NONIN

Waveform Capnography

Essential Information You Can Trust

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When You Can't Wait for Patient Data

In the emergency department, time is everything. To make critical decisions for actions such as CPR and intubation, you need immediate data on perfusion, respiration, and ventilation. The quality of information you get can affect the speed and confidence of your response.

The need for reliable measurements doesn't stop there. From the operating room to the intensive care unit to postoperative recovery, patient monitoring helps inform important treatment choices. That includes both professional care and unsupervised events like patient-controlled analgesia.

Readings from the First Breath

Waveform capnography measures the partial pressure of carbon dioxide (CO_2) during exhalation. End-tidal CO_2 ($EtCO_2$) detected at the end of exhalation provides important information about the health of patients—especially those in respiratory distress, cardiac arrest, or shock. This measurement is displayed as a waveform that shows the respiratory rate and how much CO_2 is present during each stage of respiration. Normal $EtCO_2$ levels are 35 to 45 mm Hg, and the waveform generally has a rectangular shape. As the respiratory rate and tidal volume change, the waveform changes as well.

"Waveform capnography is the standard of care for confirming advanced airway placement. $EtCO_2$ level and ventilation rate can be continuously monitored through all phases of patient contact, and trends can be archived for documentation and quality assurance afterward."

— Bob Sullivan, MS, NRP

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Clinical Challenges

Acute Respiratory Events During Procedural Sedation and Analgesia

In a prospective study of emergency department patients, researchers compared three patient monitoring methods to detect acute respiratory events during procedural sedation and analgesia (PSA): oxygen saturation (SpO_2), clinical ventilation assessment, and capnography ($EtCO_2$).

A study investigator recorded $EtCO_2$ levels and respiratory events during each PSA procedure, with clinical providers blinded to $EtCO_2$ levels. In 70% of patients with acute respiratory events, abnormal $EtCO_2$ findings were documented before changes in SpO_2 or clinically observed hypoventilation.[1]

CAPNOGRAPHY detected changes faster than **PULSE OXIMETRY** or **CLINICAL OBSERVATION**

in **70%** of cases

Read more at: **https://pdfs.semanticscholar.org/b8f0/272a40f13c4fe95afdeda60d2c2dcde8e9e5.pdf**

$EtCO_2$ MEASUREMENT can help users monitor **QUALITY OF CPR**

Organ Perfusion During Cardiopulmonary Resuscitation

Successful resuscitation from cardiac arrest depends on provision of adequate blood flow to vital organs generated by cardiopulmonary resuscitation (CPR). Measurement of end-tidal expiratory pressure of carbon dioxide ($EtCO_2$) using capnography provides a noninvasive estimate of cardiac output and organ perfusion during cardiac arrest.

During experimental CPR, $EtCO_2$ has shown a significant positive correlation with cardiac index and with coronary and cerebral perfusion pressures. It can be used to monitor the quality of CPR and predict return of spontaneous circulation (ROSC).[2]

Read more at: **https://www.cercp.org/images/stories/recursos/articulos_mes/noviembre_2018_articulo.pdf**

1. Does End-tidal Carbon Dioxide Monitoring Detect Respiratory Events Prior to Current Sedation Monitoring Practices? John H. Burton, MD, John D. Harrah, MD, Carl A. Germann, MD, Douglas C. Dillon, MD
2. Capnography During Cardiac Arrest: Claudio Sandroni, Paolo De Santis, Sonia D'Arrigo, Istituto Anestesiologia e Rianimazione Università Cattolica del Sacro Cuore, Fondazione Policlinico Universitario "Agostino Gemelli" IRCCS, Largo Francesco Vito, 1–00168 Rome, Italy

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Use Cases for Capnography

Capnography provides valuable patient information in a wide range of care environments, from emergency medicine to procedural or conscious sedation to sleep laboratories. Professional groups recommend the use of capnography as a standard practice in settings like these:

Emergency Department

The American Heart Association (AHA) 2010 Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Recommend continuous waveform capnography during CPR on intubated patients

Intensive Care Unit

The Royal College of Anaesthetists and Difficult Airway Society studies, 2011[3] recommend capnography for all intubated patients

General Medical and Surgical Hospital Ward

The Anesthesia Patient Safety Foundation (APSF)[4] recommends continuous ventilation monitoring for all postoperative patients, and patients receiving supplemental oxygen, to mitigate the effects of opioid-induced respiratory depression

Procedural or Conscious Sedation

The American Society of Anesthesiologists (ASA) Standard of Basic Anesthetic Monitoring (updated 2011) requires capnography during procedural sedation

Patient-Controlled Analgesia (PCA)

The Joint Commission Sentinel Event Alert 2004 Recommends capnography monitoring for patients receiving opiates that can suppress respiration

Oral and Maxillofacial Surgery (OMS)

The American Association of Oral and Maxillofacial Surgeons recommends the use of capnography for patients under moderate sedation, deep sedation, and general anesthesia[5]

Sleep Laboratory

The American Association for Sleep Medicine (AASM)[6] scoring manual requires monitoring of either transcutaneous PCO_2 or end-tidal CO_2 for pediatric sleep studies

3. Cook TM, Woodall N, Frerk C. British Journal of Anaesthesia 2011; 106(5):617-31
4. APSF Essential Monitoring Strategies to Detect Clinically Significant Drug-Induces Respiratory Depression in the Postoperative Period, June 2011
5. Anesthesia in Outpatient Facilities, AAOMS ParCare 2012
6. AASM Manual for the Scoring of Sleep and Associated Events; Rules, Terminology and Technical Specifications

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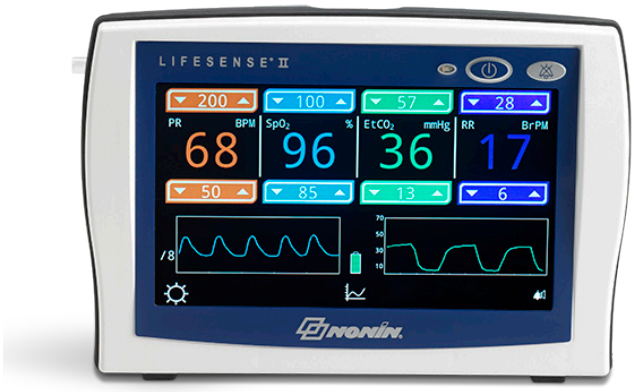
Nonin Capnographs

Nonin Medical offers $EtCO_2$ monitoring solutions for emergency departments, operating rooms, intensive care units, postoperative care, sleep labs, sedation dentistry, and homecare.

- RespSense® Capnograph*
- RespSense® II Capnograph
- LifeSense® Capnograph and Pulse Oximetry Monitor*
- LifeSense® II WIDESCREEN™ Capnograph and Pulse Oximeter



LifeSense® II WIDESCREEN™ Capnograph and Pulse Oximeter

All models feature Nonin sidestream $EtCO_2$ technology, which delivers fast, first-breath detection of respiratory rate and $EtCO_2$. LifeSense models include pulse oximetry functions with exclusive Nonin PureSAT® technology.

Nonin also makes a capnograph for veterinarians—the LifeSense VET Capnograph and Pulse Oximeter. This multiparameter monitor measures and displays $EtCO_2$ and fractional inspired CO_2 values, respiration, SpO_2, and pulse rate of intubated animals.

* RespSense II and LifeSense II carry the CE mark; RespSense and LifeSense do not.

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Comprehensive Monitoring Solutions

Reliable Measurements in Multiple Environments

Nonin designs and manufactures reliable capnography and oximetry solutions for use in a diverse range of settings.

Our sidestream capnography technology provides fast, first-breath detection of breathing irregularities.

Full Suite of Measurements†

rSO_2

Cerebral & Tissue Oximetry

$EtCO_2$

Capnography & Capnometry

Pulse Oximetry

SpO_2 COHb MetHb

Respiratory Rate

Pulse Rate

Portfolio of Products

Fingertip
Rugged designs with clinically proven accuracy

Handheld
Proven durability for portable monitoring requirements

Patient Worn
Flexible design for stationary or ambulatory monitoring

Adult, Pediatric & Neonate Sensors
The most durable sensors on the market, with options for every patient

Tabletop
Simple and dependable monitoring across all care settings

Multi-Parameter Integration
Versatile technology available in a variety of monitoring products

† Not all parameters are approved in all countries. Respiratory rate, COHb, and MetHb are not available in the United States.

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Count on Nonin.

Performance

Responsive, reliable measurements you can trust in any situation

Product

Durable devices built to withstand repeated use for long-lasting peformance

People

Dedicated sales, engineering and service support for over 30 years

To learn more about our technologies and products, visit nonin.com/technologies/capnography

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