LEAPT is a cohort of the Partnership for Patients campaign:
- 6 Hospital Engagement Networks (HENs)
- 15 months, rapid cycle quality improvement
- 11 areas of focus, including airway safety

LEAPT HENs spread what they learn to other HENs, which leads to spread of evidence-based practices at-scale.
- June 30 LEAPT webinar on Airway Safety
LEAPT HENs & Airway Safety

- Ascension Health
- Carolinas HealthCare System
- Georgia Hospital Association
- Minnesota Hospital Association
- Ohio Hospital Association
- Washington State Hospital Association
What You Will Hear Today

• Airway safety issues are urgent for patients and families.

• Video technology can be utilized to decrease airway adverse events.

• Measuring airway safety events through a registry may lead to achieving safer airway management.
Patient Story

Mimi Toomey
Director, Policy Analysis and Development
Administration for Community Living

https://www.youtube.com/watch?v=hpT376SfCXo
# Airway Safety

<table>
<thead>
<tr>
<th>HEN</th>
<th>Aims</th>
<th>Measures</th>
<th>Interventions and Practices</th>
<th>Results</th>
</tr>
</thead>
</table>
| Washington| 20% reduction by December 2014.                | **Outcome:** Percent of code blue related to respiratory function. **Numerator:** Total number of patients with code blue related to respiratory. | **Sleep Apnea**  
  - Implement identification of patients with sleep apnea on arrival.  
  - Implement obstructive sleep apnea orders and test through RCl. (stop-BAG)  
  - Implement nursing and RT interventions to be used in absence of physician order.  
  **Difficult Airway**  
  - Implement alert in electronic medical records to ensure difficult airway could be seen by all clinical disciplines.  
  - Implement standard airway cart.  
  - Develop algorithm. | **Outcome:** Flat  
  **Process:** 66% increase |

**Process:** Implementation of apnea screening upon admission. **Numerator:** Total number of patients screened for apnea on admission. **Denominator:** Total number of admissions.
Videolaryngoscopy and Patient Safety in Perspective

Kenneth P. Rothfield, M.D.
Chairman
Department of Anesthesiology
Saint Agnes Hospital

Adjunct Associate Professor
University of Maryland School of Nursing
Disclosures

• Equipment Loans:
  – Verathon
  – Karl Storz
  – AI Medical Devices
  – Ambu
  – King Systems
Objectives

• Discuss economic impact of intubation and mechanical ventilation
• Describe the incidence & severity of airway injuries
• Review the role of video technology to decrease airway injuries
• Describe whole-hospital implementation
Take Home Messages

- Patients requiring emergency intubation are at special risk of injury
- Direct laryngoscopy is skill intensive & has an unacceptable failure rate
- Intubation injuries with traditional techniques are common and costly
Take Home Messages

• Videolaryngoscopy is easily learned via simulation
• Videolaryngoscopy can prevent most injuries
• Whole-hospital & EMS implementation decreases human suffering and healthcare costs
What’s the Most Expensive Procedure in the US?
Costs for hospital stays with the six most expensive principal procedures:

- Respiratory intubation and mechanical ventilation
- Transluminal coronary angioplasty
- Coronary artery bypass graft
- Cardiac pacemaker, cardioverter, defibrillator
- Knee arthroplasty
- Spinal fusion

**Source:** CDC/NCHS, *Health, United States, 2009*, Figure 36. Data from the Agency for Healthcare Research and Quality.
Chevalier Jackson
1865-1958
“Modern” Laryngoscope
1940’s
So What’s the Problem?
Conventional Laryngoscopy Requires Unnatural Patient Positioning and Brute Force
Problems with Conventional Airway Management

• Intubation is not guaranteed even when performed by anesthesia providers

• Still a leading cause of anesthesia injuries & lawsuits
Emergency Intubation Complications

• Complications are common
• Limited data from tertiary care centers with anesthesia residency programs
  – U. Michigan 2011: 4.2%
  – Harvard 2008: 6-22%
  – Hartford 2004: 22%

Martin et al. Anesth 2011, 114: 42-8
Emergency Intubation Complications

- Multiple failed attempts may be fatal
- Aspiration of gastric contents
- Esophageal intubation & trauma
- Airway trauma
- Dental Injury
Financial Impact

• Assumptions:
  – 10% complication rate
  – $15,000 average cost per complication
  – 700,000 patients
$1,000,000,000
Anyone Can Intubate (Except You)
A practical, step-by-step guide for health professionals

Christine E. Whitten, MD
Alternative Airway Management

• Employ video technology as first-line therapy to “see around the corner”
• Early use of rescue airways to prevent multiple intubation attempts
• Level the playing field for all providers
Human Factors Advantages of Glidescope

- Lightweight, plastic single-use blade
- Not easily “weaponized”
- Steeply curved blade minimizes need for brute force
- Detached screen
  - Uses far field vision
  - Allows teaching & training, crew resource management
Videolaryngoscopy Beats Conventional Laryngoscopy Two to One

- Paramedic students, residents, nurses & medical students trained with manikins
- Immediate 93% success with Glidescope in patients
- Only 51% success with conventional laryngoscopy

Sedah, etal. Anesthesiology 2009; 110:32-7
Saint Agnes Experience

• Initial Success With Videolaryngoscopy 80%
• Initial Success with Conventional Laryngoscopy 50%
• Video intubations over twice as fast
Results at 18 Months

- RTs and ER/ICU Physicians intubate successfully on the first try almost 90% of the time
- Elimination of esophageal intubation, dental and soft tissue injuries
Results

• Safer and more expeditious airway management by non-anesthesia providers
• Decreased incidence of complications & esophageal intubation
• Acceptance of a “Videolaryngoscope First” strategy around the hospital
**Respiratory Care Services**

**Airway / Arrest Sheet**

<table>
<thead>
<tr>
<th>Airway Management:</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Elective</td>
<td>Emergent</td>
<td></td>
</tr>
</tbody>
</table>

**Indication:**
- [ ] Cardiac Arrest
- [ ] Respiratory Failure
- [ ] Airway Protection

**Location of Airway Insertion:**
- [ ] Pre Hospital
- [ ] Hospital

**Initial Intubator:**
- [ ] Anesthesiologist
- [ ] Intensivist
- [ ] CRNA / PA / NP
- [ ] ER Attending
- [ ] Resident
- [ ] EMT-P

**Number of Attempts:**

1  
2  
3  

**Alternative Intubator:**
- [ ] Anesthesiologist
- [ ] Intensivist
- [ ] CRNA / PA / NP
- [ ] ER Attending
- [ ] Resident
- [ ] EMT-P

**Number of Attempts:**

1  
2  
3  

**Difficulty of Tube Placement:**

Explain:

**Type Of Airway:**
- [ ] Endotracheal Tube
- [ ] LMA (Reason)
- [ ] King LT
- [ ] Other:

**Airway Size:**

**Placement:**
- [ ] CM @ Upper Teeth / Gum / Nare

**Airway Secured:**
- [ ] Commercial Device
- [ ] Tape

**Airway Confirmation:**
- [ ] Visual
- [ ] Easy Cap II
- [ ] Capnography (end tidal CO2)

**BS:**

**Technique:**
- [ ] GlideScope
- [ ] Laryngoscope
- [ ] Air Traq
- [ ] Oral
- [ ] Nasal

**Complications:**
- [ ] None
- [ ] Endobronchial intubation
- [ ] Esophageal intubation
- [ ] Aspiration:
  - [ ] Prior to Insertion
  - [ ] During Insertion
- [ ] Traumatic / Other (explain):

**Total Time for Intubation** (device insertion to airway placed):

**sec. / min.

**Comments:**

---

**Cardiac Arrest**

**Time CPR Initiated:**

- [ ] Hospital
- [ ] Pre Hospital

**Time RT Started Mask Bag / Vent:**

**Time Advanced Airway Inserted:**

**EtCO2:**

Prior to ResQpod: ___ mmHg.

Post ResQpod: ___ mmHg.

**ResQpod Used:**
- [ ] W / Mask Ventilation
- [ ] W / Airway

- [ ] Initiated by EMS

**Timing Lights Assisted Ventilation:**

- [ ] Y
- [ ] N

**CPR Interrupted for Airway Insertion:**

- [ ] Y
- [ ] N

**Pt. Disposition:**

- [ ] Returned to Spontaneous Pulses
- [ ] Expired
- [ ] Survived Arrest

**Hypothermia Suggested:**

- [ ] Y
- [ ] N

12 Lead EKG Obtained

- [ ] Y
- [ ] N

**RT Printed Name / Credential:**

Date: __/__/____

Signature:

Time: __:__

**RT Printed Name / Credential:**

Date: __/__/____

Signature:

Time: __:__

**RT Printed Name / Credential:**

Date: __/__/____

Signature:

Time: __:__

---

**ST Agnes Logo**

**Respiratory Care Services**

**Pt. Label**

**Airway / Arrest Sheet**

---

**SAINT AGNES**

**HOSPITAL**

**ASCENSION HEALTH**
The Videolaryngoscope DVR
Routine Clinical Practice Effectiveness of the Glidescope in Difficult Airway Management

An Analysis of 2,004 Glidescope Intubations, Complications, and Failures from Two Institutions

Michael F. Aziz, M.D.,* David Healy, M.D., M.R.C.P., F.R.C.A.,† Sachin Kheterpal, M.D., M.B.A.,‡ Rongwei F. Fu, Ph.D.,§ Dawn Dillman, M.D.,|| Ansgar M. Brambrink, M.D., Ph.D.#

Copyright © 2010, the American Society of Anesthesiologists, Inc. Lippincott Williams & Wilkins. Anesthesiology 2011; 114: 34–41

• 98% success in predicted difficult intubation
• 94% success as a rescue to DL
• 1% injury rate (half were lip or gum lacerations)
Curious George

Gets A Glidescope

by

K. P. Rothfield, M.D.
ANESTHESIA

Using teamwork, technology, and compassion to improve the lives of patients
Registries: An Important Tool for Performance Improvement in ED and Hospital Airway Management

Michael Phelan, MD
Associate Professor
Emergency Services Institute
Quality and Patient Safety Institute
Cleveland Clinic Health Systems
What is a Registry

• Definition
  - Registry: an official list or record, or a place where official records are kept
  - Disease registries are collections of secondary data related to patients with a specific diagnosis, condition, or procedure

• Large multihospital or single hospital (dept)

• In context of medical care allows you to track a specific population of patients:
  - Stoke (AHA Get with the guidelines), Heart Attack (NCDR, AHA) etc, In hospital cardiac arrest (GwG Resuscitation)
  - Intubated ED patients (Cleveland Clinic Airway Registry)
Current Airway Registries

- *National Emergency Airway Registry (NEAR III)
  - http://www.near.edu/
- *Japan’s Emergency airway registry
  - *Publications from these allow some comparison data
- Local or home grown airway registries
  - Cleveland Clinic Emergency Airway Registry
    - Started with single hospital
    - now main + 2 free standing ED’s
      - will be adding others as ED’s integrate
- Hospital Resuscitation registry (not airway but resuscitation)
  - Get with the Guidelines Resuscitation (AHA)
    - In-hospital arrest (included ED)
Why a Registry?

• Background
• QA process
  - How many a month
  - Is there a gold standard and guidelines for confirmation
    • Is there always documentation that you confirmed placement?
  - How do you QA them?
• Data very difficult to retrieve from charts or EMR
How is a Registry Utilized

• Get data on patients enrolled in registry
• With a monthly list of intubated patients
  - Can now do chart audits (review those charts)
    • Intubated in the ED and Intubated by EMS
• Developed airway audit tool (what will be reviewed)
• Allows for audit and feedback to providers
How is a Our Registry Utilized

- Was appropriate documentation of critical patient safety actions performed
  - ET co2 documentation in the chart by anyone?
    - Physician
    - Nursing
    - Respiratory therapy
  - Any red flags
    - More than 3 attempts
    - Cricothyrotomy
    - Death
- Other Focused projects
Standards

- Must confirm and document ET placement in:
  1. anyone we intubate
  2. anyone who arrives already intubated
- Method:
  - End tidal co2 gold standard
  - Bulb aspiration, re-direct look as alternatives
    - Does listening to the chest or see fog in the tube count
      - Not if you want to be sure it's in the right position
- How often does this occur? Supposed to be 100%
  - Without data and audit...just don't know
  - Without standardized template not as often as we would like
  - Risk of just being a check box

*Verification of endotracheal tube placement
2. AHA get with guidelines
http://circ.ahajournals.org/content/122/18_suppl_3/S729.full.pdf+html

*Verification of endotracheal tube placement
2. AHA get with guidelines
http://circ.ahajournals.org/content/122/18_suppl_3/S729.full.pdf+html
Over the period of July 1, 2005 to September 9, 2007 there were 433 intubations. Over all 75% rate of documentation of confirmation. Over half of the patients (281) were intubated in the ED, and these had a 96% documentation confirmation rate. Arrived intubated only 34% physician documentation rate.

Utilization of Results
Multifaceted QI Program

• 1\textsuperscript{st} needed data: Airway Registry
  - Aim was to improve documentation of confirmation ET placement
• We built airway documentation template
  - Educated staff about using it
  - Included language around confirmation
• On line education (COMET) module describing the ACEP confirmation guidelines/ required
• Chart Audit and feedback
Improvement in Documentation of Endotracheal Tube Placement May Lead to Improved Mortality

Phelan MP, Hustey FM, Glauser JM, Bena J. A multifaceted quality improvement program improvement program improves endotracheal tube confirmation documentation in the emergency department. *Am J Med Qual.* 2013
Were we Alone?

- Medical Emergency Response Team
- Cleveland Clinic joined NRCPR-GWG-Resuscitation
- Identified documentation of ET placement as an issue
Get with the Guidelines - Resuscitation

• Large multihospital AHA resuscitation registry
• Join for a fee
• Defined patient population
• Charts need to be manually abstracted and data uploaded
• Specific fields for each audited chart
• One happened to be intubation and confirmation
MERT: Airway Confirmation by Device

% Non-HVI

- 1Q 09: 67%
- 2Q 09: 83%
- 3Q 09: 80%
- 4Q 09: 83%
- 1Q 10: 80%
- 2Q 10: 95%
- 3Q 10: 90%
Comparison Data

• Were we really alone?
• Compared data to all GWG-data
• Nope! Same issue
  - Documentation either not present or not gold standard
• Asked to look at all the data guess what?
Get with the Guidelines Registry Data

- 507 hospitals participating in the GWTG-R. 75,000/175,000
- Patients: Adults resuscitated after in-hospital cardiac arrest.
- Suboptimal appropriate confirmation documentation rates
- 44% either no documentation or not guideline recommended method documented
Outcomes Matter

- Documentation improves outcomes


Appropriate documentation of confirmation of endotracheal tube position and relationship to patient outcome from in-hospital cardiac arrest.

# Cleveland Clinic

## Emergency Medicine Department

### Intubation Audit Form

**Date:** 

**Weight:** 

**Height:** 

**Location:** DE12 DE14 DE17

**Diagnosis:** 

**Ordering Attending Physician:** 

**Pre-Arrival Information:**

1. Did patient arrive intubated? [ ] Yes [ ] No
2. What outside intubation method used? [ ] Direct Laryngoscopy [ ] Blind Injection
3. Was outside intubation successful? [ ] Yes [ ] No
4. What was the patient's disposition? [ ] DIED [ ] To OR [ ] To the ICU [ ] Transferred to ED [ ] Discharged ED

**If outside intubation is successful and confirmed, you are done. Please sign form at bottom of page and place in envelope file in your department.**

**Main Indication for Intubation:** 

[ ] Blind Intubation

**Course of Intubation:**

<table>
<thead>
<tr>
<th>Position</th>
<th>Method</th>
<th>Device</th>
<th>Global Exposure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Position 1</td>
<td>Method 1</td>
<td>Device 1</td>
<td>Global Exposure 1</td>
</tr>
<tr>
<td>Position 2</td>
<td>Method 2</td>
<td>Device 2</td>
<td>Global Exposure 2</td>
</tr>
<tr>
<td>Position 3</td>
<td>Method 3</td>
<td>Device 3</td>
<td>Global Exposure 3</td>
</tr>
</tbody>
</table>

**For more than three please use additional airway audit sheet.**

**Successful Intubation:**

[ ] Yes [ ] No

**Intubation Confirmation:**

[ ] Blind Injection

**Patient's Disposition:**

[ ] DIED [ ] To OR [ ] To the ICU [ ] Transferred to ED [ ] Discharged ED

**Other Interventions:**

[ ] Blind Intubation

**Total Number of Intubation Attempts:** 

**Registrar/Therapist Name:** 

**Attending Physician Name:** 

**Registrar/Therapist Signature:** 

**Attending Physician Signature:** 

**White Copy:** Medical Record  Yellow Copy: Airway Registry Surveillance File

**Face Screen:** 10% & 30%
Questions

• We can not manage what we do not measure!

  • C Deming
References


Phelan MP, Hustey FM, Glauser JM, Bena J. A multifaceted quality improvement program improvement program improves endotracheal tube confirmation documentation in the emergency department. *Am J Med Qual.* 2013


AHA get with guidelines
http://circ.ahajournals.org/content/122/18_suppl_3/S729.full.pdf+html
Cleveland Clinic

Every life deserves world class care.
What is the most inspiring thing you heard from these presentations?
Closing

Thank you for taking the time to attend CMS Grand Rounds on Achieving Safer Airway Management!

Questions or comments may be directed to Kayla Renals

Kayla.Renals@cms.hhs.gov
(410) 786-8879