Metal needles versus plastic cannulae in hemodialysis patients: A cost-benefit analysis



Pinaki Ghosh¹, Seed Ahmed², Christopher Hepworth³, Beth Greenhough³, Claudia Barth⁴, Lara Blömeke⁴

1 B. Braun Medical Industries, Penang, Malaysia | 2 Sunderland Royal Hospital, Sunderland, UK | 3 B. Braun Medical Ltd., Thorncliffe, Sheffield, England | 4 B. Braun Avitum AG, Melsungen, Germany



Background

Successful cannulation of an arteriovenous fistula is important in patients undergoing hemodialysis. Historically, metal needles have been routinely used in clinical practice. However, plastic cannulae are available which report improved patient outcomes in areas including the reduction of angioplasty but also have a higher price when compared to metal needles.



Objectives

To determine the cost-benefit scenario when comparing metal needles vs. plastic cannulae.

Methods

A static decision tree model was conceptualized to estimate the cost-benefit of implementing plastic cannulae in a hypothetical cohort of 100 hemodialysis patients from a European healthcare perspective. Input parameters from the literature were restricted to the event rate and cost of managing complications: stenosis, aneurysm, angioplasty at cannulation site, angioplasty with thrombolysis, and device costs. One way sensitivity analysis (OWSA) varying each input parameter by 25% was used for a threshold analysis to determine the maximum economically justifiable price.

Results

The results showed that incremental costs of plastic cannulae over metal needles are offset by the higher costs of the adverse events for metal needles. Cost per month per patient with metal needles was €330.15 vs €210.13 with plastic cannulae corresponding to cost savings of €120.02 or **36.35**% for plastic cannulae compared to metal needles (Figure 1). The OWSA showed the following ranking of cost drivers: price of plastic cannulae (major driver of cost savings), followed by the cost per episode of aneurysm, stenosis, angioplasty with thrombolysis, angioplasty at the cannulation site, and costs of metal needle, respectively (Figure 2). The threshold analysis showed that €7.5 was the price of one plastic cannula (vs. €0.1 for metal needles) beyond which complications could not off-set price differences (Figure 3).



Figure 1. Consolidated costs and monetized clinical consequences of metal needles & plastic cannulae



Conclusion

Plastic cannulae are cost saving compared to metal needles in hemodialysis patients.

Discussion

Our results applicable specifically to Europe are similar to previous work on the advantages of plastic cannulae (Tito et al., 2022 and Marticorena et al., 2018). This study is unique reporting as it includes OWSA and threshold analysis.

Key takeaways for medical practitioners

- Plastic cannulae can support economic efficiency in dialysis therapy.
- The avoidance of vascular access complications in dialysis is beneficial to both patients and the healthcare system.





Figure 2. One way sensitivity analysis depicting major cost drivers impacting cost benefit calculation



Link for more information or to contact us

Incremental Price of Plastic Cannula

Figure 3. Threshold analysis showing % savings at higher prices of plastic cannulae

Disclosures

Pinaki Ghosh, Christopher Hepworth, Beth Greenhough, Claudia Barth, and Lara Blömeke are employees of B.Braun Malaysia, B.Braun UK & B.Braun Avitum AG, Germany respectively

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