Costs and benefits of an early-alert surveillance system for hospital inpatients

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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
The study evaluated the impact of an early-alert system on the deleterious clinical and economic consequences of inpatient falls and cardiopulmonary arrests on the medical-surgical ward. The authors concluded that this system allows the opportunity to reduce the likelihood of falls and cardiopulmonary arrests. The magnitude of the estimated economic benefits suggests a break-even cost for the system. The study had several methodological weaknesses and the level of reporting was insufficient. These factors give rise to some concerns about the strength of the conclusions.

Type of economic evaluation
Cost-effectiveness analysis

Study objective
The study evaluated the impact of an early-alert system on the deleterious clinical and economic consequences of inpatient falls and cardiopulmonary arrests (CPAs) on the medical-surgical ward (MSW).

Interventions
The early-alert system comprised two components: a collection of sensors set on the mattress, but below the sheets, without contacting the body of the patient to gather patient information; and an interpretative bedside device that is connected to the sensors. The system monitors heart and respiratory rates, and signals when the patient leaves the bed. ‘No surveillance systems’ was used a comparator.

Location/setting
USA. Inpatient/secondary care.

Methods
Analytical approach:
The effectiveness and cost data were combined using a decision analytic model (decision tree). The time horizon of the analysis was not explicitly stated. The authors reported the study perspective to be that of the hospital.

Effectiveness data:
The effectiveness data in the model came from a non-systematic review of the literature. Relevant studies were retrieved using MEDLINE, a suite of Ovid databases, public internet search engines and references of reviewed articles. Clinical evaluation and initial research planning was augmented by consultation with an expert panel using questionnaires and tele-conferences. Authors’ assumptions concerning the performance of the early-alert system were reported. The main model parameters included incidence of inpatient falls injuries and CPA.

Monetary benefit and utility valuations:
None.

Measure of benefit:
The authors did not derive a summary measure of benefit. The main health outcomes included the reductions in fall and CPA rates.

Cost data:
The cost categories included cost per fall with injury, cardiopulmonary resuscitation (CPR), and intensive care and...
MSW costs for survivors and non-survivors. The expected costs of the system included the cost of the system for all patients who entered the MSW during an average of 4.7 days of hospitalisation. The cost data were derived from published literature. In the case of charges, a cost-to-charge ratio was applied. Adjustments for inflation (by a factor of 0.03) were conducted. The costs were reported in US dollars ($) for the price year 2005.

Analysis of uncertainty:
Various one-way sensitivity analyses were conducted on the reductions in fall and CPA rates due to the surveillance system and the cost of the system. The ranges used were reported, as were the resulting changes in the total cost per medical-surgical admission.

Results
The direct cost of caring for falls and CPA and associated repercussions was estimated to be $191,73 per MSW hospitalisation without surveillance.

For reductions in fall and CPA rates of 40% and 25%, respectively, the economic benefits of using the system were estimated to be $14.59/day.

Sensitivity analyses demonstrated that a 1% change in the fall and CPA rates would result in a shift in the economic benefit by $1.28 and $0.64, respectively. An increase (decrease) of $1.00 in the cost of the system would result in a decrease (increase) of $4.60 in the economic benefit.

Authors’ conclusions
The authors concluded that the early-alert surveillance system provides the opportunity to reduce the likelihood of falls and CPA. The magnitude of the estimated economic benefits suggests a break-even cost for the system.

CRD commentary
Interventions:
The intervention was described clearly. Other surveillance systems currently available, although described, were not accounted for in the analysis, which may affect the cost-effectiveness results.

Effectiveness/Benefits:
The parameters were derived from published literature, assessed by an expert panel. The sources the authors searched were listed, but no systematic search for data was reported. The authors did not report any search methods or inclusion criteria. It is difficult to comment on the validity of the estimates used as no relevant details were reported.

Costs:
The costs included would appear to reflect the authors' stated perspective. The resource quantities and the unit costs were not listed separately, and the low level of reporting means that the reader is unable to identify the costs included in the analysis. The calculation of the capital cost of the system was unclear. The sensitivity analysis was restricted to the costs of the system, which may limit the interpretation and the robustness of the study findings.

Results and Analysis:
The results relating to the benefits and costs were not reported in full, thus limiting the transparency of the study. The costs and benefits were not combined, therefore, in effect, a cost-consequences analysis was conducted. Only limited parameters were investigated in the sensitivity analysis, which may reduce the generalisability of the study. The total costs and benefits were not reported clearly, thereby limiting the interpretation of the findings. The authors acknowledged several limitations to their study.

Concluding remarks:
The methodology of the study was subject to several limitations. The authors’ conclusions should therefore be considered with a degree of caution.

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