The evaluation of a two-tier trauma response system at a major trauma center: is it cost effective and safe?

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Record Status
This is a critical abstract of an economic evaluation that meets the criteria for inclusion on NHS EED. Each abstract contains a brief summary of the methods, the results and conclusions followed by a detailed critical assessment on the reliability of the study and the conclusions drawn.

Health technology
Two-tier trauma response.

Type of intervention
Trauma response management.

Economic study type
Cost-effectiveness analysis.

Study population
Trauma patients.

Setting
MedSTAR Trauma Unit (level I trauma centre) of the Washington Hospital Centre, USA.

Dates to which data relate
A pilot study was initially conducted between 6 July 1993 and 15 August 1993, in which patients were triaged to modified TR, full CY or CY default, on paper only. Effectiveness data were collected between July 6 1993 and July 24 1994, when the full study was conducted. Cost dates and the price year were not clearly stated.

Source of effectiveness data
Effectiveness data were derived from a single study.

Link between effectiveness and cost data
Costing was undertaken on the same patient sample as that used in the effectiveness analysis.

Study sample
All 1,915 patients evaluated at the MedSTAR Trauma Unit of the Washington Hospital Centre within the study period were initially included. CY defaults were excluded (8%). All burn patients were resuscitated as CY, and therefore were excluded from the study. After excluding the pilot study population (229), burn patients (43), CY defaults (155), and non-trauma patients or patients arriving more than 24 hours after injury (21), a total of 1,479 patients was triaged during phases I, II and III. Of these, 1,036 (70%) were male, with a mean study population age of 34 years. No power calculations were reported.
Study design
Case series from a single centre. The duration of follow-up was one week after discharge.

Analysis of effectiveness
The data sheets filled in by the paramedic dispatcher were reviewed and the dispatcher's decision was determined to be appropriate if the patient’s disposition from the resuscitation area was (1) CY: death, to the operating room (OR), and/or admission to the intensive care unit (ICU); and (2) TR: discharged home or admission to a regular hospital floor bed. All deaths within the TR category were reviewed to determine the impact, if any, on patient outcome because of TR versus CY designation.

Effectiveness results
Of the 1,479 patients evaluated over a 9-month period, 682 (46%) received a full trauma team response, and a modified trauma team responded to 794 (54%). When compared with final designation by outcome variables, the sensitivity, specificity, and accuracy were significantly improved after the first modification of criteria, with no significant improvement being noted after the second change which resulted in an increased number of undertriaged patients. The accuracy at phase I, II and III was, respectively, 68%, 79% and 78%. If a one-tier response system (CY) had been used, the figures would have been 33%, 34% and 31% respectively. There was a total of 116 deaths in the study population, with 3 deaths in the TR category, one in each phase of the study, with no link to TR as opposed to CY. Undertriaged patients were not adversely affected in any phase by such a lower acuity triage allocation. A total of 711 patients were correctly identified as TR.

Clinical conclusions
Clinical conclusions were not specifically drawn.

Measure of benefits used in the economic analysis
Additional cases accurately diagnosed and allocated.

Direct costs
Direct health service costs were considered. The fixed costs were essentially the same; the variable costs affected were personnel and laboratory tests. For the former, salaries were used, while cost-to-charge ratios approved by Medicare were used for the latter. Cost dates were not stated.

Statistical analysis of costs
Chi-squared analysis was used to determine significance between groups. Statistical significance was defined as p<0.05.

Currency
US dollars ($).

Sensitivity analysis
No sensitivity analysis was performed.

Estimated benefits used in the economic analysis
The additional number of cases accurately diagnosed and allocated based on prehospital information criteria per 100 trauma patients examined was 35 (68-33), 45 (79-34) and 47 (78-31) for phases I, II and III respectively.
Cost results
Estimated cost savings using the two-tiered system rather than the direct referral to the more acute CY triage allocation were about $178,000 over the 9-month period.

Synthesis of costs and benefits
The costs and benefits associated with the intervention relative to the one-tier system were not combined, since the former turned out to be the dominant strategy.

Authors' conclusions
Utilisation of a two-tier response to trauma patients was effective, safe and resulted in substantial cost savings relative to the more acute CY triage allocation (one-tier system).

CRD COMMENTARY - Selection of comparators
Conventional full trauma response was the comparator in this case and both full and modified trauma response were widely used in the authors' setting. You, as a database user, should consider if this applies to your own setting.

Validity of estimate of measure of benefit
Data do not appear to have been used selectively to prove a particular point although the choice of outcomes measure for the effectiveness analysis may need further justification (i.e. is overtriage a relevant outcome measure?) No power calculations were reported with respect to complicated outcomes.

Validity of estimate of costs
Adequate details of the methods of quantity/cost estimation were given, with the fixed costs being omitted from the analysis as they were "essentially the same".

Other issues
Cost data may not be generalisable to other settings or countries.

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