

# Evidence-based Practice Guidelines for the Optimal Assessment of the Airway in Predicting Difficult Intubation

Meredith Loudon, RN, BSN, SRNA & Project Team Members: Kacy Ballard, DNP, CRNA, Chai Sribanditmongkol, PhD, RN, IBCLC, CNS, Amy Bishop, DNP, AGCNS  
Otterbein University-OhioHealth Grant Medical Center Nurse Anesthesia Program, Westerville, Ohio

## Abstract

- Adverse respiratory events are the **most common injuries** in anesthesia
- Medical facilities lack **standardized airway assessments**
- Current evidence implicates ultrasound of HMD demonstrates high specificity in predicting difficult intubation
- Traditional airway assessments demonstrate **low accuracy** in predicting difficult intubation

## Introduction

- Every anesthetic performed holds risk for injury
- Difficult intubation & ventilation contribute to adverse events
- ASA defines **difficult airways** as scenarios in which anesthesia providers experience difficulty with mask ventilation or tracheal intubation

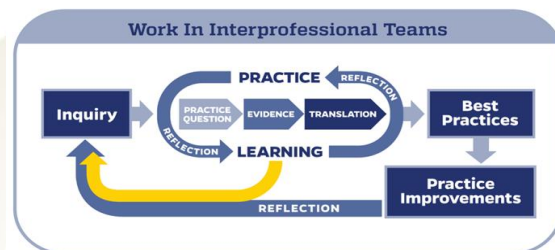
## Problem Statement & Significance to Anesthesia

- Consequences of failed airways are devastating
- Mechanisms of injury follow inadequate airway management include cerebral hypoxia, aspiration, airway trauma, and multi-system organ failure
- **Anesthesia is directly responsible** for airway management

## Project Design

- **JHNEBP Model:** Clinical decision-making tool to incorporate evidence-based data to reform clinical practices

## Johns Hopkins Evidence-Based Practice Model for Nurses & Healthcare Professionals (2022)



## PICO Question

- **Population:** Adult surgical patients requiring intubation
- **Intervention:** Preoperative US airway assessment
- **Comparison:** Basic airway assessment (Mallampati)
- **Outcome:** Predict difficult intubation in operating room

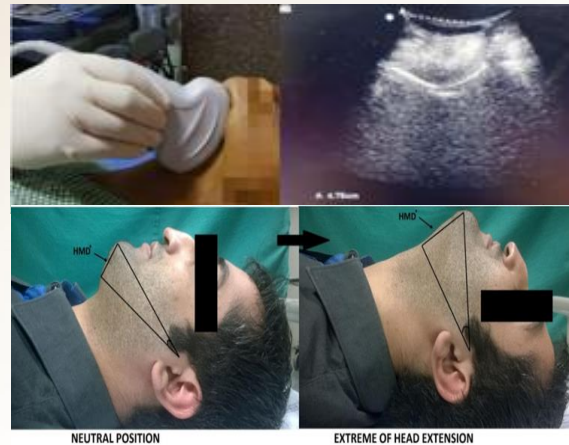
## Project Objectives

- Compare basic to advanced airway assessment efficacy
- **Identify guidelines** for ultrasound use in airway assessments
- Develop plan for implementation, monitoring, and guideline adjustment

## Ultrasound Measurements of HMD

- **HMD** estimates mandibular space available to displace the tongue and visualize larynx
- **HMD >5.5 cm** neutral position dictates easy intubation- method for safe laryngoscopy provider preference
- **HMD <5.5 cm** in neutral position precipitates difficult intubation- use video/ fiberoptic scope
- Guidelines synonymous for **HMD <5.3 cm** in extended position

## HMD measured using US in neutral and extended positions (Singh et al., 2021)



## Plan for Implementation

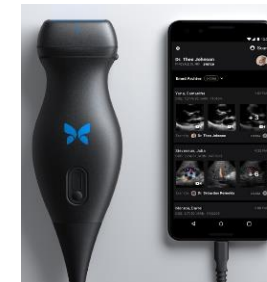
- Phase 1:** Pre-implementation survey to gauge ultrasound experience for airway assessments
- Phase 2:** Implementation of standardized airway assessment guidelines requiring evaluation of patients in preop using Mallampati and HMD measurements in extended and neutral positions
- Phase 3:** Post-intervention survey completed after 90 days to assess guidelines

## Understanding Ultrasound (US)

- US uses transmission and reflection of mechanical energy to generate electrical energy
- Piezoelectric crystals within US transducers travel through tissues at certain speeds- the crystals generate vibrations (mechanical energy)
- US technology is **low-cost** and **easily portable**

## Product Selection

- **Butterfly iQ+**: Water-resistant, hand-held ultrasound probe compatible with smart technology
- Cost: \$2,399, per unit with bulk pricing



## Outcome Analysis

- After 90 days, analysis of 100 randomly selected EMR charts will evaluate compliance
- Data will be imputed into a Microsoft Excel sheet and presented at a post-intervention meeting
- Monitoring will continue every 120 days during first year of implementation

## Recommendations

- HMD will be measured on **all surgical patients** requiring endotracheal intubation using US
- Ultrasound probe-to-patient ratio should be 1:3, requiring purchase of 30 individual probes
- All anesthesia providers will receive formal ultrasound training prior to implementation
- **Verbal consent** will be obtained for all patients prior to US scan performance

## Conclusions

- Unanticipated difficult intubations are **significant concerns** due to consequences of failed intubations
- Utilization of ultrasound in airway assessments shows **high specificity and sensitivity** in the prediction of difficult intubation
- Enacting standardized airway assessment guidelines will allow providers to implement best-practice airway management techniques

## References



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