

## **Post-operative management following endoscopic sinus surgery in the UK: a survey of The British Rhinological Society**

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Otolaryngologists; Postoperative Care; Analgesia; Nasal Lavage; Adrenal Cortex Hormones;

Surveys and Questionnaires

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**Ethical Statement:** The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013) and approved by The British Rhinological Society. Respondents were assigned an anonymous user ID on completion of the survey.

**Authorship statement:** PA, SL, RS and NT designed the work; PA, SL, RS, NT and LH acquired and analysed data; PA, SL, RS, NT and LH drafted, revised and approved the manuscript; LH takes responsibility for the integrity of the content of the paper.

## **Abstract**

### **Objective**

The primary objective of our study was to survey ENT Surgeons who perform Endoscopic Sinus Surgery (ESS) in the United Kingdom regarding their post-sinus surgery practices.

### **Method**

A 28-item questionnaire on post-ESS practices was electronically distributed to ENT UK members specialised in rhinology.

### **Results**

90% (n=90) of surgeons prescribe saline nasal irrigation post-ESS but administration timings and methods vary. Following ESS, 17.7% (n=17) of respondents routinely prescribe antibiotics, whilst about a quarter (26.0%, n=25) do not prescribe antibiotics at all. The rest of the respondents only prescribe antibiotics in specific cases. 34.7% (n=33) of respondents do not prescribe oral steroids whilst most clinicians (83.9%, n=78) prescribe intranasal corticosteroids (INCS) post-operatively.

### **Conclusion**

Our study highlights homogeneous, evidence-based, practices post-ESS from UK-based specialists, specifically in the use of saline irrigation and INCS. However, regarding oral antibiotics, oral steroids, and other specific aspects of postoperative care our cohort displayed significant heterogeneity.

**Keywords:** Nasal Polyps; Rhinosinusitis; Anti-Bacterial Agents; Debridement;

Otolaryngologists; Postoperative Care; Analgesia; Nasal Lavage; Adrenal Cortex Hormones; Surveys and Questionnaires

## Introduction

With a prevalence of 11% in Europe, chronic rhinosinusitis (CRS) is dubbed the "silent epidemic" due to its insidious nature <sup>1</sup>. The initial management of CRS includes lifestyle modifications, followed by interventions such as intranasal saline and steroids, and oral steroids. When medical treatments prove ineffective, Endoscopic Sinus Surgery (ESS) is used to relieve the obstruction of the common drainage pathways and restore sinus ventilation <sup>2</sup>.

Following ESS, various post-operative management strategies are advised to optimise CRS symptom resolution and prevent disease recurrence. This includes saline irrigation and intranasal corticosteroids (INCS), which boast substantial evidence supporting their effectiveness in the post-operative period <sup>3</sup>. Conversely, specific post-operative measures, including oral corticosteroids, oral antibiotics, and nasal packing, lack comprehensive evidence to substantiate their widespread use and are considered as options only in recent guidelines <sup>2</sup>. The paucity of data available in the literature concerning these post-operative measures has given rise to considerable variability in clinical practice among specialists, a phenomenon highlighted by Helman et al. in their 2019 survey of American rhinologists <sup>4</sup>.

The primary objective of our study was to survey ENT surgeons who perform ESS in the United Kingdom regarding their post-sinus surgery practices. We aim to compare these practices with existing evidence-based recommendations to shed light on the alignment of clinical practice in the UK with established best practices.

## Materials and methods

A 28-item questionnaire was developed using SurveyMonkey (San Mateo, CA). The questionnaire was trialled by three otolaryngologists for readability and appropriateness of content. This survey was electronically distributed to ENT UK members specialised in rhinology. Data was collected between September 2022 and April 2023 and respondents were assigned an anonymous user ID. Demographic characteristics of the respondents included level of seniority (Consultant, post-CCT fellow, Registrar ST6-8 or ST3-5), completion of a rhinology fellowship and membership to ENT UK or the British Rhinological Society (BRS). Practice volume was assessed by the number of ESS cases performed per month excluding sinonasal oncology and skull base surgery.

The survey explored post-ESS practices including the use of saline irrigation, antibiotics, oral and intranasal steroids, nasal packing, analgesia, debridement of nasal crusts and clots, and follow up timings.

Results were entered and analysed with Microsoft Excel 2016 (Microsoft Corp, Redmond, WA). Percentage response rates were calculated for each item based on the number of respondents for that specific item.

## **Results**

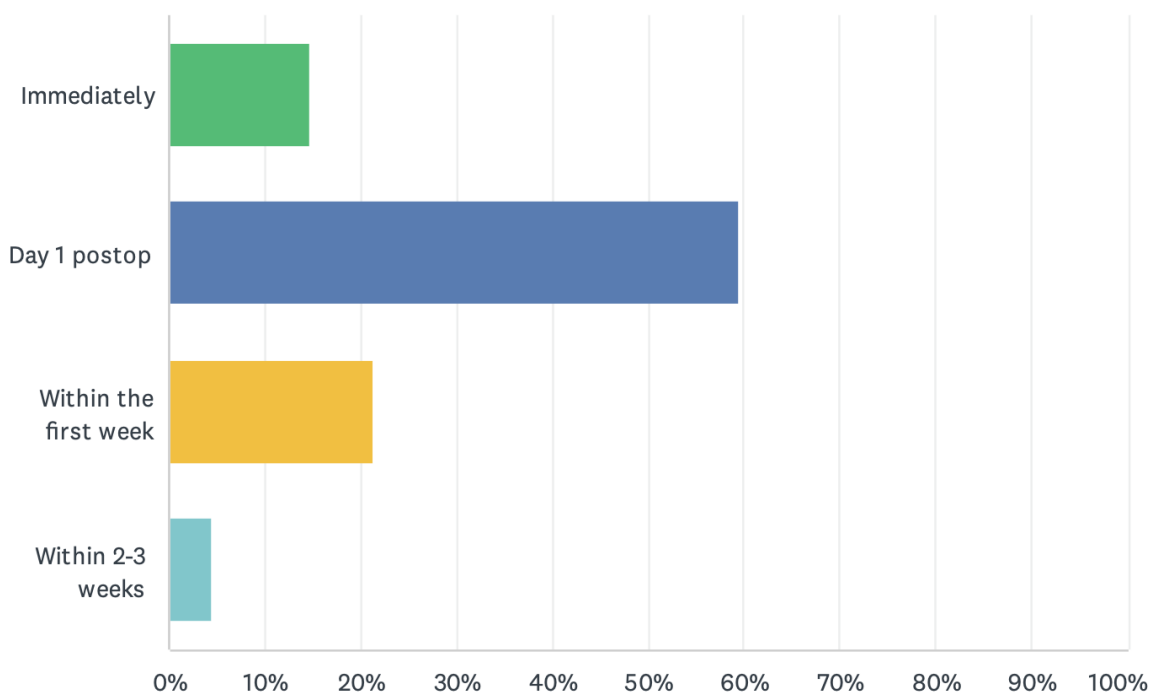
The survey was distributed to 486 members of the British Rhinological Society and completed by 100 surgeons (response rate 20.6%) during the 8 months collection period. The response rate per question varied between 100% (n=100) to 43% (n=43) of survey respondents.

Most respondents were Consultants (84.7%, n=72) while the remaining were post-CCT Fellows (3.5%, n=3), and Registrars (ST3-5 2.5%, n=2, ST6-8 9.41%, n=8). 38 clinicians (38%) had undertaken fellowship training in rhinology.

64 (64%) surgeons performed five or more ESS procedures per month while 26 (26%) reported doing 2-4 cases a month and 10 (10%) doing one case a month.

### Saline nasal irrigation

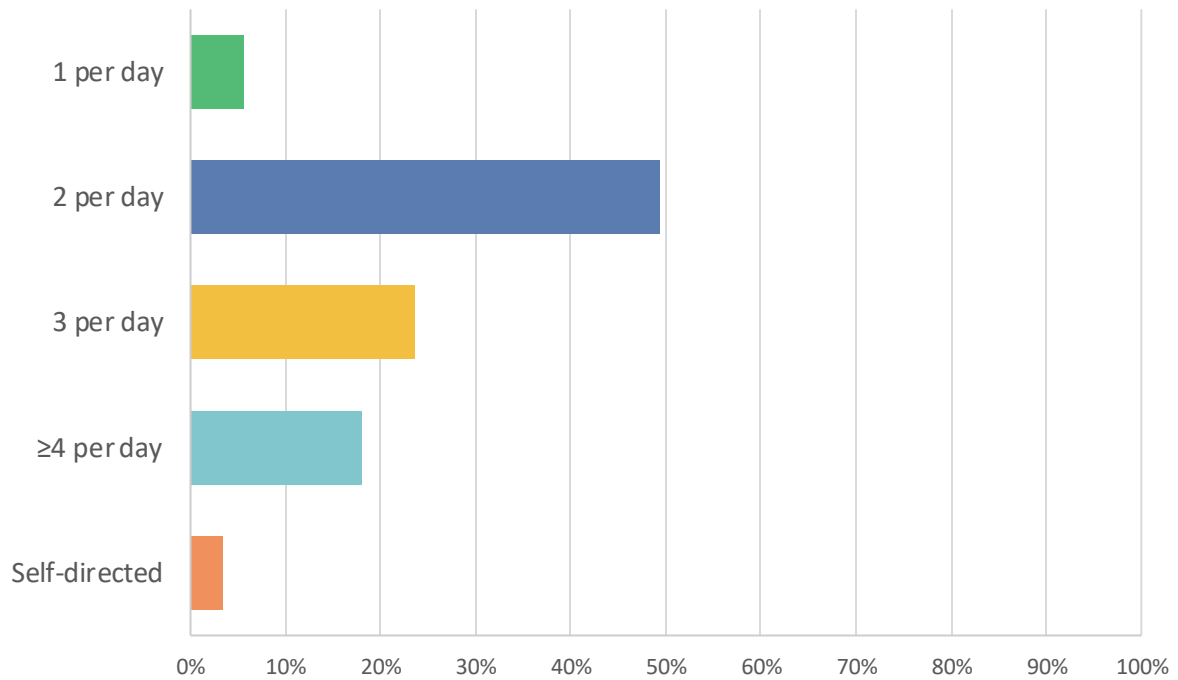
90% (n=90) of surgeons prescribe saline nasal irrigation post-ESS. Around three quarters (74.2%, n=66) of prescribers start saline nasal irrigation within 24 hours of ESS, while 21.4% (n=19) of them start it during the first week, and a minority (4.5%, n=4) initiate it within two to three weeks post-operatively (**Figure 1**).



**Figure 1:** Prescribing timings for postoperative saline nasal irrigation. Total respondents n=89.

79.8% (n=71) of respondents prescribe high-volume, low-pressure saline irrigation and 28.1% (n=25) prescribe low-volume, low-pressure saline irrigation. 7 respondents (7.9%) prescribe both. None of the respondents described using pulsating devices such as Neilmed (Santa Rosa, CA) Sinugator. Pre-prepared sachets such as Neilmed Sinus Rinse are the most popular form of nasal irrigation (65.1%, n=58), followed by patient-prepared solutions (e.g. cooking salt/bicarbonate) (49.4%, n=44) and pre-prepared syringes with saline vials (5.6%, n=5).

**Figure 2** shows that about half (49.4%, n=44) of surgeons advise their patients to use saline nasal irrigation or spray twice a day, whilst 23.6% (n=21) recommend it three times a day and 18.0% (n=16) at least four times a day respectively. Only 5.6% (n=5) of prescribers recommend once a day saline irrigation or spray and 3.4% (n=3) of them do not advise patients on a specific frequency.

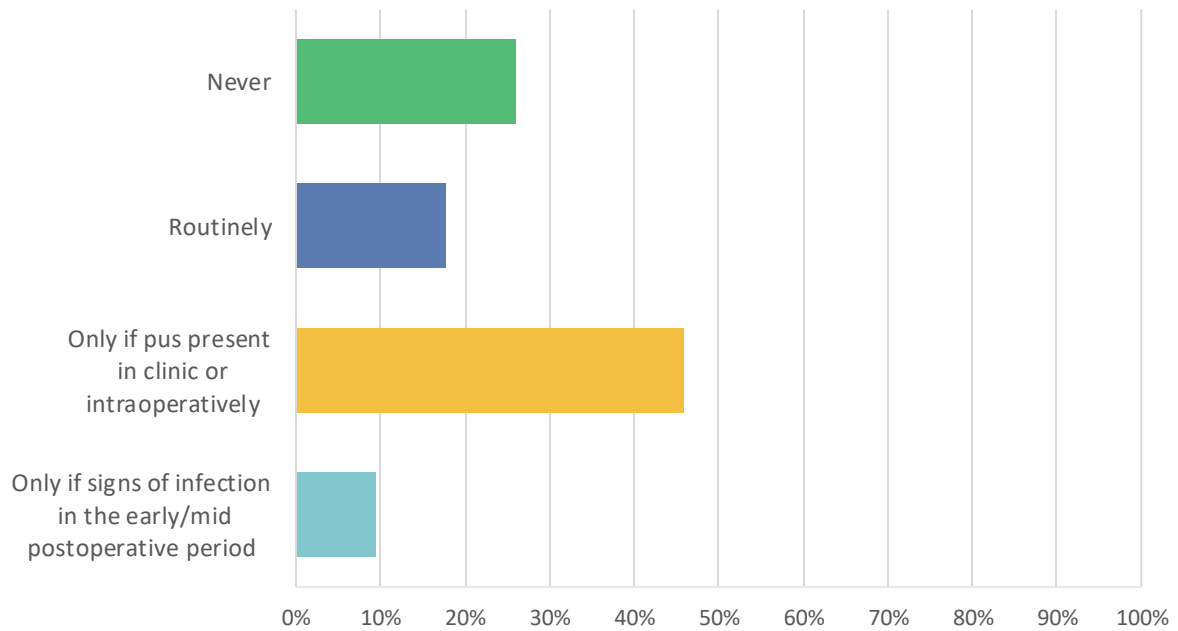


**Figure 2:** Frequency of nasal saline irrigation/spray. Total respondents n=89.

### Antibiotics

Following ESS, 17.7% (n=17) of respondents routinely prescribe antibiotics, whilst about a quarter (26.0%, n=25) do not prescribe any. Other respondents only prescribe antibiotics in specific cases such as the evidence of intraoperative mucopus or previous demonstration of pus in clinic (45.8%, n=44), or signs of infection in the early or mid-postoperative period (9.4%, n=9) (**Figure 3**). One respondent prescribes antibiotics when a non-absorbable spacer is inserted intraoperatively.





**Figure 3:** Antibiotics use in the immediate postoperative period. Total respondents n=95.

Broad spectrum antibiotics, such as penicillins or cephalosporins, are the most widely used (64.3%, n=45), with a smaller proportion of clinicians (35.7%, n=25) preferring macrolides. Six respondents use doxycycline (8.6%) and one respondent indicated using topical antibiotic.

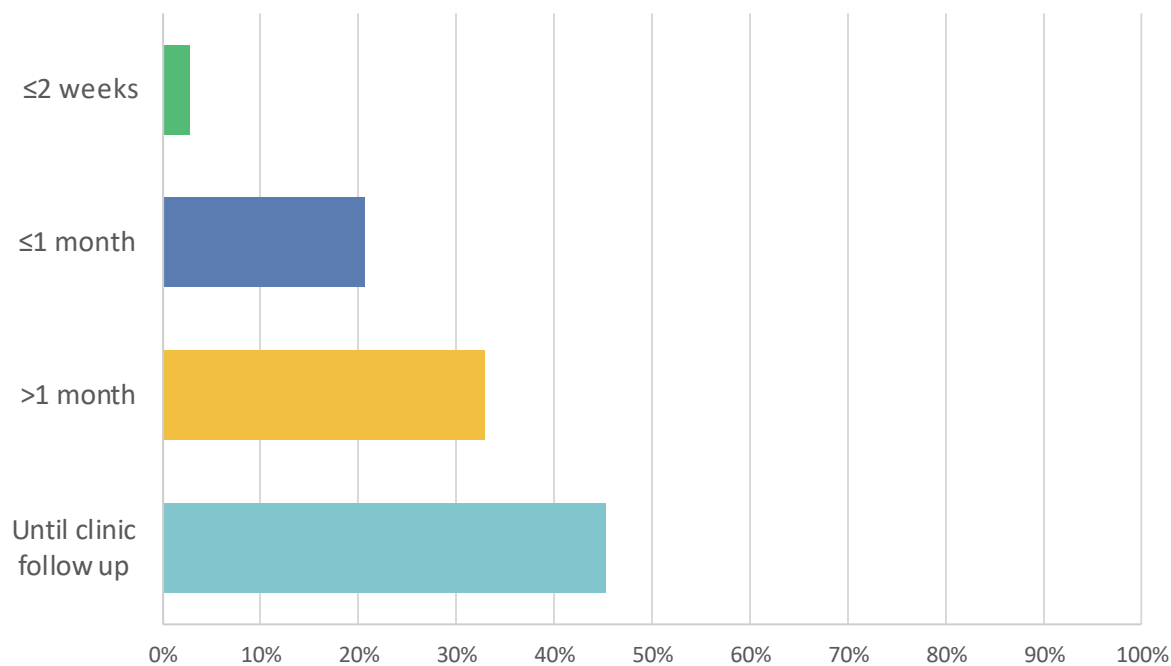
### **Steroid use**

34.7% (n=33) of respondents do not prescribe oral steroids post-operatively. In CRS patients with nasal polyps, 27.4% (n=26) of clinicians always prescribe oral steroids post-operatively, whilst 37.9% (n=36) only occasionally do. Conversely, in CRS patients without nasal polyps, only 5.3% (n=5) of respondents always prescribe oral steroids, whereas 12.6% (n=12) occasionally do.

Most clinicians (83.9%, n=78) prescribe INCS in the postoperative period. Prescription timings vary with 56.0% (n=42) of clinicians starting INCS within 24hrs of the operation, 17.3% (n=13) within the first week and 22.7% (n=17) delaying it by two or three weeks post-operatively. Two respondents (2.7%) start INCS following completion of an oral steroid course and one respondent only starts this treatment following the first follow up appointment if polyps are present.

46.7% (n=35) of respondents use intranasal spray (e.g. fluticasone), 57.3% (n=43) apply intranasal drops (e.g. flixonase nasules) and 20.6% (n=15) utilise intranasal steroid irrigation (e.g. budesonide diluted in a saline douche).

About half of clinicians (45.2%, n=33) do not set a course length for INCS and these are given until follow up at least. 32.9% (n=24) of clinicians prescribe INCS for more than a month whilst 20.6% (n=15) and 2.7% (n=2) prescribe it for up to a month and up to two weeks respectively **(Figure 4)**.



**Figure 4:** INCS course length post-ESS. Total respondents n=73.

### **Analgesia**

Paracetamol is the most widely used analgesic with 98.6% (n=71) of clinicians using it post-operatively. About half of clinicians (55.6%, n=40) routinely use non-steroidal anti-inflammatories and a smaller proportion of prescribers routinely use opioids post-operatively (22.2%, n=16). Amongst respondents prescribing oral opioids, codeine is the most popular preparation post-operatively (61.5%, n=16) and fewer clinicians use dihydrocodeine (26.9%, n=7) or oral morphine (11.5%, n=3). Oral opiates prescribing courses range from 2 days to 28 days with a mean of 7.0 days.

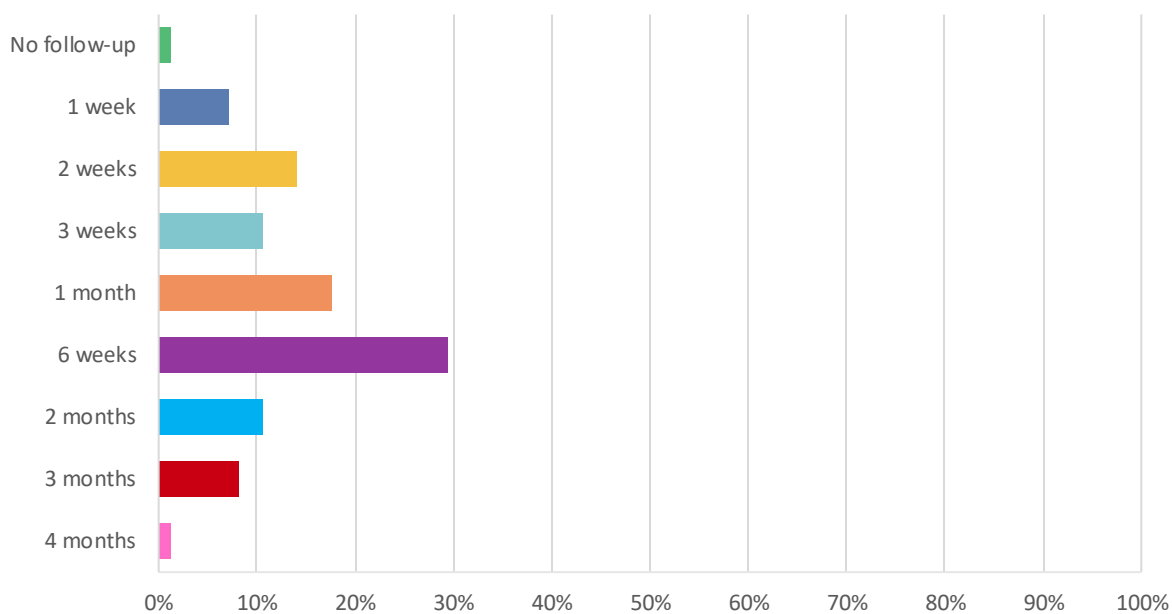
### **Nasal packing, spacers and post-operative debridement**

A large proportion (72.9%, n=62) of respondents indicated routinely (defined as >50% of the time) using nasal packing post-ESS, with dissolvable packs, such as Nasopore (Stryker,

Kalamazoo MI), being more popular (64.7%, n=55) than removable packs, such as Merocele (Medtronic, Minneapolis MN) (8.2%, n=7). Around a quarter of respondents (27.1%, n=23) do not routinely use any form of nasal packing post-ESS.

Most respondents (90.6%, n=77) do not regularly (>50% of the time) use stents or spacers in the frontal recess or middle meatus after routine ESS. However, respondents who routinely use these devices favour inert stents such as silastic (8.2%, n=7) rather than drug eluting stents such as Propel (Medtronic, Minneapolis MN) (1.2%, n=1).

**Figure 5** highlights follow up timing practices which are highly variable from no follow-up, to review at 4 months post-operatively with the most common timings being 1 month (17.6%, n=15) and 6 weeks (29.4%, n=25). 40.0% (n=34) of respondents usually perform in-office debridement of nasal crusts and clots post-operatively. 20 (71.4%) respondents undertake debridement only once post-operatively, three respondents twice (10.7%), one respondent 3 times (3.6%) and four respondents doing it as needed (14.3%).



**Figure 5:** follow up timings post-ESS. Total respondents n=85.

## Discussion

This is the first study to report the post-ESS management practices amongst UK based ENT surgeons. Our findings suggest heterogeneity in the volume of sinus surgery performed with 36 clinicians completing fewer than five cases per month, including four respondents being registrars, twenty-five being consultants/post-CCT and the rest not indicating their grade. The heterogeneity in ESS volumes between clinicians may highlight the differences between specialists in tertiary centres and generalists in secondary centres.

Most clinicians use post-operative saline irrigation as recommended by the International Consensus Statement on Allergy and Rhinology (ICAR) rhinosinusitis 2021 <sup>2</sup>. ICAR 2016 recommended that saline irrigation be started 24 hours to 48 hours after ESS <sup>5</sup>. A proportion of our respondents do not follow these recommendations with 14.6% of them starting nasal irrigation immediately and 4.5% starting it within 2-3 weeks. 21.4% of respondents indicate that they start nasal saline irrigation within the first week, but this could fit the recommended

48hrs window or include delayed treatment initiation. Our findings contrast with a more recent survey by the American Rhinologic Society which showed significantly lower rates of saline irrigation use post-operatively <sup>4</sup>.

A large proportion of our respondents indicated using high-volume, low-pressure irrigation devices rather than low volume, low pressure devices. Although high-volume, low-pressure saline irrigation is strongly recommended in the medical management of Chronic Rhinosinusitis, ICAR 2021 guidelines have not specifically recommended this method of irrigation over any other methods post-ESS. Importantly, no respondents indicated using high-pressure devices which are currently supported by very limited evidence <sup>6-8</sup>. Lastly, our survey shows heterogeneity in the frequency of nasal irrigation ranging from once a day to as often as the patient wants, which illustrates the lack of consensus in the literature.

ICAR 2021 <sup>2</sup> suggest that antibiotics should not be routinely prescribed but are an option post-operatively, which around half of our respondents adhere to by considering antibiotics only in specific circumstances. These numbers significantly contrast with American rhinologists surveyed in 2012 and 2019, where 79.6% and 76.9% routinely prescribed antibiotics in the immediate postoperative period <sup>4, 9</sup>. Similarly, Australian rhinologists surveyed in 2019 showed higher rates of postoperative antibiotic prescription than our cohort, with 68% of them routinely using antimicrobials in patients who have had packing intraoperatively and 47.3% of them prescribing antimicrobials in patients without packing <sup>10</sup>. Our survey may illustrate a better adherence to judicious antibiotic prescribing in line with antibiotic stewardship.

Our respondents indicated a preference for broad spectrum antibiotics prescription over macrolides in the post-operative period. Randomized controlled trials have shown that both broad spectrum antibiotics <sup>11</sup> and macrolides <sup>12, 13</sup> tend to improve symptom and endoscopic scores in the ESS perioperative period, but with no statistical or clinical significance. Six respondents use doxycycline, which is an antibiotic that has not been specifically in the ESS perioperative period. Overall, these results highlight the lack of consensus in the literature on the optimal agent and course length to be used <sup>14</sup>.

Despite ICAR 2021 guidelines <sup>2</sup>, and the 2016 NICE Commissioning Guide <sup>15</sup> for Chronic Rhinosinusitis strongly recommending the use of INCS post-ESS, 16.1% of respondents do not use INCS post-operatively. Our survey did not explore the reasons behind this, but it would be interesting to understand why some respondents have not adopted INCS as part of their routine post-operative care. There is however, no national or international recommendation on when treatment should be started post-operatively, and what preparation and course duration should be used. This lack of consensus is demonstrated by significant discrepancies in treatment initiation timings, types of INCS preparation and course lengths.

Around a third of our respondent never prescribe systemic corticosteroids post-operatively which is a significantly higher proportion than American surgeons surveyed by Portela et al. (7.9%) <sup>9</sup> and Helamn et al. (22.1%) <sup>4</sup>. In terms of oral corticosteroids prescriptions, our survey showed a wide range of practises with doses fluctuating between 20mg and 60mg of Prednisolone, duration of treatments ranging from single doses to 1-month treatments and preparations also including prednisone and methylprednisolone. The lack of robust studies

on oral corticosteroids post-ESS currently prevents standardised, evidence-based practises in this area of ESS postoperative care.

Our respondents almost unanimously prescribe paracetamol post-operatively which is a safe and efficacious analgesic post-ESS <sup>16, 17</sup> and is the first line analgesic recommended by ICAR 2021 <sup>2</sup>. About half of the respondents also use NSAIDs, an excellent choice of analgesic which, when used in combination with paracetamol, significantly reduces the need for opioids post-ESS <sup>18</sup>. The oral opioid course average of 7.0 days amongst our respondents could likely be shortened as the literature suggests that patients usually require only a few doses following rhinological surgery <sup>19, 20</sup>.

Almost three-quarter of respondents indicated routinely using nasal packing which is recommended as an option by ICAR 2021 <sup>2</sup>. Although packing is not essential for intraoperative haemostasis and does not reduce the risk of postoperative epistaxis, there is some evidence, albeit limited, that packing reduces adhesion formation <sup>2</sup>. Amongst our respondents, dissolvable packs are significantly more popular than removable packs. The evidence favours dissolvable packs rather than non-dissolvable packs in terms of patient comfort <sup>21, 22</sup>, but this advantage is not translated to better mucosal healing and surgical outcomes <sup>23, 24</sup>. Only one respondent routinely uses drug eluting stent such as Propel despite ICAR 2021 highlighting that corticosteroid-eluting stents can be considered in the postoperative period <sup>2</sup>. The cost, limited evidence and guarded ICAR 2021 statements on the topic likely explain the negligible use of corticosteroid-eluting stents in our cohort.



Follow-up timings are heterogeneous between our respondents which fits the NICE commissioning guide for CRS recommending post-op reviews “tailored to the individual patient needs in terms of duration and frequency ”<sup>15</sup>. However, our questionnaire does not discriminate between different CRS subtypes and is therefore unable to identify the follow-up timings for specific patients’ cohort. Only 40% of respondents routinely perform postoperative debridement following ESS despite ICAR 2021 making a recommendation for this practice<sup>2</sup>. A Cochrane review highlighted that there is little evidence to suggest that debridement improves disease severity or quality of life but there is low-quality evidence suggesting that this practice is associated with a lower risk of adhesions at three months follow-up<sup>25</sup>. These mixed findings, coupled with potential limitations of access to early follow-up appointments, may explain the poor rate of routine in-office debridement in our cohort.

There are several limitations to our study including heterogeneous response rates between questions which range between 66% to 100% of respondents. Helman et al.<sup>4</sup> in their survey of American rhinologists highlighted significant differences in management strategies between the different CRS subtypes. Similarly, Ahmadzada et al. found significant differences in antibiotic prescription rates whether patients had packing intraoperatively or not<sup>10</sup>. Apart for the use of oral steroids, our survey does not discriminate between CRS subtypes, intraoperative management, or surgical indications.

## Summary

- Certain aspects of postoperative care following endoscopic sinus surgery (ESS), such as intranasal saline irrigation, are backed by strong evidence, whilst there is a paucity of data available in the literature regarding other measures, such as postoperative antibiotics for example.
- Studies in the USA and Australia/New Zealand have shown that there is considerable variability in clinical practice among specialists.
- This study surveyed 100 UK specialists regarding their postoperative care practices following ESS.
- Results showed homogeneous, evidence-based, practices post-ESS from UK-based specialists, specifically in the use of saline irrigation and intranasal corticosteroids.
- However, there was significant variability in clinical practice regarding oral antibiotics, oral steroids, and more specific aspects of postoperative care such as formulation of drugs, doses, and frequencies.
- This paper highlights that high-quality evidence, is needed to provide more standardised care and inform the most effective post-ESS management.

## Conclusion

Our study highlights homogeneous, evidence-based, practices post-ESS from UK-based specialists, specifically in the use of saline irrigation and INCS. However, regarding oral antibiotics, oral steroids, and more specific aspects of postoperative care such as formulation of drugs, doses, and frequencies, our cohort displayed significant heterogeneity. In some cases, this heterogeneity may originate from a lack of education on the most up-to-date practices but in many areas of post-ESS care, there is a clear lack of high-quality evidence.

High-quality evidence, in the form of robust RCTs, is essential to inform the most effective post-ESS management and prevent recurrence of CRS, a disease that currently has a significant burden on patients and the healthcare system.

## References

- 1 Hastan D, Fokkens WJ, Bachert C, Newson RB, Bislimovska J, Bockelbrink A, et al. Chronic rhinosinusitis in Europe--an underestimated disease. A GA<sup>2</sup>LEN study. *Allergy* 2011;**66**:1216-23
- 2 Orlandi RR, Kingdom TT, Smith TL, Bleier B, DeConde A, Luong AU, et al. International consensus statement on allergy and rhinology: rhinosinusitis 2021. *Int Forum Allergy Rhinol* 2021;**11**:213-739
- 3 Senior BA, Kennedy DW, Tanabodee J, Kroger H, Hassab M, Lanza D. Long-term Results of Functional Endoscopic Sinus Surgery. *The Laryngoscope* 1998;**108**:151-7
- 4 Helman SN, Laitman BM, Gray M, Deutsch B, Setzen M, Govindaraj S, et al. Post-operative treatment patterns after functional endoscopic sinus surgery: A survey of the American Rhinologic Society. *Am J Otolaryngol* 2019;**40**:656-61
- 5 Orlandi RR, Kingdom TT, Hwang PH, Smith TL, Alt JA, Baroody FM, et al. International Consensus Statement on Allergy and Rhinology: Rhinosinusitis. *International Forum of Allergy & Rhinology* 2016;**6**:S22-S209
- 6 Chen PG, Murphy J, Alloju LM, Boase S, Wormald P-J. Sinus Penetration of a Pulsating Device Versus the Classic Squeeze Bottle in Cadavers Undergoing Sinus Surgery. *Annals of Otolaryngology & Laryngology* 2017;**126**:9-13
- 7 Shrestha K, Wong E, Salati H, Fletcher DF, Singh N, Inthavong K. Liquid volume and squeeze force effects on nasal irrigation using Volume of Fluid modelling. *Experimental and Computational Multiphase Flow* 2022;**4**:445-64
- 8 Lee K-I, Kim J-Y, Son S, Kim SH, Kim MH, Nam E, et al. A Novel Powered Nasal Irrigation After Endoscopic Sinus Surgery in Patients With Chronic Rhinosinusitis: A Preliminary Study. *kjorl* 2022;**65**:93-100
- 9 Portela RA, Hootnick J, McGinn J. Perioperative care in functional endoscopic sinus surgery: a survey study. *International Forum of Allergy & Rhinology* 2012;**2**:27-33
- 10 Ahmadzada S, Wong EH, Naidoo Y. Antibiotic prescribing practices in otolaryngology head and neck surgery in Australia and New Zealand: a survey of 137 specialists. *Australian Journal of Otolaryngology* 2019;**2**
- 11 Saleh AM, Torres KM, Murad MH, Erwin PJ, Driscoll CLW. Prophylactic Perioperative Antibiotic Use in Endoscopic Sinus Surgery. *Otolaryngology--Head and Neck Surgery* 2012;**146**:533-8
- 12 Amali A, Saedi B, Rahavi-Ezabadi S, Ghazavi H, Hassanpoor N. Long-term Postoperative Azithromycin in Patients with Chronic Rhinosinusitis: A Randomized Clinical Trial. *American Journal of Rhinology & Allergy* 2015;**29**:421-4
- 13 Haxel BR, Clemens M, Karaiskaki N, Dippold U, Ketterer L, Mann WJ. Controlled trial for long-term low-dose erythromycin after sinus surgery for chronic rhinosinusitis. *The Laryngoscope* 2015;**125**:1048-55
- 14 Swords CE, Wong JJ, Stevens KN, Psaltis AJ, Wormald PJ, Tan NC. The Use of Postoperative Antibiotics Following Endoscopic Sinus Surgery for Chronic Rhinosinusitis: A Systematic Review and Meta-analysis. *Am J Rhinol Allergy* 2021;**35**:700-12
- 15 Commissioning guide: Chronic Rhinosinusitis. In: [https://www.entuk.org/sites/default/files/files/Rhinosinusitis%20commissioning%20guide%20%20for%20REPUBLICAN\(1\).pdf](https://www.entuk.org/sites/default/files/files/Rhinosinusitis%20commissioning%20guide%20%20for%20REPUBLICAN(1).pdf) [13 Oct 2022]
- 16 Kemppainen T, Kokki H, Tuomilehto H, Seppä J, Nuutinen J. Acetaminophen is highly effective in pain treatment after endoscopic sinus surgery. *Laryngoscope* 2006;**116**:2125-8

- 17 Kempainen TP, Tuomilehto H, Kokki H, Seppä J, Nuutinen J. Pain treatment and recovery after endoscopic sinus surgery. *Laryngoscope* 2007;**117**:1434-8
- 18 Wu AW, Walgama ES, Genç E, Ting JY, Illing EA, Shipchandler TZ, et al. Multicenter study on the effect of nonsteroidal anti-inflammatory drugs on postoperative pain after endoscopic sinus and nasal surgery. *Int Forum Allergy Rhinol* 2020;**10**:489-95
- 19 Riley CA, Kim M, Sclafani AP, Kallush A, Kjaer K, Kacker AS, et al. Opioid analgesic use and patient-reported pain outcomes after rhinologic surgery. *International Forum of Allergy & Rhinology* 2019;**9**:339-44
- 20 Sethi RKV, Miller AL, Bartholomew RA, Lehmann AE, Bergmark RW, Sedaghat AR, et al. Opioid prescription patterns and use among patients undergoing endoscopic sinus surgery. *Laryngoscope* 2019;**129**:1046-52
- 21 Yan M, Zheng D, Li Y, Zheng Q, Chen J, Yang B. Biodegradable Nasal Packings for Endoscopic Sinonasal Surgery: A Systematic Review and Meta-Analysis. *PLOS ONE* 2014;**9**:e115458
- 22 Coey JG, Whittaker PJ, Williams G, Ikram UH, Page OJR. Fibrin tissue adhesive versus nasal packing in endoscopic nasal surgery: a systematic review and meta-analysis. *Rhinology* 2019;**57**:21-31
- 23 Verim A, Seneldir L, Naiboğlu B, Karaca Ç T, Külekçi S, Toros SZ, et al. Role of nasal packing in surgical outcome for chronic rhinosinusitis with polyposis. *Laryngoscope* 2014;**124**:1529-35
- 24 Shoman N, Gheriani H, Flamer D, Javer A. Prospective, double-blind, randomized trial evaluating patient satisfaction, bleeding, and wound healing using biodegradable synthetic polyurethane foam (NasoPore) as a middle meatal spacer in functional endoscopic sinus surgery. *J Otolaryngol Head Neck Surg* 2009;**38**:112-8
- 25 Tzelnick S, Alkan U, Leshno M, Hwang P, Soudry E. Sinonasal debridement versus no debridement for the postoperative care of patients undergoing endoscopic sinus surgery. *Cochrane Database of Systematic Reviews* 2018;**2018**