

Usage of Antibiotic-Impregnated External Ventricular Drains Results in Lower CSF Infection Rates and Significant Cost Savings

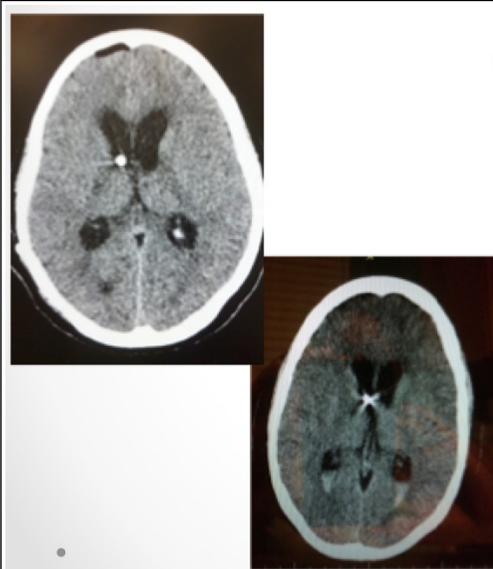
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Introduction

Infection from an external ventricular drain (EVD) can result in significant morbidity and hospital costs. Antibiotic-impregnated catheters (AiEVDs) have been reported to reduce the risk of CSF infection in patients requiring EVD catheters. We investigated the efficacy of AiEVDs in reducing rates of CSF-related infection and ventriculitis rates at a single center - an inner city hospital, and performed a cost-effectiveness analysis.

Methods

- Subjects receiving an AiEVD were prospectively enrolled in a cohort study with a historical control.
- All adult patients requiring an EVD, subdural drain, or tumor cavity drain from January 2014 through March 2015 received a clindamycin/rifampin-impregnated clear trauma catheter (Bactiseal®, Codman, Johnson & Johnson) for ventricular CSF drainage.
- Patients undergoing insertion of standard catheters from 2012-2013 were used as the historical control.
- CSF was sampled per routine as indicated for evaluation and prior to catheter removal.
- Cost-effectiveness analyses were performed based on estimated hospital stay costs (e.g. extended ICU stay).



Patients s/p placement of AiEVD (top) and nonAiEVD (bottom)

Variable	AiEVD, # (%)	Non-AiEVD, # (%)
# of patients	108	110
Mean age (years) (SD)	45.9 (+/- 24)	51 (+/- 22)
Duration of EVD	8.47 (+/- 6.8)	9.1 (+/- 7.3)

	AiEVD (n=108)	Non-AiEVD (n=110)	p-value
Infections, NNT = 13.5	0	8	0.004
Need for permanent shunt	12	17	0.10

Results

117 patients received AiEVD during the study period, and data from 108 were included in the analysis. Nine patients were excluded from analysis: 7 had catheters in place for fewer than 24 hours and 2 had known pre-existing CSF infections. The AiEVD group was compared to a historical control group (n=108). The two groups had similar clinical characteristics, including patient sex and age, indication for catheter placement, and length of time the catheter remained in place.

- The most common indications for EVD placement were subarachnoid hemorrhage (43.3%) and intraparenchymal hemorrhage (22.6%).
- Mean time before EVD removal was 9 days.
- **There were no catheter-based infections in the AiEVD group. With 8/108 (7.4%) in the control group ($p = 0.004$), with a number needed to treat of 13.5.**
- There was a trend towards fewer patients requiring shunting in the AiEVD group (6.5%) compared to control group (9.3%).
- **Our institution saved an average of \$1,324 per patient by using AiEVD.**

Discussion

- The use of AiEVDs significantly reduced the rate of catheter-induced CSF infection and were significantly more cost-effective when compared to standard EVDs, because of decreased length of ICU admission and potential decrease in rate of shunt requirement.
- Four patients in the AiEVD group had CSF results suspicious for meningitis, but negative cultures, and were treated with broad spectrum antibiotics. Further studies on the effect of antibiotic catheter on CSF sampling is necessary.

Conclusions

- First study investigating the cost utility of using a more expensive catheter in an inner-city hospital.
- **First study investigating a potential reduction in the progression to shunt dependency with usage of AiEVDs.**
- Our study further supports the use of bactiseal EVD catheters as standard of care for external CSF drainage.