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Perspective

End-Tidal Carbon Dioxide Monitoring During Patient Transport and Handoff Procedures

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Improving handoffs among healthcare professionals has been identified as an important element to enhance patient safety as well as a key factor that now impacts Medicare reimbursement [1,2]. Furthermore, the Joint Commission announced the handoff as a National Patient Safety Goal (NPSG) and has required health care providers to develop a standardized approach to the handoff process [3]. A component of the handoff process is situational awareness to avoid preventable adverse events. According to the Agency of Healthcare Research and Quality (AHRQ), handoffs and transitions of care remain highly fragmented in the United States health care industry [3]. Immediately preceding the handoff is often the procedure of patient transport in which a patient travels from one area of the hospital to another area of the hospital. Knight et al., depicted that intra hospital transportation correlates with substantial complications which impact patient safety [4]. Appropriate patient monitoring, including capnograpy monitoring, could facilitate increased awareness during the patient transport and handoff process.

Capnography monitoring depicts the concentration and numeric value of carbon dioxide content during the inspiration and expiration phase of the ventilator cycle. Capnography monitoring has decreased major respiratory events and is routinely used for patient monitoring in various hospital units [5]. The value ofcapnography has proven to be more life saving in non-operating room environments (e.g. gastroenterology) than pulse oximetry alone. Being on the forefront of $etCO_2$ monitoring, the specialty of anesthesiology established capnography as a standard of care in 2011. This standard requires capnography monitoring during all monitored anesthesia cases unless extenuating circumstances dictate otherwise. Moreover, capnography monitoring is now recommended during interventional radiology exams, pediatric sedation, and emergency department procedures, and cardiac arrests [6]. Cook suggested the biggest challenge of capnography implementation is appropriate interpretation. Outside of anesthesia, many providers lack the ability to differentiate normality and abnormality in crisis situations [5]. However, the clinical utility of capnography supplies health care providers with advantageous information regarding the patient's physiological status. A slow to very abrupt rise in $etCO_2$ could indicate sepsis, malignant hyperthermia, pulmonary embolus, and carbon monoxide, return of circulation during cardiopulmonary resuscitation, and preexisting chronic obstructive pulmonary disease or obstructive sleep apnea. On the other hand, a decrease in $etCO_2$, could signal pulmonary emboli, hypothermia, low metabolic state, esophageal placement or malposition of the endotracheal tube, ventilator disconnection, cardiopulmonary arrest, cardiac output decline, and hyperventilation [6].

Studies have overwhelmingly confirmed the benefits of capnography monitoring in saving patient's lives in a variety of hospital areas [5-7]. With more associations and organizations advocating the use of $etCO_2$, administrators and leaders should earnestly consider the application of capnography technology for their facilities. Hospital-wide education should occur to familiarize all staff with the physiology of capnography monitoring. Future research should incorporate end-tidal carbon dioxide monitoring during the patient transport and handoff process to determine if patient safety is enhanced.

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