Patient Safety Movement Foundation
Presents

Airway Safety Webinar
June 14th, 2017

Ariana Longley, MPH, Vice President, PSMF
Guest Speaker: Dr. Arthur Kanowitz, MD, FACEP
Agenda

• 10 Minutes: Introduction to Patient Safety Movement Foundation and Actionable Patient Safety Solutions (APSS)

• 35 Minutes: Patient Safety Movement Partner Presentation
  – Dr. Arthur Kanowitz, MD, FACEP

• 15 Minutes: Q&A
Our Mission

ZERO Preventable Patient Deaths by 2020 (0X2020)
We Strive to Foster New Efforts and Build On Existing Patient Safety Programs Through Commitments to ZERO

A Fresh Approach to an Old Problem

Without Reinventing the Wheel
Who Can Take Action?

- **Hospitals & Healthcare Organizations**
  - Make a *Commitment*

- **Committed Partners**
  - Sign the *Commitment to Action* letter

- **Healthcare Technology Companies**
  - Sign the *Open Data Pledge*

- **Patient & Family Advocates**
  - Share their *Patient Story*, Utilize Resources

- **Policy Makers**
  - Increase awareness and promote patient safety *Legislation*
Actionable Patient Safety Solutions (APSS)

1. Culture of Safety
2. Healthcare-associated Infections (HAIs)
3. Medication Errors
5. Anemia + Transfusions
6. Hand-off Communications
7. Neonatal Safety
8. Airway Safety
9. Early Detection & Treatment of Sepsis
10. Optimal Resuscitation
11. Optimizing Obstetric Safety
12. Venous Thromboembolism (VTE)
13. Mental Health

Download at patientsafetymovement.org
In order to reach **ZERO** our goal for 2017:

**Total Lives Saved**

- **2017 Goal**
  - 150,000 Total Lives Saved
  - 75,000 U.S.
  - 75,000 International

- Year Reported
  - 2013: 6,571
  - 2014: 24,643
  - 2015: 69,519
  - 2016: (estimated)
  - 2017: (estimated)
  - 2018: (estimated)
Dr. Arthur Kanowitz, MD, FACEP

- Medical Director (Retired), State of Colorado, Emergency Medical and Trauma Services
- Founder, Chairman, CMO, Securisyn Medical
- Member, Patient Safety Movement Foundation, Airway Safety Workgroup
Why is Airway Safety so Important?
Andrew "Drew" Hughes
1999-2013
Drew Died
From the Perfect Storm
of
Airway Safety Events

Unplanned Extubation

Failure to Intubate

Failure to Recognize a Malpositioned Tube
Drew Died
A Preventable Death
Complications of Airway Management

Safety Events:
- Failed Intubation
- Aspiration
- Pressure Ischemia
- Tube Malposition
- Unplanned Extubation

Complications:
- Sore Throat
- Vocal Cord Paralysis
- Severe Brain Injury
- Pneumonia
- Collapsed Lung
- DEATH
- Unplanned Extubation
- Failed Intubation
- Aspiration
- Pressure Ischemia
- Tube Malposition
- Unplanned Extubation
Unplanned Extubation

A Common and Costly Safety Event
Unplanned Extubation

Yearly

70,000 Incidences causing

12,000 Preventable Deaths and

$4 Billion in Healthcare Costs
Unplanned Endotracheal Extubations in the Intensive Care Unit: Systematic Review, Critical Appraisal, and Evidence-Based Recommendations

Paulo Sergio Lucas da Silva, MD, MSc,* and Marcelo Cunio Machado Fonseca, MD, MSc†

BACKGROUND: In this study, we updated the state of knowledge on unplanned tracheal extubations in the intensive care unit. We focused on the following topics: incidence, risk factors, reintubation after unplanned extubation, outcomes, and prevention. Based on this review, recommendations were made for preventing unplanned extubations.

METHODS: Electronic databases were searched for relevant publications from January 1, 1950 through June 30, 2011 on the MEDLINE, EMBASE, CINAHL, SCIELO, LILACS, and Cochrane systems. Fifty articles were eligible for data abstraction. Study quality was assessed using the Newcastle-Ottawa Scale. Grades of recommendation were assessed according to the Oxford Centre for Evidence-Based Medicine.

RESULTS: Unplanned extubations occurred at a rate of 0.1 to 3.6 events per 100 hospital days. Risk factors associated with unplanned extubations included male gender (odds ratio [OR] 4.4), APACHE score ≥17 (OR 9.0), chronic obstructive pulmonary disease, etidocaine/nitrous oxide (OR 3.3–30.6), lower saturation level (OR 2.0–5.4), higher consciousness level (OR 1.4–2.0), and use of physical restraints (OR 3.1). Reintubation rates ranged from 1.8% to 88% of unplanned extubations. Thirteen studies assessed preventive measures for avoiding unplanned extubations. These studies focused on data collection tools, standardization of procedures, staff education, staff surveillance, and identification and management of high-risk patients. These studies reported reductions in unplanned extubation rate from 22% to 53%. The best methods of securing the endotracheal tube and use of physical restraints remain controversial issues.

CONCLUSIONS: Despite numerous publications on unplanned extubation, few studies assess preventive strategies for adverse events, and few clinical trials have assessed unplanned extubations. Recommendations are proposed based on the currently available literature. (Anesth Analg 2012;114:1003–14)

The intensive care unit (ICU) setting poses safety risks to patients, including an increased risk of medical errors. A large proportion of patients admitted to the ICU require tracheal intubation and/or mechanical ventilation, both posing additional risks of adverse events. Unplanned extubation is a widely cited example of a potentially catastrophic and costly adverse event leading to complications including bronchospasm, aspiration pneumonia, hypoxemia, arrhythmias, cardiorespiratory arrest, and death. An unplanned extubation is defined as premature removal of the endotracheal tube by a patient receiving mechanical ventilation support (deliberate unplanned extubation) or by staff during nursing and medical care (accidental extubation).

An unplanned extubation is a marker of poor quality of care. There is no consensus on strategies for the prevention of this event. The majority of studies assess the risk factors associated with unplanned extubations. With the present emphasis on improving the quality of health care and patient safety, there is a demand for tracking and reducing unplanned extubations in health care accreditation. Quality improvement programs can reduce the incidence of unplanned extubations. Different approaches and methods in the published studies have resulted in widely differing outcomes. Standardizing procedures and goals may reduce outcome variability.

This review assesses the incidence and risk factors for unplanned extubations, the factors associated with reintubation after unplanned extubation, and the outcomes of unplanned extubations. We conclude with recommendations based on the available evidence.

METHODS

Search Strategy

The United States National Library of Medicine and National Institutes of Health (FUBMED), the Excerpta Medica database (EMBASE), the Cumulative Index to Nursing and Allied Health Literature (CINAHL), the Cochrane Library, the Scientific Electronic Library Online (SciELO), and the

Common

Anesthesia and Analgesia

2012 114:1003-1014

Review of Worldwide Literature

50 Studies

7.3% Unplanned Extubation Rate

Last 5 years

6.4% (2.1%-18.9%)
Unplanned Extubation

Common

73,000 incidences of UE yearly in the U.S.

7.3% = 73,000
Unplanned Extubation

>1,000,000*
Mechanically Ventilated
ICU Patients

Unplanned Extubation

Costly Patient Complications

- Pneumonia
- Vocal Cord Paralysis
- Severe Brain Injury
- Death
Unplanned Extubation

Costly Increased LOS

Costly
Total Increased Cost of Hospital Stay
253 US Hospitals. 51,000 pts.

Average Cost of ICU Stay (Ventilated Patients with UE) = $116,070

Average Cost of ICU Stay (Ventilated Patients without UE) = $59,206

Average Cost of Complications from Unplanned Extubation = $56,864 / pt

Costly
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Average Cost of Complications from Unplanned Extubation = $56,864 / pt

$4,151,072,000

Costly
Total Increased Cost of Hospital Stay
253 US Hospitals. 51,000 pts.

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Average Cost of ICU Stay (Ventilated Patients without UE) = $59,206

Average Cost of Complications from Unplanned Extubation = $56,864 / pt

Ave Hospital (4500 MV pts / yr)
Every 1% Improvement in UE Rate = $2.5 M

Unplanned Extubation

Costly Mortality

12,000 Deaths Yearly in the U.S.

*19% Mortality Rate

Unplanned Extubation is ...

common and costly
Unplanned Extubation

The Cause Is Simple Physics
Current Management

Adhesive Tape

Hollister AnchorFast

Laerdal Thomas Tube Holder
Current Management

Rate of Unplanned Extubation Remains Unacceptable
How Do We Get To

ZERO PREVENTABLE DEATHS

From Unplanned Extubation?
Unplanned Extubation

What will it take to get to ZERO PREVENTABLE DEATHS?

• Universal Tracking
• Application of APSS
• Sharing Best Practices
• New “Disruptive” Technology
“If You Can’t Measure It, You Can’t Improve It”.

-Peter Drucker
Unplanned Extubation is a significant Patient Safety Issue.

Yet, most hospitals don’t track unplanned extubation ...
7.3% Unplanned Extubation Rate

Is likely just the tip of the iceberg

... partially because most of the major EMRs do not include UE as a data field.
Unplanned Extubation

7.3% Unplanned Extubation Rate

Is likely just the tip of the iceberg

Quality Metrics

Currently Considering Adding Unplanned Extubation
Over 12,000 patients die unnecessarily in U.S. hospitals each year from the accidental removal of their life-sustaining breathing tube, known as Unplanned Extubation.

Our mission is to eliminate these deaths by 2020.

Click on the following links:
1. Challenges and Solutions
2. Patient Safety Newsletter

Scroll to:
Webinar Archive Airway Safety

Airway Safety Intro Card
Track the data listed below on every intubated patient undergoing mechanical ventilation

Unplanned Extubation Data Sheet

Patient Demographics
Age: _______________  Sex: M ☐  F ☐  Weight (lbs.): _______________

Information on Intubation
Patient Intubated: Date: _______________  Time: _______________
Endotracheal Tube (ETT): Type: Standard ETT ☐  Subglottic Suction ETT ☐
Size: _______________  Depth: _______________

Information on Extubation
Patient Extubated: Date: _______________  Time: _______________
Type: Planned ☐  Unplanned ☐
If Extubation was Unplanned:
Cause: Self Extubation ☐  Accidental Extubation (Must be Witnessed) ☐
Was patient restrained? Yes ☐  No ☐
Was patient sedated? Yes ☐  No ☐
Was reintubation required Yes ☐  No ☐
Was reintubation successful? Yes ☐  No ☐

Complications
Pneumonia (VAP, Aspiration) ☐  Date of Dx: _______________
Brain Injury ☐
Death ☐
Other ☐  Describe: ____________________________________________
"If you can't measure it, you can't improve it."

Peter Drucker

**Metrics**

Rate of unplanned extubation in patients undergoing mechanical ventilation via endotracheal tube

**Numerator:**
Number of incidences of unplanned extubation in patients mechanically ventilated via an endotracheal tube

**Denominator:**
Total number of mechanical ventilation days

**Number of UE**

100 patients

6.4 UE / 100 pts

6.4% (2.1%-18.9%)

100 ventilation days

0.6 UE / 100 MV Days

0.6 (0.1-3.6)

Patient Safety Movement

Zero preventable deaths by 2020
Executive Summary Checklist

Failures of airway management (e.g., inability to mask ventilate or oxygenate, unplanned extubation, failure to intubate) are major causes of inpatient morbidity and mortality. The following steps will establish an institutional, team-based, comprehensive and sustainable system for reliability in airway management.

- Assemble a core multidisciplinary leadership team to advance airway safety, including:
  - ED, ICU, Hospitalist, and Anesthesiology Physician Leader.
  - ED, ICU Nursing Leaders.
  - Respiratory Therapy Leaders.
  - QA/Safety Leadership (VP or higher level).

- Establish the need for improvement by examining current vulnerabilities, using known and simulated complications and difficult cases, along with key statistics.

- Create the vision of institution-wide reliability for airway management safety through standardization of best practices, policies and procedures.

- Under the leadership of a physician anesthesiologist, develop a comprehensive airway toolkit method (e.g., the Safer Airway Bundle). Start implementation in the ED and ICUs, and then move to floor units and other departments. Include the following Key Components: Failed Airway Path, Airway Cart, Airway Checklist, Quality Assurance, and Team Training.
  - Implement Safer Airway Essential Components, as described in Appendix A.

- Require tracking and reporting of “near misses” and complications of airway management. Identify adverse outcomes that are iatrogenic and preventable (e.g., multiple attempts, esophageal intubation, SpO2 <90% or decline of >10%, dental or soft tissue injury). Use these case data in medical staff educational sessions to prevent recurrences, as a part of Continuous Quality Improvement (CQI).

- Provide periodic airway management education for all care providers. This will include: identification of airway problems, selection and use of appropriate intervention, and understanding when and how to call for expert assistance (e.g. from Anesthesiology).
Airway Safety APSS #8
Executive Summary Checklist

• Assemble a core multidisciplinary team

• Establish Need for Improvement

• Require Tracking; Use Data to Improve Care

• Policies and Procedures; Standardize Best Practices,

• Develop Comprehensive Airway Toolkit

• Collect Data; Review; Find Solutions; Educate; Implement; Verify
Airway Safety APSS #8

- Performance Gap
- Leadership Plan
- Practice Plan
- Technology Plan
- Metrics

- Safer Airway Essential Components
  - Failed Airway Protocol
  - Airway Equipment
  - Critical Practices
  - Team Training
Unplanned Extubation

What will it take to get to ZERO PREVENTABLE DEATHS?
Unplanned Extubation

What will it take to get to ZERO PREVENTABLE DEATHS?

• Universal Tracking
• Application of APSS
• Sharing Best Practices
• New “Disruptive” Technology
Disruptive Technology

University of Colorado BioMed Engineering
Comparative Force Study
Five Devices
Extubation force depends upon angle of force application and fixation technique: a study of 7 methods

Jennifer L. Wagner, Robin Shandas* and Craig .

**Background**

Endotracheal tubes are frequently maintained to prevent serious complications. Available methods vary widely in the circumstances surrounding intubation, making such as tube dislodgement and unplanned extubation.

**Methods:** Seven different tube-restraint solutions were tested, with series of discrete angles (best porous) covering 2 cm and 5 cm (at failure) were recorded.

**Results:** All methods showed variation in the forces were averaged over all test points, for a series observed (10-15 N to 152 N). Compare the available devices consistently required a higher force for 5 cm displacement were compared methods span from 62-178 N (14-40 lbs), high application. Significant differences in standard deviations were noted, showing some methods may be more reproducible.

**Conclusions:** Clinically, forces can be applied with fixation techniques are sensitive to the angle of measure of fixation reliability, also vary with age presented in this study may be used to adjust device design in an effort to reduce the incidence of extubation.

**Keywords:** Unplanned extubation, Extubation, Tissue Force.
Unplanned Extubation

Find Out:

What is your hospital’s rate of UE?

Does your hospital’s EMR have UE Specific Data Fields?

Implement:

Actionable Patient Safety Solutions
APSS #8 – Airway Safety
Q & A
Thank you!