A prospective, within-patient comparison between metal butterfly needles and Teflon cannulae in subcutaneous infusion of drugs to terminally ill hospice patients

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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 study compared the use of metal butterfly needles with Teflon cannulae for the subcutaneous administration of drugs in terminally ill hospice patients.

Type of intervention
Palliative care.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised terminally ill hospice patients. Patients were excluded from the study if they were unable to give informed consent, if they required more than two SDs, or if their prognosis for survival was less than 24 hours.

Setting
The setting was tertiary care. The economic study was carried out in the UK.

Dates to which data relate
The dates to which the effectiveness, resource use and price data related were not reported.

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

Link between effectiveness and cost data
The costs were applied to the same patient sample as that used in the effectiveness study.

Study sample
No power calculations were reported for the determination of the sample size. Hospice patients who were willing to participate (and who provided informed consent) were recruited to the study. The choice of the patients was not justified in relation to disease characteristics or the generalisability of findings. Thirty patients (13 males and 17 females) with a mean age of 70 years (standard deviation 11) started the study.

Study design
This was a single-centred, within-group comparison study. The interventions were studied until either the patient died, or both needle and cannula sites needed re-siting. The authors stated that 13 of the 30 patients completed the study. Nine patients died and 8 patients discontinued the study prior to re-siting of the needle and cannula. Reasons for discontinuation were (subsequent) confusion (2 patients), dual SDs were burdensome (2 patients) and transfer to oral medication (2 patients). In addition, one patient required recurrent re-siting of needles and had all subsequent medication delivered by cannula, and one patient was withdrawn for protocol violation.

**Analysis of effectiveness**

The primary health outcome used in the analysis was site duration. This was defined as the time from needle or cannula insertion to site reaction. Assessments were made on a 12-hourly basis. The type of adverse events and the patient's preference for either device were also assessed. All 30 patients recruited to the study were included in the analysis.

**Effectiveness results**

The results showed that the cannula lasted a median of 93.5 hours (range: 22.8 - 263.5) compared with 42.8 hours (range: 7.5 - 162.3) for the metal butterfly needle. The difference was significant, (p<0.0002).

The most common adverse effects of needle insertion were redness, swelling and bleeding. Redness and swelling was the most frequently quoted reason for re-siting the cannula (bleeding was not recorded). Most patients did not express a preference for either device.

**Clinical conclusions**

The authors concluded that Teflon cannulae have a median lifespan that is twice that of the metal butterfly needles used for the administration of subcutaneous drugs in this study.

**Measure of benefits used in the economic analysis**

There was no summary measure of benefit. In effect, a cost-consequences analysis was performed.

**Direct costs**

Only the costs of the needle and cannula were included in the analysis. The source of the price data was not stated and the price year was not reported.

**Statistical analysis of costs**

The costs were treated deterministically and no statistical analyses were carried out.

**Indirect Costs**

The indirect costs were not included.

**Currency**

UK pounds sterling ( ).

**Sensitivity analysis**

No sensitivity analysis was conducted.

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

**Cost results**
The metal butterfly needle cost 1.93 and the Teflon cannula cost 2.51.

These costs included the connecting line.

**Synthesis of costs and benefits**
The costs and benefits were not combined.

**Authors' conclusions**
Teflon cannulae have a median lifespan that is twice that of metal butterfly needles. They represent a cost-effective alternative for the administration of medication by subcutaneous infusion in terminally ill patients. The authors claimed that nurse time would be saved as a result of less frequent re-sittings.

**CRD COMMENTARY - Selection of comparators**
A justification for the choice of the comparators was given. The metal butterfly needle was commonly used to administer drugs in the authors' setting, while the Teflon cannula is available in the UK NHS and is accessible to hospitals, hospice and primary care teams. In addition, it was considered potentially more patient tolerable. You should decide if these represent widely used technologies in your own setting.

**Validity of estimate of measure of effectiveness**
The basis of the analysis was a within-group comparison study. This would appear to be an appropriate design to answer the research question, but confirmation on the objectivity of measures to determine redness, swelling and bleeding (indicating a need for re-siting) would have given strength to the internal validity of the study. In addition, although some analysis of patient preference for the different devices was implicitly conducted, no further details on the methods and results were supplied. There was little information on the characteristics of the patients, other than gender and age. However, as most patients were described as having metastatic malignant disease, it is likely that they were representative of terminally ill hospice patients. The lack of an analysis on potential biases and confounding factors does, however, represent a further threat to the validity of the findings.

Although a number of patients did not complete the study, these patients were appropriately accounted for in the analysis of withdrawals. The final analysis, which was conducted on an intention to treat basis, represented a strong aspect of the research process. No power calculations were reported, thus it was not possible to ascertain whether the results obtained were due to the intervention or to chance.

**Validity of estimate of measure of benefit**
No summary measure of benefit was derived and, in effect, a cost-consequences analysis was performed. The reader is thus referred to the comments in the 'Validity of estimate of measure of effectiveness' field (above).

**Validity of estimate of costs**
The perspective adopted in the economic analysis was not stated. The inclusion of costs relating only to the needle and the cannula means that these results will be of limited use if a wider and more comprehensive health service perspective is desired. Indeed, the authors' claim that nurse time would be saved as a result of using the Teflon cannula was not supported with any analysis. It was possible to separate resource use and cost (i.e. the site duration and cost of one needle or cannula), which enhances the reproducibility of the study in other settings. Resource use was taken from this single study, and a statistical comparison of times to site reaction between the two technologies was performed. It was unclear from where (or from which year) the prices of the two technologies were taken and this represents a threat.
to the reliability of the findings. A further threat to reliability is the absence of a sensitivity analysis to test the robustness of the estimates used.

**Other issues**
The authors compared their findings with those from another study and agreement was established in terms of the favourable time duration associated with the use of Teflon cannulae. The authors did not address the issue of generalisability to other settings, but the nature of these technologies suggests that they are directly relevant to conditions in terminally ill patients. The authors did, however, acknowledge the inherent difficulties with high rates of withdrawals or non-completers in studies of palliative care interventions.

**Implications of the study**
The authors indicated that further testing of the two technologies with different patient sub-groups and different medications would be beneficial.

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