



PREHOSPITAL AND RETRIEVAL MEDICINE

Introduction of an extended care paramedic model in New Zealand

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Abstract

- Objectives:** The first extended care paramedic (ECP) model of care in New Zealand was introduced in the Kapiti region, north of Wellington in 2009. The ECP model aimed to increase the proportion of patients presenting to the ambulance service who could be treated in the community. This study evaluated the first 1000 patients seen by ECPs.
- Methods:** The first 1000 presentations attended by ECPs were examined to determine the proportions of patients transported to the ED and treated in the community. For patients treated in the community we determined the number presenting to the ED within 7 days of ECP attendance.
- Results:** A total of 797 patients (mean age 62 years) had 1000 clinical presentations. In 59% the patient was treated either at home or in the local community, with 40% transported to the ED. Within the same region and time period 74% of patients attended by standard paramedics were transported to the ED. The rate of ECP transport to the ED differed significantly by clinical condition, with 71% of cardiac presentations versus 19% of patients with spinal problems taken to the ED. In 31 cases (5%) where the patient had been managed in the community there was an acute ED presentation within 7 days.
- Conclusion:** We observed that ECPs have significant potential to reduce hospital ED attendances by treating more patients in the community, and this is associated with a low rate of subsequent ED presentations. Prioritisation of dispatch of ECPs to particular types of patients might be useful in maximising this reduction.
- Key words:** *community health service, prehospital emergency care, transportation of patients.*

Introduction

In the context of increasing clinical demands on both EDs and ambulance services to treat acute clinical presentations, the traditional model of the ambulance service is being re-evaluated in a number of countries.¹⁻⁴ Historically, the emergency ambulance service has provided treatment during transportation to hospital. It is possible that a significant proportion of the patients

seen by the emergency ambulance service could be safely treated at home or in the community without hospital attendance, as has been demonstrated overseas.^{2,5} To achieve this aim safely, paramedics in New Zealand needed an expanded set of skills and protocols,^{4,6} and were termed 'extended care paramedics' (ECPs).

The first ECP model introduced in New Zealand began in 2009, in the Kapiti region just north of

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Wellington. The aim of this model was to reduce the burden on the ED and to improve the patient experience by avoiding long waiting times for treatment of minor conditions when this could be initiated in the home.⁴

This study is a retrospective analysis of the first 1000 patients treated under the new ECP scheme. The aims of the study were to determine the rate of treatment in the community, and to examine any acute hospital presentation within a 7-day time period from ECP presentation.

Methods

This study evaluates the first 1000 consecutive clinical presentations attended by the ECPs in the Kapiti region, where the scheme was introduced in May 2009. The Kapiti district is located 50–60 km north of Wellington Hospital, Wellington, New Zealand, where the catchment ED is located. The Kapiti population was just under 50 000 people in 2009. The district is a popular retirement area, and as a result the proportion of residents over the age of 65 is twice the national average.⁴

The choice to send an ECP to each of these cases was made by the dispatcher in the Emergency Ambulance Communications Centre. The ECP vehicle was regarded as an extra resource that could be sent to both trauma and medical emergency cases, and was used in this capacity when no other vehicle was available for dispatch in the area. Where a standard ambulance was also available, the Communications Centre attempted to dispatch the ECP vehicle to calls for which treatment within the community was considered to be more achievable. This was done on the basis of subjective assessment by individual dispatchers. The study protocol was approved by the Central Region Ethics Committee (reference CEN/09/42/EXP).

For each clinical presentation we classified the type of condition in accordance with the following scheme: cardiac, respiratory, gastrointestinal, neurological, lower limb condition, renal, spinal, mental health, upper limb condition, falls, syncope and other trauma.

Patient disposition was defined as transport to hospital or treatment in the community. Treatment in the community was further divided into treated at home, referred to a general practitioner or referred to another health professional.

Any patient treated in the community was followed up through the hospital clinical record to determine whether or not they had presented acutely to hospital within 7 days of the presentation to ECPs. This was

Table 1. Patient disposition

Patient disposition	No. patients
Transported to the ED	402
Deceased	6
Treated in the community	592
Treated at home	255
Referred to a general practitioner	245
Referred to nursing service	42
Referred to community mental health	7
Referred to another community agency	43

done by reviewing the Wellington Hospital clinical record, although a limitation of this is that we cannot definitively exclude the possibility that a patient presented to a different regional hospital. Where they had attended hospital, the details of this attendance were examined by an emergency medicine specialist.

Results

The first 1000 clinical presentations attended by the ECPs consisted of a total of 797 patients over a period of 10 months. In 701 cases patients had a single clinical presentation during the study. The remaining 299 were from 96 patients, with between two and seven attendances each. Of the repeat presentations, in 116 cases the same clinical condition recurred, whereas in 183 cases the attendance was for a different clinical condition. The 797 patients had a mean age of 62.2 years, with a range from 2 months to 101 years of age and 58.7% were female.

In total, six patients were deceased at the scene. Five hundred and ninety-two clinical presentations (59%) were treated either at home or in the local community and 402 patients were transported to the ED (40%). Details are given in Table 1, including a breakdown of those treated in the community. In comparison, within the same region and the same study period, 74% of cases attended by standard paramedics were transported to the ED.

Presentations were categorised by clinical conditions, and the proportions treated in the community and transported to the ED are shown in Table 2. The most common presentations were falls and respiratory problems, accounting for 13% and 9.8% of presentations, respectively. The clinical category 'other' consisted of conditions for which there were fewer than 10 cases:

Table 2. Patient disposition by clinical condition

	No. patients (n = 1000)	Percentage of patients treated in community (n, %)	Percentage of patients transported to the ED (n, %)
Falls	131	87 (66%)	44 (34%)
Respiratory	98	59 (60%)	39 (40%)
Gastrointestinal	93	51 (55%)	42 (45%)
Cardiac	84	24 (29%)	60 (71%)
Lower limb	74	43 (58%)	31 (42%)
Neurological	67	31 (46%)	36 (54%)
Renal	59	37 (63%)	22 (37%)
Other trauma	56	36 (64%)	20 (36%)
Spinal	52	42 (81%)	10 (19%)
Syncope	41	28 (68%)	13 (32%)
Upper limb	36	24 (67%)	12 (33%)
Mental health	27	12 (44%)	15 (56%)
Other	182†	118 (65%)	58 (32%)

†Note that this group contains six cardiac arrest patients who died at the scene.

epistaxis, diabetes, obstetrics, gynaecological, cancer, sepsis, anxiety, drug reaction, influenza, dehydration, cellulitis and dizziness.

The transportation rate differed by clinical condition, with the highest rate of transport to the ED seen in patients with cardiac presentations (70%), whereas the lowest rate of transport was seen in patients with spinal problems (19%).

Patient outcome analysis for 7-day presentation to the ED

Of the 592 patients managed in the community by the ECPs, 31 (5%) presented acutely to the ED within 7 days of their ambulance presentation. In 13 of these cases (42%) this was judged to be for a distinct clinical problem unrelated to their ECP presentation. Of the remaining 18 cases, 11 patients attended a general practitioner on the advice of the ECP and were then referred on to hospital.

These 18 cases were reviewed by an emergency medicine specialist (AHS) and in each case the initial ECP management was considered to be appropriate at the time. The clinical presentation in the ED was either the result of deterioration of the clinical condition despite an appropriate management plan (four cases) or a presentation to the ED that was not warranted on the basis of the severity of the clinical condition (14 cases).

Discussion

This study reports the initial experience of the first ECP model to be introduced in New Zealand. The model aimed to reduce unnecessary transportation of patients to hospital, and appears to have achieved this aim with only 40% of patients transported. In contrast, during the same study period 74% of patients seen by standard emergency paramedics were transported to hospital, although bias in dispatch will have contributed to this disparity in transportation rates. Of those treated in the community by ECPs only 5% attended the ED within a 7-day period following the initial presentation.

The ECPs clinical practice, when responding to a call for emergency medical services, followed clinical protocols that were specific to the patient condition. These protocols were designed to identify any high-risk features that warranted transportation to hospital, but in the absence of high-risk features, to allow treatment to be delivered within the community. The differences in transportation rates to hospital by clinical condition reflect the frequency with which high-risk features are associated with each condition. Thus, patients with cardiac problems, most commonly chest pain or palpitations, were frequently associated with high-risk features and as a result only 29% of patients with cardiac problems were treated in the community. In contrast, respiratory conditions, most commonly shortness of breath or cough, were less likely to have high-risk features, and thus were more amenable to treatment within the community, with only 40% of these patients being transported to hospital. The use of an expanded set of guidelines might be associated with some risk, as guideline compliance might not always be high.⁶ A study to evaluate clinical guideline adherence within our programme is planned.

Transportation of a patient to the ED can become the default disposition for some patients because of either the lack of a patient management pathway or social support within the community. Because this study describes the first 1000 clinical presentations attended by ECPs in a model that was developing, some of these patient management pathways were not fully developed and integration into the local health setting was still occurring. For these reasons it is probable that a slightly higher rate of treatment in the community could be achieved in a more developed model. Despite that, the rate of treatment within the community was broadly comparable with international experience. A Sheffield Ambulance cluster randomised controlled trial demonstrated that a similar ECP-type scheme reduced transport to hospital by approximately 25% from 88% to

63%.⁵ Our overall rate of transport to the ED was lower than that. A Yorkshire study found that in elderly patients (>65 years of age), an ECP-type scheme resulted in 36% of patients with breathing difficulties, and 26% of patients suffering from a fall being transported to hospital.² For these two conditions in all age groups we had higher ED transport rates of 40% and 34%, respectively.

On the basis of the differences in transport rate by clinical condition, it should be possible to alter dispatch patterns to preferentially send ECP vehicles to cases where it is most likely that treatment in the community will be beneficial. To some extent that was occurring within this study, although it was being done in an ad hoc manner and was influenced by the availability of vehicles to respond in a timely fashion within the area.

Although treating patients within the community offers advantages to the health system by reducing pressure on EDs, it also offers advantages to the patient. Avoiding transport to the hospital and lengthy delays associated with acute treatment when this is not required has been seen as a very positive aspect of ECP programmes. Patient satisfaction with ECP-type services has been very high in the UK,⁷ and similarly we have previously reported that patients from the Kapiti district have high levels of satisfaction.⁸

A key requirement regarding the treatment of more patients in the community is an assurance that this is not causing harm. We observed that 5% of patients treated by ECPs in the community presented to the ED within 7 days. Comparative figures for the standard paramedics for the same period are not available. Data from Sheffield found a 11.9% rate of unplanned admission to the ED within 7 days with ECPs, compared with a 9.5% rate in standard care, not significantly different but significantly higher than in our current study.⁹ A Canadian paper reported that 8% of medical and surgical patients who were discharged following a hospital admission had died or were readmitted within 30 days of discharge.¹⁰ In this context it might be reasonable to argue that a 5% attendance at hospital within 7 days is low. However, further investigation of the safety of leaving patients in the community is warranted.

This study suffers from a number of limitations. It is a retrospective descriptive analysis of the ECP model. The ECPs were dispatched to a range of clinical presentations on the basis of perceived need/value at the discretion of the Communications Centre staff, and this was not controlled in any way. Thus, the difference in transport to hospital rates between the ECPs and standard paramedics is likely to reflect patient selection bias.

In order to determine the reduction in patients transported to hospital, a randomised controlled trial would be required. This would also provide better information regarding the types of condition for which ECPs are likely to be of value. We have also not captured unplanned presentations of patients to general practice, repeat visits by standard ambulance to patients seen by ECPs, or deaths within the 7-day time frame.

Conclusion

This study suggests that ECPs have significant potential to safely reduce hospital emergency attendances. Prioritisation of the dispatch of ECPs to particular types of patients might be useful in maximising this reduction. The extent to which ECPs adhere to clinical protocols, and the safety of treating a larger proportion of patients in the community, require further evaluation.

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Author contributions

The first draft of the manuscript was written by SH. AHS and PDL oversaw the project, and finalised the manuscript. PDL was responsible for data analysis. PF provided input into the data interpretation and the final draft.

Competing interests

None declared.

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