

A Physiotherapist-Led Paediatric Fracture Clinic was a Safe and Efficient Alternative to Traditional Outpatient Orthopaedic Care: A Preliminary Evaluation

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ABSTRACT

Background: Demand for publicly funded orthopaedic outpatient services is growing rapidly which affects a health service's ability to provide timely care. The current study describes the implementation and preliminary evaluation of a novel physiotherapist-led paediatric fracture clinic, which was introduced to provide more timely care to children. The study evaluated 1) the length of time patients spent in the outpatient department per appointment, 2) did-not-attend rates and 3) unplanned re-presentations to the clinic for the same problem.

Methods: The study was conducted at a large regional hospital in Victoria, Australia. A physiotherapist-led paediatric fracture clinic was introduced in 2013 to provide care to children with acute simple limb fractures. Descriptive data for all patients seen in the clinic between 1st January 2013 and 31st December 2018 were collected prospectively. The performance of the new service was evaluated by comparing it to the pre-existing orthopaedic surgeon-led fracture clinic for the six months prior to the introduction of the new service for 1) the total time patients spent in the outpatient department per appointment and 2) the number of patients that failed to attend an appointment. The pre-existing surgeon-led clinic was also compared to the surgeon-led clinic for the six months following the introduction of the physiotherapist-led clinic. Total time spent in the department per appointment was compared between groups using linear regression, controlling for age, diagnosis and appointment type (new or review). The proportion of patients who did not attend an appointment were compared between groups using the chi square test. The number of unplanned representations to either clinic was assessed between 01/01/2013 and 31/12/2018.

Results: Between 2013 and 2018, there were 4337 attendances at the physiotherapist-led clinic. Total time in the department was significantly less ($p < .05$) for patients seen in the physiotherapist-led clinic when compared to the pre-existing surgeon-led clinic (median difference 82 minutes). Total time in the surgeon-led clinic also reduced following the introduction of the new service (median difference 21 minutes). Did-not-attend rates (10.3%) and unplanned re-presentations (0.6%) were similar ($p > .05$) between the groups.

Conclusions: The physiotherapist-led clinic improved the timeliness of care for paediatric patients without evidence of compromised patient safety.

KEYWORDS: Paediatrics, musculoskeletal health, service evaluation, service redesign, workforce reform, fractures, orthopaedics.

INTRODUCTION

Demand for specialist orthopaedic services is growing as the burden of musculoskeletal conditions increases [1]. At our health service, orthopaedic consultations increased by 33% between 2007 and 2016 and represented one-third of all outpatient appointments, making it the largest outpatient clinical service [2]. Fracture management represented 26% of these appointments, of whom 55% were children [3].

Historically, orthopaedic outpatient clinics at our health service were characterized by long waiting times on the day of appointment, crowded waiting rooms and overbooked clinics. Paediatric patients posed particular challenges in this environment due to their poor tolerance of waiting [4,5] and the concurrent burden on parents/ carers needing to be present for the consultation [6].

To help manage increasing demand and to provide timely care to patients, Advanced Practice Physiotherapist led orthopaedic clinics have been utilised to assess and manage adult and paediatric patients with defined musculoskeletal conditions [7]. At our health service, Advanced Practice Physiotherapist services were introduced in 2005 and by 2012 were responsible for 17.5% of all outpatient orthopaedic consultations [2].

With a track record of successfully introducing Advanced Practice Physiotherapist clinics, in 2013 we collaborated with the Royal Children's Hospital, Melbourne, to pilot a new physiotherapist led paediatric fracture clinic (PLPFC). The aim of the clinic was to provide appropriate and timely care to children and reduce the amount of time patients and carers had to wait in clinic on the day of the appointment. The current study describes the development, implementation and preliminary evaluation of this novel clinic.

METHODS

Setting: The study was conducted at a large publicly funded regional tertiary referral hospital in Victoria, Australia. Adult and paediatric fractures were historically managed in a single orthopaedic surgeon led clinic each week. The clinic was overseen by an orthopaedic surgeon and care was provided by medical staff including junior medical officers and trainee orthopaedic surgeons.

Service Design: The PLPFC commenced as a 6-month pilot project in January 2013 with funding from the Victorian Paediatric Orthopaedic Network (VPON). Senior staff from Physiotherapy, Orthopaedics and Outpatients developed the PLPFC scope of practice. Physiotherapists with at least five years postgraduate orthopaedic experience and a background in primary contact physiotherapy in the Emergency

Department [8] were employed to work in the PLPFC. Prior to commencing in the PLPFC, physiotherapists received direct training and supervision from local orthopaedic surgeons.

After completing the supervised training, the physiotherapists independently assessed and managed patients (including interpreting x-rays) according to the Royal Children's Hospital paediatric fracture clinical practice guidelines® [9].

Patients eligible for the PLPFC were:

- aged 16 years and under
- referred from emergency departments or general practices/family doctors
- diagnosed with an acute simple limb fracture

Exclusion criteria were:

- fractures of the spine, thorax (excluding clavicle), pelvis and femur
- known pathological fractures
- open fractures
- fractures that were manipulated (under anaesthesia) or internally fixed prior to outpatient review.

Two four-hour clinics were scheduled each week with a capacity of 12 appointments per clinic. The PLPFC was co-located with existing orthopaedic clinics and an orthopaedic surgeon was available for consultation as required. The criteria for liaising with an orthopaedic surgeon included patients with increased likelihood of requiring surgical intervention, such as those with unstable or substantially displaced/angulated fractures. Plaster technicians were available for cast application and removal. Administrative and nursing support were provided by existing outpatient staff. A copy of the patient's consultation notes was sent to their general practitioner and indicated the patient was seen by a physiotherapist.

A typical example of a PLPFC patient was a child with a distal radius fracture who was managed with plaster in the emergency department and subsequently referred to outpatients for follow-up. The patient was seen in the PLPFC approximately one week and 4-6 weeks post injury for reassessment and management.

Patients requiring longer term follow up after this were transferred to a surgeon-led clinic.

Service Description: Service data were collected prospectively for all patients seen in the PLPFC between 1st January 2013 and 31st December 2018. Service data included:

- Patient age (by year groups: 0-4, 5-9, 10-14, 15-16)
- Patient gender (male, female)
- Appointment type (new or review)
- Fracture type (upper or lower limb)

Data were retrieved from the organisation's electronic appointment scheduling and medical record systems. Data were entered into these systems by administration, nursing, medical and physiotherapy staff at various time points, as part of normal practice.

Service Evaluation: The PLPFC was compared to the surgeon-led fracture clinic for the total time that a patient spent in the department per appointment and proportion of appointments that were not attended by the patient ('did-not-attend' rates). Re-presentation rates in the two years after being discharged from fracture clinic were collected for all patients seen in the PLPFC and surgeon-led clinic between 01/01/2013 and 31/12/2018.

Total time in the department for patients seen in the first six months of the PLPFC was compared to patients who met the PLPFC inclusion criteria and were seen in the pre-existing orthopaedic surgeon-led fracture clinic for a six month prior to the introduction of the new service. The pre-existing surgeon-led clinic was also compared to the surgeon-led clinic for the six months following the introduction of the physiotherapist-led clinic. The comparison was restricted to these 6-month periods because further changes to our fracture clinics occurred in the years beyond 2013 and any comparisons between the PLPFC and surgeon-led clinics would be confounded by this. Total time spent in the outpatient department per appointment (arrival time to departed time) was compared between groups using linear regression. Independent variables included age group, diagnosis type and appointment type (new or review).

The proportion of patients who did not attend their appointment in each group were compared using the chi square test. All analyses were conducted in R version 3.1.3 [10].

Re-presentations in the 2 years following the patient being discharged from either the PLPFC or surgeon-led fracture clinic were identified using our electronic appointment scheduling system. Medical records of patients with re-presentations were manually reviewed (by MN) to determine if the re-presentation was related to the original injury. The proportion of patients who re-presented in each group were compared using the chi square test.

Ethical matters: The Barwon Health, Human Research Ethics Committee approved the study (reference 13/102).

RESULTS

Table 1: Characteristics of PLPFC patients and attendances.

	N
Attendances ^a	4337
New appointments	2110
Review appointments	2227
Gender (male)	2381
Age	
0-4 years	778
5-9 years	1623
10-14 years	1642
15-16 years	294

^afor the 6-year period 1st January 2013 to 31st December 2018

PLPFC service description: For the 6-year period 1st January 2013 to 31st December 2018, there were 4337 attendances at the PLPFC. Patient characteristics appear in Table 1.

Service evaluation: For the pilot period 1st January 2013 to 30th June 2013, there were 347 attendances in the PLPFC and 544 paediatric attendances in the concurrent surgeon-led fracture clinic (Table 2). For the period prior to the introduction of the PLPFC (1st January 2012 and 30th June 2012), 820 paediatric patients attended the surgeon-led fracture clinic (Table 2).

The distribution of ages ($p = 0.03$) and fracture type ($p < 0.001$) were different between the three groups (Table 2). There were no differences in the proportion of new to review appointments between the groups ($p=0.21$). Age group did not predict total time spent in the outpatient department.

Total time in the department was 82minutes less (95% CI 76-91minutes, $p < 0.001$) for patients seen in the PLPFC when compared to patients seen in the pre-existing surgeon-led clinic (Figure 1). Total time in the surgeon-led clinic reduced by 21minutes (95% CI 14-28 minutes, $p < 0.001$) from a six months before the introduction of the PLPFC compared to the six months after the introduction of the PLPFC (Figure 1).

Table 2: Patient characteristics for PLPFC compared to surgeon led fracture clinics.

		PLPFC appointments	N	Concurrent surgeon- led clinic appointments	N	Pre-existing surgeon- led clinic appointments	N
Appointment type	New	181 (52.2%)		236 (43.3%)		427 (52.1%)	
	Review	166 (47.8%)		308 (56.7%)		393 (47.9%)	
Fracture location	Upper limb	325 (93.7%)		314 (57.8%)		655 (79.1%)	
	Lower limb	22 (6.3%)		230 (42.2%)		165 (20.9%)	
Age (years)	0-4	43 (12.4%)		82 (15.1%)		116 (14.0%)	
	5-8	108 (31.1%)		140 (25.7%)		188 (22.6%)	
	9-12	122 (35.2%)		173 (31.8%)		316 (38.0%)	
	13-16	74 (21.3%)		149 (27.4%)		200 (25.4%)	

PLPFC: Physiotherapist led paediatric fracture clinic (01.01.2013-30.06.2013), Concurrent surgeon-led fracture clinic (01.01.2013-30.06.2013), Pre-existing surgeon-led fracture clinic (01.07.2012-31.12.2012)

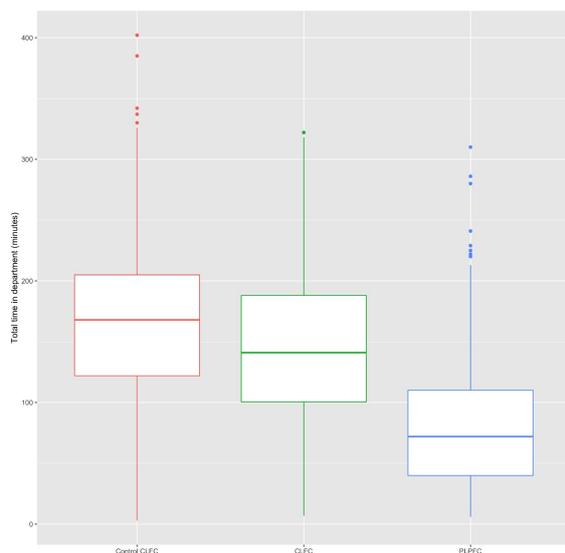


Fig. 1: Patient total time in outpatient department.

Control CLFC: Pre-existing surgeon-led fracture clinic (01.07.2012-31.12.2012)

CLFC: Concurrent surgeon-led fracture clinic (01.01.2013-30.06.2013)

PLPFC: Physiotherapist led paediatric fracture clinic (01.01.2013-30.06.2013)

The proportion of 'did-not-attend' appointments were similar between groups ($p=.48$). For the physiotherapist-led clinic, 10.3% of patients did not attend their appointment compared to 13.9% for the pre-existing surgeon-led clinic and 13.5% for the concurrent surgeon-led clinic.

The proportion of patients representing to outpatients with issues regarding their fracture were similar between the PLPFC and surgeon-led clinics ($p=.62$). Between 01/01/2013 and 31/12/2018, 6152 new paediatric patients attended either the PLPFC ($n=2110$) or surgeon led fracture clinic ($n=4042$). Thirty-four re-presentations which related to the patient's previous fracture were seen in clinic in the 2 years following the patient's original discharge from the fracture clinic. Of these, 13 patients (0.6%) had been seen in the PLPFC and 21 (0.5%) were from the surgeon-led clinic. All patients re-referred with ongoing pain progressed to pain free without significant change to the treatment plan. All patients re-referred with delayed union progressed to union with further immobilisation. Of patients who subsequently re-fractured at the same fracture site within 2 years of initial fracture, all except one (scaphoid fracture) were long bone fractures,

which is a known risk in a paediatric population.[11] There was no evidence that re- presentation related to the care provided at the initial presentation in either the PLPFC or surgeon-led clinic.

DISCUSSION

The PLPFC was introduced to improve the timeliness of care for children with simple fractures. The evaluation indicated that children seen in the PLPFC spent less time in the outpatient department compared to surgeon-led clinics. Unplanned re-presentations and did-not-attend rates were similar between the clinics, providing preliminary evidence that the PLPFC delivered safe, appropriate and acceptable care.

Ongoing reform of healthcare services is required to provide accessible care as demand for services increases. This is particularly true in regional and rural areas where access to specialised care may be limited. To address this challenge, we redesigned our fracture clinic services and employed Advanced Practice Physiotherapists to provide targeted care for children and their carers. Subsequently, appointment duration decreased substantially as patients were seen and discharged home efficiently. There was also a significant reduction of time in the department (21 minutes) for paediatric patients seen in the surgeon-led clinics, which might indicate a positive flow-on effect from the workload absorbed by the PLPFC.

Paediatric patients were prioritised in this service redesign because they represent the majority of referrals to fracture clinic and previous studies identified that clinic waiting times were the most important modifiable factor that influenced the paediatric patient experience of outpatient services [12-15]. They were also prioritised due to their lower tolerance of long waits when attending appointments, which anecdotally, was an issue in our service, consistent with what has been found by others [5,6].

Suitably trained Advanced Practice Physiotherapists were considered essential to the safety and sustainability of the PLPFC. Previous studies have shown that Advanced

Practice Physiotherapists can triage, assess and make accurate diagnoses at the level of sub-surgeon or orthopaedic surgeons [16,17]. Previous reviews of paediatric Advanced Practice Physiotherapist led clinics identified that more than 80% of all community referrals could be managed non-surgically [18] and only 7% of referrals seen by Advanced Practice Physiotherapists needed additional review by an orthopaedic surgeon [19]. Maloney et al. (2009) demonstrated that suitably trained physiotherapists can provide safe and efficient fracture care [20].

All Advanced Practice Physiotherapists working in the PLPFC met Australian Physiotherapy Association guidelines for advanced practice [8] and had prior experience in orthopaedic practice including acute fracture management. Safe and efficient practice was supported by co-locating the PLPFC with existing orthopaedic surgeon outpatient clinics, and by implementing a scope of practice that was developed with and supported by the local orthopaedic surgeons. Though cost analysis was not completed in the current study, Dakar-White et al [16] demonstrated comparable direct costs to patients and significantly lower direct costs to the hospital when comparing Advanced Practice Physiotherapists with fellowship-trained junior orthopaedic surgeons delivering outpatient orthopaedic care.

The PLPFC has become an integral part of outpatient fracture care at our health service. Following the completion of the pilot phase, the PLPFC has subsequently been funded via general outpatient revenue through the Victorian Integrated Non-Admitted Health (VINAH) and WASE funding models [21].

Limitations: Allocation of patients to the PLPFC was non-randomised and differences in outcomes between groups could be due to differences in patient characteristics rather than the clinic. Regression analysis controlled for some, but not all patient characteristics. Data were collected from electronic systems that were used for day-to-day clinic management and the accuracy of data could be a source of error. Data were collected and analysed on consecutive patients which

partially controlled for bias, as the entire accessible population over the study period were included in the review.

The review of unplanned re-presentations assessed re-presentation to our organisation only. Re-presentation to general practice and/or other health services could not be assessed. Other potentially important outcomes including specific clinical outcomes, patient/carer satisfaction and economic analysis were not directly investigated in the current study.

CONCLUSION

This study provides preliminary evidence that a PLPFC is a safe and effective option for managing paediatric patients with simple fractures. Further evaluation across a range of outcomes is necessary to evaluate the PLPFC's impact on patient care, clinical outcomes, service delivery and costs. The PLPFC is an example of service innovation that could be replicated in other health services, particularly in regional and rural areas where access to specialised orthopaedic care might be limited.

ABBREVIATIONS

PLPFC – physiotherapist-led paediatric fracture clinic

Funding: The pilot project was funded by the Victorian state government through the Victorian Paediatric Orthopaedic Network. There was no funding support for the associated research or ongoing clinic service delivery post the trial period

Conflicts of interest:

Author Professor Richard Page reports personal potential conflict of interest as: Institutional Fellowship Educational support - De Puy Synthes.

No other conflicts of interest were identified.

Author contributions:

MN, PS and RA designed and implemented the PLPFC. **MN** collected data and completed preliminary data analysis. **SL** conducted the statistical analyses. All authors assisted with analysing and interpreting the results. **MN** wrote the first draft of the paper. All authors assisted with manuscript drafting and approved the final version of the manuscript.

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