Summary of Proposal

Minimally invasive endoscopic ear surgery (EES) is a new and growing field that allows surgeons to perform common ear surgeries, for example ear drum reconstruction, through the ear canal rather than cutting open the skin. This eliminates visible scarring and reduces the length of hospital stay for the patient. Although there are direct benefits to the patient, this method of surgery requires the surgeon to operate single-handedly, as the other hand is holding the endoscope that allows the surgeon to see inside the ear canal to operate. This type of surgery is not widely employed by surgeons and one possible reason for this is that existing instruments are intended for two-handed traditional ear surgery and are not designed for EES. This project aims to understand the limitations of current EES tools to develop criteria against which new, better surgical instruments can be designed to facilitate EES. Firstly, a survey will be sent out to ask expert ear surgeons around the world to rate the importance of various tool functionalities. Secondly, a time flow study will record the duration of steps during surgery, performed by experienced endoscopic ear surgeons at SickKids Hospital in Toronto. This will help us understand what types of tools are required by surgeons and what the current inefficiencies are during EES. Next, by using the resources available at the CIGITI lab at SickKids, a computer model will be created using patient CT scans. This model will incorporate the barriers of the ear canal, endoscope, and instrument, to provide a platform to develop new tools for EES. These studies will identify the ways in which instruments can be designed to ease EES for surgeons which will aim to increase its use and send patients home sooner and safer.