# A Feasibility Study of Noninvasive Intracranial Pressure Monitoring for Adults After Traumatic Brain Injury in Uganda

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## BACKGROUND

Traumatic Brain Injury (TBI) is a leading cause of death and disability worldwide, but TBI burden is concentrated in low and middle income countries. Elevated intracranial pressure (ICP) is one mechanism for adverse outcomes from TBI, and early detection is key in treatment. In many limited-resource settings, including Uganda, invasive ICP monitoring devices are rarely used for TBI patients.

Abnormal measurements from pupillometry are associated with elevated ICP, suggesting that pupillometry could be used for noninvasive ICP monitoring. Because pupillometry is new in Uganda and has not been used for ICP monitoring clinically, this study sought to assess the feasibility of pupillometry use for noninvasive ICP monitoring and the feasibility of conducting follow-up clinical research at a national referral hospital in Uganda.


*The NPI-200 Pupillometer is a handheld, noninvasive, automated device that measures the pupil response to light (image from https://neuroptics.com)*

## RESEARCH QUESTIONS

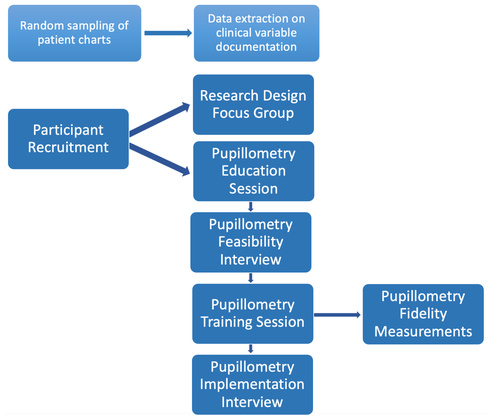
1. What is the **acceptability** of pupillometry among healthcare workers?
2. What is the **fidelity** of pupillometry measurement?
3. What are the **barriers and facilitating factors for implementation** of pupillometry?
4. What is the **perception of research design** among healthcare workers?
5. What is the current **capacity to collect clinical data** from patient charts?

## METHODOLOGY

**Setting**: Mulago National Referral Hospital (MNRH) in Kampala, Uganda

**Study Population:** Providers working in the neurosurgery ward, emergency ward, and clinical laboratories at MNRH were recruited. Additionally, a chart review was completed and included patients with a diagnosis of TBI who were treated on the neurosurgery ward from April to July 2022.

**Study Flow Diagram:**




**Study Components:**

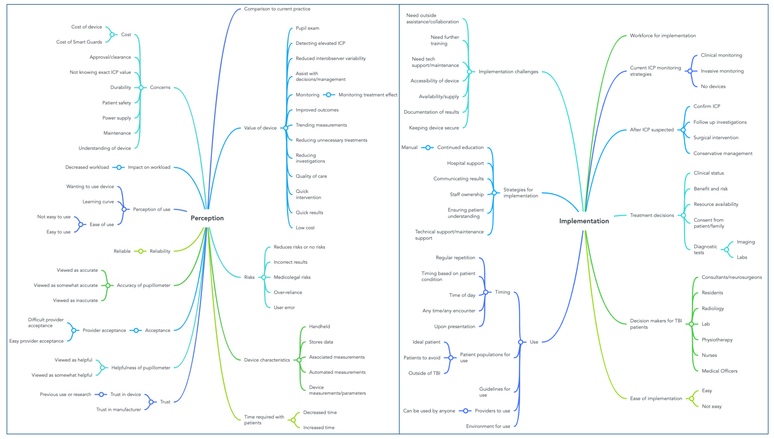
- Chart review assessing variable documentation
- Education session on ICP monitoring and pupillometry
- Interview discussing initial perceptions of pupillometry
- Training session where participants learned how to use device and obtained fidelity measurements
- Interview discussing pupillometry implementation
- Focus group discussing perception of research at MNRH
- Qualitative analysis of interviews and focus groups with inductive coding and Framework Method
- Quantitative analysis of variable documentation and fidelity measurements

## PRELIMINARY RESULTS

362 charts were screened for inclusion, and 167 charts were reviewed. 22 healthcare workers were enrolled and completed the full study.

| 3 Neurosurgeons | 7 Residents | 9 Nurses | 3 Laboratory Technicians |
|---|---|---|---|
| 2 Emergency Ward Neurosurgeons | 4 Neurosurgery Residents | 5 Emergency Ward Nurses | 1 Working in the Blood Bank |
| 1 Neurosurgery Ward Neurosurgeon | 3 General Surgery Residents | 4 Neurosurgery Ward Nurses | |

**Feasibility of Pupillometry:**




*Initial analysis of the feasibility interview has identified these emergent themes on pupillometry perception and implementation*

## CONCLUSIONS

Further analysis will determine the current perspectives on pupillometry and implementation at MNRH, fidelity of pupillometry measurements, capacity to collect clinical variables, and feasibility of conducting further research. This will allow us to understand barriers to overcome in the implementation of pupillometry for ICP monitoring and design a follow up study to determine if pupillometry can be used to improve TBI patient care.

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