Implementation of 24/7 radiology services in an academic medical centre level 1 trauma centre: impact on trauma resuscitation unit length of stay and economic benefit analysis

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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.

CRD summary
This study evaluated the cost savings from increasing emergency radiologist services, at a trauma centre, from 17 hours to 24 hours a day. The authors concluded that 24-hour radiology services could be cost saving, if vacated beds were used optimally. Given the limited reporting and retrospective design, it is not clear if the study accurately evaluated the cost savings to the trauma centre. The focus on cost savings means that the health benefits were not measured.

Type of economic evaluation
Cost-effectiveness analysis

Study objective
This study evaluated the cost savings from increasing the availability of emergency radiologist services, at a trauma centre, from 17 hours to 24 hours a day.

Interventions
The 24-hour coverage, by an emergency radiologist, at a trauma centre, was compared with 17-hour cover from 7am to midnight, plus seven-hour night-shift cover, by a radiology resident, from midnight to 7am. The attending emergency radiologist promptly reviewed all cross-sectional images and provided final electronic reports. Residents provided preliminary reports, and patients were treated accordingly, but patients who were suspected to have major trauma, despite no major injuries in the preliminary report, were only discharged after a final report, after 7am.

Location/setting
USA/in-patient care.

Methods
Analytical approach:
The mean radiology turn-around time and the costs of health services were from a retrospective observational study. Services were measured during the year before the introduction of 24-hour emergency radiologist services (2006), and during the year after introduction (2007). Only patients who underwent cross-sectional imaging between midnight and 7am, and patients with minor trauma, during the two years of the study, were included. The authors stated that they took a trauma centre perspective.

Effectiveness data:
The most clinically-relevant outcomes were the mean radiology turn-around time, and the length of stay in the trauma resuscitation unit. The outcomes were derived from the retrospective observational study. There were 1,087 patients in the 17-hour emergency radiology group, and 1,323 patients in the 24-hour group.

Monetary benefit and utility valuations:
Not relevant.

Measure of benefit:
The was no summary measure of benefit. The most clinically relevant outcomes were the mean radiology turn-around time, and the length of trauma resuscitation unit stay.
Cost data:
Fixed and variable hospital costs were analysed. The fixed costs included capital, employee salaries, building maintenance, and utilities. A per-patient share of the fixed cost was calculated, based on study numbers. Variable costs included patient care supplies, laboratory re-agents, medications, and other items. All costs were from records, at the hospital in which the retrospective study was undertaken. They were reported in US $.

Analysis of uncertainty:
Probabilities were reported for statistical tests of the differences between groups for length of stay.

Results
The mean radiology turn-around time, during the night shift of midnight to 7am, decreased from 8.19 to 1.67 hours.

The mean trauma resuscitation unit stay decreased from 11.19 to 8.25 hours, a difference of 2.94 hours (p<0.001).

The total potential economic benefit, over a calendar year, from moving to 24-hour emergency radiology services, was $340,069. This assumed that patient turnover was increased to take advantage of the released bed space.

Authors’ conclusions
The authors concluded that 24-hour radiology services could be cost saving, over 17-hour services, if the vacated beds were used optimally.

CRD commentary
Interventions:
The interventions were described and they were directly relevant to the study setting. Other trauma centres might have different radiology service arrangements.

Effectiveness/benefits:
The study focused on evaluating the potential cost savings, from moving to a 24-hour radiology service. Health benefits were therefore not fully evaluated. The authors noted in the discussion that faster availability of radiology reports could provide earlier clinical treatment and more timely and improved patient care, but this study did not set out to evaluate this. The outcomes of radiology turn-around time and length of stay were only indicators of health benefit. As the study was retrospective, and had a before-and-after design, there was a possibility of bias from both confounding and assessment.

Costs:
It was not clear if the costs of the two different services, between midnight and 7am, were included. Only one variable cost and one fixed cost were reported, but these are likely to have been different for the different radiology services. Any evaluation of cost savings should account for any increase in cost due to different salaries for the different radiology services. The cost methods were not well described, and there was insufficient detail. The price year was not reported. The costs were from the retrospective observational study, with the possibility of confounding and assessment bias.

Analysis and results:
The analysis and results were sufficiently reported, except that the cost savings per patient would have been useful, as well as the total cost savings. The authors acknowledged some of the limitations of their study, such as its retrospective, before-and-after design, the use of a single centre, issues with the length of stay as a proxy for cost. The generalisability of the results to other settings may be limited. As noted by the authors, any cost savings were dependent on the trauma centre making use of the beds which were vacant due to a reduced length of stay.

Concluding remarks:
Given limited reporting and the retrospective design, it is not clear if the study accurately evaluated the cost savings to the trauma centre. The focus on cost savings means that the health benefits were not measured. In addition, cost savings are dependent on increasing turnover to meet the freed capacity, and not having empty beds.
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