System-related influences on assigning patients to emergency care practitioners

H.S. Abd Hamid[1,2], P. Waterson[1]

[1]*Loughborough Design School, Loughborough University Loughborough, LE11 3TU England*
[2]*Department of Psychology KIRKHS, International Islamic University Malaysia, PO Box 10, 50728 Kuala Lumpur, Malaysia*
Email: *harris@iiu.edu.my*

Abstract

The deployment of advanced paramedics in ambulance services in the UK has been reviewed in the last few years. This study examined the role played by a computerised dispatch system (AMPDS – Advanced Medical Priority Dispatch System) which was reported to be not predictive in terms of selecting suitable patients to assign to emergency care practitioners (ECPs). The aim of this paper is to further examine the AMPDS data in order to understand influences on ECPs deployment and the resulting patient outcomes in an Ambulance Services NHS (National Health Service) Trust. AMPDS data for cases where ECPs were dispatched during a six-month period was extracted. The data was analysed using SPSS 12.0 to examine the number and types of cases across different time frames. In order to understand the factors related to ECP deployment and decisions to transport patients, semi-structured interviews were conducted with seventeen ECPs and three ambulance control room staff. The interviews were transcribed and analysed using emergent themes analysis with NVivo7. *Results*: There was an increase in the number of cases assigned to ECPs in the months covered by the data set. There are differences of the rate of patient transport among the Primary Care Trusts (PCT) within the Ambulance Services which are not due to fluctuations in workload across days of the week. The interviews help to explain the variations by identifying wider systemic influences. Themes derived from the interviews are patient's social needs, geographical factor, technical factor, information factor, and connectivity to care pathways. *Conclusions*: The variations in the deployment of ECPs within the Ambulance Services can be partly attributed to wider systemic influences. Designing a paramedic role for pre-hospital care in the community should take into accounts the factors that influence their decisions regarding patient's care pathway.

Keywords: pre-hospital care, advanced paramedics, emergency care systems, emergency ambulance system,

1. Introduction

Emergency care practitioners (ECPs) within England's ambulance services are paramedics equipped with advanced skills and knowledge to provide emergency and urgent care in the community. Continuous development, changes and refinement of the role has taken place since it was introduced in 2002 [1]. The ECP role has been evaluated, for example, a study examined the development of ECP Schemes at several sites in England in terms of skill, competencies, patient outcomes, cost, and

operational framework [2]. More evidence however, is needed in order to further design the role so that it can meet its original objectives.

One of the issues that had been investigated is the clarity of the types of roles that the ECP can carry out. A recent review concluded that the role seems to be somewhat clearer but its implementation within Trusts still needs clarification [3]. The ambulance services and the wider healthcare organisations have stakeholders who may have direct and indirect influence on the role. These stakeholders need to understand the role to be able to have positive effects on the ECPs in terms of their deployment and patients' outcomes.

The available evidence suggests that the role is progressing well. For example, there is evidence that ECP intervention is related with avoidance of attendance at the ED [4]. Patients also reported higher satisfaction when treated by ECP compared to other ambulance crew (e.g. paramedics and emergency medical technicians). However, the procedures which are used to select cases to be assigned to the ECPs need further attention. For example, an analysis of the AMPDS (Advanced Medical Priority Dispatch System) data from Yorkshire Ambulance Services revealed that the computerised dispatch system is not a suitable way to assign cases to the ECPs. The dispatch system is not a predictive tool in terms of matching the ECP skills and the patients' needs. It was argued that the AMPDS is used as a trigger for a time-based response for which it was not designed [5]. However, it is not clear what other factors are limiting the utility of the system for dispatching ECPs.

In this paper, we examine in detail the information given in an AMPDS dataset, alongside additional data from interviews with ambulance services staff. The objective of this study is to understand the pattern of ECPs deployment within one Ambulance Service. Our primary aim was to identify factors that influence the successful deployment of the ECPs alongside resulting patient outcomes.

2. Methods

2.1 AMPDS

A request for the AMPDS data from EMAS was made after ethical approval was obtained from the NHS Research Ethics Committee. Data from two operational areas within the Ambulance Services were not given by EMAS due to technical limitations. The data include 999 calls received by the EMAS in a six-month period (August 2008 - January 2009) that were assigned to ECPs. The data were analysed using SPSS 12.0 for frequencies and dependencies. The calls were tabulated by call category and the outcome for the patient (i.e., transportation to the hospital or not transported). The AMPDS data set allows an examination of factors such as time (days of the week, month of the year), and local administration offices (Primary Care Trusts associated with ambulance stations).

2.2 Interviews

Convenience sampling was used to recruit ECPs. A semi-structured interview schedule (Table 1) was developed based on types of interview questions [6]. Each interview was reviewed and additional probes were added where necessary. This was done to facilitate achieving theoretical saturation point in relation to the aim of these interviews which was to examine the factors related to the ECP deployment and patients' conveyance. The interviews were transcribed and analysed in NVivo7 using

Emergent Themes Analysis. Themes were grouped into categories to identify factors that influence ECPs' decision and the resulting care pathway for patients.

Table 1. Interview schedule for factors influencing ECPs' decision

Type of questions	Sample items
Introducing question	In your experience, have there been cases where patients who don't have strong clinical need were recommended for transport to hospital?
Probing question	Can you elaborate on ..?
Specifying questions	How do you assess ...?
Direct questions	What happens for Category A calls?
Interpreting questions	Would it be correct to say that your job involve ...?

3. Results

3.1 AMPDS data

Table 2. The number and percentage of calls by call category

Call Category	Number	Percent
Cat A	4358	34.3
Cat B	5269	41.4
Cat C	3036	23.9
Urgent	59	.5
Total	12722	100.0

From 1 August 2008 to 31 January 2009, a total of 12,722 of calls were recorded in the AMPDS dataset. Table 2 shows that ECPs were assigned to Category B call more than to Category A and C. Only a small percentage of call was urgent cases. Of these calls, the percentages of patients transported to the hospital are 6.56% (Category A), 7.99% (Category B) and 3.89% (Category C) respectively.

Table 3. Number of calls by call category and day of the week

Day	Call Category					
	Cat A		Cat B		Cat C	
	Transport		Transport		Transport	
	No	Yes	No	Yes	No	Yes
Monday	596	49	701	59	407	15
Tuesday	547	30	696	67	421	14
Wednesday	524	37	713	63	424	23
Thursday	588	41	659	67	375	15
Friday	608	45	736	60	431	18
Saturday	629	38	701	58	430	13
Sunday	580	46	642	47	430	20
Total	4072	286	4848	421	2918	118

There was a definite increase in the rate of calls assigned to ECPs, for example, in the second half of November, more calls were assigned to ECPs than before. More

than 60% of all calls were handled in the last 40% of days in the data set. Looking at a smaller unit of time, there does not appear to be a significant variation of the number of cases attended by the ECP during each day of the week (Table 3). A Chi-square test shows that the proportion of patients transported in each category does not depend on the day of the week. The statistical test result for category A, B and C calls are $X^2(6)=4.437$, $p=0.618$, $X^2(6)=3.862$, $p=0.695$, and $X^2(6)=4.01$, $p=0.675$.

The AMPDS data set contains records regarding the ambulance station that is the dispatch point upon allocation. These ambulance stations are associated with their respective Primary Care Trusts (PCTs). Figure 1 compares the percentage of patients transported to the hospital for all PCTs. It shows clear differences among the PCTs. Calls that falls under PCT 6 resulted in more admission to the hospital than for PCT 4. The data also shows that not all PCTs had a higher percentage of hospital admission for category A calls compared to category B and C. Only two PCTs had a higher percentage of hospital admission for category A calls.
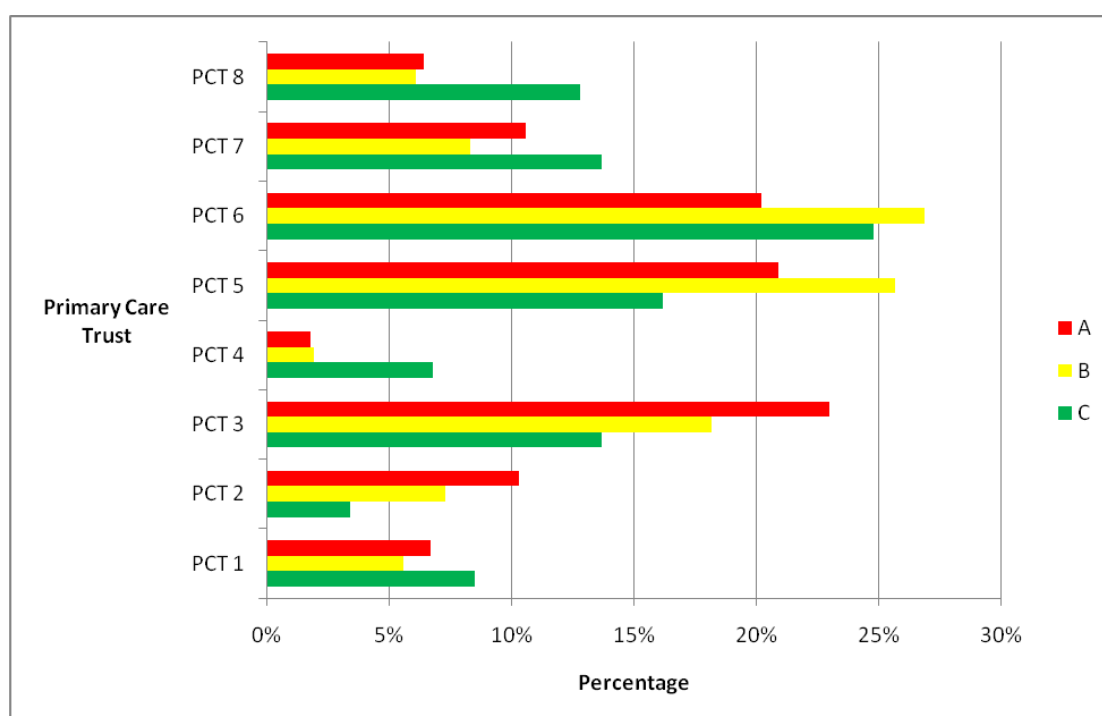

Figure 1. Percentage of patients transported to the hospital after being seen by ECPs by category of calls from different PCTs

The AMPDS data set also has records on termination of calls. The system has a list of reasons that can be used to describe why a call was stopped or concluded. These reasons were categorised into themes. These themes include: "Stood Down" (i.e. ECP did not have to attend to patient); "Managed in Community" (i.e. ECP assisted other care giver or defer treatment to patient); and, "Non-existing Patient" (i.e. no patient to treat). ECPs were stood down for 4,564 calls (35.9%) due to the calls being cancelled or handled by other personnel. For 1,235 calls (9.7%) the ECPs involvement were minimal, such as providing assistance to ambulance crew to lift patients. Also included in the managed in community theme are patients who made their own treatment decisions. There were 309 calls (2.4%) where the patients either were not found or were found dead. Therefore, there are 48% of the calls where ECPs do not have to make decisions about the patients' care pathway or the decisions were made by other people. No reasons were recorded for 6,614 calls (52%). It can be

speculated that these calls are for cases where the ECPs actually attended, treated, and/or referred the patients to appropriate care pathways.

3.2 Interviews

An analysis of the interviews revealed six main themes about the influences, other than clinical needs, on ECPs' decision to treat patients on location or refer to the hospital. The themes are (1) patients' social needs, (2) geographical factor (3) staffing issue (4) technical factor (5) connectivity to other car pathways, and (6) information factor. The themes reflect patients' psychosocial characteristics, the way the ECPs are deployed, and the wider healthcare structure. The themes are described with quotes from the participants.

3.2.1 Patient's social needs

The deployment of ECPs would be beneficial in reducing hospital admission. This benefit is one of the objectives for the creation of the role. However, the decision to treat in the community or send to the hospital is not always based on clinical needs. ECPs also evaluate the psychosocial needs of the patients. For example, the level of vulnerability – which may not be related to presenting illness – of the patients and lack of social support might influence an ECP to send the patients to hospital.

"Someone in their mid-30s or 40s that has some family structure as opposed [to an] elderly person on their own ... that would influence your management of that patient" (ECP1)

"Vulnerable patient, might be age [factor], the patient's mental ability would not allow you to leave them at home." (ECP 14)

"The factors that I would consider are the vulnerability of the patient whether they got a network around them to monitor the patient to raise the alarm if need be." (ECP 17)

The decision to send to the hospital is based on the assessment that the patient can cope better in a hospital:

"If that patient was on their own unable to cope alone .. they are unable to get out of the chair or go to the toilet.. and there was nobody around to care for them (ECP 12)

"You haven't found anything ... wrong, but if they can't cope at home well, probably they would go in the hospital as well." (ECP2)

The patients' rights to make their own decision are respected. They can say where and from whom they want to get the treatments. Patient may go against the advice given by the ECPs. When patients want a second opinion, they might still go to the hospital. In other cases, patients' refuse to go to the hospital:

"Some patients demand [to go to the hospital], and they go. [They] are in charge of their own medical healthcare. If the patient doesn't want to go [to hospital], what can I do?" (ECP3)

3.2.2 Geographical Factor

The distance to the nearest hospital may influence the ECPs' decision for sending patients to hospitals. There is a bias for sending the patients due to the

expected longer time required to get an ambulance to the patient. In other word, the safety net is in favour of hospital admission:

> *"[Patients] could possibly be sent to the hospital more in rural areas. That's what I found. The time factor is quite big really. You know you can't always get ambulance straight to somebody". (ECP 12)*

Patients themselves may take the geographical considerations for consenting to be transported to the hospital by ambulance. Geographical factor, coupled with the time of day and availability of other transport options may make travel by ambulance a less desirable option. Those with their own transport can go to the hospital on their own. Those without transport may decide to follow other care pathways:

> *"It is not necessarily for [the hospital] to decide how you get home. A taxi journey at 3 o'clock in the morning is very expensive. That is off-putting for [the patients]." (ECP 16)*

3.2.3 Staffing issue

The deployment of ECP does not adhere strictly to the roles for which they were designed. Fluctuations in the demand for pre-hospital care influence the decisions for sending an ECP to patients. For example, when there are not enough role-specific cases to be assigned to the ECPs, then they may be asked to respond to other cases:

> *"There is performance times [target] that the ambulance service has to work to, and due to that, it has an impact on the way the ECPs actually used." (ECP 3)*

> *"Sometime, when we, the triage nurse, want to allocate them on [a] job because there has been nothing coming through to [the ECP], and they are just wasting [time] at an area. They are sent on Cat A's and B's which are not necessarily [their] role." (Control Room Staff 1)*

On the other hand, they may provide cover for ambulance crew when there is a high demand for emergency cases. This point was made explicitly by the ECPs themselves:

> *"We are being sent straight to [the patient] as an emergency [responder] and I think part of that is that [the ambulance services] are very short staffed." (ECP1)*

> *"There is an immense pressure at the moment to respond to calls within a certain time and so you're often called in." (ECP2)*

The purpose of providing cover may be influenced by expected response time. The distribution of ambulance crew may not be enough to provide timely access for patients in all area. Sometimes, an ECP might be the resource that will be able to arrive at the patient the fastest. Therefore, there are not enough time for the ECPs to get updates from Control Room:

> *"Because of our targets, around Category A and B, we haven't got the time to [assess patient's need in details]. We got vehicles moving even before we know what is the problem. If the nearest one is an ECP, then the ECP will be sent." (Control Room Staff 2)*

> *"The job could be other side of the road. I might not even know what the problem was. It is just a call." (ECP 16)*

The implication of these staffing issues is that ECPs are responding to patients who needed to be transported to hospital (such as those assigned as Category A callers). Therefore, the staffing issue produces a bias for the ECPs in favour of patient conveyance.

3.2.4 Technical Factor

The system used to process 999 calls is found to be inaccurate at times resulting in a mismatch between the actual presenting problem and the problem as conveyed to the ECPs:

> *"The AMPDS system can be a little misleading sometimes. The calls seem to be falling into the wrong category." (ECP 10)*

The system does not allow in-depth information gathering by the call takers. The threshold for categorising some medical complaints is low, thus forcing the call takers to make a decision quickly:

> *"The computer system, we use is very strict in the sense that it does not allow a non-clinical person to elaborate on certain calls So, when a [patient with] chest pain [call], that would be automatically responded to in an 8 minute a response time. A chest pain could be anything from serious MI [myocardiac infarction] to minor indigestion, muscular skeletal. [The system] need to allow that elaboration." (ECP 15)*

The inaccuracy leads to problem such as the following:

> *"Somebody may [be reported as having] a chest pain, but when you get there, it is not actually chest pain at all. It is something else." (ECP 16)*

Technical problems could also present itself in the form of access of language line. Translation service may not be available when the ECPs need it. The time it would take to secure a language service via the control room would make transport to the hospital a better choice for patients:

> *"In some circumstances, for example, if there is a particular language barrier, patients may go to the hospital anyway because you might not have the resource there to sort the problem out." (ECP 13)*

3.2.5 Connectivity to Other Care Pathway

Related to the technical problem, other care pathways are not universally accessible to the ECPs. The best care pathway as decided by the ECPs may not be available. For example, the external resources to help ECPs make decision are limited by the opening hours. Speaking about a problem that the patient cannot answer, an ECP demonstrate the limitations of connectivity to other care pathways:

> *"There are problems. It can be overcame because we talk to the [patient's] doctor. But that's ideal within working hours, when doctors work. [At] 2 o'clock in the morning, you can't get the information (ECP 3)*

Hospital admission may be used as a bridging pathway due to limited direct connectivity. The limitations could be due to the lack of professional recognition of ECPs by the receiving institution:

"I have sent patient to hospital purely based on the social aspects of their home life and the condition of the home in order to facilitate a follow-up with social services." (ECP 9)

On the other hand, patient's needs may be distorted as their information is passed through different care providers. In the example below, the control room sent an ECP to a patient even though the patient did not require ambulance transport:

"[The patient] may be given [an ambulance service resource] indirectly not because they have asked for the ambulance. [They] speak to another primary care may be a GP, the out-of-hours, the NHS Direct [and they] had referred them to the ambulance service unknowingly. I turned up on scene they weren't expecting an ambulance they want us stand down." (ECP 16)

3.2.6 Information Factor

The information factor represents an interaction of factors already identified. For example, patient's characteristics interact with the limitations of the technical systems at the control room and leads to inadequate information gathering:

"Sometimes the call maker doesn't give the control [the information]. Sometimes controllers themselves get limited information." (ECP 17)

"The patient can't tell them [the control room staff] for any reason or I suppose over the telephone misunderstanding about what people are saying." (ECP 10)

This problem is compounded by the individual variations of the control room staff. The information gathered, and subsequently transferred to the ECPs, depends on the thoroughness of the control room staff:

"Some [controllers] are more thorough than others." (ECP 17)

The lack of information may impede the ability of the ECPs to make decisions. The cases assigned to them may not be cases that they can deal with. Therefore, a safer decision would be to arrange for a hospital admission for the patients.

4. Discussion

If we take at face value that the ECP role was designed to cater for urgent care demand, then the AMPDS and call categories demonstrate limitations in terms of assigning ECPs to patients. The limitations are partly due to factors outside of the ambulance services' control. Hoax calls represent one such factor, albeit only a small percentage of all calls. In terms of time factors, one study showed that the number of calls for London Ambulance Services fluctuated by day with the highest number of calls on Saturday and the lowest on Wednesday [7]. However, in the present study, the day of the week was shown to have little effect on the number of calls assigned to each call categories and the corresponding rate of patient transports.

Patients' characteristics, another factor not under the direct control of the Ambulance Services, appear to be more important in determining the outcomes of

ECP intervention. For example, the patient's social needs are not captured by the AMPDS categorisation but influence the decisions for patient conveyance. The patient's ability to cope without social support is one such factor. Patient's rights in making decision regarding medical care may also contribute to distort the number of hospital admittance. The number of patients who refused treatment (860, 6.7%) and the account of the ECPs from the interviews suggest a significant number of patients do not behave in expected ways. In other words, the predictive value of the AMPDS and call categories is weakened by the decisions that the patients make. Therefore, the AMPDS data needs to be seen in the light of patients as one of the active participants within the large systems of pre-hospital care.

Some of the predictive values of the computerised dispatch system are within the ambulance services' control. The percentage of patients transported to the hospital after being seen by an ECP is much lower than reported elsewhere. At Yorkshire Ambulance Services, the percentages of patients attended Emergency Department after being seen by ECPs are 52.6% (Category A), 41.2% (Category B), and 52.1% (Category C) [5]. These numbers are similar to those from another study that reported the actual proportion of cases being dealt with by ECPs without the need for referral is 54% [4]. These differences also occur within the Ambulance Services and point to a set of wider systemic factors that influences decisions to deploy ECPs. These systemic factors include local implementation and interpretation of the ECP role, and patient-specific factors.

As mentioned by participants in the interview, staffing levels are an example of as organisational decision that eventually influences the type of jobs being assigned to the ECPs. The placement of ECPs at appropriate locality may increase the proper utilisation of their skills. Whether the ECPs – primarily designed to cater to urgent (i.e. non-emergency) demand – should be subjected to time-based target also need to be reconsidered.

With regards to the wider healthcare structure, it seems there are varying degrees of support available to the ECPs. If the ECPs are expected to channel the demand on hospital resources, then there must be access to other care pathways. Apart from building and developing new supporting health and social care services, existing services should be made more available to the ECPs. The promotion and integration of the role within the wider healthcare system is desirable. This is in line with the aim of the role which is complementing existing practitioners/clinical within the NHS [8].

Viewing the ECPs as actors within a wider system helps to describe and explain the relative success of the role. As mentioned in another study, the larger strategic vision contributes to a successful operational framework [2]. The ability of the ECPs to achieve their role's objective should be evaluated against the level of other resources, and targets – which may not directly be applicable to the ECPs (i.e., put forward or set by the Ambulance Services, Strategic Health Authorities, and Department of Health). In this light, this study provides further support for the plan to change the assessment of the ECP from a time-based to an outcome-based performance measure [5].

A limitation to this study is the time period used in the analysis. Compared with the data set reported for Yorkshire Ambulance Services [5], the data presented here only covers a period of six months instead of twelve. However, this study has a larger number of calls (12,722 compared to 3955). Another limitation is the number of participants in the interviews. The data reported here, however, suggests that these are worthwhile issues and should be investigated further.

Another practical limitation with studies like this is the frequent changes that happen in the Ambulance Services. These changes are hard to pin down. Changes like re-assignment of ECPs to different ambulance stations are not discernible from the data set. Future studies should try to identify major changes that occur and then compare the data from before and after the change had occurred. Comparison with other Ambulance Services would also be beneficial in order to provide a better picture of pre-hospital care for the whole of England.

5. Acknowledgments

6. References

[1] S. Mason, P. Coleman, C. O'Keefe, J. Ratclife, and J. Nicholl, "The evolution of the emergency care practitioner role in England: experiences and impact," *Emergency Medicine Journal*, vol. 23, pp.435-439, 2006.

[2] S. Cooper, B. Barrett, S. Black, C. Evans, C. Real, S. Williams, S., and B. Wright, "The emerging role of the emergency care practitioner," *Emergency Medicine Journal*, vol. 21, pp.614-618, 2004.

[3] R. Doy, and K. Turner, "The giraffe: the emergency care practitioner; Fit for purpose? The East Anglian experience." *Emergency Medicine Journal*, vol. 21, pp.16-18. 2004.

[4] S. Mason, C. O'Keeffe, P. Coleman, R. Edlin, and J. Nicholl, "Effectiveness of emergency care practitioners working within existing emergency service models of care," *Emergency Medicine Journal*, vol. 24, pp.239-243, 2007.

[5] J.T. Gray, and A. Walker, "AMPDS categories: are they an appropriate method to select cases for extended role ambulance practitioners," *Emergency Medicine Journal*, vol. 259, pp.601-603, 2008.

[6] S. Kvale, *Interviews: an introduction to qualitative research interviewing*. Thousand Oaks, California: Sage Publication, 1996.

[7] C.R. Victor, J.L. Peacock, C. Chazot, S. Walsh, and D. Holmes, "Who calls 999 and why? A survey of the emergency workload of the London Ambulance Service," *Journal of Accident and Emergency Medicine*, vol. 16, pp.174-178, 1999.

[8] DOH, *The Emergency Care Practitioner Report*. London: COI Communications, 2004.