Standards Mandating Capnography Monitoring

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AAAAPSF (American Association for Accreditation of Ambulatory Plastic Surgery Facilities, Inc.)

2003

"ANESTHESIA MONITORING - applicable to all anesthesia…Ventilation as noted by:…
Monitoring of end tidal expired CO_2 including volume, Capnography/Capnometry, or mass spectroscopy"

1999

"Every patient receiving general anesthesia shall have the adequacy of ventilation continually evaluated. Qualitative clinical signs such as chest excursion, observation of the reservoir breathing bag and auscultation of breath sounds are useful. Continual monitoring for the presence of expired carbon dioxide shall be performed unless invalidated by the nature of the patient, procedure or equipment. Quantitative monitoring of the volume of expired gas is strongly encouraged." (The mandatory use of CO_2 monitoring will apply to wherever drugs that are capable of interfering with airway protective reflexes are given.) (General anesthesia, Procedural Sedation, Analgesia) (Intubated, non- intubated, in and out of the OR)

AAMS (Association of Air Medical Services)

2004

Equipment specific to a critical patient: Include but not limited to:

1. Invasive monitors – Swan Ganz, arterial lines, CVP, ICP needle
2. Cardiac Assist Devices – pacemakers, intra-aortic balloon pump, ventricular assist device, extra-corporeal support (ECMO), 12 lead monitoring, interpretation and intervention
3. Specialty Drug Delivery – epidural catheters, intra-osseous lines
4. Respiratory equipment – ventilators, artificial airways, chest tubes, capnography

AAP (American Academy of Pediatrics)

2006

Health care providers should confirm endotracheal tube placement immediately after intubation, during transport and whenever the patient is moved. Exhaled CO_2 should be monitored in patients with an endotracheal tube both in the pre-hospital and hospital settings, as well as during all transport, by using a colorimetric detector or capnography.

2004

Guidelines and Levels of Care for Pediatric Intensive Care Units

Respiratory Equipment

Mechanical ventilators suitable for pediatric patients of all sizes must be available for each level I and level II PICU bed. Equipment for chest physiotherapy and suctioning, spirometers, and oxygen analyzers must always be available for every patient. Oxygen monitors (pulse oximeters and transcutaneous oxygen monitors) and CO_2 monitors (transcutaneous and end-tidal) are required; portable (transport) ventilators are desired.

American Academy of Pediatrics, American Academy of Pediatric Dentistry

2006

Expired carbon dioxide monitoring is valuable to diagnose the simple presence or absence of respirations, airway obstruction, or respiratory depression, particularly in patients sedated in less accessible locations, such as MRI or computerized axial tomography devices or darkened rooms. The use of expired carbon dioxide monitoring devices is encouraged for sedated children particularly in situations where other means of assessing the adequacy of ventilation are limited.

AARC (American Association for Respiratory Care)

2007

BA 10.0 RESOURCES

10.1.2.5 Capnograph

10.3.3 The bronchoscopy assistant must be trained in monitoring and evaluating the patient's clinical condition as reflected by pulse oximetry, capnography, electrocardiogram, and stability of or changes in mechanical ventilation parameters, and be capable of relating changes in clinical condition to disease state, procedure, or drugs administered for the procedure.

BA 11.0 MONITORING

Patient monitoring should be done before, at regular intervals during, and after bronchoscopy until the patient meets appropriate discharge criteria. For no or minimal sedation, less monitoring is necessary. For moderate and deep sedation, more monitoring should be done. The following should be monitored before, during, and/or after bronchoscopy, continuously, until the patient returns to his pre-sedation level of consciousness.

11.1.5 SpO_2, FIO_2 and $etCO_2$

2003

Capnography should not be mandated for all patients receiving mechanical support, but it may be indicated for: Evaluation of the exhaled [CO_2], especially end-tidal CO_2; Monitoring severity of pulmonary disease and evaluating response to therapy; as an adjunct to determine that tracheal rather than esophageal intubation has taken place; continued monitoring of the integrity of the ventilatory circuit; evaluation of the efficiency of mechanical ventilatory support; monitoring adequacy of pulmonary, systemic, and coronary blood flow; monitoring inspired CO_2 when CO_2 is being therapeutically administered; graphic evaluation of the ventilatory-patient interface; measurement of the volume of CO_2 elimination to assess metabolic rate and/or alveolar ventilation.

Hazards and Complications: Warns against the addition of excessive weight on the endotracheal tube.

American Academy of Sleep Medicine

2007

Standard 10: The comprehensive polysomnogram must record sufficient data for sleep stage scoring and evaluation of major sleep disorders. Parameters must include: ECG, EOG, chin and leg EMG, respiratory monitoring, oxygen saturation, and EKG.

Standard 13: The laboratory must have written protocols for the following:

continued

13d: Other monitoring procedures employed at the laboratory such as infant and pediatric polysomnography, actigraphy, maintenance of wakefulness testing, capnography, and temperature monitoring.

ACEP (American College of Emergency Physicians)

2009

ACEP Policy Statement revised and approved by the ACEP Board of Directors April 2009.

ETT Placement

End-tidal carbon dioxide detection is the most accurate technology to evaluate endotracheal tube position in patients who have adequate tissue perfusion. Properly placed endotracheal tubes may become displaced due to movement of patients and/or equipment. Continuous assessment of correct endotracheal tube placement with continuous end-tidal carbon dioxide monitoring is ideal.

2005

Godwin SA, Caro DA, Wolf SJ, Jagoda AS, Charles R, Marett BE, Moore J, American College of Emergency Physicians. Clinical policy: procedural sedation and analgesia in the emergency department. Ann Emerg Med 2005 Feb;45(2):177-96.

Sedation in the Emergency Department

Capnometry is a technique used to monitor $etCO_2$ and, therefore, may detect early cases of inadequate ventilation before oxygen desaturation takes place. An increase in $etCO_2$ might be the only clue to hypoventilation and potential respiratory compromise. The authors conclude that in the presence of $etCO_2$ monitoring, these identifiers may allow more rapid identification of hypoventilation than pulse oximetry alone. In the study, pulse oximetry would have identified only 11 of the 33 patients meeting the predetermined definitions for respiratory depression of an oxygen saturation less than 90%, $etCO_2$ of greater than 50 mm Hg, or an absent waveform.
Interventions and practices considered: Pulse oximetry and capnometry if indicated
How should respiratory status be assessed? Consider capnometry to provide additional information regarding early identification of hypoventilation.

Verification of Endotracheal Tube Placement

Standard physical examination methods, such as auscultation of lungs and epigastrium, visualization of chest movement and fogging in the tube, are not sufficiently reliable to exclude esophageal intubation in all situations. End-tidal CO_2 detection, either qualitative, quantitative or continuous, is the most accurate and easily available method to monitor correct endotracheal tube position in patients who have adequate tissue perfusion. Pulse oximetry and esophageal detector devices are not as reliable as end-tidal CO_2 determinations in patients who have adequate tissue perfusion.

Michael L. Carius, President of ACEP. "This new policy supports the use of carbon dioxide monitoring as the most effective method of confirming that patients have been intubated correctly."

Consider capnometry to provide additional information regarding early identification of hypoventilation.

continued

2001

Among prehospital providers, reports of missed intubations range between 0-5%, although a recent study demonstrated a substantially higher rate (25%) of misplaced endotracheal tubes when patients intubated in the field were re-evaluated upon presentation to the emergency department.

Pulse oximetry alone is inadequate because desaturation as a marker for a misplaced endotracheal tube can be a late finding depending on the amount of pre-oxygenation the patient has undergone.

End-tidal CO_2 detection approaches 100% sensitivity and specificity in the patient with spontaneous circulation. Several professional organizations including the American Society of Anesthesiologists, the National Association of EMS Physicians, and the American Heart Association recommend utilizing secondary tube confirmation techniques such as end-tidal CO_2 measurements.

AHA (American Heart Association)

2010

American Heart Association (AHA) Guidelines for Cardiopulmonary Resuscitation (CPR) and Emergency Cardiovascular Care (ECC) of Pediatric and Neonatal Patients: Neonatal Resuscitation Guidelines

Part 8: Adult Advanced Cardiovascular Life Support

8.1: Adjuncts for Airway Control and Ventilation

Advanced Airways - Endotracheal Intubation

Continuous waveform capnography is recommended in addition to clinical assessment as the most reliable method of confirming and monitoring correct placement of an endotracheal tube (Class I, LOE A). Providers should observe a persistent capnographic waveform with ventilation to confirm and monitor endotracheal tube placement in the field, in the transport vehicle, on arrival at the hospital, and after any patient transfer to reduce the risk of unrecognized tube misplacement or displacement. Effective ventilation through a supraglottic airway device should result in a capnograph waveform during CPR and after ROSC (S733).

8.2: Management of Cardiac Arrest

Monitoring During CPR - End-Tidal CO_2

…it is reasonable to consider using quantitative waveform capnography in intubated patients to monitor CPR quality, optimize chest compressions, and detect ROSC during chest compressions or when rhythm check reveals an organized rhythm (Class IIb, LOE C). If $PETCO_2$ is <10 mm Hg, it is reasonable to consider trying to improve CPR quality by optimizing chest compression parameters (Class IIb, LOE C). If $PETCO_2$ abruptly increases to a normal value (35 to 40 mm Hg), it is reasonable to consider that this is an indicator of ROSC (Class IIa, LOE B). The value of using quantitative waveform capnography in nonintubated patients to monitor and optimize CPR quality and detect ROSC is uncertain (Class IIb, LOE C) (S740).

Part 14: Pediatric Advanced Life Support

Verification of Endotracheal Tube Placement - Exhaled or End-tidal CO_2 Monitoring

When available, exhaled CO_2 detection (capnography or colorimetry) is recommended as confirmation of tracheal tube position for neonates, infants, and children with a perfusing cardiac rhythm

continued

AHA (American Heart Association) cont.

in all settings (eg, prehospital, emergency department [ED], ICU, ward, operating room) (Class I, LOE C) and during intrahospital or interhospital transport (Class IIb, LOE C). (S 880).

Part 14: Pediatric Advanced Life Support cont.

CPR for newborns with Cardiac Arrest of Cardiac Origin - End-tidal CO_2 Monitoring

Continuous capnography or capnometry monitoring, if available, may be beneficial during CPR, to help guide therapy, especially the effectiveness of chest compressions (Class IIa, LOE C) (881).

Part 15: Neonatal Resuscitation

Assisted Ventilation Devices - Endotracheal Tube Placement

Exhaled CO_2 detection is effective for confirmation of endotracheal tube placement in infants, including very low-birth-weight infants (Class IIa, LOE) (S913) …Exhaled CO_2 detection is the recommended method of confirmation of endotracheal tube placement (Class IIa, LOE B)(S913).

APSF (Anesthesia Patient Safety Foundation)

2009

APSF Newsletter, Summer, 2009

PCA

We recommend consideration of the use of technology to continuously monitor ventilation in all patients receiving postoperative PCA or neuraxial opioid pain management. Even if ventilation assessments are performed intermittently during routine nursing observations, the use of respiratory monitoring technology (capnometry) would improve the detection of progressive or unrecognized hypoventilation. Consider monitoring ventilation (even if intermittent) with technology capable of detecting progressive hypoventilation.

2007

APSF Newsletter, Winter, 2006-2007

…Thus, immediately, we urge health care professionals to consider the potential safety value of continuous monitoring of oxygenation (pulse oximetry) and ventilation in patients receiving PCA or neuraxial opioids in the postoperative period. Although pulse oximetry will monitor oxygenation during PCA, it may have reduced sensitivity, as a monitor of hypoventilation, when supplemental oxygen is administered. When supplemental oxygen is indicated, monitoring of ventilation may warrant the use of technology designed to assess breathing or estimate arterial carbon dioxide concentrations. Continuous monitoring is most important for the highest risk patients, but depending on clinical judgment, should be applied to other patients….Thus, available monitoring resources will need to be directed to those patients at greatest risk of opioid-induced respiratory depression. In particular, continuous monitoring should be strongly considered in any patient with significant OSA receiving PCA or neuraxial opioids.

ASA (American Society of Anesthesiologists)

2009

Statement on respiratory monitoring during endoscopic procedures

Monitoring for exhaled carbon dioxide should be strongly considered during endoscopic procedures in which sedation is provided with propofol and/or in combination with opioids and

continued

benzodiazepines. Careful attention to airway management must be provided during endoscopic retrograde cholangiopancreaticography (ERCP) procedures performed in the prone position where ventilatory monitoring, airway maintenance, and resuscitation may be especially difficult.

2009

Both the consultants and the ASA members disagree that pulse oximetry monitoring is more likely to detect respiratory depression than are clinical signs.

The consultants and ASA members both agree that end-tidal carbon dioxide monitoring is more likely to detect hypercapnia/hypercarbia and respiratory depression than are clinical signs.

Detection of Respiratory Depression

All patients receiving neuraxial opioids should be monitored for adequacy of ventilation (e.g., respiratory rate, depth of respiration [assessed without disturbing a sleeping patient]), oxygenation (e.g., pulse oximetry when appropriate), and level of consciousness.

2005

Practice Guidelines for the Perioperative Management of Patients with Obstructive Sleep Apnea (OSA)

These guidelines focus on the perioperative management of patients with OSA who may be at risk for perioperative morbidity and mortality because of potential difficulty in maintaining a patent airway. For patients at increase perioperative risk from OSA, the following is recommended...

III. Intraoperative Management...The consultants agree that respiratory CO_2 monitoring should be used during moderate or deep sedation in these patients...

Recommendations

If moderate sedation is used, ventilation should be continuously monitored by capnography or another automated method if feasible because of the increased risk of undetected airway obstruction in these patients.

IV. Postoperative Management…Postoperative concerns in the management of patients with OSA include...the exacerbation of respiratory depression may occur on the third or fourth postoperative day as sleep patterns are reestablished and "REM rebound" occurs.

2004

Statement on the Safe Use of Propofol approved by the ASA House of Delegates, October 2, 2004

"During the administration of propofol, patients should be monitored without interruption to assess levels of consciousness, and to identify early signs of hypotension, bradycardia, apnea, airway obstruction and /or oxygen desaturation. Ventilation, oxygen saturation, heart rate and blood pressure should be monitored at regular and frequent intervals. Monitoring for the presence of exhaled carbon dioxide should be utilized when possible, since movement of the chest will not dependably identify airway obstruction or apnea."

2002

Practice Guidelines for Sedation and Analgesia by Non-Anesthesiologists

"In circumstances where patients are physically separated from the care giver, the Task Force believes that automated apnea monitoring (by detection of exhaled CO_2 or other means) may decrease risks during both moderate and deep sedation…" "Monitoring of exhaled CO_2 should be considered for all patients receiving deep sedation and for patients whose ventilation cannot be directly observed during moderate sedation."

Joint Statement: The American Association for the Study of Liver Diseases, American College of Gastroenterology, American Gastroenterological Association, and American Society for Gastrointestinal Endoscopy

2009

GASTROENTEROLOGY December, 2009;137:2161–2167.

The use of nonanesthesiologist-administered propofol (NAAP) for GI endoscopy

Capnography is recommended when it is difficult to visually assess respiration or during prolonged procedures such as ERCP and EUS. In these clinical settings, capnography has been shown to significantly reduce the incidence of hypoxemia and apnea. Capnography reduces the occurrence of apnea and hypoxemia during ERCP/EUS (grade 2B) and upper endoscopy/colonoscopy (grade 2C).

ASGE (American Society for Gatrointestinal Endoscopy)

2008

Guideline; Sedation and anesthesia in GI endoscopy GASTROINTESTINAL ENDOSCOPY, Volume 68, No. 5 : 2008; 815-826.

Recommendations for propofol use during endoscopy

Monitoring oxygenation by pulse oximetry is not a substitute for monitoring ventilatory function. Capnography should be considered because it may decrease the risks during deep sedation. Continuous monitoring will allow recognition of patients who have progressed to a deeper level of sedation.

Respiratory Depression

Given that hypoxemia resulting from depressed respiratory activity is a principal risk factor for adverse respiratory events during sedation, integrating capnography into patient monitoring protocols may improve safety.

It more readily detects hypoventilation compared with pulse oximetry or visual observation and thereby provides an opportunity for early recognition of depressed respiratory activity. Data are available, however, to support its use during ERCP and EUS. A recent randomized controlled trial using the combination of an opioid and benzodiazepine for elective ERCP and EUS found significantly less hypoxemia in the subjects who received sedation with capnography compared with standard monitoring.

2008

ASGE Standards of Practice Committee, Lee KK, Anderson MA, Baron TH, Banerjee S, Cash BD, Dominitz JA, Gan SI, Harrison ME, Ikenberry SO, Jagannath SB, Lichtenstein D, Shen B, Fanelli RD, Van Guilder T. Modifications in endoscopic practice for pediatric patients. Gastrointest Endosc 2008 Jan;67(1):1-9. [72 references]

Pediatric Sedation

Integrating capnography into monitoring protocols may improve the safety of nonintubated pediatric patients receiving moderate sedation.

continued

2003

Capnography more readily identifies patients with apneic episodes and when used to guide sedation results in less CO_2 retention. Capnography is a superior way to evaluate ventilation, compared with pulse oximetry measurement, which assesses oxygenation.

CSA (California Society of Anesthesiologists)

2008

CSA Guidelines for Deep Sedation by Non-Anesthesiologists; May, 2008.

Adequacy of ventilation

Non-Anesthesiologists Sedation Practitioners, Supervised Sedation Professionals, Education and Training

Monitoring and recognizing abnormalities of physiologic variables, including the following:

Capnographic monitoring. The health professional should be familiar with the use and interpretation of capnographic waveforms to determine the adequacy of ventilation during deep sedation.

ENA (Emergency Nurses Association)

2009

Emergency Nursing Resource: The Use of Capnography During Procedural Sedation/Analgesia in the Emergency Department

Conclusions and recommendations about the use of capnography for procedural sedation and analgesia (PSA) in adults and children in the emergency department:

· Capnography is a useful technique for detecting respiratory depression during and after PSA.

· $EtCO_2$ is a more sensitive indicator of respiratory depression than SpO_2 or clinician assessment during PSA as well as in the recovery phase…

· Capnography is a useful adjunct for monitoring patients during PSA in the emergency department (Level B).

2005

Patients undergoing sedation and analgesia require frequent assessments of their vital signs such as heart rate, blood pressure, respiratory rate, and pulse oximetry; cardiopulmonary status including cardiac monitoring, breath sounds, skin color, oxygen saturation, and exhaled carbon dioxide.

FDA (Food and Drug Administration)

2010

Infusion pump risk reduction strategies for clinicians

Monitor for signs of over- or under-infusion of high-risk medications by using other patient monitoring systems such as cardiac, pulse oximetry, end tidal CO_2, and glucose meters, when applicable.

FDNY (Fire Department City of New York)

2008

New York City Office of Medical Afairs; Policy and Procedure for performing continuous end tidal waveform capnography

ETT Placement/Waveform capnography

According to the New York State Department of Health, the new standard of care for all patients intubated by paramedics in the prehospital setting is monitoring with continuous end-tidal waveform capnography to confirm advanced airway device placement. Patients with pre-existing advanced airways (e.g., advanced nursing facilities patients) requiring mechanical ventilation must have continuous etCO_2 waveform capnography monitoring during treatment / transport.

Indianapolis Coalition for Patient Safety

2010

"Opioid-Induced Respiratory Depression" document consisting of "Facts, Recommendations, and Immediate Steps for Coalition Members."

Ideally, patients would be monitored with both oximetry and capnography. If supplemental oxygen is not being administered, monitoring with only oximetry is acceptable. If supplemental oxygen is administered, monitoring with capnography with or without oximetry is desirable.

Hospital staff should be educated in the manifestations of this complication and how to monitor for it. Significantly, the treatment of hypoxemia in patients receiving opioids will generally include supplemental oxygen, which, in the absence of a concomitant intervention to support ventilation, is the wrong response in patients who are hypoxemic due to opioid-induced respiratory depression. Educate bedside caregivers on the possibility and recognition of respiratory failure with hypercapnea despite the absence of arterial hypoxemia, as when supplemental oxygen is being administered. Emphasis should also be placed on understanding that postoperative desaturation may be due to hypoventilation, and that the addition of supplemental oxygen or increased flow rates of supplemental oxygen are not necessarily the correct treatment.

ISMP (Institute for Safe Medication Practices)

2007

ISMP Medication Safety Alert

"Do not rely on pulse oximetry readings alone to detect opiate toxicity. Use capnography to detect respiratory changes caused by opiates, especially for patients who are at high risk (e.g., patients with sleep apnea, obese patients)."

Establish guidelines for appropriate monitoring of patients who are receiving opiates, including frequent assessment of the quality of respirations (not just respiratory rate) and specific signs of oversedation.

Joint Commission

2009

Goal 16

Improve recognition and response to changes in a patient's condition.

NPSG.16.01.01

The [organization] selects a suitable method that enables health care staff members to directly request additional assistance from a specially trained individual(s) when the [patient]'s condition appears to be worsening. A significant number of critical inpatient events are preceded by warning signs prior to the event. A majority of [patient]s who have cardiopulmonary or respiratory arrest demonstrate clinical deterioration in advance. Early response to changes in a [patient]'s condition by a specially trained individual(s) may reduce cardiopulmonary arrests and [patient] mortality.

2008

Joint Commission Accreditation Program: Hospital Chapter: Provision of Care, Treatment, and Services, 2008; Standard PC.03.01.01

Elements of Performance for PC.03.01.01

1. Individuals administering moderate or deep sedation and anesthesia are qualified and have credentials to manage and rescue patients at whatever level of sedation or anesthesia is achieved, either intentionally or unintentionally.

2006

Provision of Care, Treatment, and Services
The Administration of Moderate or Deep Sedation or Anesthesia

The standards for sedation and anesthesia care apply when patients in any setting receive, for any purpose, by any route, the following:

- General, spinal, or other major regional anesthesia

Or

- Moderate or deep sedation (with or without analgesia) that, in the manner used, may be reasonably expected to result in the loss of protective reflexes

These protocols are consistent with professional standards and address at least the following: Appropriate monitoring of vital signs, including, but not limited to, heart rates and oxygenation, using pulse oximetry equipment, respiratory frequency and adequacy of pulmonary ventilation.

Standard PC.13.30-.40

Patients are monitored during and immediately after the procedure and/or administration of moderate or deep sedation or anesthesia

Elements of Performance

- Appropriate methods are used to continuously monitor oxygenation, ventilation, and circulation during procedures that may affect the patient's physciological status.
- Each patient's physiological status, mental status, and pain level are monitored

continued

Joint Commission cont.

Monitoring is at a level consistent with the potential effect of the procedure and/or sedation or anesthesia.

2004

PCA by proxy errors are highly preventable and can be significantly reduced with adequate and appropriate education and training of staff and family members. To reduce the risk of PCA by proxy overdose, the Joint Commission—on the advice of ISMP and USP—offers the following safe practice recommendations:

Carefully monitor patients. Even at therapeutic doses, opiates can suppress respiration, heart rate and blood pressure, so the need for monitoring and observation is critical. Oximetry and/or capnography monitoring may be appropriate in some cases.

Minnesota EMSC

2005

H. Intubation (without Rapid Sequence Induction)

Patient has no protective airway reflexes.

5. Patent airway assessment.

a) Confirm and document proper ETT placement:

(1) Visualized tube passing through vocal cords

(2) Bilateral breath sounds over lungs and lack of sounds over epigastric area

(3) Rise and fall of chest wall with ventilations

(4) Mist in the tube

(5) Rising pulse oximeter

(6) Positive ET CO_2 device indication.

NASEMSO (National Association of State Emergency Medical Services Directors)

2006

Procedural skills integral to the practice of emergency medical services:

Capnography

Assessment tools and adjuncts: $etCO_2$

National Association of State EMS Officials

2006

Appendix A: Interpretive Guidelines
Airway and Breathing Minimum Psychomotor Skill Set
Paramedic:

· BiPAP/CPAP

· Needle chest decompression

continued

· Chest tube monitoring

· Percutaneous cricothyrotomy

· EtCO2/Capnography

· NG/OG tube

· Nasal and oral endotracheal intubation

· Airway obstruction removal by direct laryngoscopy

· PEEP

National Highway Traffic Safety Administration

2009

National Emergency Medical Services Education Standards, Jan 2009

Clinical Behaviors, Judgements

Safely and effectively perform all psychomotor skills within the National EMS Scope of Practice Model and state Scope of Practice at this level. Airway and Breathing: $etCO_2$ monitoring

North Carolina College of Emergency Physicians

2009

NCCEP Standards for EMS Equipment

Monitoring and Defibrillation: Capnography ($etCO_2$) monitoring, continuous. Baseline equipment required in all systems (including Specialty Care Transport Programs), with EMS personnel credentialed at the specified level--EMT, EMT-I, EMT-P. It is not required but highly recommended that all EMS Systems at all levels work to have waveform Capnography capability at the scene of every emergent event.

Pennsylvania Patient Safety Authority

2007

Patients with known or suspected OSA are at increased risk for life-threatening cardiopulmonary complications. The inherent problem of airway management during administration of general anesthesia and the large patient population with undiagnosed OSA increases the risk of developing complications postoperatively. OSA patients are susceptible to the respiratory depressant effects of sedatives, opioids, and inhaled anesthetics. Guidelines to consider when administering medications include: avoiding the use of sedatives and opioids, reducing doses and titrating slowly when administering sedatives and opioids, and administering local anesthesia whenever possible. Postoperative care is the pivotal time to implement interventions to reduce complications, especially within the first 24 hours. Postoperative risk reduction strategies focus on monitoring patients for an obstructed airway so that early detection may lead to prompt treatment.

The Regional Emergency Medical Services Council of New York City, Inc.

2009

The Regional Emergency Medical Advisory Committee (REMAC) of New York City Prehospital Treatment Protocols; Revision, November, 2009

continued

ETT Placement/Waveform Capnography

The Regional Emergency Medical Services Council of New York City, Inc. cont.

All patients with endotracheal tube placement require continuous end-tidal waveform capnography to confirm advanced airway device placement. When available, the use of waveform capnography should accompany the use of alternative advanced airway devices (i.e. Combitube, King Airway, LMA).

SCCM (The Society of Critical Care Medicine)

2004

American College of Critical Care Medicine of the Society of Critical Care Medicine

Guidelines and Levels of Care for Pediatric Intensive Care Units Guidelines and Levels of Care for Pediatric Intensive Care Units – 11/04/2004

Respiratory Equipment: Mechanical ventilators suitable for pediatric patients of all sizes must be available for each level l and level ll PICU bed. Equipment for chest physiotherapy and suctioning, spirometers, and oxygen analyzers must always be available for every patient. Oxygen monitors (pulse oximeters and transcutaneous oxygen monitors) and CO_2 monitors (transcutaneous and end-tidal) are required.

Bedside monitors: Bedside monitors in all PICUs must have the capability for continuously monitoring heart rate and rhythm, respiratory rate, temperature, hemodynamic pressure, oxygen saturation, end-tidal CO_2, and arrhythmia detection.

2004

Intrahospital Transport

All critically ill patients undergoing transport receive the same level of basic physiologic monitoring during transport as they had in the intensive care unit. In addition, selected patients may benefit from capnography.

Interhospital Transport

Selected patients, based on clinical status, may benefit from the monitoring of intra-arterial blood pressure, central venous pressure, pulmonary artery pressure, intracranial pressure, and/or capnography.

2003

The measurement of exhaled carbon dioxide is the best signal of return of spontaneous circulation during CPR. Capnography is also a useful noninvasive index of the adequacy of pulmonary perfusion during closed-chest cardiac compression. Moreover, the quantitative measurement of end-tidal PCO_2 may have predictive value during CPR.

2003

Level I ICU: Services provided in unit: An ICU has the capability of providing monitoring and support of the critically ill patient. To do so, the ICU is prepared to provide the following: Capnography.

State of New York; State Emergency Medical Advisory Committee

2009

The SEMAC has endorsed and recognized as a standard of care that all out of hospital adult and pediatric patients who require ETT intubation must have waveform capnography in place at the time of intubation and throughout the entire time the ETT is in place. This advisory becomes effective statewide on June 1, 2009.

State of New Jersey, Office of Emergency Medical Services

2009

Rapid Sequence Intubation Policy, October, 2008; effective January 1, 2009

All projects must have the capability of monitoring and recording the following parameters continuously with all intubation attempts. Recordings of these parameters must be documented before and after all intubation attempts for every patient treated with this protocol.

- Waveform capnography (documented to confirm intubation and monitored continuously thereafter). Documentation for all intubated patients must include at least two recorded strips of the waveform capnography: (1) one post intubation to confirm successful placement and (2) one post transfer of the patient to confirm placement. A written protocol should be developed for the use of waveform capnography in intubated patients.

State of Ohio Board of Emergency Medical Services

2008

Rapid Sequence Induction (RSI) for Endotracheal Intubation, October, 2008

It is the position of the EMS Board that RSI can be practiced safely and effectively by EMT-Ps in the prehospital environment, as long as the following conditions are met:

- The service has continuous end tidal CO_2 monitoring capabilities or waveform capnography.

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