Physician specialty and the outcomes and cost of admissions for end-stage liver disease

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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
Care provided by physicians with different specialties in the management of patients with end-stage liver disease (ESLD) was examined. The specialties in question were attending gastroenterologist (GI), attending non-gastroenterologist (non-GI) without a GI consultation, or non-GI with a GI consultation.

Type of intervention
Other: Patient care management.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised patients aged more than 18 years with ESLD. The following International Classification of Disease, Revision 9 (ICD-9) codes were used to identify eligible patients:

- oesophageal varices, with and without bleeding,
- other varices,
- gastrointestinal bleeding,
- peritonitis,
- ascites,
- hepatic encephalopathy,
- hepatitis B and C,
- alcoholic liver disease,
- biliary cirrhosis,
- haemochromatosis,
- hepatorenal syndrome,
- other sequelae of chronic liver disease, and
- hepatocellular carcinoma.

Only patients who had received upper endoscopy, with or without therapy, and at least one paracentesis were considered.
Setting
The setting was secondary care. The economic study was carried out in the USA.

Dates to which data relate
The effectiveness and resource use data were gathered in 1997 and 1998. The price year was 1998.

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

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

Study sample
Power calculations were not conducted. An overall sample of 1,186 patients was identified. There were 406 patients who received care from a GI attending, 483 from a non-GI attending without GI consultation, and 297 from a non-GI attending with GI consultation. The mean age was 56.9 (+/- 13.1) years in the GI attending group, 58.7 (+/- 12.9) years in the non-GI group with no GI consultation, and 58.9 (+/- 14) years in the non-GI group with GI consultation.

Study design
This appears to have been a retrospective cohort study in which the data were derived from the HBS International EXPLORE data warehouse, which contains approximately 1 billion records of hospital encounter information. The database referred to about 150 hospitals, most of which were community-based. Patients were included only if variceal haemorrhage, spontaneous bacterial peritonitis, or hepatic encephalopathy were listed as the primary diagnosis at discharge. The outcomes of patients attended by the three physician specialties considered in the study were assessed. Details on the follow-up were not provided. No blinded assessment of the outcomes was reported.

Analysis of effectiveness
All the patients included in the study sample were considered in the effectiveness analysis. The primary outcome measures used were LOS and mortality. Regression techniques were used to assess the relationship between physician specialty and LOS or mortality. The variables included in the analysis were:

- patient demographics;
- etiology of liver disease;
- the presence of liver-related conditions other than the principal diagnosis;
- the severity of co-morbidity, which was assessed using a validated index;
- the number of procedures performed;
- hospital size and location; and
- the patient's primary insurance.

The baseline comparison of the study groups showed that there were statistically significant differences between the groups in terms of race, principal diagnosis, etiology of liver disease, other complications (e.g. variceal bleed, encephalopathy, hepatorenal syndrome), co-morbidity index, the number of upper endoscopies, hospital size and patient insurance.
Effectiveness results
In the unadjusted analysis, the median LOS was 4 days (range: 1 - 50) in the GI attending group, 5 days (range: 1 - 167) in the non-GI attending group without GI consultation, and 5 days (range: 1 - 85) in the non-GI attending group with GI consultation, (p=0.001).

The regression analysis revealed that significant predictors of LOS were physician specialty, co-morbidity index, gender, the number of upper endoscopies, the number of paracenteses, and geographic region. However, these variables, which were included in the analysis as potential confounders, explained only a small portion of the variability in LOS (R^2=0.17).

Even when adjusting for these variables, compared with the GI attending group, LOS was increased by 10% (95% confidence interval, CI: 0 - 22) in the non-GI attending group without GI consultation, and by 27% (95% CI: 14 - 41) in the non-GI attending group with GI consultation.

The mortality rate was 5.7% in the GI attending group, 11.6% in the non-GI attending group without GI consultation, and 8.8% in the non-GI attending group with GI consultation, (p=0.008). However, the adjusted results showed that physician specialty was not a statistically significant predictor of hospital mortality, although there was a strong trend towards higher mortality in patients without a GI attending or consultation, (p=0.14).

The multivariate analysis suggested that significant predictors of mortality were principal diagnosis, co-morbidity, etiology of liver disease, hepatorenal syndrome and other complications of liver disease.

Clinical conclusions
The effectiveness analysis showed that physician specialty had a non statistically significant influence on hospital mortality (when adjusted by possible confounders). The adjusted analysis revealed that a shorter LOS was obtained in patients who were attended by a GI.

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

Direct costs
Discounting was not relevant since the costs were incurred during a short time. The unit costs and the quantities of resources used were not reported separately. The health services included in the economic evaluation were pharmacy, supply, laboratory tests, imaging procedures and hospital stay. Professional fees were not considered. The cost/resource boundary adopted in the study was that of the third-party payer. The costs and resource use were estimated using data retrieved from the database used to derive the effectiveness evidence. The costs included individual charges that reflected Medicare values. A charge-to-cost ratio was applied to assess the true costs of the services. All the costs were presented in 1998 values.

Statistical analysis of costs
The authors stated that the costs were normally distributed and standard statistical tests were used to test the statistical significance of differences in the total costs. A regression analysis was conducted, as it was done in the effectiveness study, to assess the impact of potential confounding factors on the total costs.

Indirect Costs
The indirect costs were not considered.
Currency
US dollars ($).

Sensitivity analysis
Sensitivity analyses were not conducted.

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

Cost results
In the unadjusted analysis, the median costs per patient were $18,881 (range: 3,019 - 37,182) in the GI attending group, $18,460 (range: 3,721 - 38,714) in the non-GI attending group without GI consultation, and $18,623 (range: 3,392 - 36,104) in the non-GI attending group with GI consultation, (p=0.69).

The adjusted analysis revealed that physician specialty was not a predictor of the costs. Only the number of upper endoscopies had a statistically significant impact on the total costs.

Synthesis of costs and benefits
Not relevant due to the cost-consequences approach taken.

Authors' conclusions
Gastroenterologist (GI) involvement had a positive impact on length of stay (LOS) without affecting hospital costs. A trend towards lower mortality was also observed among patients who were attended by a GI, compared with those who received non-gastroenterologist (non-GI) care with or without GI consultation.

CRD COMMENTARY - Selection of comparators
The rationale for the choice of the comparators was clear. The selection of the three types of attending physicians was appropriate since it reflected the range of physicians available for the management of patients with ESLD. You should decide whether they are valid comparators in your own setting.

Validity of estimate of measure of effectiveness
The effectiveness evidence came from the retrospective comparison of patients attended by three different types of physicians. The use of a retrospective design has some limitations, mainly related to the fact that the data were not collected explicitly for the purposes of the study. The authors noted that their study was subject to the typical limitations of analyses based on administrative data. Above all, the data were not sufficiently detailed to allow the calculation of a severity index, which would have been useful as a potential predictor. Further, due to the lack of randomisation, the study groups differed in terms of several baseline characteristics. Regression analyses were undertaken to investigate potential confounding factors, but the final model only explained a small fraction of the variability in the outcome measures. The authors admitted that other factors related to hospital size and activity, which were not available from the database, could have better explained the observed variability. No information on the follow-up was reported. In addition, no justification for the choice of the sample size was provided, although the group of patients considered was quite large. These issues tend to limit the internal validity of the analysis. The study sample was representative of the study population as the data were derived from a large group of hospitals.

Validity of estimate of measure of benefit
No summary benefit measure was used in the analysis because a cost-consequences analysis was conducted.
Validity of estimate of costs
The authors stated implicitly which perspective was adopted in the study, but a detailed breakdown of the cost items was not provided. Similarly, information on the unit costs and the quantities of resources used was not reported. Therefore, it appears that it would be difficult to replicate the study. The source of the costs and resources was reported, and it referred to individualised data. The price year was given, which will facilitate reflation exercises in other settings. Statistical tests were conducted to assess the impact of several prognostic factors on the total costs. The authors stated that the costs were normally distributed, but large ranges of values were reported for the total costs. Due to the lack of longitudinal follow-up, resource consumption after discharge could not be tracked.

Other issues
The authors made some comparisons of their findings with those from the few available studies on ESRD, and those from studies that assessed the impact of physician specialty on patient outcomes in other disease areas. In general, comparable results were obtained. In terms of the issue of the generalisability of the study results to other settings, the authors noted that their findings would be easily transferable to community-based hospitals since their sample comprised a variety of institutions. Therefore, their estimates were representative of several centres across the USA.

Implications of the study
The study results suggested that physician specialty does have an impact on LOS and might be an important predictor of survival. However, the authors stressed that the reasons why GI attending physicians provided more efficient care than non-GI attending physicians could not be explained by their study.

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