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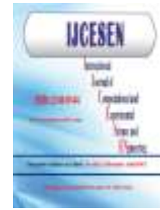

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Research Article

Role of Physicians, Nurses, and Health Care Assistants in Initial Airway and Breathing Management in Emergency Departments

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Abstract:

The initial management of airway and breathing in the emergency department is a critical, time-sensitive intervention that demands a highly coordinated interprofessional team approach. The emergency physician provides strategic leadership and advanced procedural expertise, performing rapid assessment, decision-making, and definitive airway securing through techniques like rapid sequence intubation. The emergency nurse acts as the essential linchpin, responsible for continuous patient monitoring, preparation and anticipation of needs, precise medication administration, and direct assistance during the procedure, while also advocating for patient safety and comfort. The health care assistant offers indispensable foundational support, ensuring optimal patient positioning, procuring and preparing necessary equipment, and managing logistical and environmental factors to facilitate an efficient resuscitation. The synergy between these distinct yet interdependent roles, governed by principles of shared mental models, closed-loop communication, and mutual trust, is the cornerstone of patient safety and successful outcomes in these high-stakes scenarios, transforming individual competencies into a unified, high-reliability team.

1. Introduction

The emergency department (ED) stands as the critical frontier of hospital-based medicine, a high-stakes environment where undifferentiated patients present with a vast spectrum of illnesses and injuries, ranging from the mundane to the immediately life-threatening. Within this chaotic and time-pressured setting, the initial assessment and management of a patient's physiological derangements follow a sacrosanct hierarchy, epitomized by the ABCDE (Airway, Breathing, Circulation, Disability, Exposure) approach. This systematic paradigm underscores a fundamental truth of emergency and resuscitation medicine: without a patent airway and adequate ventilation, all other interventions are futile. The management of airway and breathing, therefore, constitutes the primordial and most critical intervention in emergency care, upon which all subsequent diagnostic and therapeutic efforts depend [1]. The success of this endeavor is not the solitary achievement of any single profession but rather the symphony of a well-coordinated, interprofessional team, each member contributing unique and essential skills within a defined scope of practice.

The clinical imperative for expert airway management is starkly evidenced by morbidity and mortality statistics. Hypoxia, resulting from airway obstruction or inadequate ventilation, rapidly leads to cellular dysfunction, organ failure, and cardiac arrest. Studies consistently show that failed or delayed airway management is a leading contributor to preventable death in trauma, medical resuscitation, and in the ED itself [2]. The "golden hour" concept in trauma, while somewhat metaphorical, emphasizes the critical importance of time; for the patient in respiratory distress or failure, this window is measured in minutes. The initial management of airway and breathing is thus a race against the clock to prevent hypoxia and hypercarbia, which can precipitate cardiac arrest and irreversible neurological injury [3]. This urgency demands not only technical proficiency but also impeccable teamwork, clear communication, and shared mental models among all involved clinicians.

The landscape of airway management has evolved dramatically over recent decades. From a time when emergency airway management was often a crude, last-ditch effort, it has transformed into a sophisticated sub-discipline replete with advanced devices, potent pharmacological agents, and structured algorithms. The armamentarium has expanded beyond direct laryngoscopy to include video laryngoscopy, supraglottic airway devices (SGAs), and techniques for front-of-neck access. Simultaneously, the philosophy of care has shifted towards a greater emphasis on pre-oxygenation, apneic oxygenation, and strategies to minimize peri-intubation hypoxia and cardiovascular collapse, especially in critically ill patients [4]. This complexity necessitates specialized knowledge and training, elevating the role of the emergency physician to that of an airway expert while simultaneously increasing the demands on supporting staff.

However, the path to securing an airway is fraught with challenges unique to the ED. Unlike the controlled environment of an operating room, ED patients are often not fasted, may have unknown or difficult airway anatomy, and are frequently physiologically compromised—suffering from hypoxia, hypotension, acidosis, or profound agitation. This is the concept of the "physiologically difficult airway," which can be as perilous as the anatomically difficult airway [5]. Furthermore, the ED clinician must often act with incomplete information, without the luxury of a detailed past medical history or prior anesthetic

records. This combination of physiological instability, time pressure, and diagnostic uncertainty creates a high-risk scenario where the margin for error is slim and the consequences of failure are catastrophic.

Within this high-acuity context, the interprofessional team emerges as the cornerstone of safe and effective care. The traditional, hierarchical model of care, with the physician as the sole decision-maker and executor, is inadequate for the dynamic demands of modern emergency airway management. Instead, a synergistic model has taken hold, where physicians, nurses, and health care assistants (HCAs) function as integrated, interdependent units [6]. Each role brings a specific set of competencies, perspectives, and responsibilities to the bedside. The physician, with advanced training in pathophysiology, pharmacology, and procedural skills, assumes the role of team leader and primary proceduralist for advanced interventions. The nurse, with expertise in continuous monitoring, medication administration, and patient advocacy, serves as the linchpin of the process, often anticipating needs and bridging communication gaps. The health care assistant, with fundamental skills in patient positioning, equipment handling, and logistical support, provides the essential foundation upon which the more complex tasks are built.

This team-based approach is not merely additive but multiplicative, enhancing patient safety through mechanisms of cross-monitoring, shared situational awareness, and distributed cognitive load. Effective teams are characterized by clear role clarity, closed-loop communication, mutual trust, and a shared goal. When a patient in respiratory distress arrives, the simultaneous, coordinated actions of this team—the HCA positioning the patient and fetching the suction, the nurse attaching monitors and drawing up medications, and the physician performing the rapid assessment—create a seamless response that no individual could achieve alone [7]. This collaboration is formalized in protocols and training, such as through crisis resource management (CRM) principles, which have been adapted from aviation to improve team performance in medical emergencies [8].

2. The Physician's Role:

The emergency physician occupies a dual role in airway and breathing management: that of the team's strategic leader and the primary expert for advanced procedural interventions. This responsibility extends far beyond the technical act of intubation; it encompasses rapid diagnosis, decision-making under extreme uncertainty, pharmacological mastery, and the orchestration of the entire team's efforts. The physician's cognitive and procedural actions set the course of the resuscitation.

3. Initial Assessment and Declaration of Emergency

The physician's role begins with a rapid, targeted primary survey. While the nurse and HCA may initiate oxygen therapy and monitoring, the physician must synthesize this data to form a definitive clinical impression. This involves a "look, listen, feel" approach: looking for signs of airway obstruction (stridor, paradoxical chest movement), work of breathing (accessory muscle use, tracheal tug), and cyanosis; listening for breath sounds (their presence, symmetry, and quality) and voice sounds; and feeling for tracheal position and chest expansion. This assessment, often accomplished in under sixty seconds, determines the acuity of the situation. The physician must then categorize the problem: Is this a *patent airway* with inadequate *breathing* (e.g., opioid overdose, status asthmaticus)? Is it an *immediately threatened airway* (e.g., anaphylaxis, expanding neck hematoma)? Or is it a *complete airway obstruction* (e.g., foreign body, profound sedation)? This diagnostic clarity is crucial, as it dictates the urgency and type of intervention required [9]. The physician verbally declares the emergency, establishing a shared mental model for the team (e.g., "This is a difficult airway scenario; we will proceed with a rapid sequence intubation with video laryngoscopy").

4. Decision-Making and Algorithmic Navigation

Based on the initial assessment, the physician must choose and articulate a management plan, often following established difficult airway algorithms. Key decisions include: Does this patient require definitive airway control (endotracheal intubation) immediately, or can they be managed initially with non-invasive techniques? If intubation is needed, what is the predicted difficulty? What is the optimal pharmacologic strategy (rapid sequence induction vs. awake technique)? What is the primary device (direct vs. video laryngoscope) and what is the backup plan (SGA vs. surgical airway)? This decision-making integrates factors such as the patient's Glasgow Coma Scale, oxygen saturation, anticipated clinical course (e.g., risk of deterioration), and co-morbidities [10]. The physician must also consider the "can't intubate, can't oxygenate" (CICO) scenario and be prepared

to escalate to a surgical airway, a procedure for which they must ultimately be responsible.

5. Advanced Procedural Execution: Intubation and Beyond

The most definitive procedural action is endotracheal intubation. The physician must perform this with a high level of technical skill, often in suboptimal conditions. Mastery of both direct and video laryngoscopy is now considered standard. Video laryngoscopy, in particular, has become a first-line tool in many EDs, as it improves glottic view and first-pass success rates, especially in predicted difficult airways [11]. The procedure involves precise coordination of pre-oxygenation, medication administration (sedatives and paralytics), laryngoscopy, tube placement, and immediate confirmation. Confirmation is multi-modal, requiring waveform capnography (the gold standard), chest auscultation, fogging of the tube, and clinical observation of chest rise. The physician must interpret the capnography waveform accurately to distinguish between esophageal, tracheal, and bronchial intubation [12].

Beyond intubation, the physician is responsible for other advanced interventions. This includes performing a surgical cricothyroidotomy in a CICO emergency, a high-stakes, low-frequency procedure that demands practiced proficiency. It also includes procedures like needle thoracocentesis for tension pneumothorax—a critical breathing-related intervention that can be immediately life-saving. Furthermore, the physician manages complex pharmacological aspects, such as the selection and dosing of induction agents (e.g., ketamine, etomidate, propofol) and neuromuscular blocking agents (e.g., rocuronium, succinylcholine), tailoring choices to the patient's hemodynamic and physiological state [13]. They must also manage post-intubation sedation and analgesia to ensure patient safety and comfort while facilitating ongoing care.

6. Ongoing Management and Reassessment

Securing the airway is not the endpoint. The physician must oversee the transition to post-intubation management. This includes ensuring appropriate ventilator settings are initiated (mode, tidal volume, respiratory rate, FiO2, PEEP), ordering a confirmatory chest X-ray, and interpreting it to verify tube depth and rule out complications like pneumothorax. They lead the ongoing reassessment of the patient's respiratory status, integrating data from arterial blood gases, continuous capnography, and ventilator mechanics to optimize oxygenation and ventilation. The physician's leadership continues as they guide the team through the subsequent phases of the ABCDE approach, having first established the secure foundation of airway and breathing [14].

7. The Nurse's Role: The Linchpin of Coordination, Monitoring, and Advocacy

If the physician is the strategist and primary proceduralist, the emergency nurse is the tactical coordinator, constant monitor, and patient advocate. Their role is continuous, dynamic, and multifaceted, forming the essential connective tissue that binds the team's activities together. The nurse operates at the intersection of patient assessment, procedure facilitation, and family communication, often managing multiple parallel processes simultaneously.

Continuous Assessment and Surveillance

From the moment of patient arrival, the nurse conducts an ongoing, nuanced assessment that complements the physician's focused exam. They are the first to notice subtle changes: a slight decrease in oxygen saturation, an increase in respiratory rate, the onset of restlessness (an early sign of hypoxia), or a change in the character of breath sounds. They are responsible for the accurate placement and interpretation of monitoring devices: pulse oximetry (understanding its limitations, e.g., in carbon monoxide poisoning or poor perfusion), capnography (for both non-intubated patients, using nasal cannula devices, and intubated patients), and cardiac monitoring [15]. This continuous surveillance provides the real-time data stream upon which the physician's decisions rely. The nurse's role is to identify trends and alert the team to deterioration before a crisis occurs, acting as an early warning system.

8. Preparation and Anticipation: The "Airway Cart" Mindset

A hallmark of expert emergency nursing is anticipation. Prior to the physician even declaring the need for intubation, an experienced nurse, recognizing clinical cues, will often begin preparing the resuscitation bay. This includes ensuring the functionality and immediate availability of core equipment: the suction apparatus (turned on, with Yankauer tip attached), the bag-valve-mask (BVM) device connected to high-flow oxygen, and the airway cart opened and organized. The nurse mentally runs through the required equipment—laryngoscope handles and blades of appropriate sizes, endotracheal tubes, stylets, syringe for cuff inflation, and securing device—and verifies their

presence and function. This “airway cart” mindset transforms the nurse from a reactive participant to a proactive enabler of a smooth procedure [16].

9. Medication Administration and Pharmacology Support

During rapid sequence intubation (RSI), the nurse plays a critical pharmacological role. They are responsible for drawing up, labeling, and administering the induction and paralytic agents as per the physician’s order, often under strict time pressure. This requires precise knowledge of drug dosages, indications, contraindications, and side effects. The nurse must sequence the medications correctly and administer them rapidly via a large-bore intravenous line, which they have often established or verified. Furthermore, they prepare and have ready push-dose vasopressors (e.g., phenylephrine, epinephrine) to manage the common post-induction hypotension in critically ill patients, a key component of modern “hemodynamically-guided” RSI [17]. They also manage the infusion of post-intubation sedatives and analgesics, titrating them to effect based on prescribed parameters.

10. Procedure Facilitation and “Cricoid Pressure” / BURP Role

During the intubation procedure itself, the nurse assumes several hands-on roles. They may apply and manage cricoid pressure (Sellick’s maneuver), though its universal use is now debated, or provide external laryngeal manipulation (BURP – Backward, Upward, Rightward Pressure) to optimize the glottic view under the physician’s direction. More universally, the nurse acts as the primary operator of the BVM device, providing pre-oxygenation and, if the first intubation attempt fails or is delayed, effective bag-mask ventilation to prevent hypoxia. Effective bag-mask ventilation is a vital and often under-appreciated skill, requiring a two-person technique in difficult cases to achieve a good seal and adequate tidal volumes [18]. The nurse must also assist with suctioning of secretions and hand the physician necessary equipment in a timely, organized manner.

11. Post-Procedure Management and Patient Advocacy

After successful intubation, the nurse’s responsibilities intensify. They are primarily responsible for securing the endotracheal tube definitively, using a commercial device or robust tape, to prevent potentially fatal accidental extubation. They connect the tube to the ventilator, ensuring all connections are secure, and initiate the prescribed settings. They obtain the post-intubation chest X-ray and assist in its interpretation for tube placement. Continuous monitoring remains paramount: the nurse watches the capnography waveform for sustained presence (confirmation of tube placement) and for changes that might indicate displacement, obstruction, or worsening physiology (e.g., rising ETCO2 in a status asthmaticus patient). They also advocate for the patient’s comfort and safety by ensuring adequate sedation and analgesia, performing regular oral care, and monitoring for complications such as ventilator-associated pneumonia or pressure injuries [19]. The nurse also serves as the crucial communication link with the patient’s family, providing explanations and updates during a terrifying time.

12. The Health Care Assistant’s Role: Foundational Logistical and Supportive Pillar

Health Care Assistants (HCAs), also known as nursing assistants, orderlies, or clinical support workers, provide the indispensable logistical and foundational support that allows physicians and nurses to function at the top of their licenses. While their scope of practice does not include advanced assessment or procedures, their contributions are vital for maintaining the flow, safety, and efficiency of the resuscitation. They are the force multipliers of the emergency team.

13. Patient Positioning and Mobility

Optimal patient positioning is a cornerstone of successful airway management, and it is often the HCA who physically accomplishes this. For BVM ventilation and intubation, the “sniffing morning air” position (neck flexion, head extension) is ideal in patients without suspected cervical spine injury. The HCA may adjust the bed height, remove headboards, or place blankets under the patient’s occiput to achieve this. In cases of respiratory distress, they may assist the patient into a position of comfort, typically upright, which can significantly improve work of breathing. For the morbidly obese patient, they help with ramping—using blankets or a dedicated ramp device to align the external auditory meatus with the sternal notch—which is critical for improving pre-oxygenation and laryngeal view [20]. They also assist with log-rolling patients for examination or procedures when needed.The HCA is instrumental in ensuring the right equipment is at the right place at the right time. Upon activation of a respiratory or trauma alert, they are often tasked with fetching

specific items: the airway cart, the difficult airway trolley, a bronchoscope, a chest tube tray, or additional monitoring equipment. Their familiarity with the department's layout and inventory is key. Beyond fetching, they assist with preparation: opening sterile packaging, assembling suction canisters, connecting tubing to oxygen flowmeters, and ensuring light sources on laryngoscopes are functional. This proactive support prevents the nurse or physician from breaking their focus on the patient to search for equipment [21].

14. Basic Procedure Assistance and Specimen Handling

During procedures, the HCA provides crucial hands-on support. They may be tasked with operating the suction catheter under direction during laryngoscopy to clear secretions or blood from the oropharynx. They apply firm pressure to the syringe of saline or water to flush the suction tubing if it becomes clogged. They hold limbs steady during procedures or help with restraining a confused or combative patient to ensure safety, always under the guidance and supervision of the clinical team. Following procedures, they handle specimens, such as delivering arterial blood gas samples immediately to the point-of-care analyzer, a task where delay can render results inaccurate [22].The HCA plays a critical role in maintaining the operational integrity of the resuscitation space. They manage the crowd, ensuring only essential personnel are in the immediate area. They answer nearby phones or intercept arriving family members to allow the clinical team to remain focused. They fetch blood products from the blood bank or transport patients swiftly to CT scan or the ICU once stabilized. They are also responsible for the rapid turnover of the room after a resuscitation, cleaning and restocking so it is ready for the next critical patient. This environmental control is essential for preventing errors and maintaining a safe workflow [23].While focused on clinical tasks, the HCA often provides the first and most consistent human touch for the patient. They can offer reassurance with a calm presence and a comforting hand on the shoulder. They may be the one to explain simple steps to a frightened but conscious patient (e.g., "I'm just going to put this blood pressure cuff on your arm"). They can also provide basic monitoring support, such as repeating non-invasive blood pressure measurements or reporting obvious changes in patient consciousness or breathing pattern to the nurse. This combination of practical support and human compassion is an invaluable part of holistic patient care in a crisis [24].

15. Synthesis: Interprofessional Collaboration as the Critical Success Factor

The discrete roles described above do not function in isolation; they are interwoven threads in a single tapestry of care. The true power of the ED team is realized in its collaborative synergy, where the combined output exceeds the sum of individual actions. This collaboration is governed by principles of crisis resource management (CRM), which are deliberately cultivated through joint training and shared experience.

Effective collaboration begins with establishing a shared mental model. The physician's initial declaration ("Difficult airway, plan for video laryngoscopy") sets this model. All team members then understand the plan, their roles within it, and the potential pitfalls. Communication follows closed-loop principles: when the physician requests "10 milligrams of etomidate," the nurse responds, "10 milligrams of etomidate drawn up," and after administration states, "10 milligrams of etomidate administered." This eliminates ambiguity and ensures instructions are heard and executed correctly [25]. The nurse or HCA is also empowered to speak up with concerns using graded assertiveness (e.g., "I'm concerned the oxygen saturation is dropping during your attempt") without fear of reprisal, a core tenet of a just culture.Each team member serves as a check on the others. While the physician focuses on the glottic view, the nurse monitors the patient's oxygen saturation and heart rate, and the HCA ensures the suction is within reach. The nurse verifying the medication label with a second nurse (or the physician) before administration is a classic example of cross-monitoring. This distributed vigilance creates a robust safety net, catching potential errors before they reach the patient [26]. For instance, an HCA might notice the endotracheal tube cuff is not inflated after connection to the ventilator and alert the nurse.The high-stakes, low-frequency nature of advanced airway management necessitates rehearsal. Interprofessional simulation training, where physicians, nurses, and HCAs train together on manikins in realistic scenarios, is the gold standard for building effective teamwork. These simulations allow teams to practice CRM skills, clarify role expectations, and familiarize themselves with protocols and equipment in a consequence-free environment. Debriefing after simulations, and after real clinical events, is where the deepest learning occurs, allowing the team to reflect on what went well and what could be improved [27]. Such training builds the trust and familiarity that allow teams to perform seamlessly under pressure.

Successful collaboration is predicated on clear understanding and respect for each profession's scope of practice. The physician relies on the nurse's assessment and must trust their judgment. The nurse relies on the HCA's supportive actions. Overlap exists (e.g., both nurse and physician can assess breathing), but the boundaries of independent action are clear (e.g., only the physician performs the surgical airway). This clarity prevents task omission or duplication and ensures that all necessary activities are covered without overstepping legal or competency boundaries [28]. Regular interprofessional meetings and protocol development help to reinforce this clarity.

16. Conclusion

The initial management of airway and breathing in the emergency department is the quintessential test of a healthcare system's responsiveness, skill, and teamwork. It is a complex, time-sensitive intervention where physiological reserve is often exhausted and the risk of catastrophic failure is ever-present. As this analysis has detailed, meeting this challenge is not the purview of a single heroic individual but the collective achievement of a finely tuned interprofessional team. The emergency physician provides the strategic direction, diagnostic acumen, and advanced procedural expertise necessary to secure a definitive airway. The emergency nurse acts as the indispensable coordinator, anticipator, monitor, and patient advocate, ensuring the procedure is prepared for, facilitated, and followed up with meticulous care. The health care assistant supplies the critical logistical and foundational support, optimizing the environment and enabling the clinicians to focus their advanced skills where they are most needed.

The synergy between these roles—forged through shared mental models, closed-loop communication, cross-monitoring, and dedicated joint training—transforms a group of skilled individuals into a high-reliability team. This teamwork is the ultimate patient safety device, the buffer against error, and the engine of successful resuscitation. In the high-stakes arena of the ED, where seconds count and lives hang in the balance, it is this collaborative, role-specific, yet integrated approach to airway and breathing management that stands between a patient and irreversible harm.

Author Statements:

- **Ethical approval:** The conducted research is not related to either human or animal use.
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References

1. Álvarez Lerma F, Sánchez García M, Lorente L, et al. Guidelines for the prevention of ventilator-associated pneumonia and their implementation. The Spanish "Zero-VAP" bundle. Med Intensiva 2014;38:226–36.
2. Turner JS, Bucca AW, Propst SL, et al. Association of checklist use in endotracheal intubation with clinically important outcomes: a systematic review and meta-analysis. JAMA Netw Open 2020;3:e209278.
3. Tabaeian SM, Yazdannik A, Abbasi S. Compliance with the standards for prevention of ventilator-associated pneumonia by nurses in the intensive care units. Iran J Nurs Midwifery Res 2017;22:31–6.
4. Speck K, Rawat N, Weiner NC, et al. A systematic approach for developing a ventilator-associated pneumonia prevention bundle. Am J Infect Control 2016;44:652–6.
5. Chinese Nursing Association. Endotracheal suctioning in adults receiving invasive mechanical ventilation.
6. Sole ML, Bennett M, Ashworth S. Clinical indicators for endotracheal suctioning in adult patients receiving mechanical ventilation. Am J Crit Care 2015;24:318–24.
7. Mwakanyanga ET, Masika GM, Tarimo EAM. Intensive care nurses' knowledge and practice on endotracheal suctioning of the intubated patient: a quantitative cross-sectional observational study. PLoS One 2018;13:e0201743.
8. Marini AL, Khan R, Mundekkadan S. Multifaceted bundle interventions shown effective in reducing VAP rates in our multidisciplinary ICUs. BMJ Qual Improv Rep 2016;5:u205566.w2278.
9. Gomarverdi S, Khatiban M, Bikmoradi A, et al. Effects of a multi-component educational intervention on nurses' knowledge and adherence to standard precautions in intensive care units. J Infect Prev 2019;20:83–90.

10. Kalil AC, Metersky ML, Klompas M, et al. Executive summary: management of adults with hospital-acquired and ventilator-associated pneumonia: 2016 clinical practice guidelines by the infectious diseases Society of America and the American thoracic Society. Clin Infect Dis 2016;63:575–82.
11. Suqin X, Liu Y, Hongyan Y. Application of a self-designed aseptic sputum suction kit. Am J Nurs Sci 2014;29:52–3.
12. Liu W, Yang Y, Jiao Y, et al. Evaluation of the effects of applying the ventricular care bundle (VCB) method for reducing ventilator-associated pneumonia (VAP) in the intensive care unit of a general Chinese tertiary hospital. Ann Palliat Med 2020;9:2853–61.
13. He M, Xiong J, Huang S, et al. Airborne precautions recommended in Wuhan, China for bedside fiberoptic bronchoscopy examination of patients with COVID-19. J Infect 2020;81:e75–7.
14. American Association for Respiratory Care. AARC clinical practice guidelines. endotracheal suctioning of mechanically ventilated patients with artificial airways 2010. Respir Care 2010;55:758–64.
15. Bülbül Maraş G, Kocaçal Güler E, Eşer İsmet, et al. Knowledge and practice of intensive care nurses for endotracheal suctioning in a teaching hospital in Western turkey. Intensive Crit Care Nurs 2017;39:45–54.
16. Dastdadeh R, Ebadi A, Vahedian-Azimi A. Comparison of the effect of open and closed endotracheal suctioning methods on pain and agitation in medical ICU patients: a clinical trial. Anesth Pain Med 2016;6:e38337.
17. Klompas M, Branson R, Eichenwald EC, et al. Strategies to prevent ventilator-associated pneumonia in acute care hospitals: 2014 update. Infect Control Hosp Epidemiol 2014;35:915–36.
18. Afshari A, Safari M, Oshvandi K, et al. The effect of the open and closed system suctions on cardiopulmonary parameters: time and costs in patients under mechanical ventilation. Nurs Midwifery Stud 2014;3:e14097.
19. Leddy R, Wilkinson JM. Endotracheal suctioning practices of nurses and respiratory therapists: how well do they align with clinical practice guidelines? Can J Respir Ther 2015;51:60–4.
20. Borkowska M, Labeau S, Schepens T, et al. Nurses' sedation practices during weaning of adults from mechanical ventilation in an intensive care unit. Am J Crit Care 2018;27:32–42.
21. Tan CSL, Harrold M, Hill K. Approaches and adjuncts used by physiotherapists when suctioning adult patients who are intubated and ventilated in intensive care units in Australia and New Zealand: a cross-sectional survey. Aust Crit Care 2017;30:307–13.
22. Ebrahimian A, Tourdeh M, Paknazar F, et al. The effect of the open and closed system Suctions on pain severity and physiological indicators in mechanically ventilated patients with traumatic brain injury: a randomised controlled trial. Turk J Anaesthesiol Reanim 2020;48:202–7.
23. Pinto HJ, D'silva F, Sanil TS. Knowledge and practices of endotracheal suctioning amongst nursing professionals: a systematic review. Indian J Crit Care Med 2020;24:23–32.
24. Rotstein C, Evans G, Born A, et al. Clinical practice guidelines for hospital-acquired pneumonia and ventilator-associated pneumonia in adults. Can J Infect Dis Med Microbiol 2008;19:19–53.
25. Toolis M, Tiruvoipati R, Botha J, et al. A practice survey of airway management in Australian and New Zealand intensive care units. Crit Care Resusc 2019;21:139–47.
26. Sen S, Johnston C, Greenhalgh D, et al. Ventilator-Associated pneumonia prevention bundle significantly reduces the risk of ventilator-associated pneumonia in critically ill burn patients. J Burn Care Res 2016;37:166–71.
27. Guan X, Yang H, Li H. Airway secretion aspiration performed by nurses in adults with invasive mechanical ventilation. Chin J Nurs 2020;55:922–7.
28. Scott JA, Heard SO, Zayaruzny M, et al. Airway management in critical illness: an update. Chest 2020;157:877–87.