The effect of a multidisciplinary hospitalist/physician and advanced practice nurse collaboration on hospital costs

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 objective was to assess the efficacy and cost impact of care management by a multidisciplinary physician and nurse practitioner team, for hospitalised, acutely ill, medical patients. The authors concluded that the multidisciplinary care reduced hospital stay and hospital costs, without changing readmissions and mortality. The methods and reporting were good. The authors’ conclusions appear to be appropriate, but the results are unlikely to generalise beyond similar US hospital settings.

Type of economic evaluation
Cost-effectiveness analysis

Study objective
The objective was to assess the efficacy and cost impact of care management by a multidisciplinary physician and nurse practitioner team, for hospitalised, acutely ill, medical patients.

Interventions
The intervention was a multidisciplinary doctor and nurse practitioner team to manage the care and discharge of hospitalised, acutely ill, general medical patients. The comparator was usual care. The intervention had three components in addition to usual care: an advanced nurse practitioner, a hospital specialist (hospitalist) medical director, and daily rounds rather than weekly. The nurse practitioner managed patients during hospitalisation and for 30 days after discharge, to promote the early discharge of high-risk, high-cost patients.

Location/setting
USA/hospital and out-patient care.

Methods
Analytical approach:
The cost-effectiveness analysis was based on one clinical study. The time horizon was the length of hospital stay, plus four months. The study perspective was not explicitly stated.

Effectiveness data:
The two key effectiveness estimates were the four-month post-discharge death and readmission rates. These were from a quasi-experimental trial (2000 to 2004), conducted in a tertiary academic medical hospital, with 610 beds. Physicians were randomised to either the intervention unit or a physically separate control unit. Nurse practitioners were exclusively assigned to the intervention unit. There were 1,207 patients who were randomised on a four-day admission rotation schedule, with 581 in the intervention unit and 626 in the control unit. Patients were followed-up for four months after discharge. Readmissions and mortality were from the hospital database. Mortality data were confirmed by participants’ relatives and by death certificates. Readmission rates and mortality were estimated using regression models, which controlled for key variables, including ethnicity, gender, age and preadmission severity of illness.

Monetary benefit and utility valuations:
Not applicable.

Measure of benefit:
The health benefit was measured by differences in readmission rates and mortality.

Cost data:
The cost data were from the hospital where the clinical trial was conducted. The authors calculated the difference in net revenue (profit) between the patient management systems, rather than the difference in costs. As the intervention reduced the length of stay, patient turnover increased and resulted in greater revenue, because the hospital received more income for the first four days of any in-patient stay. Net revenue was the total revenue less the cost of in-patient stay. Length of stay, from the trial, was combined with per day revenue and in-patient stay costs, which were calculated by the finance department. This assumed that the hospital units functioned at maximum capacity (83 to 84%). All costs were reported in US $.

Analysis of uncertainty:
Standard errors and confidence intervals for the net revenue difference, between the intervention and control group, were calculated using bootstrapping methods (drawing repeated samples from the study population to estimate the variance).

Results
The mean hospital stay was five days (SD 6.3) in the intervention group, versus six days (SD 6.9) in the control group, which was a statistically significant difference. The regression-adjusted length of stay (controlling for key variables) was significantly different between groups (p<0.001). The minimum stay was one day in both groups, and the maximum stay was 79 days in the intervention group, versus 58 days in the control group.

There was an average profit of $1,707 (SE 81) per day, for each intervention patient, resulting from the shorter hospital stay.

The mean readmission rate, four months after discharge, was 32% with the intervention, versus 31% with control (p=0.22). There was no statistically significant difference in frequency of readmissions, between the two groups (p=0.94).

In the four months after discharge, 10% of patients in the intervention group died versus 8% in the control group (p=0.31). These percentages included 19 patients who died while in hospital, during the initial stay (seven control and 12 intervention patients).

Authors' conclusions
The authors concluded that, compared with standard care, the multidisciplinary care management strategy reduced hospital stay and hospital costs, without changing readmissions and mortality.

CRD commentary
Interventions:
The intervention and comparator were appropriate for the setting. The different elements of the intervention and control were clearly reported, with a detailed description of the roles of the nurse practitioners and physicians. The most appropriate comparator, standard care, was included. Another care model, the advanced practice nurse management model, was discussed, but this focused on follow-up after discharge rather than in-patient care.

Effectiveness/benefits:
The methods used to derive the effectiveness estimates, and the effectiveness results, were clearly reported. The authors stated that another article had been published on patient satisfaction and the quality of life outcomes of the intervention (Hays, et al. see Other Publications of Related Interest).

Costs:
The perspective was not explicitly stated, but appears to have been that of the managed care organisation. The methods used to derive the costs were clearly reported and appropriate. The resource use was not reported separately from the unit prices (only combined costs were reported). The price year was not reported. The authors stated that another article had been published on the intervention costs of hospitalisation and four months after discharge (Ettner, et al. see Other Publications of Related Interest). To calculate the net revenue, it was assumed that the hospital operated at maximum
capacity, and that the first four days of hospital stay were more profitable than later days. The cost savings are unlikely to be applicable to hospitals with different capacities or reimbursement systems.

Analysis and results:
The methods were clearly described. The authors highlighted that, randomisation of patients to trial arms was not possible, but systematic bias was minimised by randomisation of the physicians and the four-day admission rotation. The results of the analysis were clearly reported, but were not combined in an incremental cost-effectiveness analysis. The short time horizon was a limitation of the analysis, if the costs and effects of the intervention are expected to extend beyond four months. Confidence intervals and standard errors were appropriately calculated to show the expected uncertainty around the results. The authors stated that the model should be tested in other settings and with other types of patients to determine its generalisability. Given the specific cost data, it is unlikely that the results could be generalised to hospitals with different reimbursement procedures or capacities.

Concluding remarks:
The study methods and reporting were good. The authors' conclusions appear to be appropriate, but the results are unlikely to generalise beyond similar US hospital settings.

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