HRET
HEALTH RESEARCH & EDUCATIONAL TRUST

U.S. DEPARTMENT OF HEALTH & HUMAN SERVICES
Partnership for Patients
HealthCare.gov

2017 UPDATE

AIRWAY SAFETY

>>>

RECOGNITION AND PREVENTION OF AIRWAY EVENTS AND HARM EVENTS

CHANGE PACKAGE

ACKNOWLEDGEMENTS

We would like to recognize the contributions of the Health Research & Educational Trust (HRET) Hospital Improvement Innovation Network (HIIN) team and Cynosure Health Solutions for their work in developing the content of this change package.

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How to Use this Change Package

This change package is intended for hospitals participating in the Hospital Improvement Innovation Network (HIIN) project led by the Centers for Medicare & Medicaid Services (CMS) and the Partnership for Patients (PFP); it is meant to be a tool to help you make patient care safer and improve care transitions. This change package is a summary of themes from the successful practices of high performing health organizations across the country. It was developed through clinical practice sharing, organization site visits and subject matter expert contributions. This change package includes a menu of strategies, change concepts and specific actionable items that any hospital can choose to implement based on need. Hospitals may use it to begin testing for purposes of improving patient quality of life and care. This change package is intended to be complementary to literature reviews and other evidence-based tools and resources.

PART 1: AEA DEFINITION AND SCOPE

Airway safety events refer to delays in airway placement due to a lack of recognition of respiratory depression and/or patients with a difficult airway. Seventy-five percent of adverse respiratory events result from inadequate ventilation, esophageal intubation and difficult tracheal intubation.[1] Additionally, complications in airway maintenance, device-related skin injury and unintended extubations are included in this scope. Addressing and preventing adverse drug events related to opioids and failure to rescue are two topics that will also improve airway safety.

Magnitude of the Problem — Why Does This Matter

Airway mismanagement is rare but catastrophic, leading to severe morbidity and mortality for patients in our hospitals. Opioid-induced respiratory depression (RD), when not recognized and treated with immediate airway stabilization and ventilation can cause brain damage and death.[2] Twenty percent of all adverse airway events in hospitals result from difficult airways,[3,4] necessitating both a standardized airway assessment to predict level of difficulty and skilled providers to perform intubations. In critical care settings, approximately 25,000 potentially life-threatening errors occur daily and as much as 10 percent of these adverse events involve unintended incidents in airway management. More than half of these errors have been deemed preventable.[5] Departments outside of the perioperative area (ED, ICU and inpatient units) have increased adverse airway events due to the emergent nature of the intubations and multiple attempts in attaining airways. First-pass success or single-attempt intubations decrease the rate of complications by 33 percent.[6]

> HIIN Reduction Goals

- Reduce health care facility-onset of airway safety events by 20 percent by September 27, 2018.

PART 2: MEASUREMENT

A key component of making patient care safer in your hospital is to track your progress toward improvement. This section outlines the nationally recognized process and outcome measures that you will be collecting and submitting data on as part of the HRET HIIN. Collecting these monthly data points at your hospital will guide your quality improvement efforts as part of the Plan-Do-Study-Act (PDSA) process. Tracking your data in this manner will provide valuable information needed to study your data across time and determine the effects your improvement strategies are having on reducing patient harm. Furthermore, collecting these standardized metrics will allow the HRET HIIN to aggregate, analyze, and report progress toward reaching the project's 20/12 goals across all AEAs by September 2018.

Nationally Recognized Measures: Process and Outcome

Please download and reference the encyclopedia of measures (EOM) on the AHA/HRET HEN website for additional measure specifications and for any updates after publication at: http://www.hret-hiin.org/data/hiin_eom_core_eval_and_add_req_topics.pdf

HIIN Evaluation Measure

- Ventilator-associated condition (VAC) — all facilities

> Process Measures

- Percentage of patients who underwent the ABCDEF bundle assessment
- Percentage of eligible patients who receive spontaneous awakening trial

Suggested Bundles and Toolkits

- Practice guidelines for management of the difficult airway. Retrieved at: http://anesthesiology.pubs.asahq.org/article.aspx?articleid=1918684
- Practice guidelines for the prevention, detection, and management of respiratory depression associated with neuraxial opioid administration. Retrieved at: www.asahq.org/~/media/sites/asahq/files/public/resources/standards-guidelines/practice-guidelines-for-the-prevention-detection-and-management-of-respiratory-depression.pdf
- Department of Veterans Affairs Emergency Airway Management Initiative. Retrieved at: www.ncbi.nlm.nih.gov/books/NBK43632/
- Quality standards and practice guidelines for airway management. Retrieved at: www.asahq.org/~/media/sites/asahq/files/public/resources/standards-guidelines/practice-guidelines-for-management-of-the-difficult-airway.pdf
- Think L-E-M-O-N When Assessing a Difficult Airway. Retrieved at: www.acep.org/content.aspx?id=33992
- For key tools and resources related to preventing and reducing airway safety events, visit www.hret-hiin.org

Investigate Your Problem and Implement Best Practices

DRIVER DIAGRAMS: A driver diagram visually demonstrates the causal relationship between your change ideas, secondary drivers, primary drivers and your overall aim. A description of each of these components is outlined in the table below. This change package is organized by reviewing the components of the driver diagram to first, help provide you and your care team identify potential change ideas to implement at your facility and second, to show how this quality improvement tool can be used by your team to tackle new process problems.

AIM			
	PRIMARY DRIVER	SECONDARY DRIVER	**Change Idea**
		SECONDARY DRIVER	**Change Idea**
	PRIMARY DRIVER	SECONDARY DRIVER	**Change Idea**

AIM: *A clearly articulated goal or objective describing the desired outcome. It should be specific, measurable and time-bound.*

PRIMARY DRIVERS: *System components or factors that contribute directly to achieving the aim.*

SECONDARY DRIVERS: *Actions, interventions or lower-level components necessary to achieve the primary driver.*

CHANGE IDEAS: *Specific change ideas which will support or achieve the secondary driver.*

Drivers in This Change Package

PREVENT AIRWAY EVENTS			
	PREVENT UNANTICIPATED AIRWAY EVENTS	STRATIFY RISK THROUGH SCREENING TOOLS AND SCALES	**Change Idea**
	ENSURE OPTIMAL AIRWAY PLACEMENT	ENSURE APPROPRIATE TRAINING	**Change Idea**
		IMPLEMENT AN ALGORITHM FOR STANDARD CARE AND ESCALATION	**Change Idea**
	PRACTICE SAFE AIRWAY MAINTENANCE	ENSURE STANDARD AIRWAY SECUREMENT TO PREVENT DISLODGED AIRWAYS	**Change Idea**
		DEVELOP SKIN-INJURY PREVENTION STANDARDS	**Change Idea**
		IMPLEMENT EARLY WEANING AND EXTUBATION PROCEDURES	**Change Idea**
	DEVELOP AN AIRWAY SAFETY PROGRAM	PREVENT, PRACTICE, PERSONNEL AND PERFORMANCE	**Change Idea**

Primary Driver:

PREVENT UNANTICIPATED AIRWAY EVENTS

Prevention of unanticipated airway events can be enhanced by the adoption of a reliable routine screening process for patients at high risk for respiratory depression or airway compromise. This screening should include: oxygen saturation monitoring, end tidal CO2 monitoring (capnography) and monitoring of sedation levels to promote the early recognition of adverse airway events. Create a decision tree to standardize the monitoring needed based on patient risk. Implement a standardized sedation scale to monitor patients who are at high risk for respiratory depression. Patients at risk for airway compromise include: the elderly, the obese, patients with a history of sleep apnea, patients prescribed additional sedatives, patients on a patient-controlled analgesia pump or epidural anesthesia and post-operative head and neck surgery patients. Using the sedation scale to trigger escalations and consultations for additional evaluation and treatment will help to avoid adverse airway events.[7]

Secondary Driver > STRATIFY RISK THROUGH SCREENING TOOLS AND SCALES

Patients who are receiving narcotics are at risk for respiratory depression and airway compromise. Those who are elderly, obese or have a history of sleep apnea are at greater risk. Monitoring standards should be based on risk factors for respiratory depression and airway compromise.

Change Ideas

> Develop and implement a decision tree and screening tool to identify patients at risk for airway compromise (i.e., elderly, obese, history of sleep apnea).

> Implement a standardized, sedation scale assessment on all high risk patients (e.g., the Richmond Agitation Scale (RASS) or the Pasero). See Appendices III and VII.

> Educate and train staff to use a standardized sedation scale for all at-risk patients.

> Use changes in the sedation scale as a trigger to call for rapid response team evaluation.

> Create standard orders for non-invasive positive-pressure ventilation for patients with a high risk of airway or ventilatory compromise.

Suggested Process Measures for Your Test of Change

- Percent compliance with monitoring standards for patients at high risk for airway compromise
- Percentage of rapid response team calls triggered by sedation-scale screenings
- Percentage of inpatient intubations due to over sedation and respiratory depression

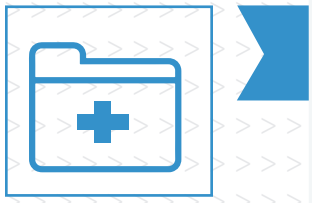
Hardwire the Process

The reliable use of sedation assessments and monitoring of patients at risk for respiratory depression will require orders for the appropriate assessments to be incorporated into standard narcotic and post-op order sets. Include the sedation assessment into the clinical documentation record and ensure compliance. Add a risk assessment to the admission assessment to trigger appropriate orders for monitoring and respiratory support. An electronic medical record can be used to alert providers of high risk patients and suggest interventions.

Primary Driver:

ENSURE OPTIMAL AIRWAY PLACEMENT

Ensuring that there is adequate staffing by properly trained individuals will lay the foundation for consistent first-pass intubation without hypoxemia. Development and distribution of standardized equipment carts and provision of simulation training for all individuals performing airway placement are critical to the initiative's success. Clear protocols, readily available rescue equipment and well-developed algorithms for difficult airways will improve airway safety organization-wide.[8]



Secondary Driver > ENSURE APPROPRIATE TRAINING

Mnemonics for airway assessment and visual charts are helpful tools to promote appropriate airway placement and selection. Practice with protocols and algorithms enhances compliance, improves safety and optimal patient outcomes.[9] See Appendices II and V.

Change Ideas

> Offer simulation training for providers placing airways. Implement a standardized sedation-scale assessment on all high risk patients (e.g., the Richmond Agitation Scale (RASS) or the Pasero). See Appendices III and VII.

> Utilize a laryngeal mask airway (LMA) rather than an endotracheal tube (ET) chart for safety and standardization.

> Develop and establish airway management carts.

> Develop back up staffing protocols for airway events and post them visibly.

Suggested Process Measures for Your Test of Change

- Percentage of first-pass intubations without hypoxemia
- Percentage of providers who are responsible for airway placement who participate in simulation training

Secondary Driver > IMPLEMENT AN ALGORITHM FOR STANDARD CARE AND ESCALATION

Development of a difficult-airway algorithm is critical to decreasing the number of airway disasters. The number of catastrophic airway incidents may be small, but can be reduced even more if a clear algorithm for difficult airways is developed and utilized. An algorithm offers providers plans A, B and C, as well as escalation guidance. Practicing the algorithm with all team members prior to an event creates a network that can assist when a patient presents with a difficult airway. Communication about a patient's history of prior airway events helps to prepare the care team for potential issues before they develop.[10]

Change Ideas

> To identify high risk airways, develop and utilize a standardized airway assessment tool, such as L-E-M-O-N: Look, Evaluate, Mallampati, Obstruction, Neck (See Appendix V). [11]

> Develop and utilize a difficult-airway algorithm as appropriate (See Appendix II).

> Offer simulation training for airway management to all front-line staff as a team (e.g., physicians, nurses and respiratory therapists together) in the ED, ICU and OB units.

> Develop a field in the electronic medical record (EMR) to record the presence of a difficult airway; this field would be permanent.

Suggested Process Measures for Your Test of Change

- Percentage of patients evaluated using a standardized airway assessment tool
- Percentage of patients with difficult airways identified using the standardized airway assessment tool
- Percentage of staff (all members of the multidisciplinary teams) from ED, ICU and OB departments who participate in simulation training

Hardwire the Process

Standardizing the planning and process for intubation can accomplish hardwiring of the use of the assessment tools for airways. Placing mnemonics and visual charts on airway carts increases visibility. Focused simulation training for all staff on airway equipment carts, team roles and communication in the event of a difficult airway create a culture of safety and help hardwire the response during intubations.

Primary Driver:

PRACTICE SAFE AIRWAY MAINTENANCE

Maintenance of an open and functioning airway is an essential element for airway safety. Airway dislodgements, blockages and leakages can account for greater than 80 percent of post intubation complications.[12] Adequate securement of airway devices is critical to prevent dislodgement and should be standardized and monitored. Skin and mucosal injuries can also be a complication during airway maintenance and can be reduced if clear standards of care are developed collaboratively among relevant disciplines. Implementation and coordination of spontaneous awakening trials (SATs) and spontaneous breathing trials (SBTs) have been shown to both decrease the number of days a patient is on a ventilator and decrease patient harm.[13]

Secondary Driver > ENSURE STANDARD AIRWAY SECUREMENT TO PREVENT DISLODGED AIRWAYS

Securement of airways is important to prevent airway dislodgment. Capnography monitoring can identify dislodgement that is not evident externally. Training staff to identify potential dislodgement and adopt and implement standards for securement can reduce the incidence of dislodged airways.

Change Ideas

> Implement capnography monitoring for all intubated patients in the ICU (model the anesthesia standard) as one mechanism to identify airway dislodgment.

> Use tracheostomies that have a disposable inner cannula to prevent lumen narrowing and airway blockage.

> Consider a method for first, identifying patients with a difficult airway to ensure appropriate vigilance and second, making sure that necessary personnel and equipment are available if unintended extubation occurs.

> Standardize the securement method of endotracheal tubes and tracheostomies to minimize airway dislodgement.

> Develop a treatment standard to electively exchange airways that have narrowed and/or demonstrate pilot balloon leaks.

> Encourage families to call the rapid response team if they are worried or see evidence of respiratory issues.

Suggested Process Measures for Your Test of Change

- Percent of intubated patients with capnography monitoring
- Percent compliance with standard airway securement
- Percent of unintended endotracheal tube removals that had a bedside debriefing held in response to the unintended extubation

Secondary Driver > DEVELOP SKIN-INJURY PREVENTION STANDARDS

Implementing standard skin care for the skin and mucosa around airway devices will decrease the incidence of skin injury. Regular inspection and tube repositioning are key components of these efforts.

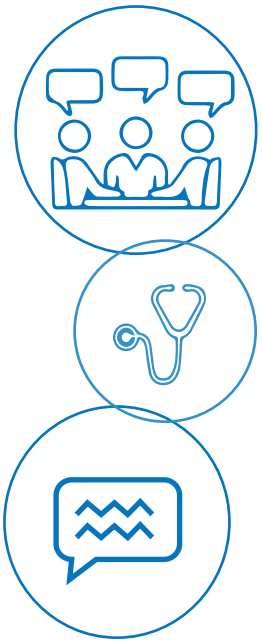
Change Ideas

> Review and update the standards for tube repositioning and skin and mucosal inspection to ensure frequent assessment of the risk for injury.

> Develop a process for a bedside debriefing when a skin injury occurs to identify possible opportunities for improvement in equipment, procedures or workflows.

Suggested Process Measures for Your Test of Change

- Percent compliance with skin-injury prevention standards
- Percent of skin or mucosal injuries that had a bedside debriefing conducted after discovery of injury



Secondary Driver > IMPLEMENT EARLY WEANING AND EXTUBATION PROCEDURES

Coordinated spontaneous awakening trials (SAT) and spontaneous breathing trials (SBT) promote early weaning and extubation. This method allows for a reduction in the number of days on the ventilator and fewer days with an airway device, thereby decreasing the potential for harm.[14]

Change Ideas

> Adopt SATs, coordinated with SBTs to promote early weaning and extubation.

> Develop standing orders for SAT and SBT for all intubated patients.

> Ensure multidisciplinary rounds are conducted daily and that SAT and SBT-trial progress is reported.

Suggested Process Measures for Your Test of Change

- Percent compliance with SATs and SBTs for intubated patients
- Percent compliance with sharing of SAT and SBT-trial progress during daily multidisciplinary rounds

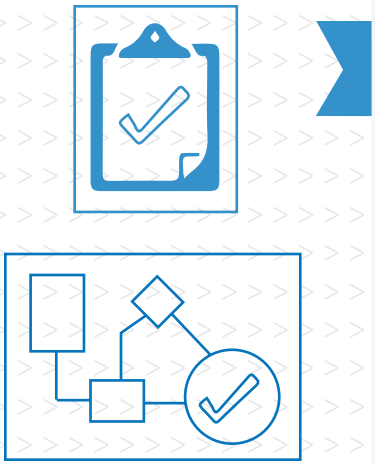
Hardwire the Process

Standardizing the procedures in safe airway maintenance can hardwire the interventions of airway securement and skin-injury prevention. Ventilator-management order sets, including SAT and SBT, assist in hardwiring the components for early weaning and extubation. Multidisciplinary rounds can be used to monitor the aspects of the procedure and further promote the standards for safe airway maintenance while involving all disciplines in the efforts.

Primary Driver:

DEVELOP AN AIRWAY SAFETY PROGRAM

An airway safety program is a key part of improvement efforts.[15] The four components that promote a successful safety program comprise the secondary driver below.



Secondary Driver > PREVENTION, PRACTICE, PERSONNEL AND PERFORMANCE

Prevention focuses on the early identification of patients who are at risk for airway compromise.

Practice encompasses simulation training for various types of airway complications to ensure all members of the health care team are prepared to respond. Simulation training should include practice in airway establishment for physicians and the experts who may be serving as back ups (i.e., nurse anesthetists), as well as dry runs with the ICU and ED teams to streamline the necessary procedures. Teams should have simulation practice and training on how to address airway dislodgements and how to utilize algorithms for patients with difficult airways. Simulation training is also important for personnel who will be assisting with transporting, repositioning, or exercising patients with airways.

Personnel emphasizes the need for a qualified specialist for urgent and unanticipated airway complications 24 hours a day, 7 days a week. It may be necessary to train additional physicians or health professionals in other disciplines, such as respiratory therapy, to ensure available expertise in this area. To promote automatic and efficient responses in urgent situations, develop escalation and consultation chains for difficult airways.

Performance requires the creation of a feedback loop to provide timely information to the organization about the quality of care, the patient outcomes and the effectiveness of the implemented measures. These data can identify opportunities for improvement in teams' performance. Timely root cause analysis (RCA) or immediate bedside debriefing for all airway complications will glean invaluable information regarding hospital systems, equipment, training and protocols that impact airway safety. Develop an automatic prompt for RCAs or debriefing for airway complications when the following occur: delays in recognition, delays in airway placement, airway dislodgements and skin/mucosal injuries related to airways.

Change Ideas

> Offer simulation training to multiple department (ED, OR, ICU and OB) staff for difficult airway management.

> Offer simulation training to address tube dislodgment to ICU staff and respiratory therapists.

> Train personnel in airway protection for all patient activities, such as transporting, turning, manipulating and exercising.

> Develop and implement an algorithm to care for patients with difficult airways. (See Appendix II)

> Train airway specialists for back up when expert coverage is delayed or unavailable.

> Develop a process for immediate bedside debriefing or RCA for airway safety issues, such as delays in recognition, delays in airway placement, airway dislodgement and skin injury. (See Appendix VIII)

Suggested Process Measures for Your Test of Change

- Percent compliance with RCA completion for airway complications
- Percentage of rapid response team calls and consults for urgent airway issues and intubations

Hardwire the Process

Hardwiring an airway safety program must begin with leadership motivation and support to mitigate barriers and provide necessary resources for equipment and training. Reliable processes in all four areas of the airway safety program (prevention, practice, personnel and performance) along with structured feedback to all staff involved allow the organization to monitor for small failures and proactively improve airway safety while averting catastrophic events.

Choice of Tests and Interventions for Airway Events and Harm Reduction:

IMPLEMENT SMALL TESTS OF CHANGE

Implement the airway-safety ideas one element at a time

PLAN

1. Begin with early recognition of patients at risk for difficult airway or respiratory depression.
2. Adopt and implement a screening tool and/or decision tree for monitoring patients as appropriate based on risk assessment and the type of potential compromise.

DO

1. Ask a receptive, early adopter physician on your improvement committee to trial these tools with his/her next few patients in the emergency department or in the operating room.
2. Ask a receptive nurse and respiratory care practitioner on your committee to trial the screening/decision tree tool.
3. Test "small": coordinate with the physician champion to trial the screening/decision tree tool on one patient, in one unit, with one nurse and one respiratory therapist.

STUDY

Debrief with those involved as soon as possible after the test, asking:

> What happened?

> What went well?

> What didn't go well?

> What do we need to revise for next time?

ACT

Revise and retest with the same physician, the same nurse and the same respiratory care practitioner. After the revisions and retests are successful, disseminate the protocol to a wider group and mentor and monitor the groups' implementations. Plan your next small test of change. How soon can you test it?

Potential Barriers

- Initiatives that involve multiple disciplines and departments may lead to the identification of necessary tasks as "ours" and "theirs". In other words, instead of embracing all aspects of the change process, individuals may label a component of an initiative as beyond their scope of responsibility and avoid collaborating and contributing to team efforts.
- Including key stakeholders, such as physicians, bedside nurses, anesthesiologists, respiratory therapists and senior leaders in improvement teams promotes buy in and engagement. Encourage stakeholders to collaborate in the development of protocols, workflows, peer education programs and performance reviews. However, recognize that some physicians may perceive these quality improvement interventions as unnecessary or intrusive, especially if they are being asked to change their practice or participate in simulation training for skills that they already possess.[16, 17]
- Highlight several physicians to speak about the airway-safety efforts and invite representatives from administration, medicine, nursing, respiratory therapy and anesthesia to participate in this project. This visible commitment will provide early momentum and drive improvement efforts forward.

Enlist administrative leadership as sponsors to help remove or mitigate barriers

- Each institution committed to improving airway safety should have senior leaders involved in setting the aim to ensure the aim is aligned with the organization's strategic goals. When senior leaders approve the aim, they are making a commitment to give the team whatever support and resources are needed to achieve the goals. An executive sponsor can assist with communicating the vision of the change initiative to the organization from a "big picture" perspective. Executive leadership can also help educate employees, mitigate obstacles and barriers that may arise and promote transparency in the RCA processes.
- Enlisting a respected physician or physicians from the relevant departments is crucial in the implementation of changes in practice. Senior leaders from all departments involved (e.g., medicine, nursing, respiratory) will promote the successful adoption of new ideas and change processes by communicating that change and improvement are beneficial for both patients and staff.

Change not only "The Practice," but also "The Culture"

To achieve these improvement goals, everyone caring for patients who may need airway assistive devices or who have airway assistive devices must be involved. Leadership must communicate the need for individual awareness and commitment to this effort. Work processes must be carefully scripted and standardized, a team effort that crosses disciplines and departments.

To promote successful change, three levels of participants should be engaged:

> An active working team responsible for daily planning, documentation, communication, education, monitoring and evaluation of the change activities.
  - The working team must be multidisciplinary, with representation from all departments involved in the change processes (e.g., doctors, nurses, respiratory therapists and other relevant staff such as clerks and central supply technicians). Team members should be knowledgeable about the specific aim to reduce airway complications, the current local work processes, the associated literature, the new procedures to be implemented and any environmental or staffing issues that may develop with these changes.
  - The leadership group must be made up of individuals who provide resources, monitor overall progress, remove barriers and offer suggestions from an institutional perspective.

> The working team needs a member who holds authority within the organization in order to overcome or mitigate the barriers that may arise. This person should be someone who can provide and allocate the resources the team needs to achieve its goals. This leader needs to understand both the implications for the organization of the proposed changes, as well as the potential unintended consequences the change process might trigger.
  - Finally, providers, including all stakeholders who have an interest in the change, should be involved.

> Effective communication processes are needed to keep providers and other stakeholders informed and to provide avenues to receive feedback. Providers should be encouraged to contribute input and must be confident that their input will be respected and will influence the change process. Provider engagement builds ownership and buy in, and facilitates implementation and utilization of the new processes.

PART 4: CONCLUSION AND ACTION PLANNING

To decrease airway complications, develop an airway safety program composed of prevention, simulation, advanced skill training for providers and development of a strong culture for transparency and learning. Hospitals should start with a strong aim to reduce airway complications, use data to drive change and improvement and evaluate new safety programs for effectiveness.

PART 5: APPENDICES

APPENDIX I: AIRWAY SAFETY TOP TEN CHECKLIST

Associated Hospital/Organization: HRET HIIN

Purpose of Tool: A checklist to review current or initiate new interventions for recognition and prevention of airway events and harm in your facility

Reference www.hret-hiin.org

Airway Safety Top Ten Checklist

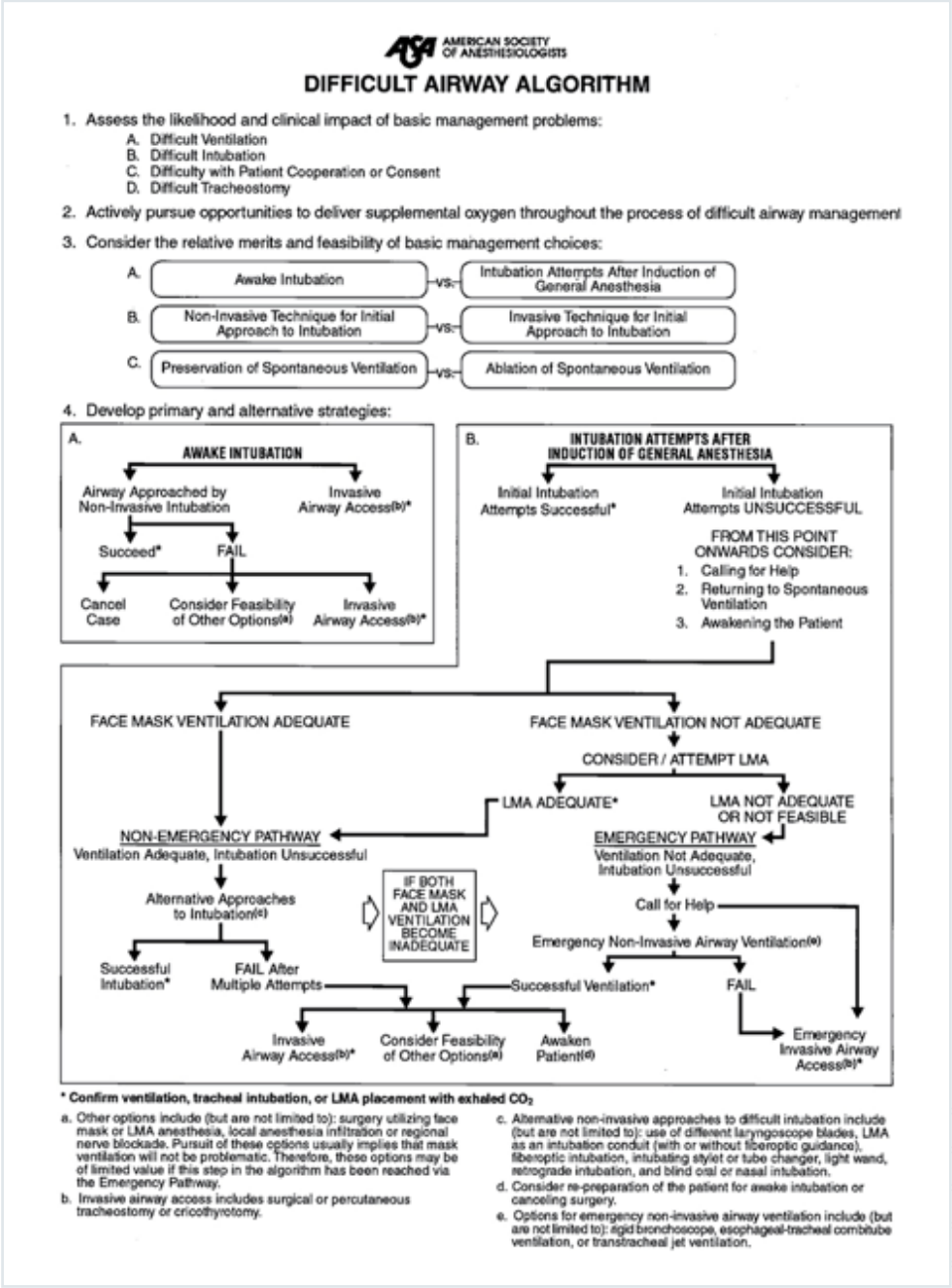
- Adopt an assessment tool to identify patients at high risk for respiratory depression or airway compromise. Use this to implement appropriate monitoring guidelines based on patient risk factors for airway compromise and respiratory depression. Educate family for rapid response team activation.
- Integrate an identification process in the electronic medical record to alert the health care team of the potential for a difficult airway.
- Adopt the Pasero sedation scale (or another validated tool) to assess sedation levels for patients receiving opioids. Use a change in the scale to trigger a rapid response team evaluation.
- Adopt and utilize a standardized airway assessment tool (such as LEMON: Look, Evaluate, Mallampati, Obstruction, Neck) to identify patients with difficult airways.
- Develop airway carts to ensure necessary equipment is readily available to address unanticipated airway events in each relevant unit.
- Develop, adopt and utilize a difficult airway algorithm.
- Adopt spontaneous awakening trials (SATs), coordinated with spontaneous breathing trials (SBTs) to promote early weaning and extubation.
- Update standards for airway device repositioning and for skin and mucosal inspection to ensure skin and mucosa are intact and not at risk for injury.
- Implement simulation training for the health care team in airway assessment, difficult airway management and airway placement.
- Cultivate a process for timely root cause analysis with the bedside staff for airway safety issues such as delays in recognition, delays in airway placement, hypoxemia during intubation, multiple intubation attempts, airway dislodgement and skin injury.

APPENDIX II: SAMPLE DIFFICULT AIRWAY ALGORITHM

Associated Hospital/Organization: American Society of Anesthesiologists

Purpose of Tool: This tool is a guide for care and treatment options for patients who have a difficult airway and can also be useful for training teams who are present for intubations. The tool should be visible in areas where intubations occur.

Reference: Practice Guidelines for Management of the Difficult Airway, retrieved at:
http://anesthesiology.pubs.asahq.org/article.aspx?articleid=1918684



APPENDIX III: PASERO SCALE

Associated Hospital/Organization: Not applicable

Purpose of Tool: Used by staff to assess sedation levels of patients who are receiving opioids to prevent over-sedation and respiratory depression

Reference: Pasero, C. (2009). Assessment of sedation during opioid administration for pain management. *Journal of Perianesthesia Nursing*, 24, 186-190. Retrieved from http://www.mghpcs.org/eed_portal/Documents/Pain/Assessing_opioid-induced_sedation.pdf

Pasero Opioid-induced Sedation Scale (POSS)

S = Sleep, easy to arouse

Acceptable; no action necessary; may increase opioid dose if needed.

> Awake and alert

- Acceptable; no action necessary; may increase opioid dose if needed.

> Slightly drowsy, easily aroused

- Acceptable; no action necessary; may increase opioid dose if needed.

> Frequently drowsy, arousable, drifts off to sleep during conversation

- Unacceptable; monitor respiratory status and sedation level closely until sedation level is stable at less than 3 and respiratory status is satisfactory; decrease opioid dose 25% to 50% or notify prescriber or anesthesiologist for orders; consider administering a non-sedating, opioid-sparing nonopioid, such as acetaminophen or an NSAID, if not contraindicated.

> Somnolent, minimal or no response to verbal or physical stimulation

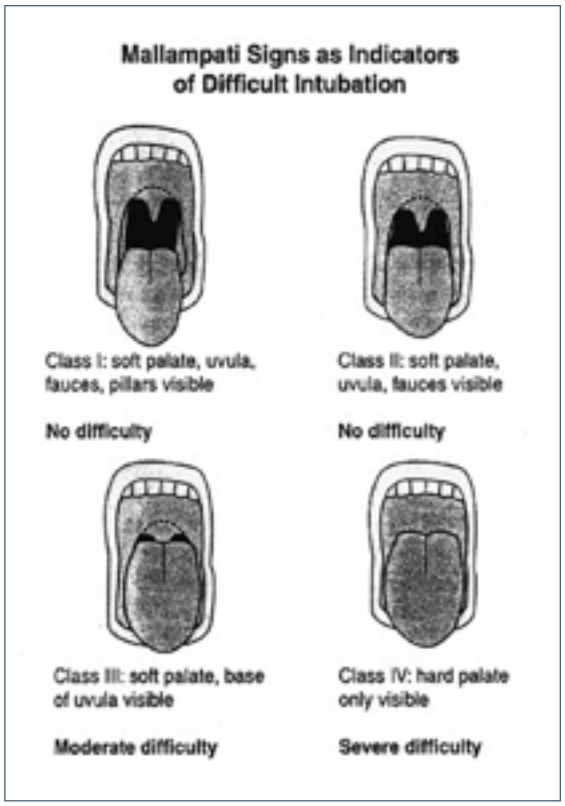
- Unacceptable; stop opioid; consider administering nalaxone; notify prescriber or anesthesiologist; monitor respiratory status and sedation level closely until sedation level is stable at less than 3 and respiratory status is satisfactory.

APPENDIX VI: MALLAMPATI CLASSIFICATION CHART

Associated Hospital/Organization: Not applicable

Purpose of Tool: Used by providers as a portion of an airway assessment prior to intubation to predict difficult airways.

Reference: Birnbaumer, D., Pollack, C.V. (2002). Troubleshooting and managing the difficult airway. *Seminars in Respiratory and Critical Care Medicine,* 23(1). Need to sign up to obtain this tool from http://www.medscape.com/viewarticle/430201_2



APPENDIX V: LEMON ASSESSMENT TOOL

Associated Hospital/Organization: American College of Emergency Room Physicians

Purpose of Tool: Use prior to each intubation to promote early identification of potentially difficult airways

Reference: Borschert, S. (2007) "Think L-E-M-O-N When Assessing a Difficult Airway." Clinical & Practice Management. Elsevier Global Medical News. Retrieved from http://www.acep.org/content.aspx?id=33992

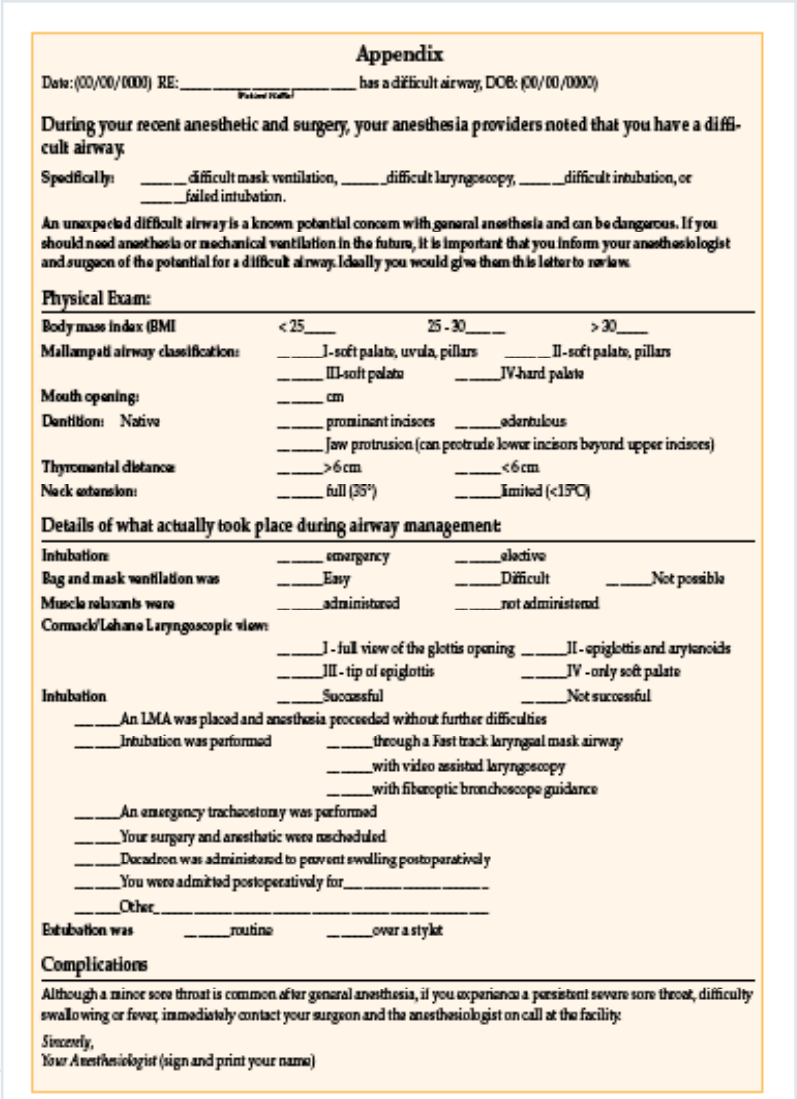
Physical Signs	Less difficult airway	More difficult airway
Look externally	> Normal face and neck > No face or neck pathology	> Abnormal face shape > Sunken cheeks > Edentulous > "Buck teeth" > Receding mandible > "Bull-neck" > Narrow mouth > Obesity > Face or neck pathology
Evaluate the 3-3-2 rule	> Mouth opening > 3F > Hyoid-chin distance > 3F > Thyroid cartilage-mouth floor distance > 2F	> Mouth opening < 3F > Hyoid-chin distance < 3F > Thyroid cartilage-mouth floor distance < 2F
Mallampati	> Class I and II (can see the soft palate, uvula, fauces +/– facial pillars)	> Class III and IV (can only see the hard palate +/– soft palate +/– base of uvula)
Obstruction	> None	> Pathology within or surrounding the upper airway (e.g., peritonsillar abscess, epiglottis, retropharyngeal abscess)
Neck Mobility	> Can flex and extend the neck normally	> Limited ROM of the neck

APPENDIX VI: DIFFICULT-AIRWAY COMMUNICATION TOOL

Associated Hospital/Organization: Anesthesia Patient Safety Foundation

Purpose of Tool: Communication tool used to track and identify patients with difficult airways; used by patients to distribute to future providers to prevent adverse airway events.

Reference: Koenig, H. (2010). No more difficult airway, again! Time for consistent standardized written patient notification of a difficult airway. *The Official Journal of Anesthesia Patient Safety*. Retrieved from http://www.apsf.org/newsletters/html/2010/summer/06_diffairway.htm



Appendix

Date: (00/00/0000) RE: _____ has a difficult airway, DOB: (00/00/0000)

During your recent anesthetic and surgery, your anesthesia providers noted that you have a difficult airway.

Specifically: _____difficult mask ventilation, _____difficult laryngoscopy, _____difficult intubation, or _____failed intubation.

An unexpected difficult airway is a known potential concern with general anesthesia and can be dangerous. If you should need anesthesia or mechanical ventilation in the future, it is important that you inform your anesthesiologist and surgeon of the potential for a difficult airway. Ideally you would give them this letter to review.

Physical Exam:

Body mass index (BMI < 25____ 25 - 30____ > 30____

Mallampati airway classification: _____I-soft palate, uvula, pillars _____II-soft palate, pillars
_____III-soft palate _____IV-hard palate

Mouth opening: _____ cm

Dentition: Native _____prominant incisors _____edentulous
_____Jaw protrusion (can protrude lower incisors beyond upper incisors)

Thyromental distance: _____>6 cm _____<6 cm

Neck extension: _____full (35°) _____limited (<15°C)

Details of what actually took place during airway management:

Intubation: _____emergency _____elective

Bag and mask ventilation was _____Easy _____Difficult _____Not possible

Muscle relaxants were _____administered _____not administered

Cormack/Lehane Laryngoscopic view:
_____I - full view of the glottis opening _____II - epiglottis and arytenoids
_____III - tip of epiglottis _____IV - only soft palate

Intubation _____Successful _____Not successful

_____An LMA was placed and anesthesia proceeded without further difficulties
_____Intubation was performed _____through a Fast track laryngeal mask airway
_____with video assisted laryngoscopy
_____with fiberoptic bronchoscope guidance
_____An emergency tracheostomy was performed
_____Your surgery and anesthetic were rescheduled
_____Decadron was administered to prevent swelling postoperatively
_____You were admitted postoperatively for_____
_____Other_____

Extubation was _____routine _____over a stylet

Complications

Although a minor sore throat is common after general anesthesia, if you experience a persistent severe sore throat, difficulty swallowing or fever, immediately contact your surgeon and the anesthesiologist on call at the facility.

Sincerely,
Your Anesthesiologist (sign and print your name)

APPENDIX VII: RASS SCALE

Associated Hospital/Organization: Not applicable

Purpose of Tool: A clinically useful tool to assess the level of consciousness and agitated behavior in ICU patients that can be used to guide sedation and assist in communication among care providers

Reference: Sessler, C.N., Gosnell, M.S., Grap, M.J., Brophy, G.M., O'Neal, P.V., Keane, K.A., Tesoro, E.P., Elswick, R.K. (2002). The Richmond Agitation–Sedation Scale. *American Journal of Respiratory and Critical Care Medicine,* 166(10), 1338-1344. Retrieved from http://www.atsjournals.org/doi/full/10.1164/rccm.2107138

Richmond agitation sedation scale

Score	Term	Description
	Combative	Overtly combative or violent; immediate danger to staff
	Very agitated	Pulls on or removes tube(s) or catheter(s) or has aggressive behavior toward staff
	Agitated	Frequent non-purposeful movement or patient–ventilator dyssynchrony
	Restless	Anxious or apprehensive but movements not aggressive or vigorous
	Alert and calm	
	Drowsy	Not fully alert, but has sustained (more than 10 seconds) awakening, with eye contact, to voice
	Light sedation	Briefly (less than 10 seconds) awakens with eye contact to voice
	Moderate sedation	Any movement (but no eye contact) to voice
	Deep sedation	No response to voice, but any movement to physical stimulation
	Unarousable	No response to voice or physical stimulation

Procedure

1. Observe patient. Is patient alert and calm (score 0)?
   > Does patient have behavior that is consistent with restlessness or agitation (score +1 to +4 using the criteria listed above, under DESCRIPTION)?
2. If patient is not alert, in a loud speaking voice, state patient's name and direct patient to open eyes and look at speaker.
   > Repeat once if necessary. Can prompt patient to continue looking at speaker.
   > Patient has eye opening and eye contact, which is sustained for more than 10 seconds (score −1).
   > Patient has eye opening and eye contact, but this is not sustained for 10 seconds (score −2).
   > Patient has any movement in response to voice, excluding eye contact (score −3).
3. If patient does not respond to voice, physically stimulate patient by shaking shoulder and then rubbing sternum if there is no response to shaking shoulder.
   > Patient has any movement to physical stimulation (score −4).
   > Patient has no response to voice or physical stimulation (score −5).

APPENDIX VIII: ROOT CAUSE ANALYSES IN AIRWAY SAFETY

Associated Hospital/Organization: Not applicable

Purpose of Tool: Ideas to be considered when initiating Root Cause Analysis (RCA) for adverse airway events

Reference: Latino, RJ. (2014) "Root Cause Analysis Training, Consulting and Software | Reliability Center Inc." Root Cause Analysis Training, Consulting and Software | Reliability Center Inc. N.p.,n.d.

Special Considerations for the Development of Root Cause Analyses (RCAs):

- Enlist leadership commitment and support of the RCA concepts, and promote an understanding of the benefits of this method of discovery.
- Allow any member of the team to trigger an RCA for airway complications.
- Ensure that RCA leaders and facilitators are trained to conduct the RCA in a non-punitive, non-judgmental environment so as to promote learning rather than blame.
- Develop a systematic process to facilitate discussion and discovery sessions.
- Promote the participation of the bedside staff in the bedside debriefing and/or RCA process. Invite the staff who were involved in the event to participate. They often know the gaps and obstacles that may have contributed to a complication.
- Conduct an RCA as close to the event as possible, both in timing and proximity. For example: gather a group (physician, nurse, nurse manager, respiratory therapist, quality leader, wound-care specialist) together (in a private location not far from the patient's room) during the same shift in which a skin injury was identified.
- Collect facts and evidence about the incident (not hearsay information).
- Seek to understand why good people might sometimes make bad decisions. Why did the person who made an unfortunate decision think it was the right thing to do at the time? The goal of this inquiry is to obtain clues about a provider's situational awareness to try to understand all the rationales for the decisions made.
- Aggregate RCA results into an easily searchable database that can serve as a resource to instruct others about "lessons learned."
- RCA, when used properly, is a form of "corporate memory." This memory can be lost with retirements, downsizing, and attrition. Preventable misfortunes may then recur.
- RCA can help transform a reactive culture (i.e., one that reacts to problems) into a forward-looking culture that is pro-active (i.e., prevents problems before they occur or addresses problems before they escalate). In environments where the RCA process is used, the frequency of problems and negative incidents is reduced.[18]

PART 6: REFERENCES

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