Success rates for peripheral iv insertion in a children’s hospital

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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
Peripheral IV insertion in the pediatric population.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
Children in a pediatric hospital requiring IV replacement. No further details were provided.

Setting
Pediatric hospital. The economic study was carried out in Philadelphia, USA.

Dates to which data relate
The main effectiveness data were obtained from a single trial conducted in 1997. Resource and cost data were taken from 1997 sources. The price year was not stated.

Source of effectiveness data
The estimate of the number of successful/unsuccessful IV attempts was derived from a single trial.

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

Study sample
Children in a pediatric hospital were included in the analysis. Patient ages ranged from infant to adolescent. Power calculations to determine the sample size were not stated.

Study design
The study was a case series. The duration of the follow-up was two weeks. No loss to follow-up occurred.

Analysis of effectiveness
The analysis of effectiveness was based on intention to treat. The primary health outcomes used in the analysis were the
number of successful/unsuccessful IV attempts.

**Effectiveness results**
The patient groups were shown not to be comparable with respect to the number of attempts made in each group. The total number of attempted IV starts was 656: 197 attempts were made by staff registered nurses; 416 attempts were made by physicians and 43 attempts were made by the IV nurse clinician. Of the 197 attempts by staff registered nurses, 56% were unsuccessful (111). Of the 416 attempts made by physicians, 77% were unsuccessful (321). Of the 43 attempts made by the IV nurse clinician, 2% were unsuccessful (1).

**Clinical conclusions**
The lowest rate of success for IV placement in children was demonstrated by the physician staff, who received little or no formal IV insertion training, yet performed most of the attempted or actual procedures. The highest rate of success for IV placement was demonstrated by the IV specialty nurse, who placed the smallest number of IVs in patients.

**Measure of benefits used in the economic analysis**
The benefit measure was the number of successful IV attempts.

**Direct costs**
Labour and equipment costs were included in the analysis. Resource and cost data were reported separately. The quantity/cost boundary adopted was the hospital. Discounting was not undertaken due to the short study period. The price year was not stated.

**Statistical analysis of costs**
Not undertaken.

**Indirect Costs**
Not considered.

**Currency**
US dollars ($).

**Sensitivity analysis**
No sensitivity analysis was performed.

**Estimated benefits used in the economic analysis**
Of the 197 attempts by staff registered nurses, 56% were unsuccessful (111). Of the 416 attempts made by physicians, 77% were unsuccessful (321). Of the 43 attempts made by the IV nurse clinician, 2% were unsuccessful (1).

**Cost results**
The total costs of labour and materials for unsuccessful attempted IV placement were $10,392 for a 2-week period. The annual estimated loss which the author's institution might incur because of unsuccessful IV attempts was $270,192.

**Synthesis of costs and benefits**
Costs and benefits were not combined.
Authors' conclusions
The use of IV specialist nurses for placement of peripheral IVs in children is more cost-effective than using staff registered nurses or physicians for provision of this service.

CRD COMMENTARY - Selection of comparators
The reason for the choice of the comparator is clear. Many publications have demonstrated the cost-effectiveness of using IV nurse specialists with adult patients, but very few have explored this topic in the pediatric population. Furthermore, many agencies choose to use staff RNs and physicians to place IVs in both pediatric and adult patients. You, as a user of this database, should consider whether this is applicable to your own setting.

Validity of estimate of measure of effectiveness
The validity of the study results is questionable on the grounds that the number of attempts made in each group was very different. As stated by the authors, the collection of data subjectively by the person placing the IV and the fact that those participating in the data collection were interested in acquiring the services of an IV nursing team might have introduced elements of bias into the analysis.

Validity of estimate of costs
Resource and cost data were reported separately from the prices. However, as no statistical analysis was conducted, the costs need to be treated with a degree of caution. The costing methodology lacked some details, in particular the price date was not reported.

Other issues
The authors' conclusions are likely to be justified given the uncertainties in the data. The issue of generalisability to other settings or countries was not addressed. However, appropriate comparisons were made with other studies as a systematic review of relevant literature was conducted to determine the availability of similar data for comparison and to support the clinical results from the present study.

Implications of the study
More research is required using an objective data collector and collation in order to keep more accurate time for the procedures. A prospective, randomised trial would eliminate sources of bias and confounding evident in this research.

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None stated.

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