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Developing a new response to Non-Urgent Emergency Calls;

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Developing a new response to Non-Urgent Emergency Calls.

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ABSTRACT (263 words)

Aim

To evaluate a new service development whereby a nurse and paramedic working in partnership attended non-urgent emergency calls.

Background

The demand for emergency ambulance services both nationally in the UK, and internationally, has been steadily increasing. A large proportion of calls made to the emergency ambulance service are classified as non-urgent. An alternative response to these calls may release the standard ambulance service to attend more urgent calls.

A pilot project was initiated in order to provide an alternative response to non-urgent emergency calls in an Ambulance Trust in England with support from the local Primary Care Trust. This alternative response comprised a district nurse or an emergency nurse practitioner dispatched with a paramedic to visit low priority emergency calls. The pilot service was trialled during a fifteen weeks period in 2003-2004.

Methods

This paper evaluates the cost-effectiveness of the pilot service by examining both its resource use and the outcome of the service.

Findings

It was found that introducing this service to the current provision would increase the overall cost to the ambulance services. However, a reduction in conveyance rate to hospital was observed as people could be treated on-scene. A reduction in conveyance rate to hospital would lead to reduced admissions to accident and emergency departments and subsequent hospitalisation. This paper provides an indication that further development of this type of service has the potential to be cost effective if the wider health care economy is considered as the cost savings made in secondary care could more than balance the costs to the Ambulance Services in providing such a service.

KEYWORDS

Emergency services, cost-effectiveness, low priority ambulance calls, older people, partnership working.

INTRODUCTION

History of the development

In 2003 two short projects were undertaken by Bedfordshire Heartlands PCT (BHPCT) and Bedfordshire and Hertfordshire Ambulance and Paramedic Service (BHAPS) to trial an alternative response to low priority ambulance calls. This alternative response comprised a district nurse and an accident and emergency nurse accompanying a paramedic to Category C emergency calls. Following the positive results of these two short projects, a longer pilot project was proposed with a formal evaluation undertaken by the authors. Using the information gained from the two short pilot projects, it was decided that, for the new project, one nurse and a paramedic would form the response team. The intervention vehicle used to convey the nurse and paramedic was a fully equipped emergency response car. The pilot project extended over 15 weeks from 5th December 2003 until 15th March 2004 and the pilot project operated on shifts from Friday to Monday inclusive, between 08.00-16.00 and 16.00-24.00.

BACKGROUND

Over the course of the last few years various reports have documented the increased demand for emergency ambulance services both in the UK and internationally, Department of Health, 2001b; Department of Health, 2005; National Audit Office, 2004) . While part of this increase may be due to the general ageing of the population, there is also a significant proportion of ambulance calls which have been found not to warrant an emergency response. As early as 1980, Morris and Cross (1980) found that out of 1000 consecutive patients brought to A&E by ambulance

following an emergency 999 telephone call, 51.7 per cent of these journeys were medically 'unnecessary'. Similarly, Gardner (1990), showed that 38 per cent of people who used an ambulance service following a "999" call in Chester did not have a sufficient medical need (Gardner, 1990). More recently in 1998, Snooks *et al* (2002) found that 40 per cent of calls to "999" were estimated not to require an emergency response. In a study providing epidemiological information on 999 callers not conveyed to hospital, most callers were assigned as low priority at the time of the call and the largest category of non-transported callers were people who had fallen, most of whom were over 70 years .

Dispatching an emergency ambulance to low priority calls is a cause for concern as patients may be transported to hospital unnecessarily; incurring long waits in accident and emergency departments (A&E) when an alternative response might have been more appropriate. In addition, the cost component associated with the expenditure of scarce ambulance resources is a serious matter in a health care system already facing budgetary pressures. In 1998, for example,) determined that 16 per cent, or 75,000 calls per year to the London Ambulance Service, were not necessary. At the same time, the monies which are spent on these unnecessary/low priority emergency ambulance calls might be applied to other sectors of the health care system which required investment.

In line with policy initiatives (*The NHS Plan* (Department of Health, 2000), *Reforming Emergency Care* (Department of Health, 2001b), *Transforming Emergency Care in England* (Department of Health, 2004b)) interventions to provide a more appropriate response by the emergency ambulance services to low priority calls are being investigated. In 2002, Snooks *et al* explored a range of options for calls that were neither life threatening nor serious, including; 1) prioritising 999 calls, 2) telephone

advice, 3) alternative vehicles and 4) on-scene alternatives. Overall, little data are available on the potential cost-effectiveness of providing alternative responses to low priority ambulance calls, although there have been some attempts at economic modelling to compare costs of implementation of use of Emergency Care Practitioners (ECPs) in urgent care both in urban and rural areas (Modernisation Agency, 2004).

It is against this backdrop that this study to evaluate the pilot project involving partnership working between paramedics and community nurses attending low priority ambulance calls took place.

The service development

The alternative response comprised a district nurse or an emergency nurse practitioner teamed with a paramedic to visit low priority emergency calls. The aim of the intervention was to visit and treat patients at home where appropriate and hence reduce the unnecessary transfer of patients to hospital. The pilot service was trialled during a 15-week period in 2003/2004. A qualitative exploration of the views of patients and staffs was also undertaken and is reported elsewhere (Machen et al 2005, Machen et al 2007).

Emergency 999 calls were answered and triaged by emergency call operators who allocate the calls to different categories according to their priority and need. Those calls which were thought to be non-urgent, non-life threatening cases were given a lower priority and could be assigned to the pilot service.

METHOD

Aim

To investigate the cost-effectiveness of the development project.

Cost-effectiveness analysis

In order to measure the cost effectiveness of the pilot service, both resources and outcomes data of the pilot service were analysed and compared with the current standard service data for responding to non-urgent calls. A comparison group which were attended by the standard ambulance service was drawn from non-urgent emergency callers on the same shift and time period and similar geographical area, as the pilot service.

Cost Data and Outcome Data

Although, ideally, costs are measured from the social (whole community) perspective (Drummond 1997) the analysis in this study was limited to the viewpoint of health care providers (i.e. Primary Care, Ambulance, and Hospital Trusts). This was thought sufficient to answer whether the pilot project was a cost effective service to be implemented by the NHS which is facing stringent budgetary constraints.

Costs were measured as costs in the year 2004 as the pilot service was primarily carried out within the first months of 2004. Data were gathered from various sources, including from the PCT, Ambulance and Paramedic Trust and also other published studies from the UK setting. Unit cost figures were obtained from the Unit Cost of Health and Social Care 2004 compiled by PSSRU University of Kent as well as the costs from the Department of Health Reference Cost database (DH 2004b, Curtis and Netten 2004).

Cost-effectiveness of the pilot service was assessed using an incremental cost-effectiveness analysis, where the where the difference in costs of introducing such a service is compared with the difference in outcomes/effectiveness of the service.

It was thought that the most important impact of the pilot service would be the reduction of patient conveyance to hospital as the patients could receive on-scene treatment by the nurse. To measure this, hospital conveyance data recorded on the database of the ambulance dispatch system in the ambulance trust was used. Data from the Computer Aided Dispatch (CAD) system from the Bedfordshire and Hertfordshire Ambulance and Paramedic Trust were used to compare the performance and the outcomes of the pilot service relative to the standard ambulance services in attending non-urgent emergency calls. These data were extracted from the database by ambulance trust personnel. No data which could be used to trace individual patients were extracted from the database.

The data covered all of the dispatch information from the ambulance trust for non-emergency calls (categories B&C) made during the operation times of the pilot project. This includes the call-sign codes for the vehicles used by the pilot initiative as well as other vehicles available for the standard dispatch procedure. The data were available in MS Excel format and converted to SPSS to enable statistical calculations.

Ethics and research governance approval were obtained prior to the pilot project evaluation.

ANALYSIS

The cost-effectiveness of the pilot project was assessed using incremental cost effectiveness analysis, where the incremental cost of introducing such a programme is compared with the incremental effectiveness of the project.

Sensitivity analyses were directly performed to factor uncertainty in the analyses. These were done by manipulating some related variables to reflect differences that might occur and also to provide a safe margin of error to support policy decisions.

All analyses were conducted with SPSS (Version No 12). and MS Excel (2003).

RESULTS

Although the pilot project was conducted over a 15-week period, the data analysed here were limited to a 13-week period. Data from the first 2 weeks of the trial were not used as during this time the emergency dispatchers and the pilot service team were still familiarising themselves with the project and their tasks.

During the 13-week period (morning – evening shifts, Friday – Monday inclusive), 3523 non-urgent, non-life threatening calls were logged into the computer aided dispatch system. After ~~data~~ cleaning the data for erroneous entries, cancelled calls, hoax calls etc, ~~the final data consisted of~~ 2781 non-urgent emergency calls ~~, which were assigned~~ with a total of ~~to~~ 4310 vehicle journeys were analysed. The pilot service team attended 198 of these calls either by itself or in conjunction with other emergency vehicles.

It was found that the group of patients attended by the pilot service had a significantly lower conveyance rate than those attended by the standard service alone. This was an encouraging result as the pilot team seems to be successful in treating patients at home (on-scene) and hence reduced the need to convey patients to hospital (Table 1). Similar results in relation to a reduction in conveyance rates have been found by

Mason et al (2007) in a randomised controlled trial focusing on paramedic practitioners (paramedics who have had extended training and education) when managing older patients with non life threatening conditions.

Insert Table 1 here.

Costs

Table 2 shows the breakdown of unit cost of both the standard and pilot service. Unit cost is the financial cost required to produce a unit of output. Data for the standard ambulance service was compiled from Curtis & Netten (2004) and supplemented with the data from the Ambulance and Primary Care Trusts, in particular, the data for the pilot service. Overheads consisted of general office costs, electricity, petrol, and other itemsthings related to the operations of the Ambulance Trusts.

Insert Table 2 here.

Overall, the pilot service was slightly more expensive than the standard ambulance service in attending a call. This was mainly due to the higher salary of the pilot service team than those on the standard ambulance service. The salary component of the pilot service was higher as the pilot vehicle was crewed by an experienced senior community nurse (Agenda for Change, Band 6 equivalent) and a paramedic. A standard ambulance vehicle is usually operated by a paramedic and a technician although some variances to this practice are also observed (Downing and Wilson 2005). For clinical reasons, it would have been inappropriate for a nurse and a technician to attend, what we were seeking to explore is how the additional skills which the nurse brought would enhance the skills of the paramedic. These included knowledge of local community services and referral systems, as well as clinical skills

such as suturing and wound dressing. The vehicle unit cost for the pilot service was less than the standard service due to the cheaper cost of the leased pilot vehicle (a car) and the high utilisation rate of the vehicle.

The cost for responding to non-urgent patient calls during the pilot project was calculated by multiplying the number of emergency journeys/visits by the pilot service and the standard service with their respective unit cost, both for on-scene treatment and hospital conveyance data, and is presented in Table 3.

Insert Table 3 here.

During the 13 weeks of the pilot service, non-urgent emergency calls cost the Ambulance Service more than £772,000. However, what is important is how much the pilot service increased the costs in comparison to the currently available service (incremental cost). This was analysed by comparing the total cost of the pilot service with the cost of standard ambulance service (without the pilot service).

The following analysis shows the incremental cost of introducing the pilot service (Table 4). This assumes that previous to the introduction of the pilot service, patients' conveyance rate was identical to that of the standard service (operational during the timescale of the pilot phase)The incremental cost of conducting the pilot service was about £20,000 for the duration of project. This incremental cost consisted of the additional cost of the pilot service attendance as well as the cost of the standard ambulance services on the occasions when the pilot service was unable to deal with the case on-scene and patients needed to be transported to hospital.

Insert Table 4 here.

If we assume that there had been no pilot service, and assume that patients were conveyed to hospital at the same rate as in the standard ambulance service (running concurrently), then there would have been an additional 72 hospital conveyances over the 13 week time period. Hence, the incremental cost per patient prevented from being conveyed to hospital of the pilot service was £286.90 (That is, £20,657 divided by 72). This means that the pilot service costs an additional £286.90 to prevent a single hospital conveyance from a non-urgent caller.

Economic modelling

In order to explore potential costs and savings to the wider health economy the following economic modelling was undertaken.

The pilot project showed that more people could be treated in their own homes (or on-scene) thereby reducing the need to convey patients to hospital unnecessarily. Consequently this would lead to a reduction in the use of the A&E department and subsequent hospitalisation. The following analysis assumes that each conveyed patients cost £83 to the A&E department (Curtis and Netten 2004). This cost does not include any treatments given in the A&E department. The rate of hospitalisation following a transfer to A&E visit by ambulance has been found to be 33.4% for people under 65 years and 58.8% for those over 65 (Downing and Wilson 2005). In the modelling carried out here we assumed a conservative length of stay of one day for those who could have been admitted, at a cost of £166 (Curtis and Netten 2004).

Therefore, adding all the above estimations and conservative costs into the model, the updated incremental cost across the wider health economy is shown in Table 5.

Insert Table 5 here.

Therefore, the total cost to respond to non-emergency patient calls was lower than the standard service following the introduction of the pilot service. Even with the very conservative estimate of the costs incurred in the A&E department and the subsequent hospitalisation rate, the modelling demonstrated that the project saved £29,260 during its 15-weeks. The cost of providing the pilot service was compensated by the savings made from the reduced use of the A&E department and subsequent hospitalisation.

The negative incremental cost and a positive outcome (positive number of prevented patient conveyances to hospital) implies that the pilot service was very cost-effective for NHS when the wider system was considered. Although it actually costs more to the Ambulance Trust to provide such a service, the pilot service saved money when considered in terms of overall NHS expenditure.

DISCUSSION

The results of the economic modelling indicate that the development of an alternative response for non-urgent emergency calls can be cost-effective. However, caution should be exercised in using these results as there are several possible biases within the project methodology. Firstly, the vehicles in this project were not assigned randomly to patients' calls. Second, the reduction in the conveyance rate might have been an indirect result from a selection bias from the emergency dispatchers. If the pilot service was deployed to attend less serious calls then patients receiving the pilot service may have had less need to be conveyed to hospital.

The economic modelling has used very conservative assumptions about costs in the calculations, therefore it is possible that the actual cost-effectiveness of the pilot service is higher than the calculated figures presented in this paper. That is, if extra diagnostic tests were carried out and periods of hospitalisation were longer than one day, the pilot service would have saved further resources, and hence be more cost-effective.

This development indicates that there is very real potential for similar developments to address the increasing demand on emergency services and improve the cost-effectiveness of services. This pilot intervention was only able to attend a small proportion of the non-urgent emergency calls being made. Not all of the non-urgent patient calls could be treated on-scene by the pilot service, thus necessitating a response from the standard ambulance service.

The accuracy of triage classifying emergency calls is important for effective implementation of alternative responses to non-urgent calls. Urgent calls might be wrongly classified as low-priority patient calls (Deakin et al 2006) and inaccuracies of allocating those calls to the pilot service would maybe require further assistance from additional vehicle units, which would in turns increase the costs. Furthermore, assigning an alternative response ~~such as this pilot service~~ to those callers could potentially ~~adversely~~ affect the patient outcome. However, during the current study, no evidence was found to indicate any adverse effects on patient outcome caused by the introduction of the pilot service.

Recently in the UK emergency care practitioners (ECP) have been employed by some ambulance trusts to attend low-priority ambulance calls. The ECP role combines some of the extended skills of the nurse and paramedic and is currently being evaluated. Results from an initial survey found that ECPs were able to assess,

treat and discharge over 40% of patients who were classified as low-priority callers (Mason at al 2006) and Cooper et al (2007a) had an overall non-conveyance rate of 62% in their study with 48% (285/595) of patients being seen, treated and discharged by the ECP. Further evaluations of this and other interventions which provide alternative responses to low-priority emergency needs are required. Further evaluations of these developments should include a thorough economic evaluation which enables exploration of the real costs of the intervention and its economic impact on the wider health economy. For the economic analysis to be more precise and not be reliant on estimates and modelling, detailed data on patient destination, hospital length of stay, treatment and investigation cost will also need to be collected.

This paper only discusses the financial implications and outcomes of the pilot project, and does not discuss other benefits of the pilot service such as patient and staff satisfaction (for discussion of these see Machen et al 2007), patient convenience, releasing emergency ambulances for more life saving calls and the reduction in waiting times for available beds at the hospital. S~~with s~~everal of the original, qualitative findings have been~~being~~ supported more recently in Cooper et al's (2007b) study~~.~~

As far as the authors are aware, to date, few studies have reported the cost and the effectiveness of similar developments (Snooks at al 2004, Newton et al 2006) ~~.~~

CONCLUSION

T~~Hence, t~~hese findings ~~add important insights and~~ demonstrate the potential ~~possibilities~~ for the development of similar interventions to deal with non-urgent calls to the ambulance service in other ambulance trusts. Policy makers and those responsible for the provision of emergency services seeking to reduce unplanned

hospital conveyance and admission should consider similar schemes as a potentially cost-effective response to non-urgent emergency calls, particularly within the context of the wider health care economy.

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TABLES:

Table 1: Patient Conveyance

Patient outcome	**Standard**		**Pilot**		**Total**	
	N	%	N	%	N	%
Conveyed to hospital	2,130	82.5	91	46.0	2,221	79.9
On-scene treatment	453	17.5	107	54.0	560	20.1
Total	**2583**	**100**	**198**	**100**	**2781**	**100**

Table 2: Unit Cost for Pilot and Standard Ambulance Service (in £)

Categories	**Standard**	**Pilot**
Crew salaries	113.7	124.1
Vehicle	12.3	5.5
Overheads	118.4	118.4
Unit cost		
Per patient attended	244.4	247.9
Per patient conveyance to hospital	276.0	Not calculated*

**The unit cost for the pilot service was not calculated as the service~~-~~ was ~~is~~ not intended to convey patients to hospital.*

Table 3: Cost of Responding to Patient Calls (in £)

Outcome	Standard	Pilot	Total Cost
On scene	110,700	26,529	137,229
Hospital	587,880	47,678**	635,558
Total cost	**698,580**	**74,207**	**772,787**

*** This includes the conveyance cost by standard ambulance in addition to the cost of on-scene treatment by pilot team*

Table 4: Incremental Cost of Introducing The Pilot Service (in £)

Outcome	**Base Service (No Pilot Service)**	**Pilot + Standard Service**
Conveyed to hospital	632,944	635,558
On Scene treatment	119,186	137,229
Total cost	**752,130**	**772,787**
Incremental cost		**20,657**
Patient conveyance prevented		72
Incremental cost per hospital conveyance prevented		**286.9**

Table 5: Incremental Cost Analysis (in £)

Treatment	**Base Service (No Pilot Service)**	**Pilot + Standard Service**
Hospital On Scene	632,944 119,186	635,558 137,229
Ambulance cost	**752,130**	**772,787**
A&E cost	190,342	184,343
One day hospitalisation cost	232,328	188,410
Hospital cost	**422,670**	**372,753**
Total cost	**1,174,800**	**1,145,540**
Incremental cost		**- 29,260**