The Intubated Patient: Clinical Management

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Abstract

When a patient is unable to breathe for himself due to illness, injury, or physical impairment, intubation may provide lifesaving airflow. However, the intubation process is painful and carries its own risks. Appropriate clinical management of the intubated patient is necessary to minimize pain and side effects. Nurses who provide clinical management for intubated patients should monitor vital signs and communicate with the patient, if possible, to gain critical information that may decrease the risk of patient morbidity and mortality.
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This educational activity is credited for 1.5 hours. Nurses may only claim credit commensurate with the credit awarded for completion of this course activity.

Statement of Learning Need
The important skills of managing the intubated patient are important for nurses to master in order to ensure patient comfort and prevention of complications.

Course Purpose
To provide nursing professionals with knowledge of the basic management of airway intubation in the ventilated patient.
Target Audience

Advanced Practice Registered Nurses and Registered Nurses
(Interdisciplinary Health Team Members, including Vocational Nurses and Medical Assistants may obtain a Certificate of Completion)

Course Author & Planning Team Conflict of Interest Disclosures
Jassin M. Jouria, MD, William S. Cook, PhD, Douglas Lawrence, MA,
Susan DePasquale, MSN, FPMHNP-BC – all have no disclosures

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There is no commercial support for this course.

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Please take time to complete a self-assessment of knowledge, on page 4, sample questions before reading the article.

Opportunity to complete a self-assessment of knowledge learned will be provided at the end of the course.
1. On situations where pre-emptive analgesia may be beneficial (i.e., before patient intubation or other procedures), the nurse should:
   a. strive to provide pre-emptive analgesia when intubated patients ask for pre-emptive pain relief.
   b. only provide pre-emptive analgesia to the patient if the patient is in obvious pain.
   c. only provide pre-emptive analgesia to the patient when the patient becomes agitated, or “bucks” the ventilator.
   d. strive to provide pre-emptive analgesia to the patient ahead of time to allow the medications to take effect before the procedure begins.

2. True or False: Management of the patient’s oxygen levels using a ventilator is best expressed by the principle: if some is oxygen is good, then more oxygen is even better.
   a. True.
   b. False.

3. Pulse oximetry is a non-invasive method:
   a. for measuring the arterial oxygen concentrations of a patient.
   b. that may not be as effective in some patients, such as those who have low blood pressure or those with hypothermia.
   c. that may give inaccurate readings or no readings at all if the healthcare provider cannot maintain a good connection between the patient’s skin and the probe.
   d. All of the above.

4. Tidal volume is best described as which of the following?
   a. Positive pressure in the lungs after exhaling
   b. Repeated inflation and collapse of the alveoli
   c. The amount of air that a person breathes in and out
   d. The ability of the lung interstitium to stretch to support the alveoli

5. Which of the following interventions is most appropriate for stress ulcer prevention in the intubated patient?
   a. Administration of sucralfate
   b. Rapid weaning from the ventilator
   c. Maintaining the head of the bed at a 30 to 40 degree angle
   d. Administration of antacids
Introduction

The nurse caring for the intubated patient has many responsibilities for keeping the patient comfortable and safe while minimizing the impact of a potentially traumatic experience. Intubation can be painful and frightening for the patient, regardless of his or her level of consciousness when placed on a ventilator. The goals of managing the intubated patient are to maintain comfort, provide careful monitoring of the patient’s physical condition, and to avoid causing damage to the respiratory system, all while treating the underlying cause of the patient’s need for intubation.

Post-Intubation Sedation

Giving medication to calm and comfort a patient is a necessary part of management after intubation, yet it is often underachieved as a nursing intervention. Intubation can be painful and breathing through an endotracheal tube produces anxiety for most people. Providing post-intubation sedation is not only necessary for pain and anxiety control, it can prevent many deleterious effects.

Indication for Sedation

Providing post-intubation sedation is part of good nursing care and consideration for the patient’s wellbeing. Patients who are intubated must often undergo several procedures beyond the initial intubation, all of which can be painful and scary. Providing medication for pain control as well as to decrease anxiety is an ethical choice that promotes patient comfort.

Without appropriate sedation after intubation, the patient may be more likely to be uncooperative with procedures because of anxiety and discomfort. The health care staff may have a difficult time completing tasks
and procedures because of patient noncompliance. Additionally, the patient’s physiological status can change without proper sedation when intubated. Anxiety causes vital signs to change, such as an increase in heart rate and blood pressure, leading to alterations in hemodynamic status and cardiac instability.

**Type of Sedation**

Anxiolysis involves controlling anxiety through medication. It is important to understand that providing medication to control anxiety is not the same as what is used for pain control. If a patient is in pain, medications to manage the pain should be given and the clinician should not rely on anxiety medications for this purpose. However, if a patient is agitated and his or her pain is being treated, the patient may be given medications that provide a calming and sedative effect.

Sedation can range from a minimal level to complete unconsciousness. Minimal sedation relieves anxiety without resulting in great changes to the sensory or nervous systems; whereas, moderate sedation puts the patient in a deeper level of calm that depresses the level of consciousness. The patient may still be able to respond to stimuli and can still breathe on his or her own, but the sensory functions are somewhat altered.

Deep sedation involves loss of consciousness for the patient to the point not being able to arouse. Deep sedation is used during surgical procedures and in situations where the patient should remain unconscious for the benefit of health and wellbeing. The patient may be given a number of different types of medication to promote sedation; the most common types are benzodiazepines. Examples of these types of medications include diazepam (Valium®), midazolam (Versed®), and lorazepam (Ativan®).
Richmond Agitation Sedation Scale

While sedation and pain control are necessary components of managing the intubated patient, there is a fine balance between giving enough medication to cause calming effects and giving too much for the patient’s own good. A sedation assessment scale can give the nurse an idea of how well the patient is responding to the sedative medication that has been provided; such as, whether its effects are appropriate, if the nurse needs to decrease the amount of sedative medications, or whether the patient needs more sedation.

The Richmond Agitation Sedation Scale (RASS) is a widely used method of assessing a patient’s level of sedation when he or she is intubated and in the Intensive Care Unit (ICU). The nurse uses the RASS to assess a patient’s level of consciousness based on the patient’s activity levels and responses to stimuli. The nurse observes the patient’s activity levels and gives a score based on his or her behavior and level of consciousness. If the patient is not responsive, the nurse may need to provide stimulation by calling the patient’s name or providing a mild amount of physical stimulation. Again, if these measures are used, the nurse then gives a score based on the patient’s response.

The RASS is scored in a numerical order from +4 to -5. The order of the scoring appears as:

- +4: Combative, aggressive, danger to self or staff
- +3: Very agitated, pulling on lines, behaving aggressively
- +2: Agitated, fighting the ventilator
- +1: Restless, anxious
- 0: Calm, alert
-1: Drowsy, awakens to voice stimulation, eye contact for more than 10 seconds
-2: Light sedation, awakens for <10 seconds to voice stimulation
-3: Moderate sedation, moves or opens eyes to voice stimulation, no eye contact
-4: Deep sedation, responds to physical stimulation but not voice stimulation
-5: Not arousable, no response to voice or physical stimulation.

The level of sedation that is most appropriate will be determined by the patient’s condition and the physician’s orders. Intubated patients should not be allowed to remain at the high end of the RASS, at a level of +3 or +4; alternatively, most patients are not sedated to the point of a -4 or -5 response. The nurse can use the scale to quickly approximate what level of sedation the patient appears to be and modify treatment interventions in response to the goal score.4

**Analgesia For The Intubated Patient**

Analgesia is an extremely important aspect of caring for the intubated patient, as patients who are on mechanical ventilators can experience pain. The intubated patient may undergo more procedures when compared to a patient in the general care unit; these additional procedures include laboratory testing, placement of central lines, or minor surgical procedures. Furthermore, the process of intubation, as well as maintaining the endotracheal tube, such as by suctioning or repositioning, can be painful for the patient as well. The intubated patient typically has few methods of expressing pain, so it is the nurse’s responsibility to provide adequate pain control and to anticipate the patient’s need for analgesia while intubated.
**Pre-emptive Analgesia**

Pre-emptive analgesia is the process of providing pain control measures, such as through medications, before a procedure begins. Pre-emptive analgesia may be beneficial before patient intubation, as well as before any other procedures that may be necessary.

The nurse should know when procedures are going to take place and strive to provide pre-emptive analgesia to the patient ahead of time to allow the medications to take effect before the procedure begins. Opioid medications effectively control pain and are some of the most commonly used drugs. Examples include fentanyl and morphine sulfate.\(^6\)

**Pain Assessment**

When assessing for adequate pain control, the nurse must be familiar with a baseline of the patient’s vital signs and behavior, as these can change if the patient is experiencing pain. When pain is present, the patient’s heart rate, blood pressure, and respiratory rate may increase. Additionally, when the patient becomes agitated, he or she may be more likely to fight or “buck” the ventilator, may show agitation by increased movements and muscle tension, and may exhibit facial expressions that convey pain, such as a facial grimace.\(^{15}\)

**Effects of Poor Pain Control**

Poor management of the patient’s pain can lead to many deleterious effects on the patient’s physical condition as well as psychological state. Untreated or poorly treated pain results in an increase in vital signs, an increased need for oxygen consumption, and increased stress on cardiac function. The
patient may be at higher risk of cardiac ischemia, stroke, and excess bleeding because of the body’s hemodynamic response to pain.¹

Unresolved pain can also impact the patient’s immune function, potentially increasing the risk for infection and delaying the healing process for the patient’s underlying condition.¹³ Other negative effects of poor pain control include a possible increase in intracranial pressure, reduced tidal volume; prolonged catabolism, resulting in slower energy release, and release of excess cortisol, which is a stress hormone. Poor pain control also causes feelings of stress, increased anxiety, and depression.¹² Providing appropriate pain control through analgesia is imperative for intubated patients who often cannot speak for themselves or tell anyone that they are in pain. It is the role of the nurse to recognize cues that the patient is experiencing pain and then take steps to relieve discomfort.

**Ongoing Management**

A ventilator is used as part of supportive measures for the underlying condition that the patient has developed. It is not a cure itself, but rather provides support for gas exchange while the patient is being treated for other circumstances. Because there is most likely another disease process present when a patient is intubated, whether it is short-term management through surgery, or for a longer period of time, such as when in the ICU, the patient’s status is already compromised and he or she is at greater risk of developing complications. Ongoing management of the ventilator and the patient’s condition is necessary to maintain and support the patient’s health, both for providing respiratory support through the ventilator and treating the underlying disease.
**Ventilator Adjustment**

Ventilator adjustment is important for reducing lung injury to the patient. Ventilator-induced lung injury (VILI) occurs when ventilator pressures and settings cause damage to the lung tissue. VILI can take several forms, including *volutrauma*, which occurs when the alveoli become over-distended due to high tidal volumes; *biotrauma*, or lung inflammation and excess cytokine release in response to mechanical ventilation; *atelectrauma*, which occurs when the alveoli become injured because of the repeated inflation and collapse from ventilator settings; and *barotrauma*, which occurs as overinflation of the lung tissue because of too much pressure from ventilator settings.24

Oxygen toxicity is another potential injury that may develop to the intubated patient. In terms of oxygen supply and maintaining oxygen saturations, it may seem that if some is good then more oxygen is even better. However, too much oxygen delivered through the ventilator can lead to an excess of oxygen in the tissues and damage to the cells. Oxygen free radicals can cause the body to respond with inflammation, further causing tissue damage.24 Oxygen toxicity can have disastrous results to the respiratory system, including injury to the airway and damage to the lung parenchyma.

Because there are so many potential complications for the intubated patient, it is extremely important to monitor the patient’s clinical status and to make associated ventilator changes as necessary. This may involve frequent reporting of the patient’s status to the physician, who then orders the ventilator adjustments. The nurse’s duty is to remain aware of the patient’s status and to look for potentially subtle changes that can point to the development of VILI or oxygen toxicity, and to report changes as necessary.
While many nurses do not order or even change the settings on the ventilator without the assistance of a physician or respiratory therapist, it is still important to understand ventilator settings and the effects of their adjustment. The tidal volume normally represents the regular amount of air that a person breathes in and out, even when not intubated.\textsuperscript{16} Pressures or respiratory rate set on the ventilator can increase the patient’s tidal volumes, causing the patient to take in more air with each breath. Managing tidal volumes and the number of respirations per minute can reduce the potential for volutrauma. Tidal volumes are typically calculated according to the patient’s weight by the physician.\textsuperscript{8}

Positive end expiratory pressure (PEEP) can also be set on the ventilator to control excess lung distention and resulting barotrauma. PEEP refers to maintaining a positive pressure within the lungs after exhaling. It is useful for keeping airways open in cases of obstruction and to make breathing easier for the patient; maintaining PEEP can reduce the potential for edema, injury to the lung parenchyma, and resulting barotrauma and atelectrauma.\textsuperscript{23}

Biotrauma occurs as stress to the borders between the alveoli and the capillary membranes result in an inflammatory response. Protective lung measures developed by adjusting ventilator settings can reduce the risk of biotrauma, such as by minimizing excess distention of the alveoli, as well as minimizing the repeated process of inflation and collapse of alveoli. Ventilator management such as by monitoring inspiratory and expiratory pressures and volumes can protect the sensitive lung tissue and minimize the occurrence of inflammation and resulting biotrauma.\textsuperscript{24}
Oxygen toxicity can be prevented by closely monitoring the amount of supplemental oxygen that the patient receives. It may be difficult to determine the balance between how much oxygen the patient needs and how much is too much. Often, the patient is not given straight oxygen, but rather a combination of oxygen and room air. This is called the fraction of inspired oxygen or FiO2. Often, the nurse can increase or decrease the amount of FiO2 that the patient receives according to the patient’s condition.9

The physician may set an optimum level of oxygen saturations for the patient and the nurse can titrate the FiO2 up or down, depending on the patient’s clinical condition. For example, if the patient must maintain an oxygen saturation level at 90 percent or greater, the nurse can decrease the FiO2 to maintain saturations at or above that level. It is not necessary and is even detrimental to keep the patient’s oxygen saturations at 100 percent, so titrating the FiO2 down to the lowest level possible to maintain oxygen saturations will reduce the potential for oxygen toxicity while still following prescribed orders.

**Physiologic Monitoring**

Monitoring of the patient’s physiological status is a regular and ongoing part of nursing care for the intubated patient. Often, the patient on a ventilator has a condition that involves more than one body system that must be treated and managed to prevent further decline in the patient’s health. Additionally, use of a ventilator puts the patient at risk for other complications because the intubated patient often has few mechanisms in place to protect or care for himself or herself, which requires the nurse to provide the care instead.
Vital signs

Physiologic monitoring of the intubated patient requires frequent assessment of vital signs. Most patients who are ventilated are on cardiac monitors that provide a constant reading of heart rate, respiratory rate, and oxygen saturation. If the patient has an arterial catheter in place, a consistent blood pressure reading may also be available.

Oxygen saturation levels should be monitored and available for every patient who is intubated. Oxygen saturation can be quickly and easily measured with pulse oximetry and is read as SPO$_2$. Pulse oximetry measures the arterial oxygen concentrations of a patient in a non-invasive manner, through a probe that can be placed in such locations as the finger, toe, or forehead. Pulse oximetry typically displays the patient’s pulse as part of its measurement. It may not be as effective in some patients, such as those who have low blood pressure or those with hypothermia. Additionally, an inability to maintain a good connection between the skin and the probe can cause inaccurate readings or a failure to achieve readings at all.\textsuperscript{20}

Pneumonia Prevention

Ventilator associated pneumonia (VAP) is a leading cause of death among patients who acquire hospital-based infections.\textsuperscript{25} VAP occurs when pneumonia develops in the lungs as a result of the patient being intubated and on a ventilator. Nurses who care for intubated patients can implement many different measures that will aid in the prevention and risk of development of VAP among their intubated patients.

The nurse can implement interventions to prevent VAP development; the set of interventions specifically designed to target and prevent VAP infection may sometimes be referred to as a VAP bundle. Nurses may implement
interventions such as raising the head of the bed for the patient to 30 to 40 degrees, minimizing condensation in ventilator tubing, and providing routine oral care measures as part of VAP prevention. Because many bacteria that cause pneumonia enter the body through the mouth, these measures aim to reduce the amount of potential pathogens that can infect the patient in this manner.  

Other measures to prevent pneumonia include regular hand washing and infection control practices to avoid introducing infectious agents from the environment. Some units implement a regular break from sedation for the intubated patient as part of pneumonia prevention. Temporary sedation breaks may allow the patient a chance to communicate more and may also allow the nurse to better understand if the patient is closer to being able to wean from the ventilator. Ventilator weaning and ultimate extubation can significantly reduce the risks of pneumonia because removing the endotracheal tube eliminates a path for organisms to travel to the lungs to cause infection.

Finally, clearing patient secretions, suctioning carefully, and providing prophylactic antibiotic medications can all work further toward preventing ventilator-associated pneumonia in the intubated patient.

**Ocular Care**

When a patient is intubated, a number of care measures are required to keep the patient safe and to treat the underlying illness. Through all of the occasional critical interventions nurses must perform, eye care may seem like a minor task. However, eye care is extremely important for the intubated patient, as lack of proper protection for the eyes can lead to damage that can result in permanent vision loss.
A patient who is intubated typically receives sedatives for comfort and may also be given paralytic medications. Some patients who are intubated are already unconscious because of their underlying conditions. During these situations, the eyes would normally close, which would protect the delicate ocular surface. Some patients, though, must have their eyes manually closed, particularly if the muscles that control blinking are not working or have been paralyzed.

Tear production may be minimized in the intubated patient, causing the surface of the eye to become very dry. The patient may not have rapid eye movements that normally occur as part of sleep, and so the eyes themselves may move very little. In short, the intubated patient is at a greater likelihood of losing the important protective mechanisms needed for the eyes.11

To provide eye care and prevent infection, irritation, and other damage to the eyes while the patient is intubated, the nurse may provide interventions to keep the eyelids closed and the surface of the eye moist. If the patient cannot close the eyes completely, the nurse should manually close the eyelids and implement measures to keep them closed, if needed. Such measures include taping the eyes shut, using a gel lubricant, or providing a moisture chamber, which involves application of moistened gauze over the eyes.26

Regular eye care is also needed on a routine basis to monitor the state of the patient’s eyes and to prevent pressure and infection. The nurse should inspect the patient’s eyes to ensure that no debris has entered or that the patient’s lids or lashes are positioned in a manner that they are touching the surface of the conjunctiva. Regular cleaning of the skin around the eye and
application of lubricants to keep the eye moist are also protective measures for preventing ocular complications.²⁶

**Stress Ulcer Prevention**

Stress ulcers, which develop as gastrointestinal bleeding in the stomach and small intestine, can develop when the patient becomes stressed from the impact of illness and intubation. Stress ulcers have been associated with an increase in mortality by up to 50 percent.²⁷ Changes in the hemodynamic status of the patient, an increase in inflammatory processes, and alterations in blood flow to the gastrointestinal tract may all occur as a result of illness that is significant enough to require intubation.

Several medications are available that are typically used for stress ulcer prophylaxis in intubated patients. Proton pump inhibitors (PPIs) are used to reduce gastric acid and to treat ulcers; examples of these types of medications include omeprazole (Prilosec®) and lansoprazole (Prevacid®). Histamine-2 receptor antagonists are another type of prophylactic medication given to combat stress ulcer formation among intubated patients. These medications also work by reducing the amount of gastric acid produced by the body; examples include famotidine (Pepcid®) and ranitidine (Zantac®).²⁷

Sucralfate (Carafate®) is a type of medication that is classified as a protectant. It is given to prevent ulcer formation and to provide protection when stress ulcers have already developed. Medications for stress ulcer prophylaxis may be given to the intubated patient as ordered; however, there are some types of medications that should not be used for this purpose, such as antacids.²⁷ Although many people take antacids to reduce
stomach acid on a regular basis, these medications are not indicated for stress ulcer prophylaxis among intubated patients.

**Communication**

The intubated patient will have difficulties communicating his or her needs to caregivers because the endotracheal tube passes through the vocal cords, thus preventing the patient from speaking. Additionally, because many intubated patients are given sedatives and analgesics, affect and levels of consciousness may prevent adequate communication. The nurse must assess the patient’s level of consciousness and communication abilities before providing a method of communication with the patient.

Initial development of a communication method with the intubated patient involves assessing the patient’s communication abilities, which can be affected by consciousness, medication use, and anxiety or pain related to tube placement. Some patients may be able to communicate by nodding or shaking the head, while others may be able to write if a piece of paper or white board were provided. If the patient is alert enough and has a desire to communicate, the nurse should employ some of these efforts to allow the patient to express his or her needs, if possible.15

There are some patients who may be able to mouth words around the endotracheal tube, and even if sound does not come out, basic words can still be understood. Other forms of communication that may be used include letter or picture boards, signs and gestures, a list of words commonly used that the patient can point or refer to, and alternative communication devices that use technology to provide a bridge between what the patient is trying to say and what the clinician understands.18,19
When speaking to an intubated patient, the nurse should speak slowly and clearly; if asking questions, words used should be short and to the point, to avoid confusion. Short statements, instructions, or questions are easier to understand and retain than if the nurse speaks in long sentences or uses complicated medical jargon.

Summary

Nurses who care for patients that are intubated are in special positions to provide care and treatment to this very vulnerable population. Because an intubated patient has special needs for care and will typically have difficulty communicating those needs, the nurse should be familiar with appropriate interventions and the challenges that often accompany them, in order to provide safe and effective care for the ventilated patient.

Please take time to help NurseCe4Less.com course planners evaluate the nursing knowledge needs met by completing the self-assessment of Knowledge Questions after reading the article, and providing feedback in the online course evaluation.

Completing the study questions is optional and is NOT a course requirement.
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5. **Which of the following interventions is most appropriate for stress ulcer prevention in the intubated patient?**  
   a. Administration of sucralfate  
   b. Rapid weaning from the ventilator  
   c. Maintaining the head of the bed at a 30 to 40 degree angle  
   d. Administration of antacids

**CORRECT ANSWERS:**

1. d  
2. b  
3. d  
4. c  
5. a
References Section

The reference section of in-text citations include published works intended as helpful material for further reading. Unpublished works and personal communications are not included in this section, although may appear within the study text.


15. Truwit, J. D., Epstein, S. K. (Eds.). *A practical guide to mechanical ventilation*. West Sussex, United Kingdom: John Wiley & Sons, Ltd.


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