


## ORIGINAL RESEARCH

# Short waits, happy patients and expert care, moving basic musculoskeletal care from the emergency department to a physiotherapist-led diversion pathway

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## Abstract

**Objective:** Patients with musculoskeletal conditions (MSKCs) are highly prevalent in ED. This project explores the impact of the pilot phase of a 'diversion pathway', which directed patients with MSKCs from the ED waiting room to an outpatient clinic led by advanced-scope physiotherapists.

**Methods:** A prospective intervention study comparing care outcomes between patients in the 'diversion pathway' with usual ED care. The characteristics of patients considered eligible and non-eligible are described.

**Results:** Between May and December 2022, 1099 patients were diverted. For diverted patients, mean length of stay (LOS) in ED was reduced by 110 (95% confidence interval [CI]: 99–120) min and 4 h rule compliance improved by 19.3% compared to usual ED care.

There were fewer patients who 'did not wait' (DNW) with the diversion pathway. The diverted group was young (median age 22 years and 41% paediatric), mostly low urgency, self-referred and arrived by private transport with minor limb trauma. The diversion pathway triage process appropriately identified 182 patients ineligible for diversion. 96.7% of patients reported satisfaction with care received from the diversion pathway. There was no change in ED representation rates for diverted patients.

**Conclusions:** A new pathway resulted in reduced LOS, reduced DNW, high patient satisfaction and more people being discharged within 4 h for diverted patients compared to usual ED care. The pathway increased ED capacity, improved key ED performance metrics and safely expedited care delivery for patients.

## Key findings

- Length of stay in ED was reduced by 110 min for 1099 patients diverted from the ED waiting room to care provided by physiotherapists in an outpatient clinic setting.
- Advanced-scope physiotherapists accurately identified patients who were ineligible for diversion (i.e. required medical or multi-disciplinary care).
- 96.7% of diverted patients were satisfied or very satisfied with the care they received.

**Key words:** *advanced-scope physiotherapist, emergency medicine, fracture, musculoskeletal, physiotherapy.*

## Introduction

Most musculoskeletal conditions (MSKCs) can be appropriately managed in primary care settings.<sup>1</sup> Despite this, they represent a significant case-load in Australian ED.<sup>2,3</sup> These presentations extend the traditional function of ED to offer 24 h care to seriously ill or injured patients. Current data show that 60% of all Australian ED presentations occur during office hours (08.00–17.00) and the largest proportion (82.8%) are triaged to the three lowest urgency categories using the Australasian

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Triage Scale (ATS).<sup>3</sup> The proportion of all ED presentations that could be seen in primary care has been estimated between 10% and 40%.<sup>4,5</sup> This demand from lower urgency presentations impacts key ED performance indicators.

There is an increasing number of people presenting to Australian ED with low urgency conditions contributing to an increased patient length of stay (LOS).<sup>6</sup> LOS and the percentage of patients discharged within 4 h (National Emergency Access Target [NEAT]) are key ED performance indicators. In Western Australia in 2021–2022, the median ED LOS was 191 min, with NEAT compliance at 65%.<sup>6</sup> This included many patients who could have sought care in alternative settings.

The high prevalence of low urgency MSKC ED presentations has led to the employment of advanced-scope physiotherapists (ASPs) in many Australian ED.<sup>7</sup> ASPs in Western Australian (WA) EDs must hold clinical postgraduate qualifications and complete additional role-specific training. They are highly competent in providing appropriate care for patients with MSKC including atraumatic onset pain, soft tissue injuries and closed fractures.<sup>7,8</sup> In the ED, ASPs can independently select patients, order radiological imaging, discharge patients and organise appropriate follow-up care.<sup>7,9</sup> Adding ASPs to the treating team in ED results in effective safe care,<sup>10</sup> reduced wait time (WT),<sup>9,11</sup> reduced LOS<sup>9,11,12</sup> and high patient satisfaction<sup>12,13</sup> for patients with MSKC.

This project aimed to explore the impact of the pilot phase of a new 'diversion pathway', which directed eligible patients presenting to the ED with MSKC to an outpatient clinic managed by ASPs.

Primary research question:

- For patients presenting to an ED with an MSKC, does care provision through a physiotherapy-led diversion pathway reduce LOS compared to usual ED care?

Secondary questions:

1. What are the characteristics and presenting conditions of patients eligible for diversion to a physiotherapist-led diversion pathway?

2. Are diverted patients satisfied with the experience?

## Methods

### Study design

This was a prospective intervention study comparing patient characteristics and care outcomes in patients moved to a physiotherapist led diversion pathway with patients who received usual care in the ED.

### Setting

The setting was the ED of a 229-bed secondary hospital (62 056 annual presentations 2021–2022) in metropolitan Perth, WA. In the local area are multiple general practices, but no urgent care clinics. The ED, Medical Imaging department and the ASP-managed outpatient clinic are co-located on the ground floor of the hospital and adjacent to each other. The diversion pathway operated with staff recruited and trained for this purpose and who were in addition to the usual outpatient physiotherapy workforce. Additional staff and the designation of two treatment bays for diversion pathway use, required a moderate re-organisation of the existing outpatient service delivery. The treatment area was equipped with a plaster trolley, thermoplastic splinting trolley, a full range of orthopaedic braces and other appropriate physiotherapy outpatient resources. The diversion pathway operated from 10.00 to 18.00 hours Saturday to Wednesday, as these are the busiest days in the ED. The specific days of the week varied because of staff availability and operational factors. During the period of this pilot project, COVID restrictions were in place which involved all patients taking an exterior rapid antigen test (RAT) on arrival to the ED. The study period was from May to December 2022.

### Participants

Patients presenting to the study ED with MSKC between the hours of 10.00 and 18.00 were included. Participants were placed into one of

three groups dependent on whether they were diverted from the ED or not and their suitability for diversion as measured against pre-determined eligibility criteria (Table 1).

### Diverted patients (DIV)

This group included patients in the usual scope of practice of ASPs that were diverted from the ED to outpatients on days the diversion pathway was operating (i.e. Sat–Wed).

### Eligible patients, who were not diverted (END)

This comparison group included eligible patients who were not diverted and received usual care in the ED as they attended on days the diversion clinic was not operating (i.e. Thurs–Fri).

### Patients presenting with MSKC, but deemed not eligible for diversion (NOT)

This group included patients with MSKC who were classified as not eligible for diversion as they met one or more of the pre-determined diversion pathway exclusion criteria (Table 1). This group received the usual care in the ED.

### Procedure: Emergency Department Musculoskeletal Diversion Pathway

The Emergency Department Musculoskeletal Diversion Pathway (MDP) was launched on 14 February 2022. A triaging ASP was stationed in the ED waiting room and the treating team (a second ASP and senior physiotherapist) were in the hospital physiotherapy outpatient clinic. All patients went through normal ED triage procedures and a demographic check with ED clerks (see Fig. 1). Patients who met eligibility criteria for diversion were identified from the presenting complaint information entered into the Emergency Department Information System (EDIS). The ASP approached the patient in the ED waiting room, took a brief history, undertook a triage assessment, and, if deemed eligible, offered diversion to the ASP-managed outpatient clinic.

**TABLE 1.** Emergency Department Musculoskeletal Diversion Pathway inclusion and exclusion criteria

Inclusion criteria	Exclusion criteria
<ul style="list-style-type: none"> <li>• Presenting with MSKC eligible for management by an ASP</li> <li>• ATS 3–5 (With senior ED doctor agreement, ATS 2, e.g., shoulder dislocation post-reduction in ED)</li> <li>• Aged 8–65 (with senior ED doctor agreement, eligible patients outside this age range)</li> <li>• Able to become easily and safely ambulant for discharge</li> </ul>	<ul style="list-style-type: none"> <li>• GCS &lt;15</li> <li>• At risk of deteriorating: Assessed by Adult Deterioration Detection System (ADDS) OR Paediatric Acute Response and Recognition Observation Tool (PARROT) score</li> <li>• COVID-positive patients (during hospital COVID restrictions)</li> <li>• Expanded differential diagnosis requiring medical review (e.g. insidious onset joint swelling)</li> <li>• Explicit exclusion (e.g. open fracture, head injury)</li> <li>• History of violence/complex psychiatric history</li> <li>• Poorly controlled severe pain</li> <li>• Intoxicated</li> <li>• In custody</li> <li>• Motor vehicle accident</li> <li>• Requires multi-disciplinary care (e.g. elderly faller)</li> </ul>

ASP, advanced-scope physiotherapist; MSKC, musculoskeletal condition.

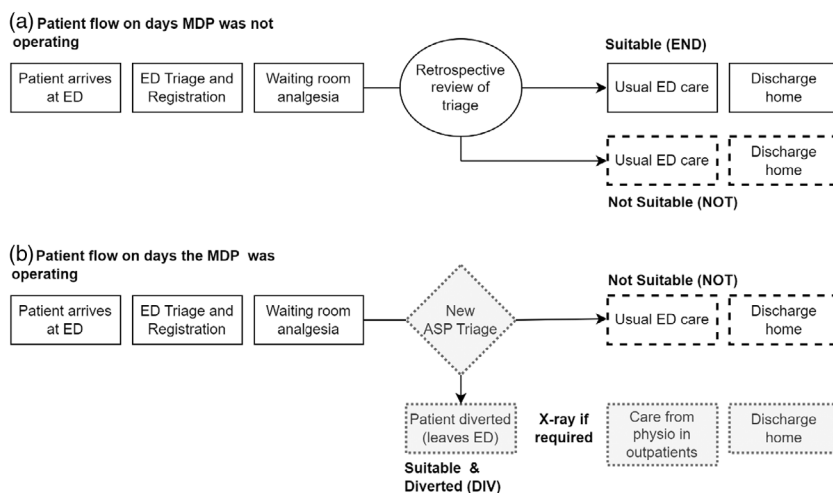
There was a two-part consent process for the diversion pathway and to participate in the research project. Once patient consent for diversion was obtained, they were registered in a Research Electronic Data Capture (REDCap) database,<sup>14,15</sup> which also provided a digital clinical workflow and medical record authoring tool for

MDP clinicians. Patients were given the option to decline diversion and receive usual ED care, remaining in the waiting room to follow usual department procedures. Analgesia was provided to all patients in the waiting room as per usual ED protocol.

Patients consenting for diversion were discharged from the ED and

admitted to the MDP. Indicated imaging (e.g. radiographs of the limbs) was ordered by the triaging ASP and the indicated images were taken as patients transited to the outpatient clinic. Upon arrival, patient care was transferred to the treating ASP or senior physiotherapist, depending on the clinical complexity of the patient's presentation.

The MDP team accessed a digital clinical handover, assessed the patient, reviewed imaging, provided a diagnosis and initiated appropriate evidence-based care. The physiotherapist was able to consult with the ED medical team or hospital specialty services (e.g. Orthopaedics) from MDP. Following care, patients were discharged home from the MDP with a management plan and safety net contact details for the MDP.



**Figure 1.** Patient flow on (a) days the Emergency Department Musculoskeletal Diversion Pathway was not operating and (b) days the Emergency Department Musculoskeletal Diversion Pathway was operating. The review of triage on non-operating days represents the retrospective review of the research team to qualify patients for analysis groups.

### Data collection

Demographic data sourced from EDIS (EDISAPAC version 21.4.0) was collected for all participants under a waiver of consent from the institutional Human Research Ethics Committee (HREC). Descriptive variables included age, sex, length of stay, ATS category, mode of arrival,

referral to ED, diagnosis and discharge destination.

Participants in the DIV group were selected as part of normal clinic operations by the MDP triage ASP. All diverted patients were invited to opt in to participate in research around the ED Diversion clinic. Those who opted in were included in prospective data collection including access to their medical record and access to data captured on the MDP REDCap database. A patient satisfaction survey was sent to all patients by SMS from the REDCap database.

Participants in END and NOT groups were identified retrospectively (see Fig. 1) by MDP clinicians and members of the research team who reviewed EDIS triage for patients presenting with MSKC between 10.00 and 18.00 hours daily, during the study period, with a focus on June–July 2022. The decision on their suitability for diversion was registered in the REDCap database with reasons why they were or were not deemed eligible listed. All reviewers worked in teams and cross-checked patient selection to ensure consistency. Participants in the NOT group were also registered by the triage ASP at the time of their waiting room review.

### Outcome measures

LOS was sourced from EDIS. NEAT Compliance was calculated from LOS, with LOS greater than 240 min deemed non-NEAT compliant.

The patient satisfaction survey was based on the five-question adaption of the validated Short Assessment of Patient Satisfaction (SAPS).<sup>16</sup> The single question reported in the present study was ‘Overall I was satisfied with my treatment experience’ and rated on the 5-point Likert scale ‘Strongly agree, agree, Neither agree or disagree, Disagree, Strongly disagree’.

### Data analysis

Data were analysed using STATA v15 (StatCorp LLC, TX, USA). Descriptive summaries by group and between-group differences are presented. Linear and logistic regression was used to assess the difference between group demographics. Equality of proportions was assessed using chi-squared tests. Equality of mean LOS was assessed assuming a negative binomial distribution in generalised linear model to estimate appropriate standard errors. Equality of median LOS was assessed using non-parametric *k*-sample test.

### Ethics

Ethics approval was obtained from the South Metropolitan Area Health Service (SMHS) Human Research Ethics Committee (RGS5279) and the SMHS Research Governance Office. A waiver of consent was provided for deidentified health service data from the EDIS.

## Results

A total of 1794 participants were identified from registration in REDCap. Participants were excluded if they bypassed ED and came directly to the MDP ( $n = 22$ ). Figure 2 shows the distribution of participants. Three hundred and twenty-eight provided informed research consent, but only 211 (65%) completed the survey.

Patient demographics and ED arrival and departure data are shown in Table 2. Although the DIV and END groups were similar, a key difference was a reduction in patients who did not wait for treatment in the DIV group (0.5% of patients compared to 9.6%). The DIV and END group contained a substantially higher proportion of paediatric patients (40.6% and 47.7%, respectively) compared to the NOT group (13.2%). The NOT group (10.3% of participants) were older, more likely to arrive by ambulance (12.1% compared to 0.6% for DIV and 2.1% for END), more likely to be higher ATS acuity, presented more frequently with spinal pain and were more likely to be admitted to the hospital.

Table 3 shows the key ED metric outcomes for each group. There was a 109.8 min (95% confidence interval [CI]: 99.3–120.3) reduction in ED LOS for DIV when compared to END patients. The percentage of patients who were NEAT compliant in the DIV group was 19.3% higher than those in the END group. There was no difference in representation to ED rates for patients in the DIV compared to the END group. The NOT group spent the longest average time in ED compared to the DIV and END groups.

Participants in the DIV group providing research consent, returned 208 complete patient satisfaction surveys. 96.7% responded ‘Strongly agree’ or ‘Agree’, indicating satisfaction with the care they received.

The primary reasons for patients not being suited for diversion related to the presence of red flags (indicating a differential diagnosis that included sinister and medical diagnoses), care provision exclusion criteria (e.g. open fracture) and patients

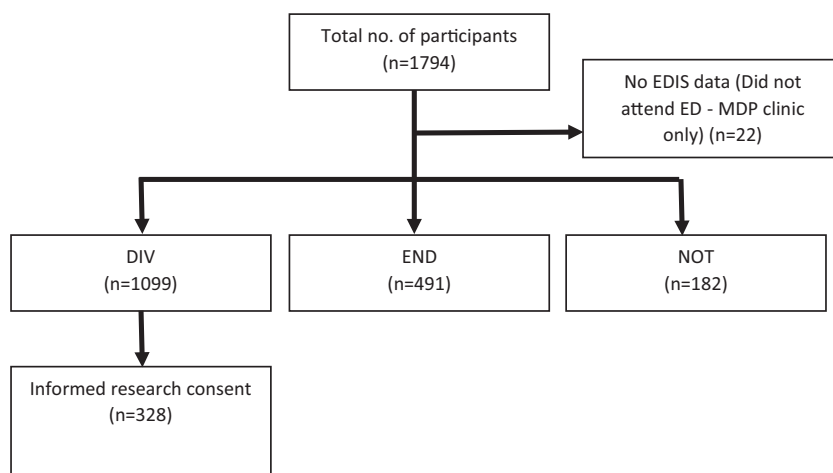


Figure 2. Flow chart showing the participants in each group.



TABLE 2. Patient demographics and emergency department arrival and departure information

	Eligible for diversion				Not eligible for diversion		Significant group difference(s)
	Diverted (DIV), <i>n</i> = 1099		Not diverted (END), <i>n</i> = 491		(NOT), <i>n</i> = 182		
Age – years (IQR)	22	13–40	18	13–40	37	27–50	DIV/NOT†
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	
Paediatric patients (under 18)	449	40.6%	230	47.7%	23	13.2%	All groups‡
Sex – female	548	49.9%	232	47.3%	86	47.3%	Nil‡
ATS Cat 1	0	0.0%	0	0.0%	0	0.0%	DIV/NOT, END/NOT§
ATS Cat 2	8	0.7%	1	0.2%	6	3.3%	
ATS Cat 3	111	10.1%	59	12.0%	65	35.7%	
ATS Cat 4	821	74.7%	368	75.0%	101	55.5%	
ATS Cat 5	159	14.5%	63	12.8%	10	5.5%	
Referral to ED							
Self	929	84.6%	412	84.4%	153	84.5%	All groups§
GP	84	8.6%	59	12.1%	11	6.1%	
Other	75	6.8%	17	3.5%	17	9.4%	
Missing	1		3		1		
Mode of arrival							
Ambulance	7	0.6%	10	2.0%	22	12.1%	All groups‡
Other	1092	99.4%	481	98.0%	160¶	87.9%	
Diagnosis							
UL soft tissue injury	199	18.1%	88	17.9%	19	10.4%	All groups§
LL soft tissue injury	311	28.3%	138	28.1%	23	12.6%	
UL fracture	307	27.9%	101	20.6%	25	13.8%	
LL fracture	175	15.9%	40	8.2%	13	7.1%	
Spinal pain	48	4.4%	21	4.3%	49	26.9%	
UL pain	12	1.1%	8	1.6%	4	2.2%	
LL pain	14	1.3%	17	3.5%	13	7.1%	
UL dislocation	10	0.9%	6	1.2%	3	1.7%	
LL dislocation	10	0.9%	2	0.4%	3	1.7%	
Other	8	0.7%	23	4.7%	20	11.0%	
DNW	5	0.5%	46	9.4%	10	5.5%	
LOAR	0	0.0%	1	0.2%	0	0.0%	
Discharge destination							
Home	1092	99.3%	443	90.2%	155	85.2%	All groups§
Admitted	2	0.2%	1	0.2%	14	7.7%	
Other	0	0.0%	0	0.0%	3	1.6%	
DNW	5	0.5%	46	9.4%	10	5.5%	
LOAR	0	0.0%	1	0.2%	0	0.0%	

†Linear regression. ‡Logistic regression. § $\chi^2$  test. ¶One person brought in by police. ATS Cat, Australasian Triage Score Category, 1 = highest urgency, 5 = lowest urgency; DNW, did not wait; GP, general practitioner; LL, lower limb; LOAR, left against medical advice; UL, upper limb.

TABLE 3. Key emergency department metrics

	Eligible for diversion				Not eligible for diversion		P values
	Diverted (DIV), n = 1099		Not diverted (END), n = 491		(NOT), n = 182		
Mean LOS in ED (95% CI), min	82	79–84	191	181–201	273	249–296	<0.001
Median LOS in ED (IQR), min	64	42–103	182	120–235	229	164–314	<0.001
	n	%	n	%	n	%	
NEAT compliant	1076	97.9% <sup>†</sup>	386	78.6%	115	63.2%	<0.001
96 h return to ED	40	3.6%	15	3.1%	10	5.5%	0.556
28 day return to ED <sup>‡</sup>	30	2.7%	15	3.1%	5	2.7%	0.648

†Most NEAT breaches because of patients being over boundary at the start of MDP shift. ‡Returns between 96 h and 28 days.

requiring multi-disciplinary input for safe discharge.

## Discussion

There were improvements in mean LOS, NEAT compliance and the proportion of patients who did not wait for care when comparing DIV and END patients. This demonstrates the value of a specialised outpatient service actively identifying eligible patients in the ED waiting room and discharging those patients quickly from the ED. This process removed patients physically from the ED and allowed the staff in the ED to focus on the remaining patients. In this pilot phase of the MDP clinic, the eligible cohort was largely young, low urgency, self-referring, arriving by private transport and presenting mainly with minor trauma affecting the limbs.

Our findings demonstrate a significant reduction in LOS compared to previous studies that have evaluated ED health service metrics for patients seen by ASPs located in the ED and patients managed with usual care. When working within the ED, ASPs have demonstrated 92.7% NEAT compliance<sup>11</sup> and 108–162 min<sup>7,11</sup> LOS. Reductions of 83–108 min LOS compared to usual ED care have been reported.<sup>10,17</sup> Operating under medical supervision in an ED piloting an ASP workforce, there was 89.6% NEAT compliance and

130 min LOS.<sup>18</sup> In our study, patients diverted to ASP care in outpatients had a mean ED LOS of 82 min. This included time spent in COVID testing procedures (estimated at 30 min per patient) which have since been removed. These patients did not require a bed space in the ED and once flagged for diversion, could be moved into outpatients to allow for more timely care to other waiting patients.

The diverted patient group in the present study appears similar to the cohort managed by ASPs working within other EDs. They are predominantly lower acuity ATS triages with 88–93% in category 4 or 5<sup>7,9,11,17,18</sup> and encompass primarily peripheral limb minor trauma (fractures and soft tissue injuries).<sup>7</sup> One area of difference is that ASPs working within the ED can see patients with higher complexity who can be admitted to the hospital from the ED or who require input from a medical or multi-disciplinary team (e.g reduction of fractures under sedation).<sup>17</sup> In the study ED, we diverted a mixed group of adults and children, which confounds demographic comparison with previous work<sup>17,19</sup> where paediatric patients were excluded. Overall, there appear to be highly variable ASP services in Australian ED, with a variety of models of care and scopes of practice.

The MDP triage process appears to appropriately identify ineligible

patients and ensure patients receive an appropriate level of care, while maintaining safety in the outpatient environment. Ineligible patients (NOT) had higher rates of attending by ambulance and admission for their condition. The NOT group also included more patients presenting with insidious onset pain in the spine and limbs, which aligns with the exclusion reason for an expanded differential diagnosis (i.e. possible non-MSKC). The triage process appears to effectively select patients that can be managed by an ASP without access to co-treatment with the ED MDT.

Patient ED representation rates were similar between the DIV and END groups at around 3% for 96 h and 28 days. This is similar to 30 day return rates for patients seen in ED fast-track services.<sup>17</sup> Our finding is surprising because all diverted patients were provided with a direct contact number and email to the diversion service. Based on our sample, it is possible that representation rates for all services may be confounded by frequently presenting individuals and the diversion pathway not operating 7 days a week.

Patient satisfaction was high with the diversion service. This concord with 95% satisfaction reported with in ED ASP care provision.<sup>17</sup> The high satisfaction scores could potentially be because of several factors. Patients seeking care in the ED value effective communication with staff,<sup>20</sup> staff

empathy<sup>20</sup> and are seeking safe effective care.<sup>21</sup> For MSKCs, patients will accept care from a physiotherapist, who patients identify as having skills and attributes relevant to their presenting complaint.<sup>22</sup> The other key driver of patient satisfaction with care in the ED is reduced waiting time and service efficiency.<sup>20,22</sup>

## Limitations

In the present study, we are reporting on a single secondary ED on the boundary of a major city. We are reporting on a period when COVID restrictions were in place and this likely increases patient length of ED stay for all patients. We are also reporting on a period where there were many new staff and a heavy investment in training. This potentially impacted productivity and potential patient selection. Data for each group were collected on different days of the week and END and DIV groups estimated primarily from June to July data, which may introduce selection bias. Data were collected during routine clinical service delivery, where research was not the main focus of the patient interaction. As such, there was a low response (20%) to the patient satisfaction survey which is another source of potential selection bias. Further research is needed to determine the effect on the overall ED patient flow, the impact on the operation of outpatients, the patient perspective on diversion and the impact on ED staff. Analysis is also needed to explore cost-effectiveness and return on investment for this initiative. In addition, the effect of free access to additional in-hospital services on community providers was not assessed.

## Conclusions

We have reported on the pilot phase of a novel diversion pathway that moves patients from the ED waiting room to an outpatient setting to receive immediate care delivered by physiotherapists. This pathway appears to have value for the ED and patients as it safely expedites care delivery. The impact is seen in reduced LOS, reduced DNW and improved NEAT for diverted patients. Based on patient satisfaction

and no change in ED representation rates, the pathway appears to deliver appropriate care to patients.

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## Competing interests

None declared.

## Data availability statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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