Cost-effectiveness analysis of chlorhexidine gluconate compared with povidone-iodine solution for catheter-site care in Siriraj Hospital, Thailand

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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.

CRD summary
The study evaluated the cost-effectiveness of antiseptics such as chlorhexidine gluconate (CG) and povidone-iodine solution (PI) for the prevention of catheter-related bloodstream infections (CRBSIs) in a Thai hospital. The authors concluded that CG was the preferred antiseptic strategy for the prevention of CRBSIs, as it reduced the incidence of infections and decreased hospital costs in comparison with PI. Overall, the results of the analysis were robust and the authors' conclusions are consistent with the objective of the study, which was adequate in terms of reporting.

Type of economic evaluation
Cost-effectiveness analysis

Study objective
The objective of the study was to assess the cost-effectiveness of two antiseptics, chlorhexidine gluconate (CG) and povidone-iodine (PI) solution, for the prevention of catheter-related bloodstream infections (CRBSIs) in a Thai hospital. The study population consisted of a hypothetical cohort of hospitalised patients requiring either a peripheral or a central catheter for short-term use (less than 10 days).

Interventions
The two antiseptics used in hospitalised patients for the prevention of CRBSIs were CG and PI solution for skin disinfection at the catheter insertion site.

Location/setting
Thailand/hospital.

Methods
Analytical approach:
A decision tree model was constructed in order to evaluate the clinical and economic impact of the alternative antiseptic options, using both published data and evidence from a local hospital. In view of the differing risk of events, two separate analyses were performed for patients with peripheral or central line catheter sites. A short-term time horizon (length of hospitalisation) was adopted. The authors stated that the study perspective was that of the hospital.

Effectiveness data:
The clinical data came from published studies, which might have been identified selectively as it was not reported whether a review of the literature was undertaken. The authors used their judgement to select the most appropriate estimate from the available evidence. The key clinical parameters were the rate of CRBSIs with the two antiseptics, rate of catheter colonisation, and probability of death attributable to CRBSI. Most of the clinical data were derived from a published meta-analysis and a local hospital. Some assumptions were also made.

Monetary benefit and utility valuations:
None.

Measure of benefit:
The benefit measures were the incidence of CRBSIs and the incidence of death due to CRBSIs.
Cost data:
The analysis included the direct medical costs related to the antiseptics (PI or CG), treatment of local infection and treatment of CRBSI. The drug costs were derived from the pharmacy department of the local hospital, while the costs of infection treatment were calculated using Thai Diagnosis Related Group estimates. The price year was 2005 and all prices were in Thailand bahts (THB).

Analysis of uncertainty:
A univariate sensitivity analysis was carried out by varying model inputs across ranges of values derived from the literature. Best- and worst-case scenarios were also considered. A threshold analysis was also conducted.

Results
In the case of central line catheters, the mean expected values for incidence of CRBSIs and incidence of death due to CRBSIs were, respectively, 1.55% and 0.31% with CG and 3.16% and 0.63% with PI (differences of -1.61% and -0.31%, respectively, in favour of CG. The direct medical costs to the hospital were THB 251.07 with CG and THB 555.57 with PI (difference of -THB 304.49 in favour of CG).

In the case of peripheral line catheters, the mean expected values for incidence of CRBSIs and incidence of death due to CRBSIs were, respectively, 0.45% and 0.005% with CG and 0.92% and 0.01% with PI (differences of -0.47% and -0.005%, respectively, in favour of CG). The direct medical costs to the hospital were THB 92.09 with CG and THB 192.23 with PI (difference of -THB 100.15 in favour of CG).

The results of the sensitivity analysis corroborated the base-case findings in that CG was the dominant strategy (i.e. more effective and less expensive). Only in the worst-case scenario did this clinical and economic advantage not hold. The model was mostly sensitive to the cost of CRBSI for central line patients and the baseline risk of CRBSI for peripheral line patients.

Authors' conclusions
The authors concluded that, compared with PI, the use of CG for the prevention of CRBSIs reduced the incidence of infections and decreased hospital costs in a Thai hospital. It was noted that, following these findings, the preliminary results from the implementation of this strategy in the authors' hospital led to a real reduction in the incidence of CRBSIs.

CRD commentary
Interventions:
The interventions under examination were appropriate comparators. PI represented the most commonly used agent in several countries, including Thailand, while CG had been recently proposed, in a meta-analysis, as an effective and cost-effective alternative to PI. These two antiseptics are also likely to be relevant in other settings.

Effectiveness/benefits:
The approach used to identify primary sources of data was not reported. However, the use of a meta-analysis to obtain relative risk estimates, and of administrative data from a local hospital to obtain baseline risk for the population analyses, appears appropriate given their internal validity (the meta-analysis) and their relevance to the authors' setting (administrative source). A limitation of the analysis was the fact that little information on these sources was provided. Both benefit measures were derived using modelling and represent intermediate end points of the interventions. They are specific to the disease under examination.

Costs:
The perspective was clearly defined and it would appear that all the relevant costs have been considered. The authors stated that the adoption of a broad perspective, such as that of society, would have further favoured the CG strategy given the reduction in costs related to time lost from work. A breakdown of cost items was not given, and the unit costs were presented separately from resource quantities only for antiseptics. Other costs were reported as macro-categories, which limits the possibility of replicating the analysis in other settings. The price year was reported. Administrative data were used to derive the costs and the authors reported the key calculations made to determine total costs.
Analysis and results:
Given the dominance of CG over PI, the costs and benefits were not combined. Extensive information on the decision model was reported. The issue of uncertainty was addressed in a deterministic sensitivity analysis, which helped identify the most influential model inputs. The results of both the base-case and sensitivity analyses were extensively reported. The authors pointed out that their findings were very robust and, despite the fact that the study was carried out in a single academic centre, they may be generalisable to other settings.

Concluding remarks:
This cost-effectiveness analysis was satisfactorily performed in terms of transparent reporting and calculation of all model inputs and results. However, there were some limitations, namely the narrow perspective and the lack of detail on some data sources. The conclusions reached by the authors are robust and appear appropriate.

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Other publications of related interest


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Subject indexing assigned by NLM

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