

## BENCHMARKING THE UK MILITARY DEPLOYED TRAUMA SYSTEM

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### Comparing Civilian and Military Performance

In November 2007 the National Confidential Enquiry into Patient Outcome and Death (NCEPOD) published a report [1] that identified that almost 60% of major trauma patients (Injury Severity Score  $\geq 16$ ) receive care that is "less than good practice" in a representative sample of hospitals across England, Wales, Northern Ireland and the Offshore Islands. The report represents one of a series of Royal College sponsored reports over almost 2 decades that have consistently criticized the quality of acute trauma care in the NHS [2,3].

A core function of the Defence Medical Services (DMS) is the effective assessment, treatment and evacuation of Service personnel injured on deployed operations. Service clinicians would argue that the organization and delivery of acute trauma care that has developed to support contemporary combat operations is significantly advanced compared to the NHS. The publication of the NCEPOD report is an opportunity to objectively benchmark DMS trauma system performance against the NHS.

The DMS has audited its clinical effectiveness in major trauma management in detail since 1999 [4] and has deployed personnel in a Trauma Nurse Co-ordinator role to collect relevant data throughout the contemporary conflicts in Iraq and Afghanistan, generating periodic reports of major trauma performance [5,6]. A Joint Theatre Trauma Registry (JTTR) is maintained at the Royal Centre for Defence Medicine (RCDM) in Birmingham. NCEPOD determined that under half (42%) of sampled NHS hospitals undertake detailed audit through subscription to the national Trauma Audit Research Network (UK TARN).

Many NHS hospitals sampled treated less than one major trauma case per week, and some treated only 1-2 cases in the entire 12 week sampling period. Only 12/183 (6.6%) hospitals treated >1 major trauma case per week. Experience in dealing with major trauma was related to performance as those with a higher caseload (>20 major trauma in 12 weeks) were judged to deliver a higher percentage of care assessed as good practice.

A benchmark of trauma system performance is provided by comparing NCEPOD findings with JTTR for the period 01 April 2006 to 30 September 2007. While including casualties treated by UK DMS in both Iraq and Afghanistan, the first date coincides with the start of UK combat operations in Southern Afghanistan. For this period there were 314 major trauma cases (calculated using the Abbreviated Injury Scale 2005, US Military version [7]), which is an average of 4.25 per week (51.0 over 12 weeks).

Injury mechanisms and injury severity are different between the NHS and DMS patient cohorts: 56.3% of NHS major trauma patients are a result of motor vehicle collision (blast or gunshot are not coded and are included in 10.3% of "other" mechanisms); in the DMS cohort only 5.1% of major trauma is from MVC, with 53.8% blast/fragmentation and 29.9% gunshot. Banding the Injury Severity Scores demonstrated that the DMS cohort was significantly ( $p < 0.0001$ ) more severely injured than the NHS cohort (ISS 16-24, NHS = 56.5%, DMS = 26.4%; ISS 25-35, NHS = 35.1%, DMS = 22.3%; ISS 36-75, NHS = 8.4%, DMS = 51.3%). However, the injury severity must be interpreted with caution as AIS 05 (Military) has been adjusted from AIS 98 (UK civilian coding standard) to take account of injuries inflicted by military mechanisms.

The lack of availability of senior clinical staff to direct the Trauma Team was identified as the norm in the NHS: 118/183 (64.5%) hospitals did not have a consultant Trauma Team leader during a specific sample period (early hours of Sunday morning) and in only 6/183 (3.3%) hospitals was the consultant team leader resident. This was considered to contribute to incorrect clinical decision making and lack of appreciation of the severity of injury. Independently, the National Patient Safety Agency has expressed concern that trainees are less able than consultants to recognize seriously ill or deteriorating patients and that this may have a detrimental effect on outcome [8].

In the deployed field hospital there is a full consultant-based team (consultants from each of the specialties of emergency medicine [team leader], anaesthesia, general surgery and orthopaedic surgery) resident in the hospital 24 hours a day and immediately available for the reception of any seriously injured patient.

Specific criticism was made by NCEPOD of the lack of standardized transfer documentation, and the compliance with published guidelines. Secondary transfers were felt to be "conducted in haphazard fashion with little consultant oversight". This contrasts with UK DMS policy where strategic movement of the seriously injured from the field hospital to RCDM relies on a consultant in intensive care as part of a Critical Care Air Support Team (CCAST): the mobilization of CCAST follows a standardized process and is the responsibility of the Air Evacuation Liaison Officer (AELO, usually a nurse) embedded with the field hospital.

NCEPOD has commented on performance against a raft of clinical performance indicators (PIs) and the requirement to monitor PIs was highlighted by Royal College of Surgeons of England in 2000 [3]. The UK DMS continuous quality improvement programme for the seriously injured is referred to as 'MACE' (Major Trauma Audit for Clinical Effectiveness) and over 60 clinical PIs are tracked from point of wounding through to rehabilitation.

Airway management in the pre-hospital setting is often challenging and a high incidence of partially obstructed or obstructed airways on arrival at hospital has prompted the

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recommendation that these patients require pre-hospital support from a clinician who is competent to undertake rapid sequence induction of anaesthesia. The model adopted in Helmand Province, Afghanistan, since April 2006 has been similar to advanced physician-led models of pre-hospital primary retrieval by helicopter emergency medical services in UK. The differences are that 80.6% of live casualties with ISS  $\geq 16$  are known to have been retrieved to hospital by helicopter in the combat environment (compared to 11.7% in NHS sample); and the capacity of the military helicopter is substantially greater, allowing multiple casualties to be carried simultaneously, which is a frequent requirement.

The conclusions of the report on how NHS trauma services fare are symptomatic of wider systemic under performance in relation to emergency admissions, highlighted in a separate NCEPOD report designed to identify remediable factors in the organization of adult emergency care and published in October 2007 [9]. NCEPOD identified that 40% of 496 emergency admissions were not seen by a consultant within 12 hours of admission and poor documentation precluded an evaluation of when the first consultant review took place in 609 of 1275 admissions.

## Conclusions

The Defence Medical Services have held up NHS best practice as the standard to aspire to, recognizing that tactical constraints may prevent this. However, NCEPOD has facilitated valuable benchmarking that demonstrates, in a number of respects, the superior quality of the deployed military trauma system. Not every performance indicator will withstand such scrutiny as definitive care may be unavailable in the same country (it is often deferred for UK Service personnel until arrival in UK) and, in early entry operations, there will be limited access to advanced diagnostic capability (and specifically to CT scanning).

The crux of trauma audit is to identify unexpected outcomes (unexpected survivors or deaths) and to use the results of clinical performance indicator measurement to determine why the system's overall performance is above or below expectations. Analysis of DMS deployed trauma system unexpected outcomes from 1999 through to 2007 shows a highly encouraging trend in improvement of the standardized mortality ratio, albeit a crude indicator of system effectiveness [10]. This may be attributable to new paradigms of care that have been introduced [11,12], enhanced training [13,14], a learning effect through repeated deployment of personnel, and development of more representative injury scoring of military wounds. However, NCEPOD has not presented data to allow a comparison of unexpected outcomes. Nor is data currently available from NATO allies against which to compare systemic performance in this way (currently published US data allows comparison of the ratio of 'killed in action' to 'died of wounds' as an indicator of

system performance). The benchmarking process is therefore incomplete.

As a quality assurance tool benchmarking has been criticized as simply a way of facilitating "catch up", rather than keeping pace or surpassing others in the same industry sector, through the "creative swiping" of ideas. It is important that benchmarking does not stifle innovation. There is considerable contemporary experience in UK DMS of major trauma management and audit within a sophisticated end-to-end trauma system; perhaps most importantly, there is a culture in the DMS that trauma care is a core capability in which all of the relevant specialty consultants feel a deep responsibility. While there is no doubting there are pockets of exemplary trauma practice in NHS, the inconsistent and generally poor standard of national care that NCEPOD describes reflects an NHS culture that fails to assign the same importance to the systemic management of major trauma as the DMS. The question is, how can the NHS learn from the experiences of developing, monitoring and refining a military trauma system?

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