

## PREHOSPITAL CARE

# On-scene alternatives for emergency ambulance crews attending patients who do not need to travel to the accident and emergency department: a review of the literature

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With rising demand and recognition of the variety of cases attended by emergency ambulance crews, services have been considering alternative ways of providing non-urgent care. This paper describes and appraises the research literature concerning on-scene alternatives to conveyance to an emergency department, focusing on the: (1) profile and outcomes of patients attended but not conveyed by emergency crews; (2) triage ability of crews; (3) effectiveness and safety of protocols that allow crews to convey patients to alternative receiving units or to self care. The literature search was conducted through standard medical databases, supplemented with manual searches. Very few “live” studies were identified, and fewer still that included a control group. Findings indicated a complex area, with the introduction of protocols allowing crews to leave patients at scene carrying clinical risk. Robust research evidence concerning alternatives to current emergency care models is needed urgently to inform service and practice development.

emergency ambulance service that are more appropriate to their needs.<sup>6</sup> However, services seem reluctant to make changes to the services they offer without clear research evidence supporting such changes.<sup>7</sup>

This paper reviews the research literature concerning

- the profile and outcomes of patients attended but not conveyed by emergency ambulance crews
- the ability of ambulance crews to triage patients to non-conveyance or transportation to alternative receiving units
- the effectiveness and safety of protocols that allow crews to leave patients at scene or to convey to alternative receiving units, with or without referral

Studies that have been included in this review are summarised in table 1 (available on the journal web site <http://www.emjonline.com/supplemental>).

The literature search was conducted through Medline, BIDS, Healthplan, Helms (online database searches), manual searches of relevant journals, and cross checking with the bibliographies of previously published reviews and original articles. The key words for searches included the following: Ambulances; Ambulances-history; Ambulances-standards; Emergency-Medical-Technicians; Emergency-Medical-Services; Emergency-Medical-Services-utilization; Emergency Service; Transportation-of-patients; Pre-hospital care.

### (1) Profile and outcomes of patients attended but not conveyed by emergency ambulance crews

#### Current practice: non-transportation

Up to 30% of 999 callers in the UK are not transported to hospital after attendance by an emergency crew.<sup>2</sup> Similar rates of non-conveyance have been reported elsewhere, for instance in the USA—between 23% and 33%.<sup>8,9</sup> Currently, in most UK services, the only circumstance in which patients can officially be left at scene is in the case of refusal to travel. This also applies in the USA, with a survey of US emergency medical service (EMS) providers<sup>9</sup> showing that few

Recent recognition of the need to develop emergency prehospital care to meet the varying clinical needs of the range of callers to the emergency ambulance service has led emergency care providers in the UK to consider alternatives to the current responses provided by accident and emergency (A&E) departments, ambulance services, and general practitioners (GPs).<sup>1</sup> Research evidence and operational performance figures point to a situation for the ambulance service of rising demand,<sup>2,3</sup> difficulties in meeting response time targets for patients with life threatening conditions, and a mismatch between the service provided and the needs of some 999 callers with non-urgent conditions.<sup>4</sup> As one response, NHS Direct—a new nurse led telephone based information and advice service—has been set up across the country, to try to offset demand for immediate care, and to triage callers appropriately to emergency, primary, or self care.

Ambulance services are also exploring options, including on-scene assessment and referral or advice in place of automatic conveyance to A&E.<sup>5</sup> Current Department of Health initiatives promoting joint working are focusing on opportunities to develop care pathways for callers to the

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**Abbreviations:** EMT, emergency medicine technician; MIU, minor injury unit; ED, emergency department

services have written protocols that allow crews to refuse transportation to hospital (17%), and even fewer (10%) have alternative means of transportation in place such as taxi or minivan transportation. In practice, however, the line between the “reluctant patient” and the “reluctant rescuer” may be blurred, with agreement reached between the crew and patient that transportation is not needed, and is not in the best interest of the patient.<sup>10</sup> Despite apparent differences between emergency medical service systems and their financing in the UK and US, issues of non-conveyance seem remarkably similar.

In the USA, considerable concern has been expressed about non-conveyance of patients attended after emergency calls to the EMS system. Several papers have been published concerning the litigation risk of non-transportation.<sup>10 11</sup>

### Characteristics of non-conveyed patients

Two papers have been published that described the characteristics of the population of non-conveyed patients in the USA.<sup>12 13</sup> Selden’s paper<sup>12</sup> reported demographics, disposition, and reason for non-conveyance, which were retrospectively categorised and analysed for the study. In this study, non-transported patients were significantly younger than those taken to hospital, although there was no gender difference. The most frequent conditions among the non-conveyed were described as minor trauma (24%), blunt injury to the head and face (19%), and “no illness or injury” (16%). Forty seven per cent of the non-conveyed patients were treated and released at scene by the paramedic, 23% agreed to go to the emergency department (ED) or to seek other medical care by private vehicle, and 24% refused treatment. The condition that most commonly resulted in patient refusal to travel was epileptic seizure (39%). Thirty nine per cent of non-conveyed patients were left with a friend or relative, a further 36% were left alone. Eighteen per cent were left with the police, some of whom were taken by the police to the ED, some taken home, some taken to prison, some to a mental health facility, and some to a city “detoxification unit”. Stark’s paper<sup>13</sup> focuses on patient refusal to travel. For calls where the patient disagreed with the paramedic’s treatment decision, associated features were reported as alcohol use (24%), seizures (12%), narcotic use (7%), and hypoglycaemia (7%). Although some of these calls for physician telephone assistance resulted in eventual transportation to hospital, about half did not. Significantly, about one quarter of patients left at home against medical advice were reported by the paramedic to be disorientated or to have abnormal speech or behaviour.

A recent study has also provided the first information on the epidemiology of non-conveyed 999 callers in the UK.<sup>14</sup> Falls accounted for the largest category of non-transported calls (34%, n = 170), most of whom were aged over 70. Most callers had been assigned a low triage priority at the time of the call (89%, n = 140). The authors conclude that assigning an alternative response to these calls may allow the ambulance service to respond more quickly to life threatening calls, and provide a more cost effective service. They recommend however, that further research be carried out before implementing changes to the current service.

Several case reports have also been published that demonstrate the difficult position of the EMS provider when faced with a patient who does not wish to travel to hospital.<sup>15–17</sup> These papers provide some useful qualitative information concerning the non-conveyed patient population, although quantitative information is needed before generalisations can confidently be made on the basis of these papers.

### Non-conveyance: appropriateness and outcomes

Other US papers have looked at the appropriateness of non-conveyance, and the outcomes of non-conveyed

patients.<sup>8 18 19–23</sup> In Selden’s 1990 paper, criteria adapted from the ED guidelines were retrospectively applied to cases that were not conveyed to hospital within the period of study.<sup>19</sup> Measured against the criteria for release set for the study, 77.8% were assessed as appropriate. Inadequate documentation of vital signs and mental status was the most common reason for inappropriate release in patients with no injury/illness and those with minor trauma. Alcohol use was also significantly associated with inappropriate release. The study authors concluded that documentation of history, vital signs, and mental competence as well as of having explained the risks of non-conveyance are fundamental to providing a safe service for emergency patients.

Serious, and occasionally fatal, outcomes were described in the three studies in which non-conveyed patients were followed up. Cone’s and Burstein’s papers<sup>8 21</sup> focused on those who refused transportation, but Zachariah’s study<sup>18</sup> included those who were denied transportation by their attending paramedic. In each study similar outcomes were found—with up to 65% of those left at scene requiring further medical help within the week after the EMS attendance, and up to 20% requiring emergency care and hospitalisation. Follow up rates were low in all papers—between 59% and 67%, meaning that these data need to be interpreted with caution. It is quite possible that those lost to follow up experienced different outcomes to those traced. The true rates of adverse outcome may therefore have been substantially higher than those reported.

### (2) Ability of ambulance crews to triage patients to non-conveyance or transportation to alternative receiving units

#### Field triage and diagnosis by paramedics

Some preliminary studies have been carried out in the US concerning the ability of prehospital field personnel to appropriately triage or diagnose emergency patients at the scene. To date, most of these have been published in the form of abstracts rather than full papers, and have been comparatively recently published, perhaps indicating that this work is still underway.

Some of these papers have looked at how accurately paramedics can determine the clinical need for transportation to hospital,<sup>24–29</sup> while other studies have looked at the ability of crews on scene to diagnose patient conditions, two of these looking specifically at stroke.<sup>30–32</sup> The Kothari papers, looking at prehospital stroke recognition, are outside the scope of this review. In Hauswald’s 1998 study<sup>26</sup> of 176 patients, paramedics recommended alternative transportation to an ambulance for 95 patients, 21 of whom were subsequently found to be in need of ambulance transportation, based on retrospective review of ED notes. Paramedics also recommended non-emergency care for 71 patients, 32 of whom needed ED care. It was concluded that paramedics require additional training in this role before they can make safe triage decisions. Paramedics were compared with emergency physicians in their ability to determine 509 patients’ need for ED evaluation in Sasser’s 1998 study.<sup>25</sup> Results showed disagreement existed in 32% (n = 164) of cases. In Santoro’s 1998 US study,<sup>30</sup> which compared paramedics and physicians on the most likely patient diagnosis, while there was found to be a high level of agreement between physician and paramedic, in 6% of encounters it was judged that the misdiagnosis by the paramedic could have led to an adverse outcome. Schmidt’s recently published study reinforces these results.<sup>29</sup> Twenty one per cent of patients (n = 277) were judged by crews to not need ambulance transportation to hospital. Seven (3%) of these patients had a critical event in the ambulance that warranted emergency transportation, although the authors threw some doubt on this

finding, suggesting that the crew may have misclassified the calls.

In all of these studies, protocols were applied theoretically only, with practice unaffected. Because of the brevity of some of the published results, in abstract form only, it is difficult to fully appraise these studies. However, in general they report variable agreement between on-scene and A&E evaluation of need for emergency medical assessment/care ( $\kappa$  between 0.33 and 0.47) with some undertriage by paramedics consistently identified. These authors all conclude that some clinical risk would exist if crews were to triage patients routinely to self care, and further work is required before such policies should be introduced.

### (3) Effectiveness and safety of protocols that allow crews to leave patients at scene or to convey to alternative receiving units, with or without referral Treat and release

A small number of papers have published preliminary work regarding the need for, and trials of, protocols to leave patients at home. This work is clearly at an early stage, with no full papers yet published reporting the results of trials. These papers cover specific conditions—hypoglycaemia,<sup>33–35</sup> epileptic seizures,<sup>36</sup> and policies for generic groups of patients.<sup>5, 37</sup> In each case, although the authors made the case for there being a need and opportunity to leave some patients at home, the evidence collected pointed to a substantial risk for a minority of patients that was difficult to exclude in treatment protocols. Indeed, only two of these studies reported the results of actually changing practice so that patients were released by paramedics,<sup>5, 35</sup> and in the first of these the decision was approved by online medical control. In this study, although patients followed up after 24 hours reported high levels of satisfaction with the new service, three had experienced recurrence of hypoglycaemic symptoms and one of these had been found unresponsive and had had to be admitted to a long term care facility with hypoglycaemic encephalopathy.<sup>35</sup> The other “live” trial<sup>5</sup> was carried out in the UK. In this study the processes and outcomes of care for patients treated by crews trained to use protocols to leave appropriate patients at home with onward referral or self care advice were compared with patients treated according to standard practice. In this study, conveyance rates were similar in the two groups, although crews using the “Treat and Refer” protocols spent longer on scene. Patients in the intervention group were at least as satisfied with their care. Safety was assessed by identifying admissions related to the 999 call in non-conveyed patients in both groups within 14 days (intervention group: 5 of 93; control group: 17 of 195). Clinical reviewers assessed three cases in each group as having required transportation to hospital at the time of the 999 call. In the intervention group these were judged to have been related to suboptimal use of the protocols rather than the protocols themselves, and the authors concluded that this was a training issue.

In the other studies that compared hypothetical application of criteria to cases attended,<sup>25–27, 30, 37</sup> patients were mainly overtriaged by crews in comparison with physician judgement or treatment given in the ED, but undertriage was identified in each study, and included cases of ectopic pregnancy, multiple abdominal trauma, and hypoglycaemia that required hospital treatment or admission. Since this study was started, another trial of Treat and Release protocols in the USA has been reported to have been discontinued because of concerns about the safety of triage decisions made by crews.<sup>38</sup> No other studies were found that evaluated field referral to other healthcare providers.

### Triage and transportation to alternative receiving unit

Although the question of accuracy of triage of seriously injured patients to varying levels of receiving unit has been well researched, the possibility of prehospital triage to minor treatment centres, such as minor injury units (MIU) or walk-in centres has not been well explored in the research literature. An exception to this is Schaefer’s 2001 study that involved developing and testing a protocol for emergency medical technicians (EMTs) to identify appropriate patients for transport and treatment at urgent care clinics rather than ED.<sup>39</sup> Of 1016 patients who met the criteria for inclusion during the six month period of the study, 81 were taken to and treated at an urgent care clinic. Five others were initially referred to the urgent care clinic before proceeding on to the ED. Four hundred and eighteen patients were eligible for care in the urgent care clinic but were taken to the ED with a reason given for choice of destination: urgent care clinic closed ( $n = 186$ ); patient stated preference ( $n = 149$ ); EMT discretion ( $n = 78$ ); clinic refused patient ( $n = 5$ ). Forty two of the 81 patients taken to urgent care clinic (52%) who completed a telephone interview within two weeks of the call out were reported to be satisfied with their care. Medical review of all cases referred to an urgent care clinic concluded that the referral was appropriate in 97% of cases, and that the patients transferred on from urgent care clinic to ED did not suffer any delay in resolution of their condition. The authors concluded that EMTs were generally able to accurately identify patients for referral to an urgent care clinic and that the new service was acceptable to patients. Despite low rates of conveyance to the alternative receiving unit, use of the urgent care clinic instead of the ED seemed to bring benefits to most patients and the ambulance service, although this study is weakened considerably by the lack of a concurrent control group and low response rates. A trial of triage and transportation to MIUs is currently underway in two parts of south east England, with full results due in 2003.<sup>40</sup>

### SUMMARY AND CONCLUSIONS

In summary, this review has found a lack of evidence to indicate that there is a clinically safe approach to identifying patients who call for an emergency ambulance but do not need conveyance to ED. There is evidence that a significant minority of those not conveyed are at risk of deterioration and subsequent need for further emergency care. Relevant research evidence concerning the benefits of triage by crews on scene to decide upon appropriate care pathway is lacking. Most of the previous work in this area has been hypothetical only, with intervention studies rare and methodologically weak. However, preliminary studies have consistently pointed to the need for caution.

With clear evidence concerning the inappropriateness—and inefficiency—of the current model of care, but with little evidence about how to safely develop the service, further research in this area is required as a matter of urgency.



Table 1 is available to view on the journal web site (<http://www.emjonline.com/supplemental>).

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