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 intervention examined was a hospital diabetes specialist nursing (DSN) service. This included individual structured patient education appropriate to need, and practical management advice such as verbal and written case-note feedback to ward-based medical and nursing staff.

Type of intervention
Other: Hospital specialist nursing service.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised adult patients with either Type 1 or Type 2 diabetes. Further inclusion and/or exclusion criteria were not reported.

Setting
The setting was a hospital. The economic study was carried out at the University Hospital of Wales, Cardiff, Wales, UK.

Dates to which data relate
The effectiveness evidence and resource use data were gathered from January 1997 to September 1998. The costs were reported in 1997 to 1998 prices.

Source of effectiveness data
The effectiveness data were derived from a single study.

Link between effectiveness and cost data
The costing was undertaken prospectively on the same patient sample as that used in the effectiveness analysis.

Study sample
Power calculations were performed in the planning phase. These indicated that a sample of 140 patients in each group would have been required to achieve an 80% power to detect a difference in the means, using a two-group t-test with a 5% two-sided significance level. Overall, 508 sequential eligible unselected patients were identified, but only 300 patients agreed to participate in the study. Of these 300 patients, 148 were included in the intervention group and 152 on the control group. The patients in the intervention group had a median age of 63.6 years and 55.3% were men. The diabetes status of this group was 11.2% Type I, 74.3% Type 2, and 14.5% Type 2 insulin treated. The patients in the
control group had a median age of 63.4 years and 51.4% were men. The diabetes status of this group was 21.9% Type 1, 63.7% Type 2, and 14.4% Type 2 insulin treated.

**Study design**
This was a prospective, randomised, open clinical trial, which was conducted in a single centre (the University Hospital of Wales, Cardiff, Wales, UK). The method of randomisation was not reported. The patients were followed for one year. Data at follow-up, which were used to assess the secondary outcome measures, were available for 47% of all of the included patients.

**Analysis of effectiveness**
The primary outcome measures were hospital length of stay (LOS), frequency of readmission (within 12 months), and time to first readmission. All measures were collected for the whole patient sample. The secondary outcome measures were community resource use post-discharge, patient satisfaction, diabetes knowledge, and disease-specific quality of life.

Community resource use post-discharge included outpatient attendance, contacts with primary and social care, and time away from normal activities. It was recorded at one month post-discharge by post.

Patient satisfaction was measured using a modified version of the Diabetes Clinic Satisfaction Questionnaire, which was administered one week post-discharge.

Diabetes knowledge was assessed using the Diabetes Knowledge Scale, which had been modified to provide a version for insulin users and non-users. It was administered at randomisation and at one week post-discharge by post.

Disease-specific quality of life was measured through the Audit of Diabetes Dependent Quality of Life (ADDQoL) instrument. It was assessed at randomisation and at one week post-discharge by post.

Data were obtained from questionnaires for 47% of the patients, while data on resource use post-discharge were available for 41% of the patients. The two study groups were comparable at baseline in terms of their age, gender and specialty of admission. However, there was a greater proportion of patients with Type 1 diabetes in the intervention group. In addition, the patients who completed the questionnaire were significantly younger and less dependent on admission and discharge than those who did not complete the questionnaire. A comparison of non-participants and intervention group patients showed no differences in their age, gender or type of diabetes.

**Effectiveness results**
The median LOS was 8 days in the intervention group and 11 days in the control group, (p<0.01).

The readmission rate was 25% in both groups. The mean time to readmission was 283.2 days in the intervention group and 278 days in the control group, (p=0.80).

In the intervention group, 91% of the patients were satisfied with the care, 3% slightly dissatisfied and 3% dissatisfied, while in the control group, the proportions were 59% (satisfied), 23% (slightly dissatisfied) and 9% (dissatisfied), (p<0.001).

At baseline, the diabetes knowledge scores were 52% in the intervention group and 44% in the control group, (p>0.05). These increased to 74% in the intervention group and 48% in the control group. The difference in increase was statistically significant between the study groups.

The ADDQoL scores were 0.65 at baseline and 0.88 post-study for the intervention group, and 0.88 at baseline and 0.40 post-study for the control group, (p>0.05).

In terms of resource use following discharge, the mean number of contacts with a general practitioner (GP) was 1 in the intervention group and 1.7 in the control group, (p<0.01). Other contacts and time away from normal activities were
similar in the intervention (4.9 and 11.3 days) and control (4 and 15.5 days) groups.

Overall, referrals to the community DSN service were 28.4% in the intervention group and 38.2% in the control group, (p=0.09).

Clinical conclusions
The effectiveness analysis showed that the DSN service proved to be a safe intervention, which improved patient satisfaction and significantly reduced the hospital LOS.

Measure of benefits used in the economic analysis
The health outcomes were left disaggregated and no summary benefit measure was used. A cost-consequences analysis was therefore carried out.

Direct costs
Discounting was irrelevant as the costs were incurred less than 2 years. The unit costs and the quantities of resources were not reported separately. The costs included in the analysis were inpatient hospitalisation costs and the cost per patient for the DSN service. The inpatient hospitalisation costs were estimated using specialty-specific fixed and marginal costs, which were derived from national cost data. The cost per patient for the DSN service was assessed by dividing the nurse's salary and overhead costs by the typical annual workload of a DSN. The cost/resource boundary appears to have been that of the hospital. The resources used were measured from January 1997 to September 1998. The costs were reported in 1997 to 1998 prices.

Statistical analysis of costs
Statistical analyses were carried out to test for statistical significance of the results. These were conducted on the total costs and the resource use, in terms of the hospital LOS, readmission rates, GP and other contacts, and referrals to the DSN service.

Indirect Costs
The indirect costs were not included in the analysis.

Currency
UK pounds sterling (€).

Sensitivity analysis
Statistical analyses were performed to take into account the uncertainty of the cost data. The cost items varied were the salary costs, salary overheads, nurse workload, estimate of marginal costs, and LOS difference.

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

Cost results
The mean hospital costs amounted to 2,174 in the intervention group and 2,610 in the control group. There was a difference of -436 (bootstrapped 95% confidence interval: -1,125.2 to 206.3; p=0.19) in favour of the DSN service. The estimated costs were fairly robust and were only sensitive to quite unrealistic variations in the LOS and marginal costs.
Synthesis of costs and benefits
Not relevant.

Authors' conclusions
Compared with standard care, the diabetes specialist nursing (DSN) intervention was associated with a shorter length of hospital stay without any adverse impact on the readmission rates and the use of community resources or perception of quality of care. The costs of the intervention were offset by the reduced hospitalisation.

CRD COMMENTARY - Selection of comparators
The rationale for the choice of the comparator was clear. Standard care was selected as it represented the routine intervention for hospitalised patients with diabetes. However, a strict definition of standard care was not provided, since the authors stated that it referred to any management carried out by health care professionals other than the DSN. This makes assessment of the effect of a DSN service difficult.

Validity of estimate of measure of effectiveness
The effectiveness evidence were derived from a prospective, randomised controlled trial. The internal validity was further enhanced by the use of power calculations in the preliminary phase of the analysis. The study groups were generally comparable at baseline, with the exception of diabetes status. In addition, since the study sample was fairly unselected, the study results appear to be generalisable to the study population of diabetic patients requiring hospitalisation. However, the patient sample providing data on the secondary outcome measures was small, thus caution could be necessary when interpreting these data.

Validity of estimate of measure of benefit
The health outcomes were left disaggregated and a cost-consequences analysis was carried out. The use of a summary benefit measure reflecting patient preferences, already measured in the analysis, would have been useful.

Validity of estimate of costs
The analysis of the costs was carried out from the perspective of the hospital. Only those categories of costs relevant to the intervention were included in the analysis. The price year was reported and statistical analyses were carried out on the total costs. Finally, sensitivity analyses were performed on all the relevant resources and cost items. The cost estimates appear to be somewhat specific to the study setting.

Other issues
The authors did not compare their findings with those from other studies. The issue of the generalisability of the study results to other settings was not explicitly addressed, and sensitivity analyses were only carried out on the costs. Diabetic patients hospitalised were enrolled in the study and this was reflected in the authors’ conclusions. The authors presented their results in detail. They pointed out that caution is necessary when interpreting the cost results, as freed resources are unlikely to be released.

Implications of the study
The authors suggest that further research should be carried out to assess the long-term impact of DSN on the benefits and the costs.

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