Just-in-time evidence-based e-mail "reminders" in home health care: impact on patient outcomes
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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
The health interventions under evaluation were two information-based provider reminder interventions designed to improve the self-care management and outcomes of heart failure (HF) patients: a basic intervention and an augmented intervention. The basic intervention was an e-mail to the patient's nurse highlighting six HF-specific clinical recommendations. The augmented intervention supplemented the initial nurse reminder with additional clinician and patient resources. Specifically, nurses received a laminated card focused on medication management, a prompter card to facilitate better physician-nurse communication, a self-care guide for patients, and follow-up outreach by a clinical nurse specialist. The interventions were delivered by a home health nurse, who was routinely responsible for ongoing patient assessment, individualized care planning in consultation with the patient's physician, patient instruction in self-care management, monitoring of patient symptoms and support of patient adherence to medications and diet. Both basic and augmented interventions provided the nurse with an e-mail reminder highlighting six HF-specific clinical guidelines.

Type of intervention
Secondary prevention; Rehabilitation.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised adult patients with a primary diagnosis of HF. Individuals who were unable to give informed consent, or could not speak English or Spanish, were excluded from the study.

Setting
The setting was the community. The economic study was carried out in the USA.

Dates to which data relate
Effectiveness and resource use data were gathered from August 2000 to November 2001. The price year was not reported.

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 included in the effectiveness study.
Study sample
Power calculations, if performed, were not reported. An initial study sample of 1,242 patients was identified: 448 patients were included in the usual care group, 390 in the basic intervention group, and 404 in the augmented intervention group. However, complete interview data were available for only 628 patients (57.9%). There were 227 patients with a mean age of 71.2 (+/- 12.2) years in the usual care group, of whom 76.7% were female. The basic intervention group comprised 199 patients with a mean age of 72.4 (+/- 12.1) years and was 64.8% female. The augmented intervention group had 202 patients with a mean age of 71.8 (+/- 12.0) years of whom 65.4% were female.

Study design
This was a prospective, randomised, controlled trial, which was carried out at a large, urban, non-profit home care agency in the USA. Randomisation was based on a computer algorithm, which assigned nurses to either a control group (usual care) or one of two intervention groups (basic or augmented) the first time they began caring for an eligible HF patient. The agency staff that were responsible for assigning patients to nurses were blinded to the study. Furthermore, all interviews to derive clinical outcomes were conducted by trained interviewers blinded to the study groups. The length of follow-up was 45 days. Of the 1,242 patients meeting study criteria, 158 (12.7%) were found to be ineligible for the survey during the telephone screener interview because of death or institutionalisation. Of the 1,084 eligible respondents, 171 (15.8%) could not be located at the 45-day follow-up; 26 (2.4%) moved out of the area; and 259 subjects (23.9%) refused to be interviewed.

Analysis of effectiveness
The analysis of the clinical study was restricted to treatment-completers only.

The primary outcomes were measures assessing patient disease self-management, knowledge, and behaviour. Outcomes also included the patient's clinical and functional status, including activities, limitations, and problems secondary to the cardiac condition, as well as general quality of life (EuroQol EQ-5D), depression (measured using the 15-item Geriatric Depression Scale (GDS)) and HF-specific outcomes (Kansas City Cardiomyopathy Questionnaire (KCCQ)). For example, to determine the extent to which patients recognised their HF medications, the interviewer collected the prescription bottles for all current medications, read the name and presented each medication to the patient, and asked the patient to indicate whether it was taken for the heart condition or related side effects.

At baseline, significantly more women were included in the two intervention groups in comparison with the usual care group. In general, there were no marked differences in mean age, race, education, or baseline health characteristics among the three groups. However, there was a statistically significant difference between basic and control group members in the relative number of individuals in four broad age categories. 40% of the augmented intervention group reported an annual income of less than $10,000, compared with 52% of the usual care group.

Univariate descriptive statistics and multivariate regression models were used to analyse the data. All multivariate analyses controlled for a wide array of patient, disease, nurse, and environmental characteristics that might confound the relationship between interventions and outcomes. These included baseline measures of patient health and functional status, physical, social and cognitive functioning, and the presence and number of pre-existing medical conditions.

Effectiveness results
Both interventions had a statistically significant effect on patient recognition of HF medications as measured by a three-level indicator, namely: (1) does not recognise any, (2) recognises up to half, and (3) recognises more than half.

Specifically, patients in the basic and augmented intervention groups were significantly more likely to recognise more than half of their HF medications (38.4% and 35.0%, respectively) compared with the control group (26.3%). These improvements represented a gain of 46.0% for the basic group and 33.1% for the augmented group. Conversely, they were much less likely to recognise none of their HF medicines (31.1% and 34.3% versus 43.9%).

There was a marked 6.2 point (15.3%) improvement in the mean KCCQ summary score of patients treated by nurses
randomised to the basic intervention and a 5.2 point (12.9%) improvement for the augmented intervention, compared with patients receiving usual care.

Patients in the basic and augmented intervention groups had mean KCCQ summary scores of 46.5 and 45.6, respectively, compared with a mean of 40.4 for patients in the control group (higher scores represent better outcomes). Both effects were statistically significant.

Patients in the basic intervention group scored significantly higher (48.9) than those in the control group on the EuroQoL scale (39.3).

Other outcomes were comparable across the groups.

**Clinical conclusions**
The effectiveness analysis showed that both of the interventions led to improvements in some clinical outcomes, in comparison with usual care. In particular, the basic intervention significantly improved quality of life.

**Measure of benefits used in the economic analysis**
The summary benefit measures used in the economic evaluation were the KCCQ summary score and the EuroQoL health-related quality of life scale, which were derived directly from the effectiveness analysis.

**Direct costs**
The perspective adopted in the study was not clearly stated. However, it appears that costs relevant to the third-party payer were included. The following categories of direct medical costs were considered: home care-related visits, hospitalisations, inpatient nights, emergency department (ED) visits, and outpatient doctor visits. Two different measures of cost were examined: home care related and overall health care costs. Home care costs included administrative costs (i.e., the incremental cost of implementing the interventions, such as the cost of producing and distributing educational materials, and the cost associated with the consultant clinical nurse specialist), and costs associated with care provision (direct and indirect costs associated with the provision of home care visits by nurses, therapists, and home health aides). Overall costs included, in addition to the home care costs, resource costs associated with using other health care services, such as the cost of hospital and ED services and physician visits during the study period. Unit costs and the quantities of resources used were not presented separately. Resource use information was obtained through a combination of the agency's administrative records and self-reported data on medical care use, collected as part of the patient interview. Data came from the sample of patients included in the effectiveness study. Costs were estimated from Medicare payments for each type of service based on Centers for Medicare and Medicaid Services' data. Discounting was not relevant as costs per patient were incurred over a short time frame. The price year was not reported.

**Statistical analysis of costs**
Multivariate methods similar to those used in the effectiveness analysis were used to obtain estimates of regression-adjusted treatment impacts on home-care-related and overall cost measures. Standard tests were used to test for statistical significance of cost differences.

**Indirect Costs**
Indirect costs were not considered.

**Currency**
US dollars ($).
Sensitivity analysis
Sensitivity analyses were not performed.

Estimated benefits used in the economic analysis
Please refer to the effectiveness results reported above.

Cost results
As expected, there was a pattern of higher service use among patients treated by intervention nurses, particularly among those in the augmented group. However, service-specific differences did not reach statistical significance with the exception of home care related visits for both the basic and the augmented intervention groups in comparison with the usual care group (43.6, 44.1, and 35.2 visits, respectively).

Home care related costs were $2,814 in the usual care group, $3,371 in the basic intervention group, and $3,425 in the augmented intervention group.

Overall costs were $4,996 in the usual care group, $5,869 in the basic intervention group, and $6,330 in the augmented intervention group. The difference between costs in the usual care and basic intervention groups did not reach statistical significance. However, costs in the augmented intervention group were significantly higher.

Synthesis of costs and benefits
Incremental cost-effectiveness ratios were calculated to combine costs and benefits of each intervention with usual care.

The incremental cost to produce a 5% improvement in the KCCQ summary score in comparison with usual care was $246 for the basic intervention and $513 for the augmented intervention.

The incremental cost to produce a 5% improvement in the EuroQol health-related Quality of Life scale in comparison with usual care was $181 for basic intervention. Costs and benefits were not combined for the augmented intervention as the difference in the benefit measure was not statistically significant.

Authors' conclusions
The authors concluded that interventions providing evidence-based practice information to dispersed home health nurses at the time they needed it, significantly improved self-care management and outcomes in a predominantly poor minority HF patient population in comparison with usual care. However, the basic intervention produced roughly equivalent patient outcomes at lower cost than the augmented intervention. Thus, the basic intervention was associated with the greatest value for money. The increase in the number of home visits suggested that effectively educating patients and developing their skills to manage their condition themselves takes more time and effort than current routine care.

CRD COMMENTARY - Selection of comparators
The selection of the comparator was appropriate as the authors stated that it represented the standard pattern of care. However, it was not described in detail. You should decide whether they are valid comparators in your own setting.

Validity of estimate of measure of effectiveness
The effectiveness evidence came from a clinical trial, which was appropriate for the study question. The trial was published in a companion paper, where more details of the study were reported. The method of randomisation was described and should have reduced the impact of selection bias. The approach used to select the sample of participating patients was reported, and the reasons for the loss of patients over the study period were stated. Study groups were not well matched at baseline, but the authors controlled for the potential impact of possible confounding.
factors using statistical analyses. However, the analysis of the clinical study appears to have been based on treatment-completers only, thus outcomes in patients whose data were not available at the end of the follow-up period were not taken into account. This may have had a substantial impact on the results of the analysis due to the large loss to follow-up. The authors noted that even among patients served by nurses in the augmented group, levels of non-adherence were substantial, indicating room for further improvement. No justification for the size of the sample was provided in this paper. It is unclear whether clinical outcomes might have differed over a longer time frame. One strength of the analysis was its blinded design, which should have reduced the assessment bias. These issues should be considered when evaluating the robustness of the study design.

Validity of estimate of measure of benefit
The summary benefit measures were specific to the disease considered in the study, although the EuroQol measure is comparable with the benefits of other health care interventions to some extent. Validated instruments were used to assess the benefit measures.

Validity of estimate of costs
The categories of costs included in the analysis suggest that the perspective of the third-party payer may have been adopted, although this was not explicitly stated. Extensive information on unit costs and the quantities of resources used was provided, which will simplify replication exercises in other settings. The source of data was stated. Cost estimates were specific to the study setting and the impact of using alternative economic estimates was not investigated. The price year was not given, thus limiting the possibility of refltating costs in different time periods. Statistical analyses of costs were performed to take into account the potential impact of confounding factors and different baseline characteristics.

Other issues
The authors did not make extensive comparisons of their findings with those from other studies and did not explicitly address the issue of the generalisability of the study results to other settings. Sensitivity analyses were not performed, which limits the external validity of the study. The authors stated that the extensive use of regression analysis and blinding should have reduced the impact of systematic errors associated, respectively, with baseline differences and assessment of the clinical outcomes. The study referred to patients with HF discharged to community and this was reflected in the authors’ conclusions. The results of the analysis were satisfactorily reported. The authors noted some limitations of their analysis, which have been reported in above.

Implications of the study
The study results support the implementation of a basic information-based provider reminder intervention aimed to improve self-care management and outcomes of HF patients.

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