

# Anesthesia Outside the Operating Room in Adults: A Matter of Safety?

*Guest Editorial*

*Panagiotis Kiekkas, PhD, RN*

**ALTHOUGH IT HAS BEEN** more than 10 years, I clearly remember the first time that, as an anesthesiology department nurse, I was sent to the endoscopy suite to care for a patient scheduled for colonoscopy under sedation. The anesthesiologist I was co-operating with had a rather loose mood and informed me that there was no reason to worry about anything, since this would be a mild sedation case. Indeed, nothing went wrong during that first time. However, mishaps did occur in a few of the following cases in which I participated in anesthesia provision outside the operating room (OR). These mishaps made me seriously wonder whether a loose mood is appropriate when anesthesia needs to be provided far from the comfort and safety of the OR.

During the last 2 decades, the demand for anesthesia care outside of the traditional OR environment has been gradually expanded.<sup>1,2</sup> This demand emanates from a variety of diagnostic or therapeutic procedures conducted in emergency departments, gastrointestinal endoscopy, cardiology, pulmonary medicine and radiology suites, psychiatric or pediatric wards, and office areas (plastic, dental surgeries, etc). The expansion of this demand has been mainly attributed to advances in available interventional techniques, OR time and cost constraints, and increased patient desire for unconsciousness and pain relief.<sup>2</sup> According to

recent reports from the United States and European countries, the proportion of anesthetic activity at remote locations has reached as much as 12% to 15% of total anesthesia services provided.<sup>1,3</sup>

Provision of anesthesia outside of the OR generally aims to allow patients to tolerate invasive procedures by relieving anxiety and pain while maintaining adequate cardiorespiratory function.<sup>4</sup> In this context, many terms have been used for describing anesthesia delivery including procedural sedation, conscious or moderate sedation, sedation and analgesia, and monitored anesthesia care. The problem with these terms, however, is that they carry a false sense that fewer complications are expected during this “light” anesthesia compared to general anesthesia. In fact, the incidence of serious complications associated with anesthesia outside of the OR and of those associated with general anesthesia within the OR has been found to be comparable, with risk for death being significantly higher outside the OR.<sup>2,5</sup> The latter may be partially explained by the fact that patients receiving anesthesia outside of the OR are generally older, sicker, and more often treated as emergent cases compared to those admitted to the OR.<sup>2</sup>

Among complications that may occur during anesthesia conducted outside of the OR, complications associated with the respiratory system are generally the most common.<sup>6</sup> Respiratory depression, apnea, airway obstruction or difficulties, and pulmonary aspiration can be followed by severe hypoxemia, cerebral damage, and death. Cardiovascular complications are equally serious, especially severe hypotension, cardiac arrhythmias, and myocardial ischemia.<sup>7</sup> In addition, allergic reactions are very difficult to predict and sometimes become life threatening. Other adverse effects, such as hypothermia, disorientation or agitation, and postoperative nausea/vomiting rarely affect the safety of patients, but may seriously compromise their comfort and satisfaction.

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*Panagiotis Kiekkas, PhD, RN, is an Assistant Professor, Nursing Department, Technological Educational Institute of Western Greece, Patras, Greece.*

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*Address correspondence to Panagiotis Kiekkas, 76 Stratigou Konstantinopoulou Str., Aroi, Patras 263-31, Greece; e-mail address: [kiekkpan@otenet.gr](mailto:kiekkpan@otenet.gr)*

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The increasing number and complexity of procedures requiring anesthesia outside of the OR, along with the associated high risk for complications, pose an imperative need for improving patient safety. High standards of care should be met as guided by the guidelines for anesthetic care delivered outside the operating suite developed by the American Society of Anesthesiologists (ASA).<sup>8</sup> Although patient-associated factors can contribute to complications occurring when anesthesia is administered outside of the OR, the role of an unfamiliar environment has been highlighted. It has been speculated that unavailability of an electrical power supply, airway management equipment and suction devices, outdated, poorly maintained monitors or ventilators, problematic access to the patient due to small, crowded rooms with large machines, insufficient lighting conditions, and loss of visual contact with the patient or the monitor due to procedure requirements can compromise safe anesthesia provision.<sup>2,3,9</sup> It is crucial that environmental deficiencies are identified before induction of anesthesia by surveying the facility for availability of necessary equipment and supplies, functional devices, emergency preparedness, and sufficient space for personnel.<sup>6,10</sup> Safety can be promoted by the presence of defibrillators, disconnect alarms in ventilators, and communication devices to summon assistance or equipment.<sup>11</sup>

The absence of health care professionals experienced in anesthetic aspects of care constitutes a further safety concern and may have a negative impact, especially in the case of unanticipated or emergency situations. With regard to facility personnel, their knowledge and skills about anesthesia care need to be pre-evaluated to determine their potential to assist anesthesia providers, as well as their training and supervision requirements.<sup>10</sup>

Besides facility environment, up-to-date, thorough history, physical examination, and adequate preparation of the patient scheduled to receive anesthesia outside of the OR are prerequisites for safe care.<sup>4,7</sup> Anesthesia providers should be aware of risk factors, especially obesity, uncontrolled diabetes, substance abuse, and history of adverse reactions to anesthetic drugs, as the risk of cardiorespiratory complications is higher in patients with pre-existing respective disorders. The presence of comorbidities should guide the

selection of anesthetic drugs and sedation depth; in case these are severe, the patient should be considered to be excluded from receiving anesthesia outside of the OR.<sup>10</sup> Particular focus is recommended on airway management; patients with a high-risk airway should be identified and advanced airway devices readily available.<sup>12</sup> It is equally important that post anesthesia care should not be waived, considering not only that adverse events commonly occur during this phase, but also that the risk for inadvertent deep sedation is higher after the painful or unpleasant stimuli of the procedure have been removed.<sup>7</sup>

The anesthesia continuum begins with anxiolysis and progressive loss of consciousness, proceeds with loss of airway reflexes, and may extend to respiratory system depression. The problem is that individual responses to anesthetic agents vary considerably and cannot be precisely predicted.<sup>13</sup> Thus, it is crucial that over sedation, that is, sedation level deeper than originally intended, be identified in a timely manner and rescue capacity, that is, interventions for supporting patient respiratory status and for recalling sedation to the optimal level, be initiated. Since the majority of procedures requiring anesthesia outside of the OR are of short duration, the use of anesthetics with fast-acting and fast-recovery profiles, such as propofol, has been strongly recommended.<sup>14</sup> Similarly, opioids can be substituted by local anesthetics and non-steroidal anti-inflammatory drugs, considering that most procedures are not followed by severe pain.<sup>10</sup> Moreover, drugs are recommended to be administered individually, their doses proportional to the intensity of noxious stimulation and titrated; combinations of opioids with benzodiazepines should also be avoided due to a high risk for deep and prolonged sedation, while reversal agents (naloxone, flumazenil) should be always available.<sup>12</sup>

According to ASA standards,<sup>15</sup> qualified anesthesia providers should be present during the entire procedure to monitor patient oxygenation, ventilation, circulation, and temperature. Circulation is monitored by continuous electrocardiogram display and arterial blood pressure measurement; blood oxygenation is monitored by pulse oximetry. Of importance, recent findings have confirmed the value of monitoring patient ventilation with capnography during procedural sedation, which has been shown to allow more effective and earlier

detection of respiratory depression or apnea compared to pulse oximetry.<sup>16</sup> End-tidal carbon dioxide monitoring is particularly recommended for patient groups at high risk for adverse respiratory events, such as obese and aged individuals and those with chronic obstructive pulmonary disease.

Thanks to their knowledge and experience regarding anesthesia care, perianesthesia nurses are in an excellent position to advocate for patient safety for procedures involving anesthesia outside of the OR. To achieve this, perianesthesia nurses need to replace the false sense of safety commonly associated with speculated “light” sedation with the question: “What might go wrong?” Development of

a safety culture evolves from a reactive culture (taking measures after a mishap) to a proactive culture (thinking how to prevent mishaps) and finally to a generative culture (risk management as an integral part of professional thinking).<sup>17</sup> Minimizing complication rates can be based on standardizing procedures through the establishment of detailed protocols, encouraging teamwork and communication among personnel, increasing risk awareness, and managing stress of personnel.<sup>18,19</sup> Continuous evaluation of patient outcomes after anesthesia outside of the OR and additional research on facility standards, as well as on drug and monitoring alternatives, are further recommended for promoting patient safety.

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