There were some missing data because medicine data was not available for one of our study sites for March and first week of April in 2019.

^BDenominator for medicine data was 215

^CDenominator for pain medication data was 615.

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