

Neurosurgical National Audit Programme Cranioplasty in England 2013-2019

Summary

Almost 4000 cranioplasty procedures are recorded in HES data for 24 neurosurgical units in England between 2013 and 2019. Analysis shows a wide variation in revision rate between units. Although there a number of caveats regarding the data, this brief report illustrates the value of HES data in defining neurosurgical activity in England.

Methods

(Please see the appendix on data quality)

- Data Period 22.12.2012 29.03.2019 (6.25 years)
- Number of Units 24
- Cohort age 18 years and over
- Codes used
 - V011 Cranioplasty using a prosthesis
 - \circ V014 Removal of Prosthesis from cranium
 - $\circ \quad V012 \ Cranio plasty using bone \ graft$
 - V015 Revision of cranioplasty NEC
- Method of admission elective and non-elective

Results

- Total spells with cranioplasty as a primary procedure 3972, range by unit for 6.25 years was 37 263 cases.
- Cases where cranioplasty was done as a secondary procedure 861 (after craniotomy for other indication)

		Numb	per of cases	
V011	Cranioplasty using a prosthesis		2824	(71%)
V014	Removal of Prosthesis from cranium		639	(16%)
V012	Cranioplasty using bone graft		325	(8%)
V015	Revision of cranioplasty NEC		184	(5%)
		Total	3972	

- Median insertions per unit 140 in 6 years, median removals 32.5.
- Proportion by unit of removals of cranioplasty ranged from 12-61%



- LOS overall 9.6 days, for insertions 8.6 days, for removals 13.8 days
- **Male to Female ratio** 60% of the cases were male (2414 cases) with an average age of 43 years (17-84), 40% were female (1558 cases) average age 48.6 years (17-86).

• Multiple Admissions

In this period 394 patients had multiple admissions during the 6 year period. These patients underwent a total of 956 operations. The numbers of recorded operations were,

V011 - 500 V012 - 32 V014 - 336 V015 - 88

• Infection

B956 is the code for staphylococcal Infection. 156 cases had this code. Coding of infection is complex within HES.

• Deaths

There were 345 deaths in the 6.25 years, after a mean time of almost 2 years. The 30 day death rate 0.45% (18 deaths).

Figure 1. Funnel Plot of the ratio of removals of cranioplasty against unit activity over 6.25 years.



- units
- mean ratio of removal to all cases
- → 95% lower control limit
- → 95% upper control limit
- → 99.7% lower control limit
- → 99.7 upper control limit



Figure 2. The relationship between the proportion of cases where bone was used as implant material, and revision rate for individual units. Points show individual units.



Discussion

Type of cranioplasty - most (90%) of cranioplasties in this data period use synthetic material and publications have shown this to be associated with fewer complications. 4 units used bone as the cranioplasty material for over 25% of cases. Figure 2 shows that there does not appear to be a relationship between the proportion of bone implants in a unit and revision rate.

Revisions - outliers. On funnel plotting the data (figure1) 2 units had revision rates slightly higher than 3SD and further data validation is recommended.

Multiple operations – This analysis highlights problems with high revision rates and some patients undergoing multiple operations – 394 patients had 2 or more operations. The indications for cranioplasty often encompass considerable comorbidity and causes of and risks for revisional surgery should be sought.



Conclusions

The revision rate for cranioplasty shows considerable variation and further analysis should identify risks for revision.

The type of implant (autologous bone or synthetic material) does not, in this analysis predispose to revision.

Once the HES data for our dataset has been assessed for validity persistently outlying units will be invited to look further into their data and identify QA challenges.

Considering a high proportion of cases of removal will be for infection a more detailed examination of HES codes for associated infection is appropriate.

Acknowledgments

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Appendix

Data Quality

This data is from a provisional dataset supplied by NHSD that is now subject to a modified access request. There are a number of caveats regarding its accuracy but preliminary assessment shows that the case attribution accuracy is over 95%. Coding variation between units is difficult to define. This analysis has been chosen to illustrate the potential of HES data and has used a minimal number of codes which are clear in terms of procedure.

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