# Needs Analysis Survey Paper

## Journals:

* [Journal of Otolaryngology - Head & Neck Surgery](https://journalotohns.biomedcentral.com/)
* Otolaryngologic Clinics

## Abstract:

## Background:

* Why are we doing a needs analysis?

To identify, describe and rank the difficulties experienced during TEES and if developing new instruments to address these challenges would be beneficial to TEES.

* What do we want to learn from the needs analysis?

The difficulties that are most widely experienced by TEES surgeons and what difficulties do surgeons require new instruments for.

* What context does the reader need in order to understand this study?

TEES, endoscopes used

* Clinical implications, and say that this method is still contended because of…. The problems of TEES

Endoscopes provide direct access and a wide angle view into the middle ear, reducing the time required to gain access, drill bone for exposure and close during middle ear surgery and are able to visualize hidden recesses within the middle ear including: the sinus tympani, anterior and posterior epitympanum and hypotympanum [1] [2] [3] [4] . As well, the endoscope allows visualization past the shaft of the instrument, such as the drill, which is a problem during microscopic surgery [5].

Despite the enthusiasm of some otologists, endoscopic ear surgery has not as yet been accepted by all practicing otologists [6] [7].  The principal challenge with TEES is that a one-handed surgical technique is required as the endoscope is held in the other hand [6] [8]. During traditional surgery, the non-dominant hand usually maintains suction and removes blood from the operative field while the dominant hand performs the delicate maneuvers [8]. Otologic instruments were developed for two-handed microscope-guided surgery so they are not optimized for the TEES environment. As otologists have been trained and gained experience in microscope-guided ear surgery, they have developed techniques with the according instruments and have become accustomed to a two-handed surgical approach. By learning different surgical techniques and gaining experience with the endoscope, most surgeons find that they can complete more cases endoscopically [9] [6] [1] [8].

Technological advances in the design of the endoscope, camera and suction dissection instruments have lead to incremental stepwise jumps in this learning curve [10]. In order to further develop technology and instruments to facilitate TEES, it is important to understand the specific difficulties experienced during TEES. It is proposed that in order to facilitate TEES, the needs of surgeons and current limitations of tools must be determined.

The research questions are: does the frequency of performing TEES affect the challenges experienced during surgery? As well, are the difficulties experienced related to the type of instrument set used by the surgeon? What is/are the challenges that surgeons need a tool for?

## Methods:

### Study Design:

This cross-sectional study employed a mixed-methods self-administered online questionnaire consisting of nine questions. The responses were scored using multiple choice, yes/no, an analog scale and an open-ended free-text response. The analog scale was anchored with verbal descriptions to ensure comparability between participants, while facilitating parametric statistical analysis. The contents of the questionnaire consist of: the percentage of surgeries performed by the participant using TEES, whether the participant uses a specialized TEES instrument set and the degree to which an instrument that addresses the following difficulties would be of use to the participant:

* Bleeding control
* Reaching structures visualized by the endoscope
* Cutting and/or removing bone
* Keeping the endoscope lens clean
* Moving and positioning a graft into the intended place
* Dissection and removal of cholesteatoma

As well, participants were asked to identify any other types of instruments that they would find useful while performing TEES. The questionnaire content was developed through a literature search of existing literature on challenges experienced during TEES and the clinical experience of the principal author and his colleagues.

### Participants and Data Collection:

We identified otologists who attended the 2nd World Congress of Endoscopic Ear Surgery, members of the International Working Group of Endoscopic Ear Surgery (??), attendees of the TEES course in Japan (??). After obtaining approval of the protocol from the Research Ethics Board at the Hospital for Sick Children, Toronto, surgeons were invited to participate in the survey. The top of the online survey includes a letter of information and informed consent was assumed upon anonymous completion of the questionnaire. All information was stored confidentially.

### Data Analysis:

Data were analyzed using a descriptive format. The quantitative data were analyzed by the means, with a confidence interval of 95% using Jump software (include company of software here). The difficulties were ranked in order of greatest need to least need.

Qualitative data will be analyzed by grouping the responses into themes/categories which would describe additional difficulties those tools would address.

### Statistical Analysis

http://blog.minitab.com/blog/adventures-in-statistics-2/choosing-between-a-nonparametric-test-and-a-parametric-test

The continuous data was analyzed using ANOVA on JUMP software.

## Results:

* Study participants
* subheadings that describe the main ideas we want to convey
* Questionnaire was sent to (number of attendees at the 2nd world congress) many otologists
* 16/number of attendees at IWGEES responded
* 3/number of people at the Japan course

|  |  |
| --- | --- |
| Percent of Surgeries Performed Totally Endoscopically | Number of Respondents |
| 0% |  |
| Up to 50% | 8 |
| 50%-90% | 5 |
| More than 90% | 3 |

|  |  |
| --- | --- |
| Use of TEES Instrument Set | Number of Respondents |
| Yes | 14 |
| No | 2 |

### Difficulty during TEES that exhibits the greatest need by surgeons:

The degree of need to facilitate each difficulty during TEES was over 50%, suggesting that each of these difficulties are experienced significantly by the respondents. Reaching structures visualized by the endoscope and dissection and removal of cholesteatoma resulted in the highest degree of need at 82%±5% and 78%±5% , respectively.

### Effect of percent of surgeries performed totally endoscopically on difficulties experienced:

### Effect of using a specialized TEES instrument set on difficulties experienced:

Note: the response rate is very low (16) at this point. There was no significant effect of the percent of TEES on the degree of difficulty experienced. There was no significant effect of the use of TEES instrument set on the degree of difficulty experienced.

## Discussion:

We have conducted a cross-sectional mixed-methods survey to identify, rank and describe the difficulties otologists face with TEES. A survey on TEES for Canadian otologists has reported that 11% of otologists in Canada use TEES for cholesteatoma, tympanoplasty, ossicular reconstruction surgeries and they find the following factors difficult about TEES: single-handed surgery, efficiency/operative time, technical difficulty, cost, managing bleeding [6]. This questionnaire was intended to build upon this research by measuring the degree to which surgeons experience specific difficulties during surgery and whether these difficulties could be addressed by a specialized surgical tool. There are many studies that identify difficulties experienced during specific TEES surgeries and so this survey was intended to ask otologists with varying experience with TEES what they need to facilitate the overall difficulties experienced during TEES. This survey included respondents internationally to get a world-wide response on what challenges during TEES require instrumentation.

An analog visual scale was chosen as it is a continuous rating scale and so respondents can pick any value between the boundary points and visually see where their answer lies in the scale [11] [12]. It is suggested that a continuous rating scale is advantageous compared to the five point likert scale because respondents do not need to subjectively discriminate between the five different rating categories and are not bound to only five answers the continuous visual analog scale can capture subjective phenomena quantitatively and can discriminate finer differences due to the larger range of possible scores, also makes it more likely that the data is normally distributed and can thus use parametric statistical analysis with a smaller sample size [11] [13].

### Bleeding control

Managing bleeding has been reported as a challenge during TEES (by 24% of Canadian Otologist repondents in Lea et al.’s survey)[5] [6] [3] [4]. Specialized instruments have been designed to incorporate a functional tip with a suction shaft, for example the Giuseppe Panetti round cutting knife with suction shaft which allows dissection and retraction of the tympanomeatal flap while suction-enabled so the surgeon does not need to switch instruments for suction [3]. Specialized instruments are being developed to mitigate the problem of bleeding control. During TEES, Lea and Mijovic list techniques to maintain proper hemostasis, which helps account for the one-handed approach, including injection of local anesthetic and epinephrine, packing the ear canal with topical epinephrine soaked neuro-patties before surgery, maintaining hypotensive anesthesia and gentle head elevation, careful instrument manipulation in external canal and applying epinephrine soaked cotton balls while raising the tympanomeatal flap [8].

### Reaching structures visualized by the endoscope and dissection and removal of cholesteatoma

Difficult to reach anatomical recesses include the sinus tympani, facial recess and anterior epitympanic recess [3]. Specialized instruments that have a curved tip in order to reach structures visualized by the endoscope are also being developed, particularly instruments to reach the sinus tympani [3]. As well, residual cholesteatoma occurs if cholesteatoma is found in inaccessible areas [14] [15]. Reaching structures visualized by the endoscope and dissection and removal of cholesteatoma resulted in the highest degree of need. These two difficulties are related as dissecting and removal of cholesteatoma requires the surgeon’s tools to reach the cholesteatoma, which is often located in hard to access areas visualized by the endoscope.

### Cutting and removing bone

need a source for this

### Keeping the endoscope lens clean

According to the members of the International Working Group of Endoscopic Ear Surgery (IWGEES) who have had more than fifteen years of TEES experience, fogging and smearing of the endoscope tip is a disadvantage of TEES [3]. This difficulty during surgery requires the surgeon to remove the tool and endoscope, and wipe it periodically when the lens is not clean. The lens can also become dirty during drilling when pieces of bone and irrigation fluid are flowing in the surgical field.

### Moving and positioning a graft into the intended place

In tympanoplasty surgery, the approach, graft material and graft placement technique vary depending on the training, case load, resources and experience available to the surgeon [16]. During TEES tympanoplasty the graft must be inserted into the ear canal and positioned single handedly in the desired orientation, e.g. underlay technique requires the graft to be supported under the annulus anteriorly and over the neck of the malleus for anterosuperior support [16]. Performing this technique single handedly can be challenging and so perhaps a tool that facilitates graft manipulation would be helpful for TEES surgeons. Lea and Mijovic show that cartilage or graft placement is easier when using two hands in a surgery video [8]

## Conclusion:

* key findings
* review main outcome measures
* compare key findings with other literature
* limitations of study
  + number of respondents

Notes from “Endoscopic and keyhole endoscope-assisted neurosurgical approaches: A qualitative survey on technical challenges and technological solutions” [17]

Methods:

* asked: name, surgical unit, subspecialty interests
* survey:
  + whether surgeon presently uses endoscopic/endoscopic assisted approaches
  + what they consider to be major technical barriers to adopting such approaches
  + technological advances they foresee improving safety and efficacy in the field
  + three authors analysed the survey

Results:

* + 40 neurosurgeons (16% response rate within the first week)
  + reported the percent of surgeons that did xyz types of surgery
  + detailed opinions on technical challenges:
    - grouped responses into specific themes: surgical approach with better integration with image guidance, intra-op visualization and improvement in neuroendoscopy, surgical manipulation and improvements in instruments
    - subthemes outlined in a figure e.g. for approach: integrated IGS, flexible access subthemes
  + paragraphs outlining the results of the themes
    - how many respondents suggested that theme?
    - E.g. How many respondents said endoscope image quality was a problem in the visualization theme?
  + Table outlining the subspecialties of the neurosurgeon respondents

Discussion:

* Why is endoscopy good (briefly)
* Recent advances in endoscopy technology – improved lenses, image quality, HD camera, screen
* Technical challenges of neuroendoscopy themes are mentioned in one sentence
* Discussion of the three themes: their current status clinically

Limitations of the study:

Small sample size, low response rate. Asked endoscopic ear surgeons/surgeons interested in TEES.

All members of SBNS were invited to participate in the survey but neurosurgeons self-selected if they had a specialist interest in neuroendoscopy, as seen by the high number of peadiatric and skull base neurosurgeons responding

“Purely Endoscopic Removal of Intraventricular Brain Tumors: A Consensus Opinion and Update”

* 15 out of 20 surveyed neurosurgeons responded

Introduction:

* background research
* questionnaire was designed and used to survey neurosurgeons who place a particular emphasis on endoscopic methods

Methods:

* questionnaire and survey
  + what led to the development of questions in the survey – literature search, interviewing fellow surgeons, attending the endoscopic ear surgery course
  + what was the questionnaire designed to do? Survey ear surgeons to figure out what difficulties they experience during TEES and would want new tools for
  + who was it sent out to? Ear surgeons who attended the 2nd world congress of EES to get a sense of what experienced surgeons who perform TEES feel, list other societies
  + how many responded?
  + Why did we select these societies?
  + Used a continuous rating scale with labels to help the participants gauge where they fit on the scale -
* Explain the different difficulties

Results:

Discussion:

* give a literature/background on the different difficulties

[18]

Bibliography:[1] M. S. Cohen, L. D. Landegger, E. D. Kozin, and D. J. Lee, “Pediatric endoscopic ear surgery in clinical practice: Lessons learned and early outcomes,” *Laryngoscope*, p. n/a-n/a, 2015.

[2] H. Kanona, J. S. Virk, and A. Owa, “Endoscopic ear surgery: A case series and first United Kingdom experience.,” *World J. Clin. cases*, vol. 3, no. 3, pp. 310–7, 2015.

[3] M. Badr-el-dine, “Instrumentation and Technologies in Endoscopic Ear Surgery,” *Otolaryngol. Clin. NA*, vol. 46, no. 2, pp. 211–225, 2013.

[4] M. L. Bennett, D. Zhang, R. F. Labadie, and J. H. Noble, “Comparison of Middle Ear Visualization With Endoscopy and Microscopy,” *Otol. Neurotol.*, vol. 37, pp. 362–366, 2016.

[5] M. Tarabichi, “Endoscopic Middle Ear Surgery,” *Ann. Otol. Rhinol. Laryngol.*, vol. 108, no. 1, pp. 39–46, 1999.

[6] M. Yong, T. Mijovic, and J. Lea, “Endoscopic ear surgery in Canada : a cross-sectional study,” *J. Otolaryngol. - Head Neck Surg.*, pp. 1–8, 2016.

[7] S. C. Prasad, A. Giannuzzi, E. A. Nahleh, G. De Donato, A. Russo, and M. Sanna, “Is endoscopic ear surgery an alternative to the modified Bondy technique for limited epitympanic cholesteatoma?,” *Eur. Arch. Oto-Rhino-Laryngology*, vol. 273, no. 9, pp. 2533–2540, 2016.

[8] T. Mijovic and J. Lea, “Training and Education in Endoscopic Ear Surgery,” *Curr. Otorhinolaryngol. Rep.*, vol. 3, no. 4, pp. 193–199, 2015.

[9] A. L. James, “Endoscopic Middle Ear Surgery in Children.,” *Otolaryngol. Clin. North Am.*, vol. 46, no. 2, pp. 233–44, Apr. 2013.

[10] M. Badr-el-dine, “I n s t r u m e n t a t i o n a n d Tec h n o l o g i e s in E ndos c o p i c Ear Su r ge ry,” *Otolaryngol. Clin. NA*, vol. 46, no. 2, pp. 211–225, 2013.

[11] A. Celenza and I. R. Rogers, “Comparison of visual analogue and Likert scales in evaluation of an emergency department bedside teaching programme,” *EMA - Emerg. Med. Australas.*, vol. 23, no. 1, pp. 68–75, 2011.

[12] D. M. Marsh-richard, E. S. Hatzis, C. W. Mathias, N. Venditti, D. M. Dougherty, and W. Forest, “Adaptive Visual Analog Scales (AVAS): A Modifiable Software Program for the Creation, Administration, and Scoring of Visual Analog Scales,” *Heal. (San Fr.*, vol. 41, no. 1, pp. 99–106, 2009.

[13] H. T. and P. Filzmoser, “Benefits from Using Continuous Rating Scales in Online Survey Research,” *J. Econ. Soc. Meas.*, vol. 4, no. November, p. 25, 2009.

[14] J. L. Sheehy, “Cholesteatoma Surgery in Children,” *The American journal of otology*, vol. 6, no. 2. pp. 170–2, 1985.

[15] B. M. Hanna *et al.*, “Minimally invasive functional approach for cholesteatoma surgery,” *Laryngoscope*, vol. 124, no. 10, pp. 2386–2392, 2014.

[16] A. L. James, B. C. Papsin, and B. C. Papsin, “Ten Top Considerations in Pediatric Tympanoplasty,” *Am. Acad. Otolaryngol. - Head Neck Surg.*, no. September, pp. 992–998, 2012.

[17] H. J. Marcus *et al.*, “Europe PMC Funders Group Endoscopic and Keyhole Endoscope-assisted Neurosurgical Approaches : A Qualitative Survey on Technical Challenges and Technological Solutions,” vol. 28, no. 5, pp. 606–610, 2015.

[18] D. M. Prevedello, F. Doglietto, J. A. Jane, J. Jagannathan, J. Han, and E. R. Laws, “History of endoscopic skull base surgery: its evolution and current reality,” *J. Neurosurg.*, vol. 107, no. 1, pp. 206–213, 2007.