# Hidden impact of paramedic interventions

Michael Powar, Jonathan Nguyen-Van-Tam, James Pearson, Andrew Dove

**Abstract**

***Objective*—To examine current patterns of deployment and use of emergency ambulance crews in Nottinghamshire, with particular reference to crew status (technician or paramedic), case mix, interventions performed, and operational times.**

***Methods*—A retrospective survey of routinely collected computerised ambulance service despatch data, and patient treatment forms for 242 randomly selected emergency callouts in Nottinghamshire, during September 1994. Data were collected on patient demography, broad diagnostic group, crew status and operational times, and paramedic interventions performed.**

***Results*—170 of 242 callouts (70%) involved a paramedic crew; extended skills were used on 31 of these occasions (18%), predominantly for medical emergencies. Paramedic crews recorded significantly longer on-scene times (median time: 14.0 *v* 11.5 min, P = 0.04). An examination of the difference between paramedics who performed interventions and those who did not revealed that "intervening" paramedics recorded significantly longer on-scene times (median time: 23 *v* 12 min, P<0.001), turnaround times (median time: 28 *v* 18 min, P<0.001), and total out-of-service times (median time 73 *v* 51 min, P<0.001).**

***Conclusions*—The additional time taken by paramedics at the scene of an emergency incident relates to their performance of an intervention, rather than time spent assessing the patient to decide whether stabilisation or immediate evacuation would be most appropriate. Paramedic interventions were most often performed for medical emergencies. The performance of paramedic interventions also extended turnaround times and total out-of-service times.**

(*J Accid Emerg Med* 1996;13:383–385)

Key terms: paramedics; operational times; emergency callout; intervention

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Accepted for publication 15 July 1996

From the beginning of 1996, in accordance with the Department of Health's directive, every emergency ambulance in England and Wales should now be deployed with at least one paramedic crew member.[1] Their extended skills include endotracheal intubation, intravenous cannulation, and the administration of drugs and fluids.[2] Recent studies have drawn attention to the fact that paramedic crews spend significantly longer periods at the scene of an incident than ambulance technicians.[3–5] However, it is still unclear whether delays occur because paramedics undertake more sophisticated patient assessments, or because they expend time performing interventions.

To our knowledge no studies have previously considered other potential delays in turnaround time (that is, the time interval between a crew arriving at hospital with the patient, transferring care to accident and emergency (A&E) personnel and subsequently "calling clear" for further service), and total out-of-service time.

We describe a study of operational time data for emergency paramedic and technician-only crews in Nottinghamshire which considers the impact of paramedic status separately from paramedic interventions.

## Methods

During September 1994, 5616 calls for an emergency ambulance were received by Nottinghamshire Ambulance Service control centre. For the purposes of this explanatory study, each call was assigned to a 1 in 20 chance of being randomly selected by computer, for more detailed examination. Abortive calls, in which transportation of a patient did not ultimately take place, were later excluded. Pre-hospital data, obtained from ambulance patient report forms and computerised despatch details, were then reviewed.

For each call, the following times were recorded: when calls were received and passed to a crew, arrival on-scene and departure, arrival at hospital, and when "calling clear". These time intervals are summarised in fig 1. Crew status (whether paramedic or technician) and the use of extended paramedic skills were also noted for each incident. Paramedic crew status was defined by the presence of at least one paramedic trained crew member; therefore crews comprising one paramedic and one technician were considered to have paramedic status. Time differences between groups were analysed using the Mann-Whitney U test; three main comparisons were made as follows: (1) overall differences between paramedic and technician crews; (2) differences between paramedics who did *not* perform interventions and technicians (who could not); (3) differences between paramedics who performed interventions and those who did not.

For each patient, basic demographic characteristics and details of presenting complaint were also recorded. No standard protocol exists for the classification of presenting complaint in pre-hospital care; therefore after

*Table 1 Demographic characteristics and broad diagnostic group of 242 patients transported by emergency ambulance in Nottinghamshire, September 1994, by ambulance crew status*

| Characteristic | Ambulance crew status | | | | |
|---|---|---|---|---|---|
| | Technician number (%) | Paramedic no intervention performed number (%) | Paramedic intervention performed number (%) | $\chi^2$ | P |
| Age (years): | | | | | |
| 0–14 | 7 (10) | 14 (10) | 0 (0) | 17.1 | 0.009 |
| 15–44 | 28 (40) | 61 (45) | 7 (23) | | |
| 45–74 | 22 (31) | 35 (26) | 19 (63) | | |
| ≥75 | 13 (19) | 26 (19) | 4 (13) | | |
| Missing data | 2 | 3 | 1 | | |
| Sex: | | | | | |
| Male | 42 (58) | 76 (55) | 21 (68) | 1.8 | 0.41 |
| Female | 30 (42) | 63 (45) | 10 (32) | | |
| Diagnostic group: | | | | | |
| Trauma (including burns) | 32 (44) | 70 (50) | 7 (23) | 7.9* | 0.02* |
| Surgical emergencies (including obstetrics & gynaecology) | 5 (7) | 15 (11) | 0 (0) | | |
| Medical emergencies | 30 (42) | 45 (32) | 23 (74) | | |
| Other categories | 5 (7) | 9 (6) | 1 (3) | | |
| Total | 72 | 139 | 31 | | |

*Trauma versus non-trauma.

*Table 2 Comparison of median operational times by crew status for 242 emergency ambulance callouts in Nottinghamshire, September 1994*

| Crew status | Median operational times in minutes | | | | | |
|---|---|---|---|---|---|---|
| | Activation | Response | On-scene | Transfer | Turnaround | Out-of-service |
| Technician | 2 | 7.5 | 11.5* | 14 | 18.5 | 55.5 |
| Paramedic | 2 | 7 | 14* | 12 | 19 | 55 |

*Difference between on-scene times of ambulance technicians and paramedics (P=0.0395).

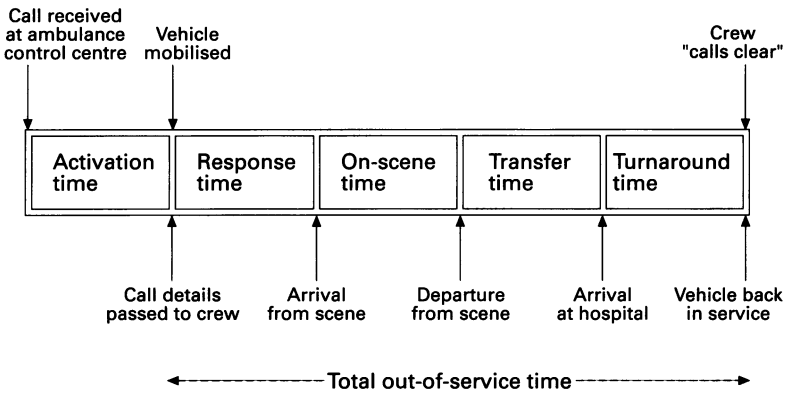


*Figure 1 Prehospital time intervals.*

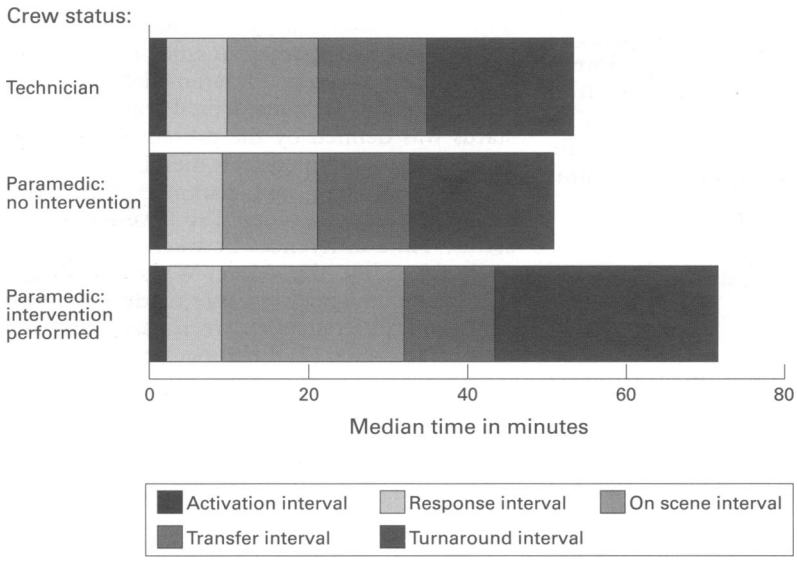


*Figure 2 Comparison of median operational times by crew status and intervention performed for 242 emergency ambulance call-outs in Nottinghamshire, September 1994.*

discussion with local A&E consultant colleagues it was decided to categorise presenting complaint by broad hospital diagnostic group (trauma, surgical emergency, medical emergency, and other conditions).

## Results

Random selection of incidents produced a total sample size of 295 and data were successfully retrieved for all cases. Fifty three incidents (18.0%) were found to be abortive calls; therefore 242 incidents were available for study. The final sample accurately represented each of the 12 ambulance stations in Nottinghamshire in proportion to their workload (data not shown). One hundred and seventy patients (70.2%) were treated by paramedics and 72 (29.8%) by technicians. Of the 170 incidents involving paramedics, 38 involved vehicles crewed by two paramedics working together; the remaining 132 involved crews comprising one paramedic and one technician. Paramedics performed interventions during 31 incidents (18.2%). There were no significant age differences between patients attended by technicians, "non-intervening" paramedics, and "intervening" paramedics (table 1). However, paramedic interventions were more likely to take place when dealing with older patients (aged 45-74 years) and non-trauma patients, predominantly medical emergencies.

Overall, activation, response, transfer, turnaround, and total out-of-service times did not differ significantly between paramedics and technicians; however, paramedics recorded significantly longer on-scene times (table 2).

A comparison of paramedics who performed interventions with those who did not showed no significant differences in activation, response, and transfer times (table 3). In

*Table 3 Comparison of median operational times by crew status and intervention performed for 242 emergency ambulance call-outs in Nottinghamshire, September 1994*

| *Intervention and crew status* | *Median operational times in minutes* | | | | | |
|---|---|---|---|---|---|---|
| | *Activation* | *Response* | *On-scene* | *Transfer* | *Turnaround* | *Out-of-service* |
| Technician | 2 | 7.5 | 11.5 | 14 | 18.5 | 55.5 |
| Paramedic: no intervention | 2 | 7 | 12* | 12 | 18† | 51‡ |
| Paramedic: intervention performed | 2 | 7 | 23* | 12 | 28† | 73‡ |

*Difference between on-scene times of "intervening" and "non-intervening" paramedics (P<0.00005).
†Difference between turnaround times of "intervening" and "non-intervening" paramedics (P<0.0001).
‡Difference between out-of-service times of "intervening" and "non-intervening" paramedics (P<0.00005).

contrast, on-scene times were significantly longer for intervening paramedics than for non-interveners. Turn-around times were also significantly lengthened following a paramedic intervention, as were total out-of-service times. However there were no significant differences between technicians and non-intervening paramedics for all six operational time parameters studied. These data are summarised in fig 2.

## Discussion

In common with many previous studies, our results show that, overall, ambulance paramedics spend longer at the scene of an incident than technicians. The Nottinghamshire Ambulance Service does not currently operate an ambulance priority despatch protocol and the results shown in table 1 reflect a policy of assigning the nearest available crew, regardless of their status.

Our data allowed a closer examination of the impact of paramedic interventions which, to our knowledge, has not previously been described. The absence of any significant difference between the on-scene times of technicians and non-intervening paramedics, coupled with the marked difference between intervening and non-intervening paramedics, suggests that it is the performance of a procedure rather than the assessment of whether to "scoop and run" or "stay and stabilise" which is responsible for any additional on-scene delay. Paramedic ambulance staff receive supplementary training compared to their technician colleagues; it appears that this extra knowledge base, in the absence of performing any practical intervention, does not increase on-scene time. Thus it is possible to conclude that paramedic trained crews do not spend extra time on-scene through taking longer to assess patients.

The reasons for performing paramedic interventions appear to be partly related to case-mix; paramedics were more likely to perform interventions on patients aged 45-74 years and on non-trauma patients. These findings may suggest that medical emergencies (predominantly cardiac conditions), and not trauma, have the greatest potential to increase paramedic on-scene times, through the performance of interventions. However, in reaching this conclusion, we acknowledge that insufficient data were available from the ambulance patient report forms to allow for the calculation of either injury severity score[6] or revised trauma score[7] for trauma patients; this would be an area for future prospective studies to address.

Paramedic interventions also resulted in lengthened turnaround time. These "hidden" delays, at the point of patient handover, are a new finding. The underlying reasons are unclear but may relate to increased complexity in the transfer of patient care to the hospital emergency team, a vested interest in the patient's outcome, replenishment of the vehicle's store of consumable or disposable items needed for subsequent calls, respite time for the crew, or even their participation in further management. This additional delay matches the extra on-scene time associated with the intervention itself, culminating in out-of-service times which are extended by approximately 20 minutes. These findings will assume growing importance to clinicians and managers involved in clinical audit, service planning and contract negotiations, as greater numbers of paramedics are deployed in line with the Department of Health directive.

We gratefully acknowledge the help of Mr D Esberger, Mr LN Jarrett, Miss L Williams, Dr J White, and the staff of Nottinghamshire Ambulance Service NHS Trust, especially Mr P Durston and Miss B Conneally.

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