

# A community intervention trial to evaluate emergency care practitioners in the management of children

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## ABSTRACT

**Objective** To evaluate the impact of emergency care practitioners (ECPs) on the patient care pathway for children presenting with minor conditions in unscheduled care settings.

**Design** A pragmatic quasi-experimental multi-site community intervention trial comparing ECPs with usual care providers.

**Setting** Three pairs of emergency and urgent care services in the UK: minor injury unit (MIU), urgent care centre (UCC) and general practitioner out of hours.

**Patients** Paediatric acute episodes (n=415 intervention and n=748 control) in participating services presenting with minor conditions.

**Main outcome measures** Percentage of patients discharged following care episode and percentage of patients referred to hospital and primary care services.

**Interventions** ECPs operational in emergency and unscheduled care settings.

**Results** ECPs discharged significantly fewer patients than usual care providers (percentage difference 7.3%, 95% CI 13.6% to 0.9%). ECPs discharged fewer patients within all three pairs of services (out of hours percentage difference 6.33%, 95% CI 15.17% to 2.51%; UCC percentage difference 8.73%, 95% CI 19.22% to 1.76%; MIU percentage difference 6.80%, 95% CI 24.36% to 10.75%). ECPs also referred more patients to hospital (percentage difference 4.6%, 95% CI -2.9% to 12.0%) and primary care providers (percentage difference 3.0%, 95% CI 3.7% to 9.7%).

**Conclusions** ECPs are not as effective as usual health providers in discharging children after assessment of urgent healthcare problems. This has implications for the workload of other paediatric providers such as the emergency department. ECPs may be better targeted to settings and patients groups in which there is more evidence of their effectiveness in patient care pathways.

## BACKGROUND

The provision of unscheduled care services for children (and adults) outside of hospital has changed considerably in recent years.<sup>1-3</sup> As fewer doctors are available to provide out of hours cover and new unscheduled services emerge to meet patient need, allied health professionals are increasingly operating in extended roles.<sup>4-6</sup> A consequence of this is that professionals working in these extended roles, such as emergency care practitioners (ECPs), are now involved in the management of children presenting with acute health problems.<sup>7 8</sup>

The ECP position is an extended role for paramedics or nurses trained to work autonomously, to see and treat patients and discharge or refer

## What is already known on this topic

- ▶ Services for children with acute problems outside of hospital have changed in recent years with new services replacing traditional provision by doctors.
- ▶ The role emergency care practitioners (ECPs) in the management of children in unscheduled services is unclear.
- ▶ There is no current evidence for the effectiveness of ECPs in the management of children.

## What this study adds

- ▶ ECPs are seeing significant numbers of children in a range of unscheduled care settings.
- ▶ ECPs are not as effective as usual care providers in discharging children with minor conditions in unscheduled care services.
- ▶ ECPs may be better targeted to those unscheduled care settings and patient groups in which there is clearer evidence of their effectiveness.

appropriately. ECPs operate in a range of urgent and unscheduled care settings such as out of hours primary care, urgent care centres (UCCs) and minor injury units (MIUs). The main focus of the ECP role is to improve the patient experience and pathway of care in these settings, particularly by discharging patients at the scene or by referring to the most appropriate care practitioner, thereby reducing unnecessary attendances at emergency departments or avoidable admissions.<sup>7 9</sup> The duration of ECP training is typically around 12 months, 6 months of which is taught and 6 months of which consists of clinical attachments.<sup>9</sup> At present there is no requirement for ECPs working with children to complete specific paediatric specialty attachments.

It is vital that the effectiveness of allied health professionals working in new roles is carefully evaluated. There is currently no evidence for the effectiveness of practitioners operating in extended roles in the management of children despite the fact that this caseload is potentially high risk and even experienced paediatricians face challenges in dealing with the undifferentiated early stages of illness in children.<sup>10</sup> As part of a pragmatic multi-centre quasi-experimental community intervention trial, we carried out a subanalysis of main trial data to evaluate the

effectiveness of ECPs in the acute management of children, focusing on patient pathway and care.

## METHODS

### Participating services

The main trial evaluated five pairs of unscheduled care services. Each participating service was aware that the study was taking place. Each pair comprised an intervention ECP service and a control service in a similar geographical setting in which ECPs were not operational. Three of the five trial ECP services saw children as part of their caseload and these paired services were included in the subanalysis (table 1). Sampling took place between January and August 2007 and the total time to recruit patients varied by paired service and was dependent on activity levels within each service. Ethics approval for the study was provided by the Scottish MREC.

### Patient identification/eligibility

All patients under the age of 16 years of age presenting to the three pairs of included services in this study were eligible for inclusion. Eligible paediatric cases were identified from routine electronic patient data and included information such as age, sex and presenting complaint collected at presentation to the study services. Consecutive eligible cases were selected during the defined sample study periods in each pair of services.

### Data collection

Details of patient management and disposal at the time of the paediatric acute health episode were collected in order to evaluate the impact of ECPs. This information was gathered from the patient clinical records collected for each included case. Information was obtained on incident location (eg, home, public place), clinical assessment (presenting complaint, investigations performed, treatments given, disposition, discharge diagnosis) and time with patient. Databases were designed by the research team for storing all data relating to the acute health episode using Access 2000 software. On completion of coding and cleaning of the database, the data were imported into the Stata v 11 statistical software package for analysis.

### Sample size

A sample size was determined for the main trial and has been described elsewhere.<sup>7</sup> For the subanalysis of paediatric acute episodes, it was calculated that a sample size of at least 240 per site pairing would provide 90% power at  $\alpha=0.01$  to detect

effect sizes of 0.5 SD. A type 1 error rate of 0.01 was selected to allow testing of five outcomes at an overall significance level of 5%.

### Data analysis

Patient pathways and management outcomes were compared between intervention (ECP) services and control services (non-ECPs). Primary outcomes included:

1. Discharged following consultation (those who were discharged without either an appointment or advice to see another health professional)
2. Urgently referred to hospital (these were patients who were referred immediately to either the emergency department or direct admission to a hospital ward)
3. Non-urgently referred to primary or community care (these were patients who were referred either to their GP, a community professional or a hospital outpatient department at a specified time).

Secondary outcomes included:

4. The total episode time, defined as the time from the patient first contacting the included study service to the end of their contact with that service; time was recorded in minutes
5. Patients undergoing any investigation at their initial episode
6. Patients receiving any treatment at their initial episode.

For the analysis of episode times, a log-transform was applied to the data and the results presented as time ratios (which can be interpreted as the ratio of the median episode time of the ECP compared to control). For all other outcomes the difference in percentages was calculated. The overall effect, averaged across all three pairs, was derived using a random-effects meta-analysis.<sup>11</sup> The difference in percentages (or time ratios for episode time) with their corresponding 99% CIs are presented for each outcome. The summary (pooled) treatment effect (with 99% CI), the  $I^2$  statistic and the statistical test for heterogeneity are also shown. The test of heterogeneity indicates whether the differences between intervention and control are consistent across the three pairs of services, and high  $I^2$  values (near 100%) indicate a high percentage of the overall variance is due to differences among the pairs.

As this was a non-randomised design, further analyses were performed to assess whether any differences in outcomes between intervention and control services could be due to characteristics of the services other than the intervention. The data were re-analysed using analysis of covariance (episode time) or logistic regression (all other outcomes), adjusting for setting, age, gender and presenting complaint (categorised as trauma vs non-trauma). For each outcome and each service the unadjusted odds ratio (time ratio for episode time) was calculated and was compared to the odds ratio (time ratio) derived from the relevant regression model to assess whether the findings still held after adjustment for these factors.

## RESULTS

A total of 1153 paediatric cases were identified from the three pairs of services. Figure 1 describes the trial profile of eligible patients. Routine clinical data were available on all the patients identified. The patients were identified and distributed across the pairs of services as shown in table 2.

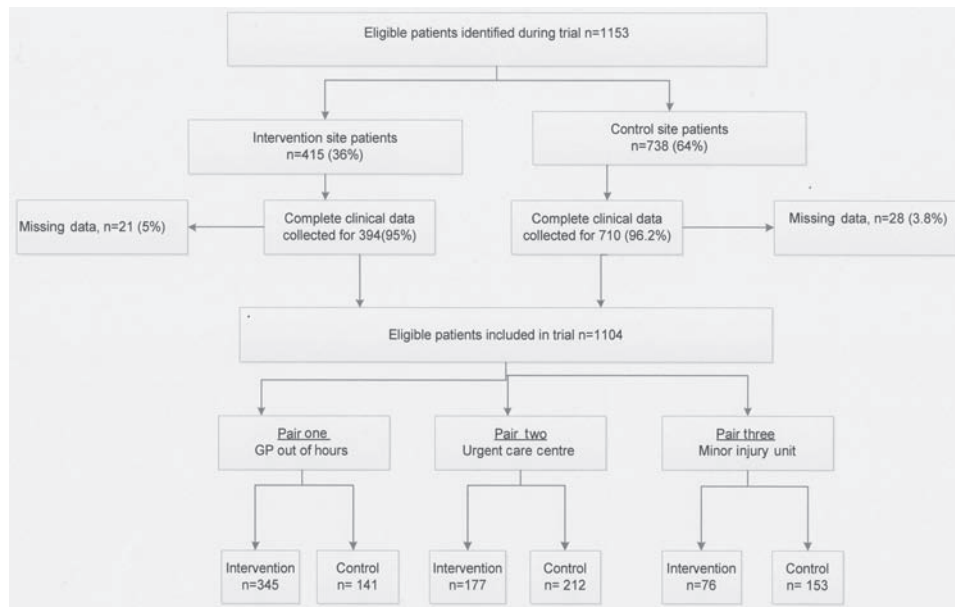
### Patient outcomes

Patient outcomes are presented for intervention (ECP) and control in table 3, which shows the distribution by pair of service and overall.

**Table 1** Pairs of services included in the study

Pair	Service setting	Intervention service setting(s)	Control service setting(s)
1	GP out of hours service	ECPs working within GP-led primary care out of hours service	GP-led out of hours primary care service staffed by GPs and nurse practitioners
2	Urgent care centre	ECP-led 24 h urgent care centre based in a community hospital	Nurse practitioner-led 24 h 'casualty' based in a small hospital
3	Minor injury unit	ECPs working in a minor injury unit alongside nurse practitioners	Nurse practitioners working in minor injury unit

ECP, emergency care practitioner; GP, general practitioner.



**Figure 1** Trial profile of eligible patients. GP, general practitioner.

**Table 2** Baseline patient data by intervention and control within pairs of services and overall

	GP out of hours		Urgent care centre		Minor injury unit		Overall	
	ECP (N=142)	Control (N=350)	ECP (N=221)	Control (N=188)	ECP (N=85)	Control (N=167)	ECP (N=415)	Control (N=738)
Mean age, years (SD)	4.2	4.3	6.4	6.3	8.7	9.6	6.3	5.9
Male, n (%)	66 (46.5)	169 (48.3)	95 (50.5)	140 (63.3)	59 (69.4)	97 (58.4)	220 (53.0)	406 (55.0)
Presenting complaint								
Medical general	84 (64.6)	236 (71.3)	65 (36.7)	74 (37.0)	2 (2.4)	27 (16.6)	151 (38.7)	337 (48.6)
Trauma	6 (4.6)	3 (0.9)	64 (36.2)	90 (45.0)	74 (89.2)	117 (71.8)	144 (30.3)	210 (30.3)
Eye/ENT	16 (12.3)	38 (11.5)	32 (18.1)	26 (13.0)	7 (8.4)	11 (6.7)	55 (14.1)	75 (10.8)
Respiratory	24 (18.5)	54 (16.3)	16 (9.0)	10 (5.0)	0 (0)	8 (4.9)	40 (10.3)	72 (10.4)

ECP, emergency care practitioner; ENT, ear, nose and throat; GP, general practitioner.

## Patient disposition

### Discharge

For each service pair, the probability of being discharged between the intervention and control services is shown in figure 2. Overall ECPs discharged significantly fewer children than usual care providers. ECPs also discharged fewer children in all three pairs of services, although the results for individual service pairs were non-significant.

### Referrals

The proportion of patients urgently referred to hospital or non-urgently referred to primary or community care is also shown in figure 2. In the MIU pair, significantly more patients were referred to hospital than by usual care providers. In the remaining two service pairs, ECPs referred a greater proportion of children to hospital, although these differences were not significant.

Non-urgent referrals (such as a primary care or other community appointment) were more frequently made by ECPs in the GP out of hours (GP OOH) and the urgent care pairs of services. In the MIU pair, ECPs referred fewer patients for a non-urgent follow-up.

## Patient management

Secondary outcomes of patient management and clinical data were collected for each patient in the three pairs of services. Information on total episode time, number of investigations

and number of treatments for the children was extracted from these data and is shown in table 3. There was significant heterogeneity between the pairs of services for each of the secondary outcomes and therefore the results for these outcomes focus on differences observed within each pair.

### Episode time

The total episode times for patients were less for children seen by ECPs within each of the three pairs of services, significantly so for out of hours and urgent care (table 3).

### Investigation

In the MIU pair, the percentage of children receiving investigations from ECPs was significantly less than from the standard providers. In the GP OOH service pair, a greater non-significant percentage of children received investigation by ECPs than standard providers. Minimal differences were seen between the paired sites in the urgent care setting (table 3).

### Treatment

ECPs provided fewer treatments than usual care providers within each paired service. In the UCC pair, the percentage of children receiving treatments from ECPs was significantly less than from the standard providers. In the remaining service pairs, ECPs also treated a smaller percentage of children, although the differences were non-significant. These types of treatments might include dispensing drugs such as

**Table 3** Outcomes by intervention and control within pairs of services and overall

	GP out of hours		Urgent care centre		Minor injury unit		Overall	
	ECP (N=142)	Control (N=350)	ECP (N=188)	Control (N=221)	ECP (N=85)	Control (N=167)	ECP (N=415)	Control (N=738)
<b>Primary outcomes</b>								
Patients discharged, n (%)	119 (84.4%)	313 (90.7%)	134 (75.7%)	179 (84.4%)	45 (59.2%)	101 (66.0%)	298 (75.6%)	593 (83.5%)
Difference (99% CI)	6.3% (15.2% to 2.5%)		8.7% (19.2% to 1.8%)		6.8% (24.4% to 10.8%)		7.3% (13.6% to 0.9%)	
Heterogeneity	$I^2=0.0\%$ , $p=0.90$							
Patients referred to hospital, n (%)	18 (12.8%)	32 (9.3%)	12 (6.8%)	12 (5.7%)	14 (18.4%)	9 (5.9%)	44 (11.2%)	53 (7.5%)
Difference (99% CI)	3.5% (4.8% to 11.8%)		1.1% (5.2% to 7.5%)		12.5% (0.1% to 25.0%)		4.5% (2.9% to 12.0%)	
Heterogeneity	$I^2=57.4\%$ , $p=0.10$							
Patients referred to primary care, n (%)	4 (2.8%)	0 (0.0%)	31 (17.5%)	21 (9.9%)	17 (22.4%)	43 (28.1%)	52 (13.2%)	64 (9.0%)
Difference (99% CI)	2.8% (1.0% to 6.7%)		7.6% (1.5% to 16.7%)		5.7% (21.2% to 9.7%)		3.0% (3.7% to 9.7%)	
Heterogeneity	$I^2=48.1\%$ , $p=0.15$							
<b>Secondary outcomes</b>								
Median (IQR) episode time, min	81 (66–109)	140 (108–205)	34 (20–52)	43 (24–75)	22 (18–29)	27 (16–45)	45 (24–75)	92 (36–147)
Time ratio (99% CI)	0.59 (0.52 to 0.67)		0.78 (0.64 to 0.95)		0.82 (0.63 to 1.07)		0.67 (0.60 to 0.74)	
Heterogeneity	$I^2=86.1\%$ , $p=0.001$							
Any investigation, n (%)	10 (7.0%)	8 (2.3%)	27 (14.4%)	36 (16.3%)	0 (0.0%)	38 (23.6%)	37 (9.1%)	82 (11.2%)
Difference (99% CI)	4.8% (1.1% to 10.7)		1.9% (11.1% to 7.3%)		23.6% (32.5% to 14.7%)		6.8% (28.9% to 15.3%)	
Heterogeneity	$I^2=95.7\%$ , $p<0.001$							
Any treatment excluding advice, n (%)	64 (45.1%)	192 (54.9%)	73 (38.8%)	148 (67.0%)	27 (34.6%)	70 (43.5%)	164 (40.2%)	410 (56.0%)
Difference (99% CI)	9.8% (22.5% to 3.0%)		28.1% (40.4% to 15.9%)		8.9% (26.0% to 8.3%)		16.0% (33.1% to 1.1%)	
Heterogeneity	$I^2=78.0\%$ , $p=0.01$							

ECP, emergency care practitioner; GP, general practitioner.

antibiotics or analgesics, insertion of sutures and applications of dressings (table 3).

### Sensitivity analyses

Further analyses were performed on each outcome in which the difference between ECP and control was adjusted for age, gender and presenting complaint. The results of these analyses were consistent with the unadjusted results (data not shown).

## DISCUSSION

### Principal findings

ECPs are working in different unscheduled service settings depending on how they have been commissioned locally and the design of this study provided the opportunity to compare ECP management of children in three different service settings and supplied some evidence for their effectiveness. There was some variation in ECP outcomes between the three different unscheduled care services included in the trial. This reflects the different operational characteristics of the settings in which ECPs saw children and also the different usual care provider they were compared with in these settings. For example, in the GP OOH paired service, ECPs were compared primarily with GPs, while in the other paired services ECPs were compared with nurse practitioners.

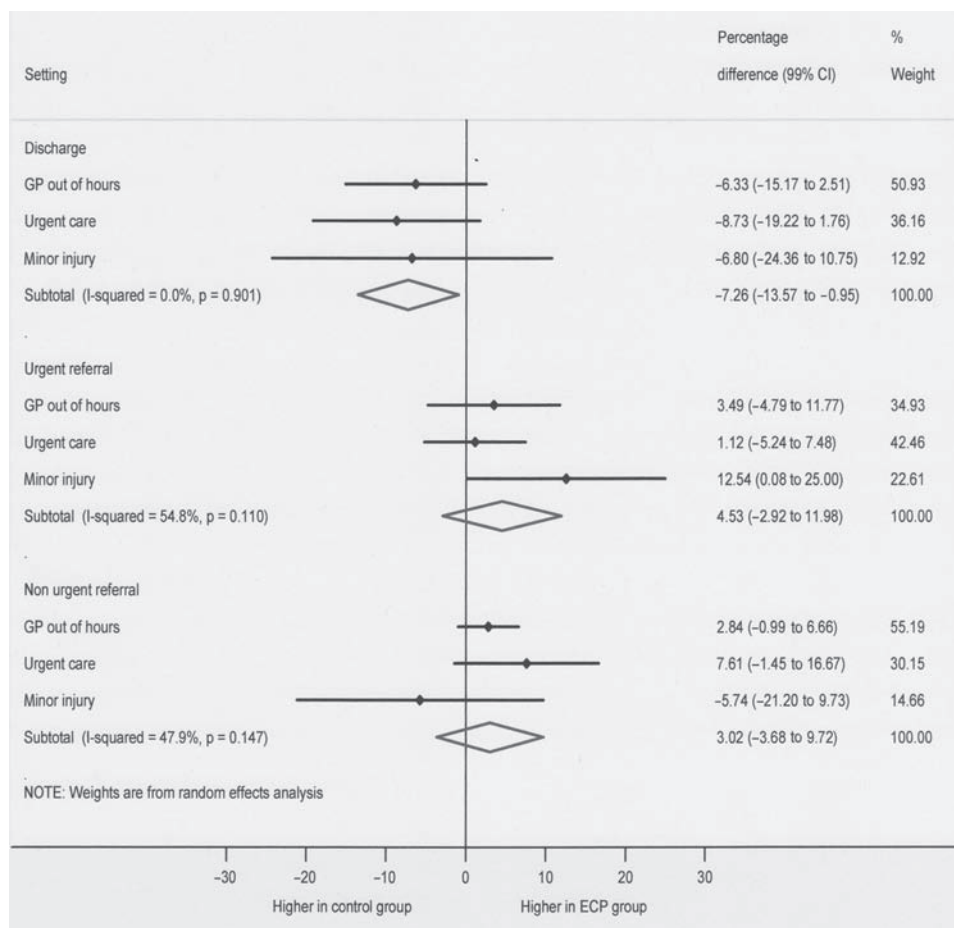
However, there were also consistent ECP outcomes across and within the service settings, particularly with regard to our primary outcome of the patient care pathway following the paediatric care episode. Overall, we found ECPs discharged significantly fewer children than non-ECP providers across all three services in which children were managed. Within each of the three service pairs, ECPs also discharged fewer patients than non-ECPs, although the percentage differences were non-significant. ECPs also referred a greater number of children for urgent hospital appointments than non-ECPs in each of the three

service settings, although this was only significant for the MIU pair. There were no significant differences in the proportion of children referred to primary care by ECPs and non-ECPs.

Previous studies evaluating ECPs have reported reduced referral to the emergency department and reduced hospital admissions compared with usual care providers.<sup>12–14</sup> However, in each of these studies ECPs were operating as mobile community responders working across traditional healthcare boundaries and targeted to specific elderly patients. In our study ECPs were managing children as a 'static' resource within care centres which were providing unscheduled care for children.

There was significant heterogeneity in our secondary outcomes between the three pairs of services. Thus overall conclusions across the three pairs of services cannot be made. However, we found episode times of children seen by ECPs were significantly less than episode times of usual providers within each of the three paired services. There was a non-significant trend for ECPs to provide fewer treatments than usual care providers within each pair of services. Some opposing non-significant trends were apparent for any investigations, with ECPs in two pairs (MIU and UCC) providing fewer investigations than usual care providers and ECPs investigating more than usual care providers in GP OOH.

One previous study evaluated time spent with the patient by practitioners with extended skills.<sup>15</sup> This study found that paramedics with extended skills spent longer with patients, but the episode time was reduced simply because fewer journeys to the emergency department and hospital were being made by patients. Time has the potential to be important both in terms of costs and also patient satisfaction. Our results for episode times have to be treated with caution as this time includes total contact time with the service (including time from initial contact with the service to seeing a professional). Thus it is unclear to what extent this time is a result of ECP consultation times or other factors such as reduced waiting times in the services in



**Figure 2** Disposition outcomes of children following care. ECP, emergency care practitioner; GP, general practitioner.

which ECPs were operational. With regard to investigations and treatments, one previous evaluation of ECPs found they carried out fewer investigations and provided more treatments than usual providers.<sup>12</sup> Our finding that ECPs provided fewer treatments than usual healthcare providers in each of the three service pairs is perhaps unsurprising as more children were referred to other healthcare professionals who may have been expected to undertake necessary treatments. The findings for investigations were less consistent and preclude any firm conclusions.

### Implications

This study is the first to report the management of children by extended healthcare providers in unscheduled care such as ECPs and demonstrates that ECPs are seeing significant numbers of children in different health service settings. These different services were characterised by the provision of unplanned urgent care in a health centre based setting. Previous studies have demonstrated paramedics and nurses with extended skills managing specific patient groups or specific conditions.<sup>15–17</sup> We provide evidence that ECPs are fulfilling a broad public health and primary care outreach role in the management of children.

ECPs were originally conceived as flexible practitioners, able to work across traditional boundaries and 'add value' by reducing unnecessary referral to over-stretched services such as the emergency department.<sup>6</sup> In our study ECPs appear to discharge significantly fewer children and consequently increase the number of children referred on to other services compared with current standard non-ECP providers. This may have implications for the workload of other services such as the emergency

department. Fewer doctors are now available to provide 24 h emergency and urgent care cover for patients. Allied health professionals working in extended roles such as ECPs are increasingly likely to be involved in managing patients (including children) in unscheduled care services and it is important that they are able to provide care at least as effectively as the traditional providers they are replacing. It is crucial that allied health staff working in extended roles have equivalent clinical competencies in recognising the well and the sick child as emergency department doctors.<sup>18</sup> Currently the duration of ECP training is 12 months and while this includes clinical attachments, there is no necessity for a paediatric clinical attachment to be included in the training. This study has highlighted this area of patient care as being a potential weakness for ECPs.

### Limitations

There were limitations to this study. This was by necessity a non-randomised design as the ECP services evaluated were fully operational at the time of the study.

The nuances of local systems of care delivery may mean that the findings from comparing a particular ECP service with a non-ECP matched service may affect generalisability. However, two of the three services are familiar service models (MIU, GP OOH) which are unlikely to differ markedly between localities, and adjusting for possible differences in case mix (age, gender and presenting complaint) did not affect the conclusions. Our outcomes data were derived from routine written and electronic clinical records and there are inevitable limitations with regard to completeness and accuracy of data collected in

this way. With respect to our data on episode times, we were unable to collect complete data on actual staff consultation times for comparison between ECPs and usual care providers.

## CONCLUSION

ECPs do not appear to be as effective as standard health providers in discharging children after assessment of an urgent healthcare problem. ECPs managing children in unscheduled healthcare centres are not fulfilling the primary remit of their role to improve the pathway of care for patients. ECPs may be better targeted to settings and patient groups in which there is more evidence of their effectiveness on patient care pathways.

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**Competing interests** None.

**Ethics approval** This study was conducted with the approval of the Scottish MREC (06/MRE00/20).

**Provenance and peer review** Not commissioned; externally peer reviewed.

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