# Time Flow Study Paper

Purpose: to analyze the efficiency of TEES

## Abstract:

## Background:

Rube et al. Recorded the time for MRI-guided angioplasty and assessed the efficiency and feasibility of the proposed workflow and framework for this type of procedure (Rube et al., 2015). Similarly in an attempt to show the efficiency of a dedicated minimally invasive operating room (OR), Hsiao et al. recorded the time for steps during laparoscopic procedures in two types of OR’s: a dedicated minimally invasive OR and a traditional OR (Hsiao, Machaidze, & Pattaras, 2004). A time flow study was also used to measure the patient wait times before and after restructuring the practice patterns to assess the efficiency of the new practice (Racine & Davidson, 2002). Time flow studies have been employed to analyze the efficiency and compare between surgery procedures and hospital protocols.

This study will also assess the feasibility and efficiency of endoscopic ear surgery using the same method: recording the times of steps in the procedure. This will aim to determine the inefficiencies and address the steps where further instrument design would be beneficial. This would also provide a good benchmark against which to measure efficiency and feasibility of future tools that would be developed.

## Methods:

The time flow analysis will measure the duration of predetermined steps during the surgery as well as the number of changes between instruments. This will breakdown and quantify the period of time associated with the completion of a particular task; it is used across a variety of fields, including medicine (14). This will aim to measure the efficiency of current endoscopic ear surgery and provide areas where instrumentation redesign is required. The time flow analysis will be recorded by the MASc. student during ear surgery. These will be divided into preparation, tympanomeatal flap elevation, access to tympanomastoid sub-sites for cholesteatoma removal, graft positioning, and ossiculoplasty. The type of instruments used during these different maneuvers and the number of changes between different instruments will also be noted. These observations will also lead to an appreciation of the ergonomic requirements of instruments during ear surgery and the design advantages of different instruments for specific maneuvers.

It is anticipated that variance in time-flow between cases will be high between cases based on patient specific factors such as extent of bleeding, ear canal morphology, extent of disease. Nevertheless, this methodology will provide a more accurate assessment of surgical practice and challenges than anecdotal surgeon’s recall. Steps demanding a disproportionate amount of time or multiple changes in instrument will be determined from analysis of these data. This will reveal procedural areas in which surgical efficiency may be improved by instrument modification.

Data was collected on a spreadsheet with the following data table:

|  |  |  |  |
| --- | --- | --- | --- |
| Surgery: |  | Study Number: XXXXX | |
| Tympanoplasty | Step | Date/notes | Time (min) |
| Cleaning Out Ear canal |  |  |
| Injecting Anaesthesia |  |  |
| Hair Trimming |  |  |
| Cleaning Edges of Perforation |  |  |
| Making Skin Incision |  |  |
| Raising Flap |  |  |
| Preparing Graft |  |  |
| Placing Graft |  |  |
| Replacing Flap |  |  |
| Packing Ear Canal |  |  |
| Surgery: |  | Study Number: XXXXX | |
| Cholesteatoma Removal | Step | Date/notes | Time (min) |
| Cleaning Out Ear canal |  |  |
| Injecting Anaesthesia |  |  |
| Hair Trimming |  |  |
| Cleaning Edges of Perforation |  |  |
| Making Skin Incision |  |  |
| Raising Flap |  |  |
| Preparing Graft |  |  |
| Placing Graft |  |  |
| Replacing Flap |  |  |
| Packing Ear Canal |  |  |

The patient chart states whether or not the patient has consented to recording their surgery duration. The date and time of the surgeries of patients who had consented are linked to the 5 digit code in a separate spreadsheet. This key sheet and the results sheet are kept in a file on a SickKids research computer.

### Statistical Analysis:

## Results:

## Discussion:

## Conclusion:

References:

Hsiao, K. C., Machaidze, Z., & Pattaras, J. G. (2004). Time Management in the Operating Room : An Analysis of the Dedicated Minimally Invasive Surgery Suite, 300–303.

Racine, a D., & Davidson, a G. (2002). Use of a time-flow study to improve patient waiting times at an inner-city academic pediatric practice. *Arch Pediatr Adolesc Med*, *156*(12), 1203–1209. https://doi.org/10.1001/archpedi.156.12.1203

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