

Online Research @ Cardiff

This is an Open Access document downloaded from ORCA, Cardiff University's institutional repository: <http://orca.cf.ac.uk/116831/>

This is the author's version of a work that was submitted to / accepted for publication.

Citation for final published version:

McLeod, Robert, Brahmabhatt, P and Owens, David 2017. Tonsillectomy is not a procedure of limited value - the unseen costs of tonsillitis and quinsy on hospital bed consumption. *Clinical Otolaryngology* 42 (3) 10.1111/coa.12773 file

Publishers page: <https://doi.org/10.1111/coa.12773> <<https://doi.org/10.1111/coa.12773>>

Please note:

Changes made as a result of publishing processes such as copy-editing, formatting and page numbers may not be reflected in this version. For the definitive version of this publication, please refer to the published source. You are advised to consult the publisher's version if you wish to cite this paper.

This version is being made available in accordance with publisher policies. See <http://orca.cf.ac.uk/policies.html> for usage policies. Copyright and moral rights for publications made available in ORCA are retained by the copyright holders.



Tonsillectomy is not a procedure of limited value. The unseen costs of tonsillitis and quinsy on hospital bed consumption

Mcleod R, Speciality Trainee University Hospital of Wales, Cardiff

Brahmabhatt P, Core Trainee ENT University Hospital of Wales Cardiff

Owens D. Consultant Otolaryngologist, University Hospital of Wales

Corresponding Author

Mr Robert Mcleod

Department of Otolaryngology

University Hospital of Wales

Cardiff

CF14 4XW

mcleodrw@cf.ac.uk

Abstract

Objectives To assess the impact of the introduction of the SIGN Clinical guidelines in 1999 and subsequent revision in 2005 on tonsillectomy, hospital admission with tonsillitis and peritonsillar abscess rates in four countries.

Methods Retrospective analysis using English, Welsh, Australian and New Zealand National healthcare hospital admission databases between 2000 and 2013. Primary outcomes measures included tonsillectomy rates and hospital admission rates for tonsillitis and peritonsillar abscess. Secondary outcome measures included bed day usage in England and Wales. Linear forecasting was used to identify the potential impact of any trends.

Results Following guideline introduction for tonsillectomy a significant decline in tonsillectomy rates in England ($p < 0.01$) and Wales ($p < 0.05$) was seen. Hospital admissions for acute tonsil infections increased in England ($p < 0.01$) and Wales ($p < 0.01$). In Australia and New Zealand, tonsillectomy and tonsillitis rates increased ($p < 0.01$) but these increases were not as great as those seen in England or Wales ($p < 0.01$).

Conclusions Following the introduction of these Clinical Guidelines there was a decrease in the rate of tonsillectomy in England and Wales and a presumed associated increase in admissions with tonsillitis. This did not occur in Australasia where tonsillectomy rates rose over time. If these trends continue it is likely that they will have a significant deleterious impact on health care spending in the future.

Keywords

Tonsillectomy, Tonsillitis, Quinsy, Bed days

Introduction

Tonsillectomy is one of the most frequently performed surgical procedures in both children and adults in the UK. Evidence on the effectiveness of tonsillectomy is conflicting with some literature suggesting tonsillectomy causes a significant improvement on health-related quality of life as well and conferring additional secondary economic health benefits from reduced General Practitioner (GP) attendances and a reduction in occupational absenteeism¹⁻⁴. In contrast to this however some literature exists to suggest tonsillectomy is unnecessary⁵ and unjustified in certain cases. The latter opinion was highlighted by the 2009 McKinsey National Health Service report⁶ which, in addition to this⁷, suggested tonsillectomy to consume significant NHS resources (In terms of cost and bed utilisation) in a time of financial difficulty. Where applications have been made a significant number of funding requests have been refused leading to restricted tonsillectomy rates. With the introduction of much stricter guidance on the criteria required for surgical intervention for tonsillitis The UK government has been exerting increasing pressure to reduce the number of tonsillectomies performed in the past 10 years⁸ even though clinicians have stated ongoing concerns over the consequences of acute infection of the tonsils⁹⁻¹⁰. In 2005, Croydon PCT deemed 35 procedures of limited clinical effectiveness (PoLCE), one of which was tonsillectomy¹¹. This was widely adapted by the Audit commission throughout the UK despite evidence that tonsillectomy does have significant benefits in the treatment of sore throat^{12,13}. Due to these changes PCTs are now required to apply for funding when performing PoLCE procedures. This study aimed to investigate the presence of trend-change over time in tonsillectomy rates, the incidence of hospital admission for the consequences of acute tonsil infection (Tonsillitis and Quinsy) and the effect on bed day utilisation in the

period following the introduction of stringent requirements for surgical management of recurrent tonsillitis and quinsy within the UK. The study assessed this data from England and Wales against data from Australia and New Zealand.

Materials and Methods

A retrospective study was performed on data collected between January 2000 to December 2013 for tonsillectomy, and for hospital admissions for the complications of acute infection of the tonsils (tonsillitis and peritonsillar abscess). Data were extracted from 4 national electronic patient databases: 1) Patient Episode Database of Wales (PEDW)¹⁴; 2) Health Episode Statistics (HES)¹⁵ of England 3) the Australian Institute of Health and Welfare database (AIHW)¹⁶ and 4) New Zealand's Health Statistics database (NZHS) supplied by New Zealand's Ministry of Health.

Tonsillitis episodes were identified in PEDW, AIHW, HES and NZHS using the ICD primary diagnosis code J03. Tonsillectomy was identified using operations codes F341-F349, excluding code F346 (excision of lingual tonsil). Peritonsillar abscess was identified using ICD primary diagnosis code J36.

The data from the UK National Statistics website¹⁷, the Australian Bureau of statistics website¹⁸ and the Statistics New Zealand¹⁹ website was used to calculate annual incidence per 1000 population using mid-year population estimates of the countries under review. For those years in which population estimates were not available the mean increase in population over the previous 10 years were used in order to estimate the true population. Extracted data were examined for differences in demographic and practice between the three national cohorts, as well as for changes in provision of tonsillectomy surgery over the period of the study. The effect of rates of tonsillectomy and tonsillitis on the number of bed days used in the UK was also investigated. Within

each country trends were evaluated using a linear regression model and differences between countries using one-way ANOVA. Data was analysed using SPSS version 20 with a p value of <0.05 was taken as statistically significant.

Ethical Considerations

Ethical review was not sought as this data is anonymised and freely available to the public.

Results

A total of 1,041,954 tonsillectomies were performed in the four countries over the period 2000-2013 as shown in Figure 1 a) (no data was available from Australia between 2012 and 2013). Using linear regression analysis from 2000 to the SIGN 117 update of 2005 no statistically significant trend change was seen in tonsillectomy rates in England, Wales and Australia ($p=0.392$, $p=0.547$, $p=0.74$). New Zealand, however, showed a significant decrease in tonsillectomy rates between the same period ($p=0.013$, $t=0.363$). A comparison of the rates of tonsillectomy between countries using multiple ANOVA identified greater operations per head of population in Australia than in England ($p<0.01$) and Wales ($p<0.01$) before SIGN update of 2005. There was no significant difference in operation rates between New Zealand and the other 3 countries.

Following the SIGN guidelines update in the UK there was a significant decrease in rates of tonsillectomy in England ($p<0.01$, $t=-6.07$) and Wales ($p<0.05$, $t=-5.296$). This is despite an increase in the numbers of tonsillectomies performed in England between 2000-2013 from 46,331 to 48,422. However these increases have not kept pace with population growth. Conversely in Australia and New Zealand,

tonsillectomy rates showed a significant increase (Australia - $p < 0.05$, $t = 4.977$, New Zealand $p < 0.01$, $t = 7.77$). A comparison of the rates of tonsillectomy after 2005 showed that both Australia and New Zealand now had significantly greater rates of tonsillectomy when compared to England ($p < 0.01$) and Wales ($p < 0.01$).

Between 2000 and 2013 there were 999,354 admissions to hospital with acute infection of the tonsil. 846,111 were due to tonsillitis as shown in figure 1 b) and 153,243 due to peritonsillar abscess as shown in figure 1 c).

There was a significant increase in the rates of tonsillitis admission pre 2005 SIGN update for both England ($p < 0.01$, $t = 6.855$) and New Zealand ($p < 0.05$, $t = 4.02$). There was no significant change for Wales ($p = 0.352$) and Australia ($p = 0.536$). The rates of tonsillitis were significantly greater in Wales than all 3 other countries during this time period ($p < 0.01$).

Post 2005 SIGN117 all four countries showed an increase in tonsillitis rates ($p < 0.05$). However, a comparison of the rates between countries using multiple ANOVA showed that the rate of tonsillitis was now greater in England and Wales when compared to Australia and New Zealand ($p < 0.01$).

There was no significant change in Peritonsillar abscess admissions in all four countries both between 2000-2005 as well as 2005-2013. A comparison of the relative rates of peritonsillar abscess between countries showed that Wales rates were significantly greater pre 2005 ($p < 0.05$) as well as post 2005 ($p < 0.05$) when compared to the other three countries.

The average bed day utilisation for tonsillectomy in England and Wales was 0.45. With a total of 615,185 bed days used for tonsillectomy over the 13 year period as

shown in figure 2 a. During this time bed day numbers in England dropped substantially from 52,229 in 2000 to 28,474 in 2012. Linear regression analysis showed this reduction was significant ($p < 0.01$, $t = -11.4$). Wales showed a similar trend with a significant reduction in bed days ($p < 0.01$, $t = -1.53$). Conversely bed day utilisation for tonsillitis in England increased from 29880 in 2000 to 48,494 in 2012 (figure 2 a). Linear regression analysis between 2000 and 2013 showed that this was significant for England ($p < 0.01$, $t = 5.129$) and Wales ($p < 0.01$, $t = 4.43$).

Linear forecasting estimating bed day use for tonsillitis in 2020 predicted that there would be a 175% increase in England and 80% increase in Wales when compared to 2000 levels. Forecasting of bed day usage for tonsillectomy in 2020 predicted that there will be a 96% reduction in England and 60% reduction in Wales.

The ratio in 2000 of tonsillectomy/ tonsillitis bed usage was 1.73. However in 2012 the ratio had reversed to 0.58. Indicating that greater numbers of bed days are now used by tonsillitis when compared by tonsillectomy.

Using linear forecasting, estimates of the rates of tonsillectomy and tonsillitis were made in 2020 for each country. It was found that there will be a predicted 21% decrease in tonsillectomy rate in England and 45% decrease in Wales. Predicted rates for 2020 in Australia increased by 89% and in New Zealand by 35%.

Linear forecasts of the rates of tonsillitis in 2020 showed large increases in England and Wales (393%, 238%). Increases were also predicted in Australia and New Zealand (52%, 76%).

Discussion

In 1999 the Scottish intercollegiate guidelines network (SIGN) first published

guidelines for the management of sore throats/ recurrent acute tonsillitis that were designed to be an aid to both GPs as well as Otolaryngologists in providing effective health care. These guidelines gave specific criteria in the management of acute infective tonsillitis with guidance for referral and nationally recognised indications for performing tonsillectomies²⁰⁻²¹. Following a consultation document in 2005 these SIGN guidelines were updated in April 2010¹³ bringing them in line with AAOHNS guidelines. Current specific recommendations for consideration of tonsillectomy due to tonsillitis are seen in Table 1. This study assessed trends in tonsillectomy rates and hospital admissions for tonsillitis and peritonsillar abscess following the introduction of SIGN 117 in the UK. Trend analysis was also performed in Australia and New Zealand, as national controls.

Since the 2005 update of SIGN guidelines, tonsillectomy rates reduced significantly in England and Wales with an inverse increasing rate of hospital admission for the consequences of acute tonsil infection. These changes were not seen in the Australian or New Zealand national cohort where a gradual increase in admission trend for tonsillitis has been recognised.

Within the confines of this study it is not possible to directly link the reduction in tonsillectomies in England and Wales to the introduction of SIGN 117 guidelines, however it appears that over this time period a significant reduction in tonsillectomy rates did occur with a reciprocal increase in hospital admission for complications related to untreated tonsillitis. In Australia where SIGN 117 was not introduced, tonsillectomy rate increased significantly there was little change in hospital admissions for tonsillitis. The results suggest there is, to a degree, an inverse relationship between hospital admission for tonsillitis and tonsillectomy rates; with

this theory being supported by the findings in the Australian and New Zealand national cohorts. Similar findings have previously been identified by Lau et al (2014)²² who deduced that the introduction of PoLCE from 2005 may have had a significant negative impact on tonsillectomy rates but rising numbers of sore throat related admissions may have negated any savings from tonsillectomy. It must be recognised that correlation does not imply causation and that other factors may have had an unknown influence on our findings such as differences in coding accuracy over time within the same country as well as differences between countries.

Over the same time period there was a significant change in bed day utilisation for both tonsillectomy and admission for acute tonsillitis and quinsy. Over the 13 year period, both England and Wales showed a significant reduction in bed day utilisation for tonsillectomy whereas, the utilisation for tonsillitis increased in both countries. This may be a cause and effect principle with reduced rates of tonsillectomies increasing the threshold at which the procedure was being offered to patients, leading to more hospital admissions with tonsillitis and quinsy.

A confounding factor that must be considered is that over the same period of time there has been increased usage of same day discharge of tonsillectomy patients which may account of the decrease. However, this does not explain the large increase in bed utilisation in those with tonsillitis or quinsy. This trend may be a sign of an increasing overall societal burden which would greatly underestimate school and working days lost and warrants further future study.

Linear forecasting of bed day usage predicting levels in 2020 showed that there will be significant reductions in bed day use for tonsillectomy (96% reduction in England and 61% in Wales when compared to 2000 levels) and large increases in bed day use

for tonsillitis (175% increase in use when compared to 2000 levels in England and 80% increase in Wales). Although significant savings can be made by reducing tonsillectomy rates this study suggests that this is being offset by increasing admissions with tonsillitis.

Conclusion

National guidelines have many benefits including clarity of referral as well as providing a baseline for when to perform an intervention. This study has highlighted that the introduction of the SIGN sore throat guidelines may have the previously unforeseen side effect of increased presentations with tonsillitis. This is further demonstrated by the fact that although bed day utilisation has decreased for tonsillectomy in England and Wales, the utilisation for tonsillitis has increased. A potentially unrecognised financial impact of this could manifest in the form of increased GP attendances in the health care services that adopt such guidelines. There may also be a wider social impact in the form of patients taking time off for sick leave. Further research is needed to investigate if there is a definite causal link between the introduction of the SIGN guidelines and the reduction in tonsillectomy rates and increased admission for tonsillitis/quinsy.

References

1. Ericsson, E., T. Ledin, and E. Hultcrantz, *Long-term improvement of quality of life as a result of tonsillectomy (with radiofrequency technique) and tonsillectomy in youths*. *Laryngoscope*, 2007. **117**(7): p. 1272-9.
2. Powell, H.R., et al., *Improved quality of life in adults undergoing*

tonsillectomy for recurrent tonsillitis. Is adult tonsillectomy really a low priority treatment? Eur Arch Otorhinolaryngol, 2012.

3. Goldstein, N.A., et al., *Quality of life after tonsillectomy in children with recurrent tonsillitis*. Otolaryngol Head Neck Surg, 2008. **138**(1 Suppl): p. S9-S16.
4. Fox, R., et al., *Does tonsillectomy lead to improved outcomes over and above the effect of time? A longitudinal study*. J Laryngol Otol, 2008. **122**(11): p. 1197-200.
5. Paradise, J. L. *et al.* Tonsillectomy and Adenotonsillectomy for Recurrent Throat Infection in Moderately Affected Children. *Pediatrics* **110**, 7–15 (2002).
6. McKinsey. *Achieving World Class Productivity in the NHS 2009/10 – 2013/14: Detailing the Size of the Opportunity*. Department of Health (2009).
7. Buskens, E., et al. (2007). "Adenotonsillectomy or watchful waiting in patients with mild to moderate symptoms of throat infections or adenotonsillar hypertrophy: a randomized comparison of costs and effects." Arch Otolaryngol Head Neck Surg **133**(11): 1083-1088.
8. Silva, S., et al., *Tonsillectomy under threat: auditing the indications for performing tonsillectomy*. J Laryngol Otol. **126**(6): p. 609-11.
9. Lawson, H. NHS should take out more tonsils to avoid repeat cases of sore throats, say doctors. *Daily Mail Online* (2013). at <http://www.dailymail.co.uk/health/article-2303215/NHS-tonsils-avoid->

repeat-cases-sore-throats-say-doctors.html>

10. Al-Hussaini A., Owens D. & Tomkinson A. (2013) Health costs and consequences: Have UK national guidelines had any effect on tonsillectomy rates and hospital admissions for tonsillitis? *Eur. Arch. Oto-Rhino-Laryngology* **270**, 1959–1965.
11. Ross E., Trotter M.I. (2015) Analysis of procedures of limited clinical value in ENT surgery. *The Bulletin of the Royal College of Surgeons of England* 97:8, e29-e33
12. Fujihara K., Koltai P.J., Hayashi M., et al. (2006) Cost-effectiveness of Tonsillectomy for Recurrent Acute Tonsillitis. *Ann. Otol. Rhinol. Laryngol.* **115**, 365-369.
13. Lowe, G. and S. Twaddle, *The Scottish Intercollegiate Guidelines Network (SIGN): an update*. *Scott Med J*, 2005. **50**(2): p. 51-2.
14. *Patient Episode Database for Wales (PEDW) primary diagnosis (4 character detail)*. [1 June 2014]; Available from:
<http://www.infoandstats.wales.nhs.uk/page.cfm?orgid=869&pid=41010&subjectlist=Main?Operation=?%284?character?detail%29&patientcoverlist=0&period=0&keyword=&action=Search>.
15. *Hospital Episode Statistics online Primary diagnosis: 4 character*. [1 June 2014]; Available from:
<http://www.hesonline.nhs.uk/Ease/servlet/ContentServer?siteID=1937&categoryID=214>.

16. *Australian Institute and Health and Welfare database (AIHW) Primary diagnosis.* [1 June 2014]; Available from: <http://www.aihw.gov.au/principal-diagnosis-data-cubes/>.
17. *Office for National Statistics (2010) Population estimates for UK, England and Wales, Scotland and Northern Ireland.* [1 June 2014]; Available from: <http://www.ons.gov.uk/ons/publications/all-releases.html?definition=tcm:77-22371>.
18. *Australian Bureau of statistics: Population by Age and Sex Tables.* [1 June 2012]; Available from: <http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/3101.0Dec%202011?OpenDocument>.
19. *Statistics New Zealand* [1 June 2013]; Available from: <http://www.stats.govt.nz/>.
20. Clement, W.A. and J.H. Dempster, *Implementation by Scottish otolaryngologists of the Scottish Intercollegiate Guidelines Network document Management of Sore Throats and the Indications for Tonsillectomy: four years on.* *J Laryngol Otol*, 2004. **118**(5): p. 357-61.
21. Harbour, R., G. Lowe, and S. Twaddle, *Scottish Intercollegiate Guidelines Network: the first 15 years (1993-2008).* *J R Coll Physicians Edinb.* **41**(2): p. 163-8.
22. Lau A.S., Upile N.S., Wilkie M.D., et al. (2014) The rising rate of admissions for tonsillitis and neck space abscesses in England, 1991-2011. *Ann. R. Coll. Surg. Engl.* **96**, 307-310

Tables

Table.1 Tonsillectomy considerations due to tonsillitis

Recurrent severe sore throat in adults.
Episodes of sore throat are disabling and prevent normal functioning
Seven or more well documented, clinically significant, adequately treated sore throats in the preceding year.
Five or more such episodes in each of the preceding two years
Three or more such episodes in each of the preceding three years.