

## ACS 2024 Surgeons and Engineers: A Dialogue on Surgical Simulation Meeting

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### Research Abstracts

#### Feasibility of Augmented Reality-Based Procedural Checklist for In-Patient Bedside EVD Placement

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**Introduction:** External Ventricular Drain (EVD) placement is a common bedside neurosurgical procedure performed by all levels of neurosurgical practitioners and trainees. Checklists have been shown to improve patient outcomes and safety/quality assurance metrics across medicine. The aim of this study was to assess the clinical feasibility of a novel augmented reality (AR) procedural checklist during bedside EVD placement.

**Methods:** A novel AR application was developed to display a hands-free digital procedure guide—steps of the procedure, tips about proper technique, and troubleshooting information for common intraprocedural complications—during 10 EVD placements performed by junior neurosurgical residents and one advanced practice provider. AR-assisted EVD procedures were directly compared to 10 EVDs placed in standard fashion without AR assistance. Procedural outcome metrics were tracked and compared as well as qualitative survey data gathered from participants post-procedurally.

**Results:** All EVDs performed in the study were completed without intra-procedural complication. There was no difference between number of pass attempts (AR group  $1.3 \pm 0.5$ ; non-AR group  $1.3 \pm 0.3$  attempts;  $p=0.5$ ) or procedure time (AR group  $37.7 \pm 0.25$ ; non-AR  $34.3 \pm 3.6$  minutes) between the AR and non-AR group. Post-procedural data from participants demonstrated appropriate clinical feasibility of the technology and excellent usability based on a high system usability scale score from respondents (99% usability percentile).

**Conclusions:** This study demonstrates the first use cases of an AR-based procedural guide successfully integrated during bedside EVD placement. Data obtained from this series demonstrates clinical feasibility of this novel application and enhanced experience for the proceduralist without detriment to their ability to complete the procedure.

