Antibiotic impregnated catheter case series

Data of 100 patients treated at Gemelli University Hospital between January 2012 and December 2019 were retrospectively reviewed in order to determine the cost-effectiveness and budget impact of antibiotic-impregnated versus non-impregnated catheters in the management of patients with aneurysmal subarachnoid hemorrhage related hydrocephalus. A budget impact model was built depending on the use of antibiotic-impregnated versus non-impregnated catheters. The model was populated with data extrapolated from existing literature concerning the Italian healthcare setting and national tariffs.

Results: A 25% reduction in the number of cerebrospinal fluid infections was achieved by using antibiotic-impregnated catheters, resulting in an overall saving equal to €5.730,52/patient. Expanding results to a 100-patient sample, the possible savings would amount to €573.052,40 for the National Health Service.

Conclusions: Antibiotic-impregnated catheter use was associated to a reduction in cerebrospinal fluid infections rate as well as in costs related to hospital care when compared to non-impregnated catheters. Thus these catheters represent, besides lifesaving, cost-saving devices that reduce the economic burden and ensure a safe clinical outcome in patients with aneurysmal subarachnoid hemorrhage-related hydrocephalus. The present study provides concrete evidence of the benefit of Antibiotic impregnated catheters to decision-makers responsible for defining health policies [1].

2015

Parker et al. retrospectively reviewed hospital discharge and billing records from the Premier Perspective Database from April 2003 to July 2009 to identify all adult and pediatric patients undergoing de novo ventricular shunt placement. The primary end point was the incidence of shunt infection within 1 year of implantation. Multivariate logistical regression was performed to determine factors associated with increased incidence of infection.

A total of 10,819 adult (AIC, 963; standard catheter, 9856) and 1770 pediatric (AIC, 229; standard catheter, 1541) patients underwent ventricular shunt placement in 287 US hospitals. Overall, the incidence of infection was 3.5% in adults (n=380) and 6.6% in pediatric patients (n=116). AICs were associated with significant reduction in infection for both adult (2.2% vs 3.6%, p=0.02) and pediatric (2.6% vs 7.1%, p<0.01) patients. AIC use was associated with reduced infection regardless of hospital size, annual shunt volume, hospital location, or patient risk factors and remained associated with a reduced infection in multivariate analysis for both adult (p=0.02) and pediatric (p=0.02) patients.

The use of antibiotic-impregnated shunt catheters was associated with a reduction in shunt infections for both adult and pediatric patients. This provides further support that AICs may represent a reliable means of reducing shunt infections for both adult and pediatric patients [2]

One hundred and fifteen patients underwent insertion of EVDs from January 2000 to March 2008. Data were collected for 99 patients with a total of 146 EVD insertions. The parameters studied were age, gender, ASA score, seniority of the surgeon, significant medical history, presence of trauma, concurrent surgeries, revisional surgery, use of peri-operative systemic antibiotic, use of antibiotic-

impregnated external ventricular catheter, tunnelling of the catheter, duration of drainage and VRIs.

Eleven patients developed new VRI (12%). Analysis comparing infection incidence for various co-morbidities shows that systemic sepsis was associated with higher infection rates ($p = 0.037$). Revisional surgery ($p = 0.036$) and longer duration of catheterization ($p = 0.001$) were also found to be associated with VRI. The Standard catheters and the antibiotic-impregnated catheters had similar infection rates. The antibiotic-impregnated catheters tended to be infection-free for longer but these differences were not statistically significant. The duration of catheterization was significantly higher for the antibiotic-impregnated catheter group. In both groups, the majority of infections were caused by Gram-positive bacteria.

The study demonstrates that there was no statistically significant difference in the infection rates for the Standard and antibiotic-impregnated external ventriculostomy catheters. The duration of catheterization was significantly higher for the Antibiotic-impregnated catheter group. The antibiotic-impregnated catheter infections tended to occur later as compared with the Standard catheter group [3)].

2011

Demetriades and Bassi present the experience of 52 months of Bactiseal catheters in all consecutive patients who underwent a ventriculoperitoneal (VP) shunt from July 2004 to November 2008, under the care of one neurosurgeon. This was a prospective study with outcome measures of infection, blockage, intra and postoperative complications and revision surgery.

One hundred and twenty-five patients underwent VP shunting with Bactiseal catheters, with a combination of NSC, Strata and Burr Hole valves. The age range of the patients was from 1 week premature to 64-years old. Forty-two of the patients were paediatric. The aetiology for hydrocephalus included posterior fossa tumoursto intra-ventricular haemorrhage, post-meningitic hydrocephalus and aqueduct stenosis. The overall complication rate was 12%. The following complications occurred: blockage in two cases; haemorrhage and blockage in two cases; Cerebrospinal fluid fistula in one case; infection in four cases; other in three cases (peritoneal adhesions, wound erosion and postoperative peritonitis). There were four infections in total (3.2%). All of these occurred within six months of implantation. All infections were caused by rifampicin resistant Staphylococcus epidermidis.

In an era of increasing methicillin-resistant Staphylococcus aureus (MRSA) resistance and 'superbugs', is the use of antibiotic-laced catheters adding to the pool of resistant bacteria which may be harder to treat? Vigilance is required, as rare and resistant staphylococci strains occasionally can emerge as causative agents for VP shunt infections, in both adults and children, and their treatment can be difficult [4)].

1)
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2)
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