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Rapid Assessment, Planning, Investigations and Discharge (RAPID); Piloting the introduction of a senior doctor at triage model in an Australian Paediatric Emergency Department

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JAC and SL conceived the study. SLA extracted the data, and SLA and JC performed the analysis. SLA wrote the initial draft. All authors made substantial contributions to editing and interpretation of the work. JAC takes responsibility for the paper a whole.

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Abstract

Objective

We implemented a senior doctor at triage (SDT) pilot program at The Royal Children's Hospital, Melbourne. We examined the impact on ED length of stay, seen on time and FTW rates.

Methods

A SDT model was piloted on Monday and Tuesday afternoons (pilot period) for 10 weeks, and compared with equivalent shifts for the preceding 10 weeks (pre-pilot period). We determined the differences between the proportions of patients seen on time, length of stay in the ED of less than 4 hours and fail to wait rate, as well as the medians of time to clinician and length of stay in ED.

Results

2736 patients presented in the pilot period, and 2889 in the pre-pilot. The percentage of patients who were seen on time improved from 52.3% to 68.7% (absolute difference 16.4%, 95% CI 13.6 – 19.2%, p<0.001), the percentage of patients who had an ED length of stay of <4 hours improved from 58.2% to 72.0% (absolute difference 13.8%, 95% CI 11.1 – 16.5%, p<0.001) and the fail to wait rate reduced from 12.5% to 7.1% (absolute difference 5.4% ,95% CI 3.8 – 7.0%, p<0.001) when the SDT model was operational.

Conclusion

Implementation of a senior doctor at triage model in a tertiary Paediatric Emergency Department resulted in an increased proportion of patients being seen on time, having shorter length of stays in the ED and reduced the number of patients failing to wait. Further studies are required to determine whether these improvements are sustained over time.

INTRODUCTION

Emergency Department overcrowding is an international problem that negatively impacts patient care[1, 2] and decreases patient satisfaction[3]. Long waits to see a clinician can result in patients deteriorating in the waiting room, or delays to commencement of treatment such as pain relief. Furthermore, prolonged wait times are associated with an increase in patients who fail to wait (FTW) to be seen by a clinician[4, 5]. These patients are at risk of adverse outcomes by not receiving medical treatment[6].

Emergency departments around the world have tried strategies to improve patient flow and decrease patient wait times. One such strategy is the senior doctor at triage (SDT) model. This model places a senior clinician at triage to review patients soon after they present to the emergency department. This intervention has the capacity to streamline patient care by initiating treatment, ordering investigations, making referrals or discharging the patient directly home or to alternate healthcare providers if suitable.

There have been two studies performed in the United States examining SDT programs within paediatric emergency departments[7, 8]. Tsai et al performed a study in 2012 examining data from ED presentations in the first 6 months of a SDT program being implemented, compared with the preceding 6 months. Sethuraman et al performed a retrospective observational study in 2011 with data from randomly selected patients attending a Paediatric ED when a SDT program was running, compared to a control period[8]. Both of

these studies demonstrated decreased time to provider, reduced length of stay within the ED and reduction in the fail to wait rate.

A systematic review was performed by Abdulwahid et al[9] in 2016 examined the effect of SDT models in either adult or mixed emergency departments. This review included 25 studies, with the majority demonstrating a beneficial effect on ED performance. Pooled data from these studies demonstrated reductions in wait time, ED length of stay, and rates of patients failing to wait (FTW). This systematic review showed no change in adverse events with implementation of this model.

There were 5 Australian studies included in this systematic review[10-14]. Thus far there has been no Australian studies published that have examined introduction of this intervention in a Paediatric Emergency Department.

This pilot study examines the effect of a SDT model within an Australian paediatric emergency department, introduced in response to prolonged wait times. We hypothesise that this model will positively impact whole of ED function, as demonstrated by improved rates of patients' time to be seen, length of stay within the ED and a reduction in fail to wait rates. This study could clarify whether this intervention is applicable to our local setting and can be helpful to provide evidence for other paediatric emergency departments considering implementing a similar program.

METHODS

Design and setting:

This was a single centre observational study set at The Royal Children's Hospital (RCH) Melbourne. RCH is a quaternary paediatric hospital and paediatric major trauma centre with approximately 86,000 Emergency Department presentations annually. The department has 4 resuscitation bays, 20 acute care bays, a fast track area and an ED short stay with 8 - 12 beds. The Royal Children's Hospital Ethics Committee provided ethics approval for this study, HREC Reference Number LNR/18/RCHM/131.

Study population:

A senior doctor at triage program was piloted for 10 weeks from the 21st August 2017 until the 29th October 2017. The program ran on Monday and Tuesdays from 12:00 until 20:00. To determine the impact of the model of care on global ED function, the inclusion criteria for the pilot cohort were all patients presenting to the ED during the pilot period. The pre-pilot period was the 10 weeks preceding the pilot, from the 12th June 2017 until the 20th August 2017. The inclusion criteria for the pre-pilot cohort were all patients presenting to the emergency department on Monday and Tuesday from 12:00 to 20:00 during the pre-pilot period. Patients were excluded from analysis if they were dead on arrival or were diverted to the co-located general practice clinic. In addition, patients who failed to wait to be seen by an ED clinician were excluded from the time to being seen and length of stay analyses.

Study procedure and data collection:

Patients were eligible for intervention following triage nurse assessment. This process allocates a triage category according to the Australasian Triage Scale (ATS)[15]. The categories are used to differentiate patients based on clinical urgency, and determine a desirable maximum waiting time (Table 1). Depending on bed availability and clinical urgency the patient will either move to an appropriate location within the ED or be placed in the waiting room. The senior doctor at triage team functioned out of the triage and waiting area. In our centre this team was called the Rapid Assessment, Planning, Investigations and Discharge (RAPID) team.

The senior doctor at triage team consisted of an Emergency consultant or fellow, a resident, a nurse practitioner and a nurse. Staff reviewed triage information and assessed patients that were deemed appropriate for intervention, however no specific cohort of patients were targeted. The team was instructed to perform a short assessment, and to perform interventions or begin a management plan which would speed the patient's eventual disposition. This could include ordering investigations or medication administration, admission directly to the ED Short Stay unit (EDSSU), referral to inpatient teams or discharge home. The RAPID team could continue to manage patients in the waiting room if required. Their assessment was documented in a specific area within the electronic medical record, which triggered a flag to notify other staff that the patient has received a RAPID assessment; this record was pulled into the patients clinical notes. No specific limitation on types or acuity of patients was given, but in general patients assessed by the team were category 3-5 as patients requiring immediate or urgent care (e.g. category 1 - 2) were taken directly to

the resuscitation area. There were no additional staff employed during the study period, but were reallocated from existing roles.

Demographic data and ED performance data is collected on every patient presenting to the RCH Emergency Department via the EMR (Epic Systems Corp, Wisconsin USA, 2017). We collected de-identified data points on patients presenting in the pilot and pre-pilot period. The data points extracted were arrival status (dead/alive), age, triage category, time to clinician, length of stay in ED, disposition and whether they FTW to be seen by a clinician. For the purposes of this trial, "seen on time" refers to the time from arrival to the time the patient was seen by either the treating clinician or the RAPID clinicians.

Outcome measures:

The primary outcomes for the study were the proportion of patients that were seen 'on time' i.e. within the Australasian Triage Scale wait times, the proportion of patients that had a length of stay within the ED of less than 4 hours, and the FTW rates for the pilot and pre-pilot period. Secondary outcomes were median ED length of stay and median waiting times to see a clinician.

Variables:

Demographic data from the two was obtained to determine whether there were any baseline differences. An unvalidated internal metric was utilized to determine access block (requirement for admitted patients to board in the ED due to lack of inpatient beds), as access block is an independent variable impacting a patients ED length of stay. This index

measured every hour greater than 2 hours that a patient remained in the ED after an inpatient bed had been requested.

Statistical Methods:

Study investigators extracted data points from the Royal Children's Hospital Electronic Medical Record (Epic Systems Corp, Wisconsin USA, 2017). The data was exported to an Excel spreadsheet (Microsoft Corp, Redmond Washington USA, 2018) and analysed using Stata (Stata Corp, College Station, Texas USA, 2017). A two sample z-test of proportion was used to determine the difference between proportions (patients seen on time, length of stay in the ED of less than 4 hours and FTW rate). Mann-Whitney U tests were used to determine the difference between two medians (time to clinician and time within the ED).

RESULTS:

Participants:

2899 patients presented within the pre-pilot period and 2736 patients presented to the ED within the pilot period; see Figure 1 for a description of patients excluded from analysis. The gender, age, patient triage categories and mean access block on the study days were similar between the two groups (Table 2).

Outcome Data:

There were significant improvements in the absolute percentage of patients seen on time, having a length of stay less than 4 hours, and FTW rate, as well as the medians of length of stay and time to being seen by a clinician (Table 3). There were significant improvements in the percentage of patients seen on time and median time to be seen in both patient acuity groupings (Category 1-3 and 4-5). Improvements were most marked in length of stay and percentage of patients with a length of stay less that 4 hours for those discharged from ED. There was no significant improvement in length of stay for patients admitted to the ward, and a trend in improvement for patients admitted to EDSSU which was not significant after correcting for multiple comparisons.

DISCUSSION:

This study demonstrated that implementation of a SDT model improved whole Emergency Department flow in a tertiary Australian paediatric emergency department.

These findings are consistent with the results of the two previous international studies[7, 8] on implementation of a senior clinician at triage model within Paediatric Emergency Departments. This study showed the generalisability of this program to a local population. This study provides data for other institutions considering implementation of a similar program.

Although a SDT model is a useful strategy to improve patient flow and government directed ED key performance indicators, it is more significant to consider the direct impact on the

patient experience. The pilot program showed improvements in time to being seen by a clinician and total length of stay; this translates to the potential to decrease the suffering of a child and their family, by enabling faster access to analgesia, anti-emetics, investigations and definitive management of their medical condition. The reduction in the number of children who FTW represents a large cohort of patients who received medical care during their presentation who otherwise would not have.

This pilot study is important as it did not utilise additional staff, but rather reallocated clinician resource. This aspect of the study negates the potential impact of the benefit to patients by having additional staff working in any area of the department.

Limitations:

As the pilot and pre-pilot populations presented to the ED at different times of year and for only 10 weeks, the full effect of seasonality on these results cannot be determined.

There is an assumption that improvement in key performance indicators such as time to clinician and ED length of stay improve patient and staff satisfaction, and patient care. This study did not examine the impact of the senior clinician at triage model on patient satisfaction. There is a significant 'trade off' for patients with this model. They get a timely assessment by a senior clinician but how that compares to waiting for a full assessment within the department, has not been fully established.

Staff satisfaction with the pilot program was not assessed in this study. Anecdotally there was a positive response from the ED staff about the introduction of the SDT team. Reduction in patient aggression and frustration in the waiting room, and improved access to senior medical staff by the triage nursing staff was voiced by ED staff as positive outcomes of the program.

There is an assumption that when patients are spending less time in the waiting room, and being seen earlier in their stay by a senior clinician, there is an improvement in patient outcomes. Senior doctor at triage models in their essence are fast and targeted patient assessment that cannot replace a full medical assessment within the Emergency Department. When a patient is discharged directly from triage, there is a risk that information that would have become apparent with a full assessment could be missed by the SDT team. Although there is an expectation that this program improves patent safety, this issue was not explored in this study. In addition, many potential drawbacks of a SDT model (such as segmented care, communication and handover issues, and junior doctor experience) have not been explored in this study and would require a more qualitative study design.

CONCLUSIONS:

Implementation of a SDT model in a tertiary Paediatric Emergency Department resulted in an increased proportion of patients being seen on time, having shorter length of stays and

reduced the number of patients failing to wait. Further studies are required to determine whether these improvements are sustained over time, to explore the financial implications of the model, and to examine patient safety and staff satisfaction. Larger studies performed with increased patient numbers over a prolonged period of time are required to overcome potential differences in overall ED performance trends, seasonality, patient demographics and to perform an economic evaluation.

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Tables and Figures

Table 1. Australasian Triage Scale[15]

Australasian Triage Scale Category	**Treatment Acuity** (Target time for medical assessment and treatment)
ATS 1	Immediate
ATS 2	10 minutes
ATS 3	30 minutes
ATS 4	60 minutes
ATS 5	120 minutes

Table 2; Patient Demographics

	Pre-Pilot	Pilot
Patients	2899	2736
% Male	55.7	55.5
Patients with Triage Category	3.7	3.8
1	11	11
2	110	111
3	717	603
4	1625	1615
5	435	396
(deceased on arrival) 6	1	0
Mean age (years)	5.4	5.3
Mean hrs access block/day*	132.7	133.3

*internal hospital metric adding every hour greater than 2 hours that patients remain in the ED after an inpatient bed had been requested

Table 3; Results

	Pre-Pilot % (95% CI)	Pilot % (95% CI)	Difference % (95% CI)	p-value	Corrected p-value*
Seen on time	52.3 (50.2-54.4)	68.7 (66.8-70.5)	16.4 (13.6-19.2)	<0.001	<0.001
Cat 1-3 patients	63.6 (60.4-66.9)	79.1 (76.2-82.1)	15.5 (11.1-19.9)	<0.001	<0.001
Cat 4-5 patients	45.5 (42.9-48.1)	64.0 (61.6-66.3)	18.5 (15.0-22.0)	<0.001	<0.001
LOS < 4hrs	58.2 (56.2-60.2)	72 (70.2-73.8)	13.8 (11.1-16.5)	<0.001	<0.001
Admit Ward	20.4 (16.6-24.3)	23.0 (18.7-27.3)	2.6 (-8.3-3.2)	0.375	1.000
Discharged	66.1 (63.8-68.4)	82.4 (80.6-84.2)	16.3 (13.3-19.2)	<0.001	<0.001
Admit EDSSU	73.2 (67.4-79.0)	82.6 (77.8-87.5)	9.4 (1.8-17.0)	0.015	0.059
FTW	12.5 (11.2-13.8)	7.1 (6.1-8.1)	5.4 (3.8-7.0)	<0.001	

	Pre-Pilot (min) Median (IQR)	Pilot (min) Median (IQR)	p-value	Corrected p-value*
Time to being seen	41 (17, 113)	28 (15, 69)	<0.001	<0.001
Cat 1-3 patients	23 (13, 37)	17 (10, 28)	<0.001	<0.001
Cat 4-5 patients	84 (25, 156)	43 (18, 90)	<0.001	<0.001
Length of Stay	218 (145, 311)	175 (110, 256)	<0.001	<0.001
Admit Ward	347 (260, 546)	357 (255, 522)	0.804	1.000
Discharged	198 (134, 277)	153 (99, 217)	<0.001	<0.001
Admit EDSSU	181 (115, 255)	164 (107, 222)	0.045	0.182

*Bonferroni correction for multiple comparisons

Figure 1; Patient consort diagram

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