Cost-effectiveness of a brief two-stage emergency department intervention for high-risk elders: results of a quasi-randomized controlled trial

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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
A brief emergency department (ED) intervention for the management of high-risk elders was studied. The intervention comprised two steps: the identification of high-risk patients using a screening tool and a brief standardised nursing assessment to identify unresolved problems, followed by referral to an appropriate community provider.

Type of intervention
Other: Patient care management.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised high-risk patients aged 65 years and older visiting an ED. High-risk patients were defined as those with a score of at least two out of a possible six on the Identification of Seniors At Risk (ISAR) scale. Patients referred from a long-term care facility, non-residents, and patients who were medically unstable or cognitively impaired and had no family members as proxies, were excluded from the study. Also excluded were patients who had already received an ED consultation from a member of the hospital's geriatric staff.

Setting
The setting was a hospital ED. The economic study was carried out in Canada.

Dates to which data relate
The period during which effectiveness and resource use data were gathered was not reported. The price year was 1999.

Source of effectiveness data
The effectiveness evidence was derived from a single study.

Link between effectiveness and cost data
The costing was carried out prospectively on the same sample of patients as that used in the effectiveness study.

Study sample
Power calculations were carried out to estimate a 95% confidence interval (CI) half-width of 6% for a difference of 10% or more in the functional decline rate between groups. The expected rate of functional decline in the control group was 30%. During the recruitment period, 10,826 visits were recorded, of which 7,921 were assessed for study eligibility criteria. A total of 5,755 patients were excluded. Reasons for exclusion were patients expected to be admitted...
(n=2,781), already seen by geriatric team member (n=698), non-resident of Montreal (n=840), resident in nursing home (n=558), previously enrolled in study (n=217), too sick and no proxy available (n=215), cognitive impairment and no proxy available (n=137), and death in the ED (n=34). Patients unable to communicate in English or French were also excluded (n=265). Ten patients had already been excluded because they had no primary caregiver.

Of the 2,166 eligible patients, 63 (2.9%) declined the screening and 11 patients could not be found to complete the screening. Among 2,092 patients screened, 426 (20.1%) had positive results. Of these 426 patients, a total of 388 (91.1%) consented to participate in the study. Therefore, the final study sample included 388 patients. One hundred and seventy-eight were allocated to the intervention group and 210 to the control group. The patients in the intervention group had a mean age of 76.7 (+/- 7.1) years and 55.6% were women. The patients in the control group had a mean age of 76.5 (+/- 7.0) years and 65.2% were women.

Study design
This was a prospective, quasi-randomised, clinical trial that was carried out at four centres in Montreal, Quebec. Intervention nurses, who rotated between hospitals on a schedule assigned by a statistician using blocked randomisation, randomised the patients to the two groups by day of visit. The length of follow-up was 4 months and the outcomes were assessed by telephone interviews. The rates of follow-up (including deaths) in the intervention and control groups were, respectively, 87.6% (156 of 178) and 87.1% (183 of 210) at 1 month and 87.1% (155 of 178) and 86.7% (182 of 210) at 4 months. Among the 248 (124 in each study group) caregivers who had participated at baseline, the follow-up rate was higher among caregivers in the intervention than in the control group (79.8% versus 69.4%, respectively) because of a higher refusal rate among control group caregivers. To maximise blinding, research assistants did not inform ED staff which patients were recruited into the study. However, other ED staff were aware of the patient allocation. Similarly, follow-up interviewers were blind to the study groups as far as possible.

Analysis of effectiveness
The analysis of the clinical study was conducted on an intention to treat basis. The primary outcome measures used were:

the proportion of patients experiencing decline in functional status (decline of =/> 3 points on a 28-point activities of daily living scale) or death; and

change in patient depressive symptoms (on a 15-item Geriatric Depression Scale).

The study groups were comparable at baseline in terms of demographic and clinical characteristics, although the intervention patients were slightly more likely to have a family caregiver than the control patients. Regression analyses were carried out to account for the potential impact of confounding factors. The clinical outcomes were adjusted for age, gender, ISAR score, cognitive impairment, disability, previous community health centre use, co-morbidity, residence, caregiver, hospital of index ED visit, and triage category.

Effectiveness results
The proportion of patients experiencing decline in functional status or death at 4 months after an ED visit was 21.1% in the intervention group and 30.9% in the control group. The odds ratio was 0.6 (95% CI: 0.4 - 1.0) in the unadjusted model and 0.5 (95% CI: 0.3 to 0.9) in the adjusted model. There were 5 deaths in the intervention group and 8 in the control group.

The change in patient depressive symptoms at 4 months after an ED visit (a negative score indicated improvement) was -0.4 (+/- 3.0) in the intervention group and 0.1 (+/- 3.0) in the control group. The unadjusted and adjusted changes (-0.5, 95% CI: -1.3 - 0.3 and -0.5, 95% CI: -1.3 - 0.3, respectively) showed that the change in depressive symptoms were not clinically meaningful.

Clinical conclusions
The effectiveness study showed that the intervention reduced the rate of functional decline (including death), compared with usual care, but there was no significant change in depressive symptoms.

**Measure of benefits used in the economic analysis**
The health outcomes were left disaggregated and no summary benefit measure was used in the economic analysis. In effect, a cost-consequences analysis was carried out.

**Direct costs**
Discounting was not relevant since the costs were incurred during a short timeframe. The unit costs were presented separately from the quantities of resources used. The health services included in the economic evaluation were nurse and physician services, medications, inpatient hospitalisations, outpatient visits (ED, clinic and surgery), community health centre (telephone contacts, home visits and clinic visits) and private resources (out-of-pocket payments, travel by patient and caregiver, and other services). The cost/resource boundary of society was adopted, and the costs included those relevant to the patient and the government. Resource use was estimated using patient-level data derived from the sample of patients included in the clinical study. The analysis was carried out using patients with complete data, as well as all available data. The data sources included provincial administrative databases, chart review and questionnaire measures. The costs came from several sources, such as the Quebec Ministry of Health and Social Services. The price year was 1999.

**Statistical analysis of costs**
A logarithmic transformation was required because of the non-normal distribution of the costs, which were presented as mean values and standard deviations. The ratio of the cost in the intervention group to the control group was also calculated. Regression analyses were also performed to consider the impact of confounding factors.

**Indirect Costs**
The indirect costs were not included in the economic evaluation.

**Currency**
Canadian dollars (Can$).

**Sensitivity analysis**
Sensitivity analyses were not performed.

**Estimated benefits used in the economic analysis**
See the 'Effectiveness Results' section.

**Cost results**
In the sample of patients with complete data, the estimated total public costs were Can$3,193 (+/- 4,092) in the intervention group and Can$3,574 (+/- 4,057) in the control group. The cost-difference was -Can$382 (95% CI: -1,369 - 605).

The estimated total private costs were Can$544 (+/- 653) in the intervention group and Can$549 (+/- 718) in the control group. The cost-difference was -Can$5 (95% CI: -172 - 162).

The estimated total costs were Can$3,737 (+/- 4,137) in the intervention group and Can$4,124 (+/- 4,306) in the control group. The cost-difference was -Can$387 (95% CI: -1,411 - 638).
Similar results were observed when all available data were used to estimate resource use. The posterior median of the ratio of the cost in the intervention to the control group was 0.92 (95% CI: 0.73 - 1.16) in the unadjusted model and 0.94 (95% CI: 0.75 - 1.17) in the adjusted model. The results of the regression analysis showed that a higher score on the co-morbidity index, previous community health centre use, and prior hospitalisation were associated with higher costs.

There was an interaction between prior ED use and treatment group. The ratio of costs was 0.66 (95% CI: 0.45 - 0.98) among previous ED users and 1.12 (95% CI: 0.86 - 1.47) among previous non-users.

Synthesis of costs and benefits
A synthesis of the costs and benefits was not relevant since a cost-consequences analysis was carried out. The authors noted that because of the better clinical outcomes associated with the intervention any cost-savings would signify dominance of the intervention.

Authors' conclusions
The brief emergency department (ED) intervention for the management of high-risk elders led to better clinical outcomes, without increasing societal costs, in comparison with usual care.

CRD COMMENTARY - Selection of comparators
The selection of the comparator was appropriate as it reflected usual care for the management of elderly people admitted to the ED. You should decide whether this is a valid comparator in your own setting.

Validity of estimate of measure of effectiveness
The effectiveness evidence came from a quasi-randomised clinical trial, which was appropriate for the study question. The patients were randomised by day of admission. The study groups were comparable at baseline and the size of the sample was justified on the basis of power calculations. The analysis of the clinical study was conducted on an intention to treat basis, which represents a strength of the study. The evidence came from several centres and the authors reported clearly the details of the patient selection process. The loss to follow-up was similar between groups. The outcome assessment was partially blinded. Statistical analyses were performed to consider the potential impact of confounding factors. These issues enhance the internal validity of the study. However, the authors noted two potential sources of bias. First, days rather than individuals were randomised. Second, the effectiveness of the interventions could have been underestimated because some patients who could have benefited from the intervention (i.e. patients who had received a consultation before study entry) were not included.

Validity of estimate of measure of benefit
No summary benefit measure was used in the analysis because a cost-consequences analysis was conducted. Please refer to the comments in the 'Validity of estimate of measure of effectiveness' field (above).

Validity of estimate of costs
The adoption of a societal perspective was appropriate. The costs associated with productivity losses were not included because patients were not of a working age. Detailed information on resource use and the unit costs was provided. In addition, a breakdown of the cost items was reported. The sources of all the data were clear. Similarly, the price year was reported. This enhances the possibility of replicating the study and reflating the results of the analysis in other settings. Statistical analyses of the costs were also performed. However, the costs were specific to the study setting and sensitivity analyses were not carried out. Further, the authors noted that the costs of non-professional care were not captured, although no statistically significant differences in the use of such item were observed. It was also noted that the time horizon of the study could have been too short to identify relevant cost-savings.
Other issues
The authors briefly presented results from other published studies, but did not make extensive comparisons with their findings. In terms of the issue of the generalisability of the study results to other settings, it was noted that some characteristics of the context played a major role in the effectiveness of the intervention. This reduces the external validity of the study. The authors noted some limitations to the robustness of their conclusions, which have been highlighted already. The study referred to elderly patients admitted to the ED and this was reflected in the authors' conclusions.

Implications of the study
The study results supported the use of a brief ED intervention for the management of high-risk elders.

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Other publications of related interest


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