

# Reducing Surgical Site Infection In Paediatric Neurosurgical Patients

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## Abstract

### Background

Infection of the surgical site following insertion of external ventricular drains or ventriculoperitoneal shunts in paediatric neurosurgical patients is an important preventable complication that is associated with significant morbidity and mortality. The objective of this pilot study is to determine whether the infection rate following ventriculoperitoneal shunt and external ventricular drain insertion is reduced by the introduction of an evidence-based checklist that bundles together several simple interventions, compared to standard practice.

### Methods

A checklist was developed utilizing the concept of "bundling" key evidence based components. Extensive interdepartmental consultation and literature searching was carried out in the process of developing the checklist. All relevant staff were educated in the use of the checklist. Compliance was monitored closely. During the study period from January 2008 to December 2009, the checklist was used for all patients undergoing ventriculoperitoneal shunt or external ventricular drain insertion. Patients who underwent these operations between January 2007 and December 2007 were used as controls.

### Results

There were a total of 197 patients with 130 in the intervention group and 67 in the control group. The infection rate dropped from 7.5% to 2.3% with introduction of the checklist ( $p=0.08$ ). Compliance to the checklist was 88% across the 130 patients, and the number of bed days required to treat neurosurgical site infections was reduced from 65 days to 4 days per quarter.

### Conclusion

In this pilot study, we have demonstrated a nonsignificant but clinically important trend towards lower infection rates for shunt and external ventricular drain surgery with the use of a simple checklist. The proposed mechanisms for this observation include improved communication between healthcare staff and readily access to useful written information on infection reduction strategies.

## INTRODUCTION

Surgical site infections (SSI) are one of the most common complications occurring in hospitalised patients (Safer Systems Saving Lives

## METHOD

A review of the medical literature was performed to identify gaps in the current practice. The Cochrane Central Register of Controlled Trials, Cochrane Database of Systematic

review, MEDLINE and EMBASE were searched to identify strategies that reduced SSI

## RESULTS

There was a total of 197 patients who underwent VPS or EVD insertion during the study period (Table 2). 67 patients formed the control group prior to introduction of the checklist and 130 patients were in the intervention group after introduction of the checklist. There were a total of 8 shunt or EVD infections in the cohort of 197 patients

representing an overall rate of 4.1 %. The infection rate was 7.5% (5 out of 67) in the control group and 2.3% (3 out of 130) in the intervention group. The absolute risk reduction of 5.2% did not reach statistical significance ( $p=0.08$ ) with a 95% confidence interval ranging from a 12% reduction to a 1.6 % increase. The odds ratio for developing a shunt or EVD infection following exposure to the checklist was 0.29 (95% confidence interval 0.068 to 1.265). The low number of patients and infections meant that this study was underpowered to detect a statistically significant effect.

**Table 2**

Summary of results

Group	Infection (%)	No infection (%)	Total
Checklist	3 (2.3)	127 (97.7)	130
No checklist	5(7.5)	62 (92.5)	67
Overall	8 (4.1)	189 (95.9)	197

chi-squared=3.016, df=1,  $p=0.08$   
odds ratio=0.29 (95% confidence interval 0.07 to 1.27)

It was also found that the number of unplanned returns to the operating theatre dropped from 34 per year in the control period to 2 per year during the intervention period. The total number of additional days of hospitalisation due to SSI decreased from 65 days to 4 days per quarter. Overall compliance with the checklist was 88%.

## DISCUSSION

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## CONCLUSION

The introduction of an evidence-based checklist resulted in a decrease in the rate of SSI in paediatric patients undergoing VPS or EVD insertion surgery when compared to historical controls treated without the checklist. Due to small numbers, the benefit did not reach statistical significance. The

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