Economic Value Of Antibiotic-Impregnated External Ventricular Drain Catheters In Cerebrospinal Fluid Diversion Procedures

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Objectives

- An external ventricular drain (EVD) is the first-line, interim intervention in a variety of acute brain injuries requiring cerebrospinal fluid (CSF) diversion.
- EVD catheters pose a considerable risk of CSF infection, forcing replacement of the contaminated catheter, systemic antibiotics treatment, and prolonged hospitalisation.[1,2]
- Reducing systemic antibiotics use and the emergence of antibiotic-resistant bacteria is a focus of many healthcare systems.[3]
- Antibiotic-impregnated EVDs can be used to reduce the duration of systemic antibiotics use (1 vs 10.6 days[1]) and reduce the infection risk.
- The present model estimated the cost impact of transitioning to antibiotic-impregnated EVDs in France, Germany, Italy, and the United Kingdom (UK).

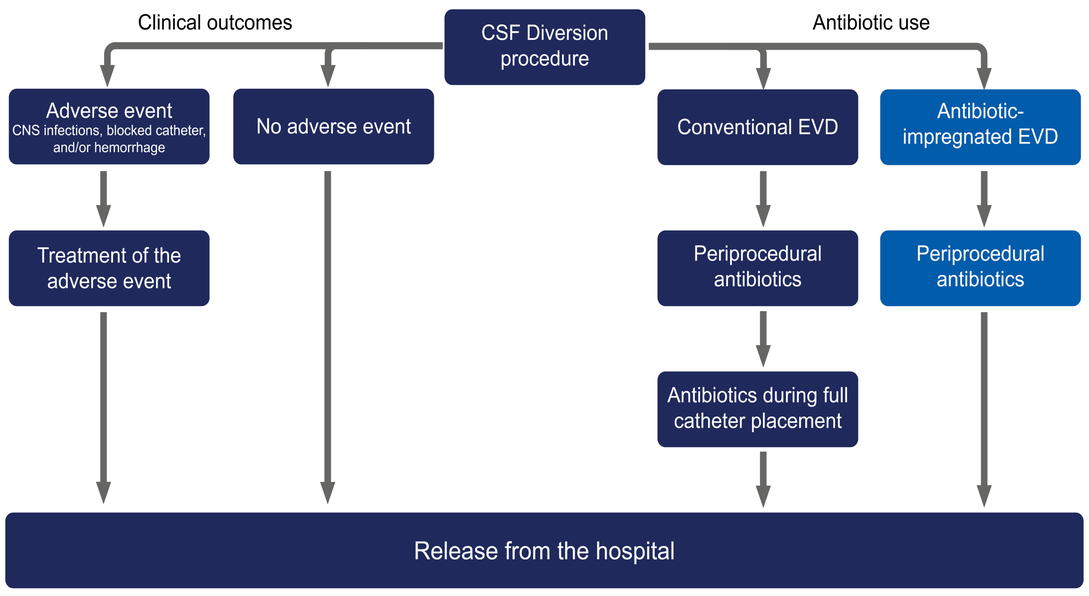

Figure 1 Pathway of the Markov model. CSF: Cerebrospinal fluid; EVD: External ventricular drain; CNS: Central nervous system

Methods

- A decision-tree model compared treatment with either conventional or antibiotic-impregnated catheters (**Figure 1**).
- The input costs were detailed for the index procedure, consumables, antibiotic use, and revision due to infections to simulate the hospital resource consumption.
- Cost data were sourced from both official reimbursement documentation and published literature for each country and, if necessary, adjusted to 2021/22 rates.[4-13]
- Clinical inputs included only EVD-related adverse events and the use of systemic antibiotics (**Table 1**).
- The model estimated a 1-year time horizon from the local hospital payers' perspective.
- Cost drivers were evaluated using one-way sensitivity analysis.

Parameters	Antibiotic-impregnated EVD	Conventional EVD
Time on antibiotics	1 day[1]	10.6 days[1]
CNS infection	0.57%[2]	2.80%[2]
Blocked catheter	5.00%[1]	7.00%[1]
Hemorrhage	1.00%[1]	2.00%[1]

Table 1 Key clinical parameters used in the model. EVD: External ventricular drain; CNS: Central nervous system

CONCLUSION

Antibiotic-impregnated EVD catheters are expected to offer a cost-saving alternative to systemic antibiotic use in the four European countries examined.

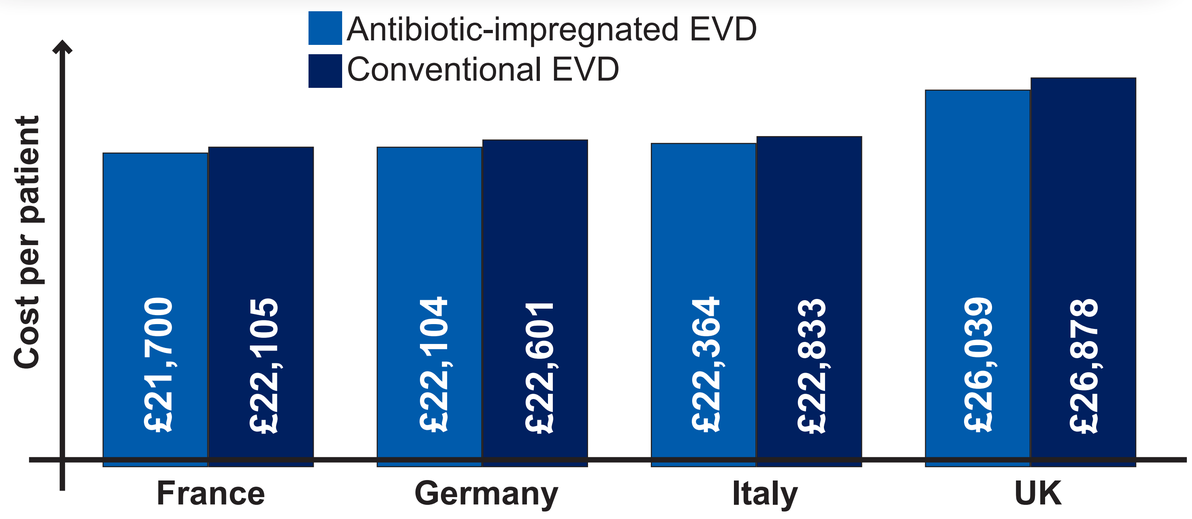

Figure 2 Cost difference per patient. EVD: External ventricular drain

Results

- In regard to clinical outcomes and costs the antibiotic-impregnated EVD system appears advantageous for the four examined European countries.
- Costs per patient were reduced in all countries (**Figure 2**), with savings ranging from 1.8% (France) to 3.1% (UK).
- In monetary terms, savings per patient were estimated to be:
  - €405 (France)
  - €497 (Germany)
  - €469 (Italy)
  - £839 (UK)
- Savings from reduced use of systemic, intravenous antibiotics accounted for up to 55% (France) of savings accrued.
- Cutbacks in infection-related management expenses from improved antibiotic prophylaxis effectively offset the higher procurement the antibiotic-impregnated catheters.
- One-way sensitivity showed that the length of stay was the largest driver of total costs of care, followed by the incidence of CNS infections.

Limitations

- The model was developed using the best clinical data available, but data is scarce and further investigations would be recommendable.
- Systemic antibiotics resource costs were modelled, but no consequences and side effects of antibiotics utilization were included.
- This is the first economic evaluation on antibiotic-impregnated EVDs and no comparison against other approaches could be made.

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Disclosures

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