ORIGINAL ARTICLE

Effectiveness of emergency care practitioners working within existing emergency service models of care

Suzanne Mason, Colin O'Keeffe, Patricia Coleman, Richard Edlin, Jon Nicholl

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Background: An emergency care practitioner (ECP) is a generic practitioner drawn mainly from paramedic and nursing backgrounds. ECPs receive formal training and extended clinical skills to equip them to work as an integral part of the healthcare team working within and across traditional boundaries of emergency and unplanned care. Currently, ECPs are working in different healthcare settings in the UK.

Objectives: (1) To evaluate appropriateness, satisfaction and cost of ECPs compared with the usual service available in the same healthcare setting, (2) to increase understanding of what effect, if any, ECPs are having on delivery of health services locally and (3) to evaluate whether ECP working yields cost savings.

Methods: Using a mixed-methods approach, data were collected quantitatively and qualitatively from three different types of health provider setting where ECPs are operational, in three areas of England. Data were collected by sending two questionnaires to each patient eligible to be seen by an ECP, at 3 and 28 days after presentation; telephone interviews were conducted with a sample of staff that included ECPs, other health professionals and stakeholders (eg, managers) in each of the three settings; and routine data were analysed to provide a perspective on costs.

Results: After adjusting for age, sex, presenting complaint and service model, some differences in the processes of care between the ECPs and the usual providers in the three settings were observed. Overall, ECPs carried out fewer investigations, provided more treatments and were more likely to discharge patients home than the usual providers. Patients were satisfied with the care received from ECPs, and this was consistent across the three different settings. It was found that ECPs are working in different settings across traditional professional boundaries and are having an impact on reconfiguring how those services are delivered locally. Costs information (based on one site only) indicated that ECP care may be cost effective in that model of ECP working.

Conclusion: Care provided by ECPs appears to reduce the need for subsequent referral to other emergency and unscheduled care services in a large proportion of cases. We found no evidence that the care provided by an ECP was less appropriate than the care by the usual providers for the same type of health problem.

See end of article for authors' affiliations

Correspondence to:
Dr S Mason, Health Services
Research, School of Health
and Related Research,
University of Sheffield,
Regent Court, Regent Street,
Sheffield S1 4DA, UK;
s.mason@sheffield.ac.uk

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A recently published report by the Department of Health¹ contains a vision of the ambulance service in the UK "to provide and co-ordinate increasing range of mobile healthcare for patients who need urgent care" (p 17), and "to provide an increasing range of other services e.g. in primary care, diagnostics and health promotion" (p 21). A key strategy in achieving these goals is the development of the emergency care practitioner (ECP) role.^{1,2} An ECP is a generic practitioner drawn from paramedic and nursing communities or other relevant healthcare background. ECPs receive formal training and extended clinical skills to equip them to work across traditional boundaries in emergency and unplanned care. Nationally, the implementation of the ECP role is moving forward in different ways. Our earlier study^{3,4} described the initial development of ECP schemes in 17 sites in England and reported that a key influence on the direction in which schemes were developing was the services and partnerships between existing care providers locally.

This paper builds on our previous results,^{3,4} and provides a snapshot of the impact of an ECP service on the practitioners themselves, other health professionals and patients as the role becomes more established.

METHODS

The evaluation received multicentre research ethics committee approval.

Using a mixed-methods approach,⁵ we collected data to conduct the following:

- A controlled comparative observational study examining the care provided to patients by the ECP service (intervention), with the care usually provided in the same health service setting (controls), for similar types of health problem.
- A qualitative study of telephone interviews conducted to assess the impact of ECP working, on ECPs themselves, other healthcare professionals and stakeholders.
- An economic analysis to identify whether ECP working yields any cost savings.

The investigation proceeded in three sites in England, selected to reflect the different ways in which ECP skills are being utilised in different health settings nationally. The first setting was a 999 urban ambulance trust where usual care consisted of paramedics, technicians and conveyance by ambulance. In the second setting, ECPs were working in a general practitioner-led out-of-hours (OOH) service. In the third setting, ECPs were working in a nurse-led walk-in centre (WIC). Settings two and three were in both rural areas.

Controlled observational study

In each of the three participating sites, we compared data for two groups of patients. Patients who were actually seen by an ECP were in the intervention group. Patients eligible for ECP care but who were seen by the health provider who delivered

Abbreviations: ECP, emergency care practitioner; ED, emergency department; EQ-5D, EuroQol; OOH, out-of-hours; WIC, walk-in centre

care usually in that setting (whichever clinical staff group that was) formed the "control" group.

Recruitment took place between March and May 2005. With consent, all participants completed a questionnaire at 3 and 28 days after their initial contact with the respective service. The questionnaire incorporated questions from the EuroQol (EQ-5D),⁶ which is a validated instrument for measuring health status. The questionnaire was supplemented by a core set of data consisting of age, sex, presenting complaint, place of residence, incident times, diagnosis, treatments, investigations and advice given, available routinely in all three settings.

Estimates of the numbers of patients seen by ECPs obtained in phase one^{3,4} and software Sizeprog V.4.1 from the Department of Mathematics, University of Texas, USA, were used to calculate that a sample of $n = 200$ intervention and $n = 200$ control patients in total across the participating sites was required to give >90% power to detect differences in effect sizes of 0.33 SDs representing a small to moderate statistical and clinical difference between the two groups.

The data were analysed using SPSS V.12. Significant difference using χ^2 tests was set at $p < 0.05$.

Telephone interviews

To elicit the experiences of healthcare providers and managers involved or affected by the ECP initiative on each site, telephone interviews were undertaken with a purposive sample of personnel in three broad staffing groups as follows:

- ECPs
- Other health professionals (eg, nurse practitioners, general practitioner)
- Stakeholders (service managers, project leads)

The interviews were guided by a semistructured schedule. The transcribed texts formed the basis for a framework analysis,⁷ which is suitable for applied policy research.

Economic analysis

The analysis of resource use was based on the data available routinely in each of the three settings. Subsequent use of health services was based on the 28-day follow-up questionnaire, which incorporated the EQ-5D.⁶ Differences between ECP and the usual care providers were analysed using mean effect and standard error of difference, and costs found using unit costs.⁸ Resource costs were calculated using standard unit costs in 2004 UK pounds, as these provide the most recent reference costs available.

RESULTS

Controlled observational study

In total, 524 patients were recruited into the study. Participants were not randomised, and there were some variations in the characteristics of patients seen by ECPs and those seen by the usual providers. Patients seen by ECPs were older and less likely

to be living in their own home, or to have had their incident at home (table 1).

Within each service, we found no differences between the range of presenting complaints seen by the ECP and usual providers, although variation in the types of health problem was observed between the three different services. The commonest presenting complaint was a fall, and the majority of these were seen in service one, the 999 setting. ECPs and control providers in the OOH and WIC settings saw proportionately more acute minor medical, ear, nose and throat, eye and gastrointestinal problems than in the 999 setting.

Processes of care and disposal

On the basis of unadjusted data, overall, patients seeing an ECP underwent fewer investigations and had more treatments recorded as being given than patients seen by the usual providers.

Overall, 72.2% ($n = 171$) of patients seen by ECPs were discharged without immediate referral to another provider (table 2). Table 2 shows the breakdown for each of the three service models. Differences in disposal of patients between ECP and the usual providers were marked in the 999 setting. Here, proportionately more ECP patients were disposed to their own place of residence and, compared with the usual providers, fewer patients seen by ECPs required an emergency department (ED) attendance or hospital admission. No differences were observed between ECPs and the usual providers in the other settings, except with regard to "other referrals".

3-day and 28-day outcomes

Overall, we found no differences between patients seen by ECPs and those seen by usual providers with regard to subsequent health service use or which service they contacted at 28 days post-event. However, within the 999 setting, patients in the ECP group utilised community or social services more than patients seen by the usual providers. Using the EQ-5D,⁶ we found no differences between patients seen by ECPs and those seen by the usual providers in self-reported health status at 3 and 28 days after their initial contact in any of the three settings.

Patient satisfaction

At 3 days post-event, more patients in the ECP group than in the usual provider group reported being "very satisfied" with their consultation ($n = 105$ (85.4%) vs $n = 85$ (66.4%)). Additionally, when asked about future preference for treatment of a similar condition, 77% ($n = 100$) patients seen by an ECP said they would prefer treatment by an ECP in future rather than a different type of healthcare provider.

Case-mix adjusted analysis

Adjusting comparisons for age, sex, presenting complaint and service made little difference to the initial findings comparing ECPs with controls. ECPs were found to investigate less frequently ($\chi^2 = 13.6$, $p < 0.001$, $df = 1$), provide more

Table 1 Baseline characteristics by study category

	Category		
	ECP $n = 245$ (46.8%)	Control $n = 279$ (53.2%)	Total $n = 524$ (100%)
Female (%)	164 (66.9)	166 (59.5)	330 (63)
Median age (years)	68	53	60
Living in own home (%)	217 (88.6)	255 (91.4)	472 (90.1)
Incident occurred in own home (%)	208 (84.9)	258 (92.5)	466 (88.9)

ECP, emergency care practitioner.

Table 2 Patient disposal immediately after episode

Disposal	999 Service one (n = 233)		OOH Service two (n = 174)		WIC Service three (n = 99)		Total (n = 506)	
	ECP n (%)	Control n (%)	ECP n (%)	Control n (%)	ECP n (%)	Control n (%)	ECP n (%)	Control n (%)
Own place of residence	70 (56)	5 (4.6)	50 (83.4)	92 (80.7)	51 (98.1)	45 (95.7)	171 (72.2)	142 (52.8)
ED/hospital admission	31 (24.8)	103 (95.4)	9 (15)	14 (12.3)	1 (1.9)	2 (4.3)	41 (17.3)	119 (44.2)
Other referral (primary care, social services, etc)	24 (19.2)	0 (0)	1 (1.6)	8 (7)	0 (0)	0 (0)	25 (10.5)	8 (3)
Total	125 (100)	108 (100)	60 (100)	114 (100)	52 (100)	47 (100)	237 (100)	269 (100)

ECP, emergency care practitioner; ED, emergency department; OOH, out-of-hours; WIC, walk-in centre.

treatments ($\chi^2 = 26.0$, $p < 0.001$, $df = 1$) and provide more advice ($\chi^2 = 8.0$, $p < 0.001$, $df = 1$). ECPs were more likely than control providers to discharge patients to their own home than take them to hospital, and, among those followed up by questionnaire, their patients were more likely to be very satisfied ($\chi^2 = 6.2$, $p < 0.001$). There were no differences in subsequent use of health services.

Using case-mix adjustment to examine whether the conclusions held equally for the different working arrangements in the three operational settings, we found that the ECP effect in the 999 setting differed from the other services with regard to investigations, advice and disposal home. We found no evidence at 28 days that the care received by the ECPs was less appropriate than that delivered by the usual providers (table 3).

Telephone interviews

Sixteen telephone interviews with staff (five ECPs, five stakeholders and six other health professionals), all of whom were involved or affected by ECP working, were conducted. The analysis revealed that most of the evaluative views expressed by the interviewees were positive, and there was clear commitment at all levels to the future development of the schemes. ECPs and stakeholders perceived the role as constructive in providing new and flexible career pathways for paramedics and healthcare staff from other backgrounds, such as nursing, and retaining trained paramedics in the National Health Service.⁹

Strategically, the interviewees identified the need to overcome specific barriers to allow the ECP role to achieve its full potential. These included the need for effective clinical and managerial links with other health providers and improved understanding in "rank and file" middle managers about the ECP role. Limited numbers of qualified ECPs also necessarily meant the resource was spread quite thinly. Underutilisation of ECP skills on two sites was raised as a source of frustration. Effective partnerships, good leadership, improved communication, continuing professional development and clinical supervision were considered crucial for the future expansion and sustainability of the ECP role. In each setting, interviewees gave examples of service innovation triggered by the availability and potential of the ECP.

Cost study

Data for the costings analysis were available for only 56 patients in the 999 setting. When patients attended by an ECP are compared with those attended by usual providers and standardised for the economic analysis,⁹ no significant differences in the care process measures were identified in relation to mean time spent on the episode, blood tests, ECGs or radiology requests ordered, treatment prescribed, or discharge decisions made. Given the small quantity of data available however, such tests have little power; therefore, to produce reasonable estimates, we assumed that the patients seen by usual providers were representative of the patients seen by an ECP. On the basis

Table 3 Odds of processes and outcomes with emergency care practitioners compared with controls

Process/outcome	Unadjusted odds, adjusted odds (95% CI)	Odds of a difference within each service setting
Any investigation	0.45, 0.31 (0.16 to 0.59)	Service one (999) = 0.22 Service two (OOH) = 3.57 Service three (WIC) = not evaluated*
Any treatment	2.47, 2.74 (1.83 to 4.09)	No differences between services
Advice	1.68, 1.75 (1.18 to 2.61)	Service one (999) = 5.53 Service two (OOH) = 0.74 Service three (WIC) = 0.50
Disposal home	2.23, 7.69 (4.07 to 14.5)	Service one (999) = 32.1 Service two (OOH) = 1.12 Service three (WIC) = 2.32
Any subsequent health service contact	1.41, 1.43 (0.64 to 3.22)	No differences between services
Very satisfied with care	3.04, 2.37 (1.17 to 4.81)	No differences between services

OOH, out-of-hours; WIC, walk-in centre.

Odds ratio (OR) < 1, process/outcome more frequent in control group; OR > 1, process/outcome more frequent in the emergency care practitioner group.

*Insufficient investigations in setting to be evaluated.

of these assumptions, the indications are that the model of ECP service delivered through the 999 service may yield cost savings of approximately £291 (US\$566, €431) per patient. This saving comes primarily from lower staff costs at incident, avoided ED attendances and lower use of non-inpatient follow-up services. However, the validity of this finding and its generalisability to other models of ECP care need to be confirmed in a larger study.

DISCUSSION

Principal findings

These results expand on previous evaluations of ECP practice,³ and contribute to the knowledge that paramedic and nursing skills can be enhanced to assess and treat specific conditions in the community. This has previously been shown in relation to the management of wounds¹⁰ and hypoglycaemia,¹¹ or a range of health problems arising in specific populations.¹² We provide evidence that ECPs are fulfilling a broader public health and primary care outreach role in the local community¹³ in both rural and urban locations.

In the three service settings studied, ECPs are delivering an alternative service. After adjusting for case mix, overall patients in the ECP group received less investigations and immediate referral to another service provider at their initial consultation, more treatments, and were more likely to have a home disposal than patients seen by the usual service providers. The ECP effect in the 999 setting differed markedly from the OOH and WIC settings in relation to investigations, advice and disposal home. Patients attended by ECPs reported no overall difference in the healthcare contacts made in the subsequent 28-day period and no difference in health status. We found no evidence that the intervention provided by the ECP service is less appropriate than the usual providers in the health settings studied. Certainly, the potential for avoiding ambulance journeys, ED attendances and hospital admissions appears to be present when ECPs are operating through the 999 setting. Patient satisfaction was higher in patients seen by an ECP than in patients seen by the usual providers. This finding was consistent across the three different models of service delivery in our study.

Strengths and weaknesses

Limitations on time and resources restricted the amount of data that we were able to collect. In the controlled observational study, we relied on self-reported use of health services at 28 days for our appropriateness of care outcomes. The method of recruitment of patients may have resulted in selectivity. Although this applies to patients attended by ECPs and those attended by the usual providers, it is possible that there are some biases in the comparisons reported here. Nevertheless, the number of patients recruited into the study meant that it was sufficiently powered to detect differences between the two groups of patients, and while acknowledging there are limitations, we are confident that our findings are reasonably robust.

Our economic findings have to be regarded with caution. The savings of approximately £291 (US\$566, €431) per patient seen by an ECP in service one⁹ are based on limited data in one operational setting, and may not be generalisable. Also, within a 999 ECP model, the finding may be affected by whether or not the practitioner was formerly employed as a nurse, as a paramedic or from another background. Assuming identical performance, the additional training cost required for equivalent competence training may affect the overall cost-effectiveness reported.

The interviews contributed to previous knowledge¹⁻³ of the perceived benefits and challenges of ECP working from the

What this paper contributes

Emergency care practitioners are fulfilling a broader public health and primary care outreach role in the local community in both rural and urban locations in England

perspective of the ECP, other healthcare providers and stakeholders involved or affected by the introduction of ECPs. Our understanding of the dynamics involved may have been enhanced by a larger sample of interviewees, or by supplementing our data with additional qualitative enquiry, such as non-participant observation. Nevertheless, the methods used⁷ are suitable for answering applied policy research questions. We validated our findings by triangulation and are confident that the sample was sufficient to identify barriers that need to be overcome, and the stimuli for the future strategic development of the ECP role to be integrated fully into the local health economy.

Comparability with existing evidence

Our finding that 72.2% of patients seen by ECPs were discharged to their place of residence without immediate referral to another provider is consistent with our previous finding that most patients accessing the ECP service via any route were discharged without immediate or later referral to another healthcare professional.⁴ Studies in the US have discussed the difficulties in identification of cases eligible for community treatment by ambulance crews.¹⁴⁻¹⁷ The differences that we found in the rates of investigations observed between patients seen by the usual providers and those seen by ECPs may indicate that potentially significant conditions are not being recognised by ECPs. We were not able to explore this because we were not resourced to collect clinical outcomes data. It has been reported that equipping paramedics with the skills to triage clinical condition groups appropriately may not be cost effective.¹⁵ Our own study did not confirm this,¹⁵ and our finding that ECPs yield a cost saving will need to be tested in a larger study.

All actual or anticipated operational settings for ECPs involve a vision of ECPs as independent practitioners working in mobile units or based in the ED or minor injury unit, and providing OOH or in-hours unscheduled care.¹⁻² Our latest findings indicate that an all-encompassing model has not yet been realised. However, we found positive commitment to the success of the scheme at a managerial, strategic and operational level reported previously,³ and the ECP service continues to expand. There were indications in all three sites that, notwithstanding differences in the operational settings, pace and direction, the availability of ECPs is having an impact on changing ways of working and reconfiguring how services are usually delivered locally.

Conclusion

ECPs are providing an alternative emergency and unplanned service in the different service settings. They are meeting their objectives in terms of reducing the need for attendance at the ED. We did not find ECP care to be less appropriate than the care by usual providers. Additionally, patients who were seen by an ECP were satisfied with the care received.

Authors' affiliations

Suzanne Mason, Colin O'Keeffe, Patricia Coleman, Jon Nicholl, Health Services Research, School of Health and Related Research, University of Sheffield, Sheffield, UK

Richard Edlin, Sheffield Health Economics Group, School of Health and Related Research, University of Sheffield, Sheffield, UK

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