

## Epidemiology of cerebrospinal fluid shunt surgery in the UK and Ireland

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### Background

There is no recent report on the epidemiology of CSF shunt surgery that is based on large populations of all ages followed over time, including all aetiologies. The aim of this study was to determine current epidemiology and clinical characteristics of CSF shunt surgery, including revisions.

### Methods

A retrospective, multi-centre, registry-based study was conducted based on 10 years' data from the UK-Ireland Shunt Registry (UKSR). All primary and revision shunting procedures reported between 2004 and 2013 were included. Case ascertainment and data quality were explored. Incidence rates of primary shunts, shunt revision rates and descriptive statistics of clinical characteristics were explored, stratified by age group, geographical region, and year of operation.

### Results

Between 2004 and 2013, the 41 UKSR participating institutions submitted 41036 shunt procedures in 26545 patients, including 20947 (51.0%) primary and 20089 (49.0%) revision procedures. Incidence rates of primary shunts in infants, children and adults were 39.5, 2.4 and 3.5 shunts per 100,000 person-years respectively, with some variation by geographical region and year of operation. Most common underlying aetiologies were perinatal intraventricular haemorrhage (35.3%) and malformations (33.9%) in infants, tumours (40.5%) and malformations (16.3%) in children, and tumours (24.6%), post-haemorrhagic hydrocephalus (16.2%) and idiopathic normal pressure hydrocephalus (14.2%) in adults. Shunt revision rates included 21.9%, 18.6% and 12.8% 90-day revision rates, and 31.0%, 25.2% and 17.4% first-year revision rates, for infants, children and adults respectively. Main reasons for revision included underdrainage (66.3%) and infections (12.2%), as single events or combined with other reasons.

### Conclusions

Our conclusions inform patients, carers, clinicians, healthcare commissioners, researchers and industry about current epidemiology of CSF shunting, and potential complications.