



AMERICAN UNIVERSITY OF BEIRUT

RICHMOND AGITATION AND SEDATION SCALE (RASS)  
EDUCATIONAL PACKAGE FOR CRITICAL CARE NURSES

by  
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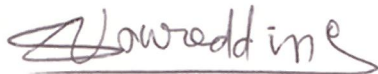
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## AN ABSTRACT OF THE PROJECT OF

Rayan Riad Al Dabbah for Master of Science  
Major: Nursing Science Adult Care Track

Title: Richmond Agitation and sedation scale (RASS) educational package for critical care nurses.

The majority of patients who are admitted to critical care areas may require sedation and analgesia, due to their need for a mechanical ventilator, and for pain and/or anxiety management. However, over or under sedation in critically-ill patients may have detrimental effects on the patient's survival. Standardized and proper sedation assessment is essential in preventing major complications of sedation. Nurses and doctors carry the main responsibility of assessing sedated patients, usually using a sedation scale.

Several sedation scales have been created to assess patients' sedation level; however, the mostly used and reliable one is the Richmond Agitation Sedation Scale (RASS). Nurses must be well trained and educated on the use of the sedation assessment tool in order to manage sedated patients adequately. At the American University of Beirut Medical Center (AUBMC), a nurse-led sedation protocol is employed, based on the RASS tool. However, the competence of the nurses in sedation assessment at AUBMC has not been monitored. In addition, no standardized reference guide for these nurses is present with regards to sedation management.

This project proposes an educational package on proper sedation assessment techniques using the RASS. Included in the package is a section on sedation indications, pharmacological guidelines, and nursing sedation management. Set as an educational reference for critical care nurses at AUBMC, this educational package includes explanatory videos on each sedation level and theoretically-based power-point presentations. The ultimate aim is to provide evidence-based sedation assessment and management to critically-ill patients.

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## CHAPTER I

### INTRODUCTION

Sedating patients in the critical care units is done for the purposes of promoting patients' safety, induction of amnesia, and prevention of ventilator dysynchrony (Guttormson, Chlan, Weinert, & Savik, 2010). However, the main purpose of sedating patients is to ensure that they are calm and pain free and that they tolerate ventilators (Thuong, 2008). Some studies have shown that 70% to 80% of patients may be inadequately sedated, while other studies revealed that the majority of mechanically ventilated patients tend to be over-sedated (Bailey & Kaplan, 2003; Bosson, Payen, Chanques & Mantz, 2007). For critically-ill patients, it may be very difficult to achieve a balanced dosing of sedation and analgesia because of their instable clinical conditions (Park et al., 2001). Having a sedation protocol in place decreases the incidence of extreme prolonged unresponsiveness (Brook et al., 1999). Experience and knowledge of nurses have a significant weight to garner the effectiveness of sedation management (Walker & Gillen, 2006).

Most undergraduate nursing programs in Lebanon have a critical care nursing course in their curricula, yet students are briefly exposed to the topic of sedation and are deficient in their knowledge in terms of extensively assessing levels of patient sedation (N. Sawalhi, RN graduate of Al Makassed College of Nursing, personal communication, April 20, 2014). Accordingly, graduates are not adequately prepared to assess sedated patients when employed in critical care units (R. Sabbagh, & A. Khatib, Neuro-ICU nurses at AUBMC, personal communication, 2014). Once graduates start working in critical care settings, they are required to follow the policies of the hospital and be competent while performing accurate sedation assessment.



## Background

At the American University of Beirut Medical Center (AUBMC), nurses follow a protocol set by the hospital to manipulate the doses of sedatives and analgesics based on the Richmond Agitation Sedation Scale (RASS) that measures the level of sedation. Nurses in critical care areas were first introduced to the RASS sedation assessment tool in 2011 by the Clinical Professional Development Center (CPDC). Although an additional session was offered after a year of implementing RASS, no evaluation for the nurses' competence in using the scale has been undertaken since then (R. Bou Diab, AUBMC clinical educator at the critical care areas, personal communication, March 10, 2014).

Clinical reasoning and competence are essential components of effective sedation management (Guttormson et al., 2010). Accurate assessment is as important, since assessment is the basis of clinical reasoning (Tanner, 2006). Training nurses how to assess patients' need for sedation would influence the overall management process. For instance, it was revealed that well trained nurses often assess the causes of agitation before administering sedative medications, whereas inexperienced nurses administer sedatives more readily before inquiring about the cause of agitation (Guttormson et al., 2010).

Graduates from the AUB, Hariri School of Nursing and other universities in Lebanon are often selected to work as registered nurses at AUBMC directly after graduation. Often time fresh graduates are designated to work in critical areas because of the high turnover of nurses in the hospital. These new graduates are trained by their preceptors on policies and procedures of the unit, including the assessment of sedated patients and the manipulation of sedating drugs. No further training or competency evaluation is done to the newly appointed nurses on managing sedation after completion of the probation period of their employment.

The sedation protocol at AUBMC is composed of three order sets under the title “Adult Critical Care Pain/Sedation Protocol” (see appendix A). This protocol was designed to be used in the critical care areas for mechanically ventilated patients, thus allowing nurses to titrate sedatives and analgesic agents based on their assessment and pre-printed order sets. The first order set targets pain management, but is not within the scope of this project. The second two order sets manage sedation in two modes: intermittent infusion sedation and continuous infusion sedation. Critical care nurses are required to assess the sedation level of the critically-ill patient using the RASS tool and then titrate the dosage of sedative agents accordingly.

Sedation management at AUBMC highly depends on the nurses’ assessment using the RASS tool. Although competence of the staff in manipulating sedating agents according to the hospital protocols is being regularly monitored by CPDC at AUBMC, assessment of patients using the RASS tool has not been directly evaluated. However, the initial step lies in ensuring proper assessment that accurately reflects the patient’s sedation level in order to prevent over or under-sedation.

### **Significance**

The annual educational needs assessment conducted by the CPDC solicits the request of nurses in critical care areas for refresher and continuing education courses on all policies and protocols used at their unit, including the RASS assessment protocol. A number of nurses have reported lack of confidence in assessing the level of sedation of critically-ill patients on their units using RASS (K. Hussein, RN, personal communication, March 10, 2014). Prior work conducted in intensive care units (ICU) revealed the absence of consensus between nurses regarding appropriate sedation and the amount and type of patient’s movement (Egerod, 2002; Weinert, Chlan & Gross, 2001). Although accurate sedation

assessment is the initial step in proper sedation management, the skill of assessing patients using the RASS tool has not been closely monitored at AUBMC critical areas.

Therefore, there is a need to provide critical care nurses with an educational package in which the different levels of RASS sedation are described and demonstrated, along with the proper approach to assessing sedated patients. Another important aspect is that this educational package could provide the framework to monitor nurses' achievement and evaluate their performance and progress, through the assessment strategies that are developed for this course.

The purpose of this project is to develop an educational package that will guide critical care nurses at AUBMC to a proper and standardized sedation assessment using the Richmond Agitation Sedation Scale (RASS). This educational package has been developed in collaboration with the University of Maryland Medical Center in the United States of America.



## CHAPTER II

### LITERATURE REVIEW

Distress and agitation are common findings among patients in the critical care settings. Many factors have been associated with these findings in the critically-ill patients, such as lack of sleep, noise, high anxiety levels, pain, and medication side effects (Watson & Kane-Gill, 2004). Distress and agitation may lead to an increased release of catecholamines, growth hormone, prolactin, vasopressin, cortisol, glucagon and other chemical substances (Epstein & Breslow, 1999; Lewis, Whipple, Michael & Quebbeman, 1994; Rolih, & Ober, 1995). These factors released as a consequence of distress, may in turn lead to detrimental effects such as ischemia, fluid and electrolyte disturbances, and decreased wound healing (Watson, & Kane-Gill, 2004). Therefore, in order to avoid such adverse effects, sedatives such as benzodiazepines and propofol are employed in critical care settings to relieve patients' distress and avoid subsequent complications (Watson, & Kane-Gill, 2004).

According to the Society of Critical Care Medicine (SCCM), the desired sedation level for mechanically ventilated patients is to easily arouse and calm the patient (Jacobi et al., 2002). Both over-sedation and under-sedation may cause instability in the clinical condition of the critically-ill patients. The dose and duration of sedation were found to be positively correlated, where higher doses of sedation administered were associated with prolonged mechanical ventilation, prolonged ICU stay, and increased incidence of re-intubation (Kollef et al., 1998; Kress, Pohlman, O'Connor, & Hall, 2000).

#### **Effects of Inadequate Sedation**

Sedation aims to induce amnesia, create calmness and drowsiness by administering sedative agents (Partington & Farmery, 2014). Issues related to patient sedation have been studied in the literature, including the high frequency of oversedation. However, a systemic review of the literature showed the absence of a clear definition of oversedation or under

sedation because of the variable sedation assessment tools employed (Jackson et al., 2009). A study done on 1,381 patients in critical care settings revealed that 57% of these patients were over-sedated (Bosson et al., 2007). In another study conducted by Weinert and Calvin (2007) on 274 critically-ill patients, 40% of the patients were over sedated and 13% under-sedated.

It is being frequently acknowledged that sedation may have a direct impact on the physical and psychological outcomes of sedated patients (Kollef et al., 1998; Kress et al., 2000). The literature review reveals that over-sedation is more prevalent than under sedation in critical areas (Jackson et al., 2009). On one side, the oversedation effects are detrimental as they affect the hemodynamic stability of the patients and tissue oxygenation, such as worsening hypotension and hypoxemia, as well as prolonged returning of consciousness and the weaning off mechanical ventilation (Riker & Fraser, 2005). Furthermore, oversedation may lead to systemic vasodilation and a decrease in cerebral blood flow, thus causing brain damage (Rhoney & Parker, 2001).

As for under sedation, it affects the critically-ill by causing inappropriate pain control, decreasing pulmonary function, and inducing stress responses (American Psychiatric Association, 2000). Moreover, under sedation may lead to an increase in the intracranial pressure and cerebral perfusion pressure as a result of the increased oxygen consumption followed by an increase in blood flow (Rhoney & Parker, 2001). The other effect of under sedation is deliberate self-extubation. Investigators reported that 40% to 60% of self-extubated patients experienced agitation and 60% to 80% of these patients required re-intubation (Cuthbertson, Hull, Strachan, & Scott, 2004). A study conducted on patients who were under sedated at an ICU setting revealed that 80% of these patients were able to recall “frightening” experiences, had nightmares, and experienced anxiety, pain, and respiratory distress (American Psychiatric Association, 2000). For these reasons, systemic and accurate sedation assessment is the key to prevent clinical complications.

Nevertheless, 70% to 80% of ICU physicians in North America do not use sedation protocols that are based on the SCCM guidelines; instead they rely on their clinical judgment to titrate sedative doses (Mehta et al., 2006; Rhoney & Murry, 2003). Prior work revealed that sedation management without using a sedation protocol led to over-sedation in more than half of a study population (Jung et al., 2012). A well-defined and guided assessment of sedation and agitation was recommended when manipulating and titrating sedative medications (Sessler et al., 2002).

### **Sedation Assessment Tools**

Sedation scales were created as a bedside tool to be used in order to assess the patient's level of sedation (Delvin et al., 1999). There are two types of sedation scales: subjective and physiologic. Subjective scales often rely on the examiner's interpretation of the behaviors of sedated patients like their facial expressions and body movements (Delvin et al., 1999). Assessment is done by the nurse or the physician using verbal or physical stimulation to determine the patient's sedation levels. The physiologic scales rely on the vital signs or the electroencephalogram readings of the patient, and sedative medications will be titrated accordingly (Olson, Thoyre, & Auyong, 2007).

In critical care settings, the most commonly used scales are the Ramsay sedation scale (RSS), the sedation-agitation scale (SAS), the motor activity assessment scale (MASS), and the Richmond agitation-sedation scale (RASS) (Ely et al., 2003; Rassin et al., 2007). RSS is composed of six levels ranging between sedation and agitation, with higher scores for deeper sedation levels. Among the few studies conducted to demonstrate the reliability of RSS, only one study could reveal a reliability assessment with kappa coefficient .86-.92 (Van Dishoeck et al., 2008).

On the other hand, SAS contains more details and descriptions of sedation levels than the RSS. The scores in SAS range from one to 7, with higher scores corresponding to deeper



sedation (Riker, Picard, & Fraser, 1999). However, this tool does not show the changes in the patient's behaviors before and after stimulation for titrating medications (Riker et al., 1999).

A similar tool is the MASS, which was created to enhance the communication between the multidisciplinary team with regards to medication titration (Delvin et al., 1999). The main feature of this tool is that it describes agitation more than other tools and addresses the changes in the patient's condition post-medication administration. MASS showed to have good inter-rater reliability, with a kappa coefficient of .83 when assessing sedation but there is no report on its validity (Olson et al., 2007).

### **Exploring the RASS tool**

The most favored tool in assessing sedation is the RASS, because of its well differentiated levels and ease of use (Watson & Kane-Gill, 2004). This tool was created by a critical care multidisciplinary team. Assessment using the RASS tool requires three steps: respiratory rate observation, verbal stimulation, and physical stimulation. The tool has ten levels and is rated on a scale ranging from +4 to -5 (see Appendix B).

On the higher spectrum of the tool, +4 represent a combative and a violent patient who poses danger to the staff. As the RASS level drops, the patient is described as very agitated (+3), agitated (+2) or distressed (+1), which is the lowest value in the agitation spectrum. An alert and calm patient will score zero, while a sedated patient will be scored using negative values. The lowest RASS score is -5 and it corresponds to an unresponsive patient that does not respond to neither verbal nor physical stimuli. Patient's sedation levels may range between drowsy (-1), light sedation (-2), moderate sedation (-3), deep sedation (-4) and unarousable (-5). Each level of the scale guides the nurses in their assessment by providing a description of how the patient would appear clinically. RASS offers a more accurate and detailed explanation of each level of sedation allowing for better titration of medications, until a moderate sedation is achieved as per the SCCM guidelines. For example,

a RASS level of -2 is described as “Light sedation: Briefly (less than 10 seconds) awakens with eye contact to voice” (Sessler et al., 2002).

A salient feature of the RASS tool is that it assesses the patient’s responses based on verbal or physical stimulation, thus recognizing the concept of agitation and differentiating it from consciousness (Ely et al., 2003). RASS demonstrates a high inter-rater reliability in its use by multidisciplinary teams. This high inter-rater reliability was assessed in different clinical settings, including the critical care settings with ventilated and non-ventilated patients, as well as the sedated and non-sedated ones (Sessler et al., 2002; Rassin et al., 2007; Riessen et al., 2012). When compared to other tools, RASS has higher levels of inter-rater reliability for moderate sedation levels assessment, with kappa coefficient 0.91 (Sessler et al., 2002).

A study conducted by Abdar et al. (2013) on 132 ICU patients sought to implement a nurse-led sedation protocol in critical care areas and to record the amounts of used sedative medications. Patients were randomly allocated to two groups: the first group received the usual ICU sedation management and the second group received a nurse-led sedation protocol using RASS. When compared to the first group, the nurse-led sedation protocol had a better mean RASS score ( $-0.95 \pm 0.3$  vs.  $-1.88 \pm 0.4$ ), with higher consciousness levels ( $8.4 \pm 0.4$  vs.  $8.8 \pm 0.4$ ), and lower doses of sedation and analgesia needed. Therefore, it is essential to implement a sedation protocol in areas where patients ought to be sedated for medical reasons like intubation. It is also highly recommended that health care professionals use a valid and reliable assessment scale when assessing the sedated patients (Abdar et al., 2013).

### **Role of Nurses in Sedation Assessment**

Nurses are the front liners in life-threatening events (Pasero, 2009). Nearly 60% to 70 % of ICU nurses do not utilize a sedation scale in their clinical practice (Bosson et al., 2007). The lack of knowledge may be impeding the nurses from employing a sedation tool in

their clinical practice (Abdar et al., 2013). For this reason, in-service education systems should integrate sedation and pain management in their professional development programs

Nurses in critical care areas are required to use a sedation scale in their practice, and thus must be well trained on using it. Lack of knowledge on how to properly assess sedated patients using sedation scales may lead to flaws in sedation dosage leading to over or under-sedation of patients. Sedation assessment is essential to provide appropriate management and allow nurses to make informed interventions and prevent sedation side-effects (Dempsey, Davidson, Cahill, & Agan, 2009; Pasero, 2009; Pasero & McCaffery, 2002).

At AUBMC, nurses in critical care areas are required to use a sedation protocol that guides them on how to titrate sedative drugs based on the RASS score. For instance, if the patient's RASS score is between +1 and +2, which means the patient is mildly agitated, nurses ought to give the patient Midazolam 2 mg intravenous push every 10 minutes without exceeding 6 mg per hour (Adult Pain and Sedation Protocol, AUBMC).

Nurses in the critical care areas play a crucial role in sedation and pain control of patients, especially the intubated ones (Abdar et al., 2013). A study was done by Kress (2000) on 150 randomly selected ICU patients to compare between a nurse-driven sedation protocol and a control group receiving routine care from a multi-disciplinary team. Findings revealed that in the nurse-led sedation protocol group, the duration of mechanical ventilation was lower from the control group (4.9 days in the intervention group vs. 7.3 days in the control group;  $P < 0.001$ ), and a lower median hospital stay (13.3 days in the intervention group vs. 16.9 days in the control group,  $P = 0.04$ ) (Kress et al., 2000). Therefore, when nurses are involved in sedation management and are well educated and informed, this leads to improving titration of sedative medications, optimizing treatment, and decreasing the side effects of over-sedation (Carroll et al., 1999).



Many factors may interfere with the nursing management of sedation of the critically-ill patients. One of the factors may be due to some biases that nurses may have when managing sedation. For example, the amount of sedation administered may be affected by the nurses' understanding of the patient's medical condition (Egerod, 2002). Another factor might be due to the nurses' lack of knowledge with regards to proper assessment. In a university hospital, a study showed that only 2.6% of nurses were able to identify overly-sedated patients (Weinert & Calvin, 2007). Therefore, building an educational program targeting health care providers is crucial for critical care nurses (Walker & Gillen, 2006). Such educational programs must aim at increasing the knowledge and clinical reasoning of bedside nurses on sedation assessment and management (Walker & Gillen, 2006).

### **Impact of Professional Development on Nursing Practice**

In order to keep nurses abreast of the new developments and advances in health care, hospitals usually provide professional development initiatives. These initiatives allow participants such as nurses to increase their knowledge, learn new skills, meet patient needs, and maintain high quality of care (Meyer & Elliott, 1996). Since the era of Nightingale, nursing literature has continued to emphasize the benefits of continuing education (Beatty, 2001). When nurses fail to stay up-to-date with their knowledge, therapeutic patient outcomes may be difficult to achieve (Beatty, 2001; Jannings & Armitage, 2001; Kersaitis, 1997).

There is a lot of evidence associating continuing education with increased productivity of nurses, a decrease in occupational hazards, and improvements in the quality of care (Aiken et al., 2014; Flores & Alonso, 2006). Other descriptive studies have revealed that benefits of accessing continuing education would include: decreasing the isolation of nurses, improving the motivation to work in rural areas, and enhancing their performance (Curran, Fleet, & Kirby, 2006). For this reason, continuing nursing education is recognized as

crucial for cost-effective quality care with less adverse effect on patients and nurses (Beatty, 2001; Glass & Todd-Atkinson, 1999; Lagerstrom et al., 1998).

The findings of a study conducted by Bosson et al. (2007) revealed the existence of several issues that need to be prevented in ICU settings. The first issue is that over sedation and deep sedation levels must be avoided. The second issue relates to painful procedures that must be well controlled and analgesia administered accordingly. It is extremely important to provide ICU staff with educational programs and sufficient training on sedation protocols (Bosson et al., 2007).

### **Review of Continuing Education Methods**

There are various methods used to provide continuing education for nurses. The major challenge for most registered nurses is to remain up-to-date in their professional field with the ongoing changes in the health care system (Atack & Rankin, 2002). The main reason for this challenge goes back to the unique aspect of the nursing profession and the nursing work place. Nurses often work in a setting where high turn-over of patients, noise, and stress restrain them from attending educational sessions (Atack & Rankin, 2002). Other challenges that prevent nurses from attending professional development activities have been addressed in the literature and include changes in shift rotation and personal commitments outside the hospital (Atack & Rankin, 2002). Yet, it is highly important for nurses to seek new knowledge and update their skills.

With today's technological advances, nurses are prompted to enroll in continuing educational programs, especially the web-based ones (Johnson et al., 2000). The importance of web-based teaching is that it can be easily accessed daily and flexibly (Atack, 2001). Traditional teaching methods are still applied in many settings, yet web-based online teaching is perceived to be effective (Johnson Argon, Shaik & Palma, 2000), thus making education reachable and shared (Atack, 2001; Johnson, et al., 2000).



Several studies helped reveal that nurses tend to be more satisfied, more active, and at ease with web-based learning (Atack, 2001; Ryan & Carlton, 1999). The method of online learning empowers and gives the learner more control over the process of learning (Benson, 2004). More flexibility is granted, where learners can study the material where ever and whenever they can access it (Benson, 2004). In addition to that, online learning can deliver large content in several modules (Benson, 2004). Utilizing this approach in delivering new material to nurses may allow them to improve their competence and practice.

Therefore, it is essential to utilize a valid and reliable scale when assessing sedation. Sedation assessment scales serve to guide protocol based management in the critical care settings. The use of such protocol is associated with lower incidence of over or under sedation, lower duration of mechanical ventilation and shorter hospitalization days of the critically ill patients. Nurses are required to assess and manage sedated patients and thus shall be well trained on the use of sedation assessment scales and protocols adopted by their hospitals.

### CHAPTER III

#### RASS EDUCATIONAL PACKAGE

This chapter tackles the course syllabus titled RASS Assessment for Critical Care Nurses. The syllabus includes the course description, learning outcomes, content, and instructional and assessment strategies. The course content includes two modules: theory-based modules (see Appendix C) and a video-based module (see Appendix D). The theory-based module introduces learners to the pharmacotherapy aspect of sedation, the sedation assessment process, the components of the RASS tool, and the major nursing interventions based on the RASS score. This module is delivered to learners using the power point format. As for the video-based module, it entails a set of video clips demonstrating the procedure of assessment and the details of assessing sedated patients based on certain criteria related to the RASS level.

Both modules will be posted on the AUBMC Moodle page. The main benefit of being an online course is flexibility and accessibility of the registered nurses, at any point in time, to the videos and the theoretical component of the course. Parallel to creating an online site for the course, a forum will be created as well for all nurses enrolling in the course. The forum will enhance communication between the learners, and through which they will share views and experiences regarding the practice of sedation assessment. Through this forum, feedback will be provided by the course coordinator, clinical educator, and fellow nurses.

## AMERICAN UNIVERSITY OF BEIRUT MEDICAL CENTER

Clinical and Professional Development Center

Richmond Agitation Sedation Scale Assessment Web-Based Course

**Course Syllabus****Coordinator:** Ms. Rayan Al Dabbah Ext. 7558Email: [ra193@aub.edu.lb](mailto:ra193@aub.edu.lb)**Course Description**

This course is developed for critical care nurses at AUBMC who are directly involved in the management of sedated patients and are required by the CPDC to annually validate their knowledge and competence. The purpose of the course is to update nurses' knowledge on sedation and the sedation assessment techniques and management using RASS.

The course consists of theory-based and video-based modules. Theory modules cover the indications for sedation, a description of the RASS tool, the pharmacology of sedatives, and the role of the nurse in sedation management using evidence-based practice. The video-based module comprises of a series of hands-on, explanatory video clips. The course is delivered in a web-based format using MOODLE.

**Prerequisites**

Nurses enrolled in this course must be registered nurses working in the critical care areas at AUBMC, regardless of their years of experience.

**Learning Outcomes**

Upon successful completion of this course, learners will be able to:

1. Discuss the indications for assessing sedated patients in critical care areas.

2. Differentiate between the various stages of RASS based on concrete criteria.
3. Demonstrate proper sedation assessment approach based on the RASS tool.
4. Design a plan of care for the patient based on the assessed RASS level, using evidence-based practice.

**Policies**

Nurses enrolled in this course will have an open access to the course's instructional material. After one month of their enrollment, the learners are required to fill an over-all evaluation sheet (see Appendix E) and a personal verification form (see Appendix F). All of these forms should be completed and submitted online to the CPDC office. All learners are required to pass the online exam (see Appendix G) with a passing grade of 80%. After completing all the course requirements, the critical care nurses will be granted 6 contact hours.

**Instructional Strategies**

Web-based strategy; hands-on clinical practice; online discussion forum

**Assessment Strategies**

At the end of the second week of their enrollment in the course, and after accessing the educational package on Moodle, nurses' knowledge will be assessed using an online exam and the demonstration of assessment skills in a clinical setting.

- The exam is comprised of 30 multiple choice questions.
- The passing grade of the exam will be 80%.
- Three attempts are allowed;
- In case of failure to achieve the passing score, the nurse will be scheduled for further training by the clinical educator.
- Clinical educators ought to monitor the assessment skills of sedated patients through scheduled rounds.



### Module Content

#### Module 1: Introductory Concepts to the RASS Tool

**Approach:** Theory Modules - Power point presentations

Based on an extensive literature review, instructional material using the power point format was developed to provide the knowledge base for the course. The content of the first module tackles the major indications and possible complications of sedation. In the second module, the RASS tool is described, together with the different sedation levels. Incorporated as well in the second module is further elaboration on the proper assessment techniques of sedated patients and the concrete criteria that nurses should consider before determining the RASS level. The pharmacology concepts related to sedative agents form the third module of the course, whereas the fourth module presents the guideline for nurses on how to respond to the different sedation levels using the hospital sedation protocol.

#### Course Content:

Self-Learning Module	Contact Hours
Indications of Sedation	1
RASS tool	1
Pharmacology of Sedatives	2
Role of Nurses in sedation Management	1

#### Module 2: RASS Application

**Approach: Explanatory Videos**

The videos are guided by a script (Appendix D), to cover the different stages of sedation based on the RASS levels. Each video clip highlights the main sedation aspects that each critical care nurse must attend to when assessing sedated patients using the RASS tool.

A total of 13 videos were filmed at the simulation center in the University of Maryland Medical Center (UMMC), under the guidance of Dr. Karen Kaiser. Approval from the UMMC was obtained by mail from Dr. Karen Kaiser.

### **The Process Used in Developing the Videos**

The first video begins with a demonstration of the nurse's approach when entering the room of a sedated patient, and proceeds with a description of the proper sequence of sedation assessment technique with an emphasis on the correct assessment of the respiratory rate. In the remaining nine videos, the nurse demonstrates each and every level in the RASS tool. Patient's responses to the assessment criteria is highlighted, thus allowing the learner to transfer the skills gained from the demonstration to real practice. It is expected that the nurses will be enabled to identify these criteria in the real clinical setting and be more familiar with the main features of the different stages.

## CHAPTER IV

### IMPLEMENTATION AND EVALUATION

The educational package will be presented to the CPDC and the critical care advanced practice nurse in the hospital for review and approval. Once an approval is granted, the course will be added on Moodle with the assistance of the IT programmers at AUBMC. All registered nurses in the critical areas will be added to the course, in order to have access to the online material, which includes an open discussion forum, the explanatory videos, the power-point material and the online exam.

Nurses will be given access to this educational package at all times and can refer to Moodle whenever they find a need to access it. Upon enrolling in this course, nurses are required to finish the modules within one month of their enrollment. As for the novice RNs in the critical care areas, they will need to complete this course, as part of the mandatory hospital orientation program, within the first three months of their employment. All critical care nurses are required to pass the online exam to be certified for using the protocol, similar to any competency in the hospital. The exam will be taken online after covering the whole material. A passing grade of 80% is required and three attempts will be permitted to achieve the required score on the test. The exam needs to be repeated every two years for re-validation of competency.

After passing the test, a hands-on clinical training session will commence on the units to ensure achievement of the course's learning outcomes. With the coordination of the nurse managers of each unit, nurses will be distributed into groups of three. The duration of the session will be 30 minutes; the sessions will not have a fixed schedule because planning will depend on the clinical setting, availability of patients, and duty of the nurses. In case the competency is not met, the clinical educator can schedule further sessions.

**Assessment of Learning Outcomes**

Clinical educators ought to monitor the learner's competence in assessing sedated patients. This would ensure that nurses are implementing what they have learned into practice and allows for direct correction and discussion of the cases with the clinical educators. Such evaluation can be done through scheduled rounds. Clinical Educators will be using a sedation assessment competency form (see Appendix I) to evaluate the clinical performance of nurses when assessing sedation of patients.

This competency form was developed based on the hospital sedation policy and the RASS tool. Initially, the assessment skill should be evaluated after completing the sedation course and the online exam. The clinical educator will evaluate the clinical competence of the nurse based on three complete sedation assessments during the initial complete validation. After one year, the re-validation of the competence requires only one complete sedation assessment for evaluation. Based on the procedure of RASS assessment, clinical educators will be observing the application of the right approach, proper respiratory assessment, and correct staging of RASS based on eye opening, response to verbal and/or physical stimuli.

In order to ensure that nurses are following the protocol of titrating sedatives according to the RASS score, chart audits will be done on monthly basis after introducing the educational package. This would ensure that there are no discrepancies when manipulating the doses. By comparing previous chart audit results to the ones done after providing the educational package, we would be able to detect changes in practice and determine if the nurses are correctly applying the skills.

It is essential to evaluate the continuing education programs implemented for nurses and this process is described as the impact model (Hawkins & Sherwood, 1999). By continuing to evaluate the educational programs, not only will patients and organizations



reach better outcomes, but also it will have an effect on morbidity and mortality, and the costs of the hospital (Hawkins & Sherwood, 1999).

### **Evaluation of the Educational Package**

The CPDC at AUBMC and the critical care advanced practice nurse shall be the first to evaluate the package before it is posted for utilization by the nurses. In addition to that, nurses will also be part of the process through an online evaluation form that will be posted on Moodle for anonymous evaluation of the online course (see appendix E). The online evaluation form used in this course is the same form used by CPDC to evaluate educational sessions held at AUBMC. This will allow the CPDC to easily make changes on the package, since they are familiar with the evaluation form.

### **Future Recommendations**

After introducing the package, close follow up is recommended to measure the sedation levels of critically ill patients and to determine whether the nurses meet the standards set by the SCCM. This will ensure that patients are neither over- nor under-sedated at AUBMC, thus avoiding the complications of sedations. Based on the follow up findings, the hospital will determine how well critical areas are doing in terms of sedation. Through the yearly competency assessment, it is also recommended that nurses be evaluated for knowledge and skills related to assessment of sedated patients and application of the proper titration methods.

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Appendix A

ADULT CRITICAL CARE PAIN/SEDATION PROTOCOL AUB

		Identification label	
<b>Adult Critical Care Pain/Sedation – Order Set (1/3)</b>			
Last Name: _____ First & Middle Name: _____ Patient Number: _____ Date of Birth: _____ Age: _____ Gender: <input type="checkbox"/> Male <input type="checkbox"/> Female Admission Date: _____ Admitting Physician: _____		Unit: _____ Weight: _____ Height: _____ Expanded Precautions: <input type="checkbox"/> None <input type="checkbox"/> Airborne <input type="checkbox"/> Droplet <input type="checkbox"/> Contact <input type="checkbox"/> Contact Plus Other Precautions: _____ Allergy (specify reaction): _____	
The following abbreviations may not be used: U IU QD QOD .X mg X.0 mg MS MSO <sub>4</sub> MgSO <sub>4</sub> CC µg mcg <input checked="" type="checkbox"/> Check the Applicable Order			
Unit: <input type="checkbox"/> ICU <input type="checkbox"/> CCU <input type="checkbox"/> CSU <input type="checkbox"/> NCU <input type="checkbox"/> RCU <input type="checkbox"/> ED <input type="checkbox"/> PACU <input type="checkbox"/> Others		Nurse's Name & Signature	Date & Time Noted
<b>Condition: Mechanically Ventilated</b>			
<b>Goals:</b>			
<input type="checkbox"/> Critical care Pain Observation Tool (CPOT) target pain score: _____ (recommended 0 to 1) <input type="checkbox"/> Richmond Agitation-Sedation Scale Target (RASS) sedation score: _____ (recommended 0 to -3)			
<b>Pain Management:</b>			
<input type="checkbox"/> <b>Fentanyl Continuous Infusion: 500 microgram in a total volume of 100 ml NSS</b> Fentanyl IV drip at 0 – 200 microgram /hour Start rate at: _____ microgram /hour (25 – 50 microgram /hour) Titrate to pain score: _____ Fentanyl bolus 12.5 microgram IV push every 5 minutes PRN for pain score 2 – 3 (mild pain) Fentanyl bolus 25 microgram IV push every 5 minutes PRN for pain score 4 – 6 (moderate pain) Fentanyl bolus 50 microgram IV push every 5 minutes PRN for pain score 7 – 8 (severe pain) If the patient requires greater than 2 boluses in an hour, increase rate by _____ microgram /hour (e.g: 12.5 – 25 microgram/hour) every hour Hold if systolic BP less than 90mmHg; HR less than 50 beats/minute; Notify MD on-call if dose exceeds 100 microgram /hour and target pain score is not achieved			
<b>For Breakthrough Pain</b>			
<input type="checkbox"/> <b>Morphine IV push:</b> <input type="checkbox"/> Patient is not on Fentanyl continuous infusion <input type="checkbox"/> Morphine _____ mg IV push (recommended 5 mg) PRN every _____ minutes (recommended 5 minutes) until pain score 1 to 2. <input type="checkbox"/> If patient requires more than _____ boluses (2 to 5) in an hour, notify MD on call.			
<input type="checkbox"/> <b>Paracetamol IV drip:</b> <input type="checkbox"/> Paracetamol _____ gram IV drip PRN every _____ hour			
<input type="checkbox"/> <b>Others:</b>			

MD Name: \_\_\_\_\_ Signature: \_\_\_\_\_  
 Date: \_\_\_\_\_ Time: \_\_\_\_\_ Pager Number: \_\_\_\_\_

Original: Medical Record  
 Blue Copy: Pharmacy  
 Pink Copy: Pharmacy

~~ FAX/SCAN TO PHARMACY ~~

		Identification label	
<b>Adult Critical Care Pain/Sedation - Order Set (2/3)</b>			
Last Name: _____ First & Middle Name: _____ Patient Number: _____ Date of Birth: _____ Age: _____ Gender: <input type="checkbox"/> Male <input type="checkbox"/> Female Admission Date: _____ Admitting Physician: _____		Unit: _____ Weight: _____ Height: _____ Expanded Precautions: <input type="checkbox"/> None <input type="checkbox"/> Airborne <input type="checkbox"/> Droplet <input type="checkbox"/> Contact <input type="checkbox"/> Contact Plus Other Precautions: _____ Allergy (specify reaction): _____	
The following abbreviations may not be used: U IU QD QOD .X mg X.0 mg MS MSO <sub>4</sub> MgSO <sub>4</sub> CC µg mcg			
<input checked="" type="checkbox"/> Check the Applicable Order		Nurse's Name & Signature	Date & Time Noted
<b>Sedation Management:</b> <b>Mode 1: Intermittent Infusion Sedation</b> <input type="checkbox"/> Midazolam _____ mg (2 – 5 mg) IV push every _____ hour (2 – 4 hours) Sedation score RASS: _____ Hold if systolic BP less than 90mmHg; HR less than 50 beats/minute <b>Mode 2: Continuous Infusion Sedation (Select ONE of the agents)</b> <input type="checkbox"/> Midazolam Continuous Infusion 50 mg in a total volume of 50 ml NSS (Not recommended in impaired renal function) Midazolam infusion at 0 – 20 mg/hour titrate to achieve goal Start rate at 2 mg/hour Titrate Midazolam to sedation score RASS: _____ Hold if systolic BP less than 90mmHg; HR less than 50 beats/minute Bolus Midazolam 2 mg IV push every 15minutes PRN if RASS greater than goal If the patient requires more than 2 boluses in an hour, increase rate by _____ mg/hour (1 – 2 mg/hour) every hour Notify physician on-call if dose exceeds 10mg/hour and target sedation score not achieved <u>Over-sedation:</u> Hold infusion until sedation score at goal. Restart infusion at ½ previous rate <input type="checkbox"/> Propofol 1% Continuous Infusion (10 mg/ml) 4 ampoules (total of 800 mg) (Avoid in patients with cardiovascular instability.) Start Propofol IV drip at 0 – 300 mg/hour titrate to achieve goal Start rate at 25 mg/hour Titrate Propofol to sedation score RASS _____ by 0.005mg/kg/minute = _____ mg/minute every 5 minutes until target sedation score achieved. Hold if systolic BP less than 90mmHg. Reduce infusion rate by ½ for systolic BP less than 100 mmHg. Bolus Propofol _____ mg IV push (10 – 20 mg) PRN RASS greater than goal Notify MD on-call if dose exceeds 150 mg/hour and target sedation score not achieved <u>Over-sedation:</u> Notify physician and wean Propofol by 10 mg/minute every 10 minutes until sedation score at goal			

MD Name: \_\_\_\_\_ Signature: \_\_\_\_\_  
 Date: \_\_\_\_\_ Time: \_\_\_\_\_ Pager Number: \_\_\_\_\_

Original: Medical Record  
 Blue Copy: Pharmacy  
 Pink Copy: Pharmacy

~~ FAX/SCAN TO PHARMACY ~~





## Appendix B

### RASS Tool

Score	Term	Description
+4	Combative	Overtly combative or violent; immediate danger to staff
+3	Very Agitated	Pulls on or removes tube(s) or catheter(s) or has aggressive behavior toward staff
+2	Agitated	Frequent non-purposeful movement or patient-ventilator dyssynchrony
+1	Restless	Anxious or apprehensive but movements not aggressive or vigorous
0	Alert and calm	
-1	Drowsy	Not fully alert, but has sustained (more than 10 seconds) awakening, with eye contact, to voice
-2	Light sedation	Briefly (less than 10 seconds) awakens with eye contact to voice
-3	Moderate sedation	Any movement (but no eye contact) to voice
-4	Deep sedation	No response to voice, but any movement to physical stimulation
-5	Unarousable	No response to voice or physical stimulation

#### *Procedure*

1. Observe patient. Is patient alert and calm (score 0)?  
Does patient have behavior that is consistent with restlessness or agitation (score +1 to -4 using the criteria listed above, under Description)?
2. If patient is not alert, in a loud speaking voice state patient's name and direct patient to open eyes and look at speaker. Repeat once if necessary. Can prompt patient to continue looking at speaker.  
Patient has eye opening and eye contact which is sustained for more than 10 seconds (score -1).  
Patient has eye opening and eye contact, but this is not sustained for 10 seconds (score -2).  
Patient has any movement in response to voice, excluding eye contact (score -3).
3. If patient does not respond to voice, physically stimulate patient by shaking shoulder and then rubbing sternum if there is no response to shaking shoulder.  
Patient has any movement to physical stimulation (score -4).  
Patient has no response to voice or physical stimulation (score -5).

### Appendix C Power-Point Presentations



Sedation in Critical Care Areas:

<p style="text-align: center;"><b>SEDATION IN CRITICAL CARE AREAS</b></p> <p style="text-align: center;">BY RAYAN AL DABBAH, RN,</p>	<p><b>OBJECTIVES</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Discuss agitation in terms of :             <ul style="list-style-type: none"> <li><input type="checkbox"/> Prevalence</li> <li><input type="checkbox"/> Causes</li> <li><input type="checkbox"/> Complications</li> </ul> </li> <li><input type="checkbox"/> Discuss the indications for sedation in the critical care areas.</li> <li><input type="checkbox"/> Differentiate between over and under-sedation:             <ul style="list-style-type: none"> <li>Causes</li> <li>Effects</li> </ul> </li> </ul>
<p><b>OUTLINE</b></p> <ul style="list-style-type: none"> <li>I. Agitation             <ul style="list-style-type: none"> <li>1. Prevalence</li> <li>2. Causes</li> <li>3. Complications</li> </ul> </li> <li>II. Sedation:             <ul style="list-style-type: none"> <li>1. Definition</li> </ul> </li> <li>I. Effects of Inadequate Sedation</li> <li>II. References</li> </ul>	<p><b>AGITATION/DISCOMFORT IN THE ICU</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> <b>Prevalence</b> <ul style="list-style-type: none"> <li>• 50% incidence in those with length of stay &gt; 24 hours</li> </ul> </li> <li><input type="checkbox"/> <b>Causes: uncontrolled pain, delirium, anxiety, sleep deprivation, etc.</b></li> <li><input type="checkbox"/> <b>Short term Complications:</b> <ul style="list-style-type: none"> <li>• Patient-ventilator dys-synchrony &gt; respiratory failure</li> <li>• Increased oxygen consumption</li> <li>• Self (and health care provider) injury</li> <li>• Family anxiety</li> </ul> </li> <li><input type="checkbox"/> <b>Long-term Complications: chronic anxiety disorders and post-traumatic stress disorder (PTSD)</b></li> </ul>
<p><b>RECALL IN THE ICU</b></p> <ul style="list-style-type: none"> <li>→ Some degree of recall occurs in up to 70% of ICU patients.</li> <li>• Anxiety, fear, pain, panic, agony, or nightmares reported in 90% of those who did have recall.</li> <li>→ <b>Potentially cruel:</b></li> <li>• Up to 36% recalled some aspect of paralysis.</li> <li>→ <b>Associated with PTSD in ARDS?</b></li> <li>• 41% risk of recall of two or more traumatic experiences.</li> <li>→ <b>Associated with PTSD in cardiac surgery</b></li> </ul>	<p><b>THE HISTORY OF SEDATIVES</b></p> <p style="text-align: center;">Sedation comes from the Latin word <u>sedare</u>. Sedare = to calm or to allay fear</p> <p>A minimally depressed level of consciousness induced by the administration of pharmacologic agents in which a patient retains the ability to independently and continuously maintain an open airway and a regular breathing pattern, and to respond appropriately and rationally to physical stimulation and verbal commands</p>



**DAILY GOAL IS AROUSABLE, COMFORTABLE SEDATION**

- ➔ **Sedation needs to be titrated to goal:**
  - Lighten sedation to appropriate wakefulness daily
- ➔ **Effect of this strategy on outcomes:**
  - One- to seven-day reduction in length of sedation and mechanical ventilation needs
  - 50% reduction in tracheostomies
  - Three-fold reduction in the need for diagnostic evaluation of CNS

**INDICATION FOR SEDATING CRITICALLY-ILL PATIENTS**

- Ensure patients' safety
- Calm
- Facilitate mechanical ventilation
- Create anxiolysis, analgesia, amnesia
- Decrease oxygen consumption
- Reduce dyspnea

**EFFECTS OF DISTRESS ON CRITICALLY ILL PATIENTS**

- Cardiovascular**
- Release of systemic epinephrine and norepinephrine
    - Elevated HR and BP
    - Increased cardiac O<sub>2</sub> demand
    - Decrease end-organ perfusion
- Endocrine**
- Release of Cortisol, Glucagon, Glucose
  - Hyperglycemia

**INDICATIONS FOR SEDATING CRITICALLY-ILL PATIENTS**

- Distress and agitation is a common finding in the critical care settings.
- Many factors were found to be associated with this finding such as lack of sleep, noise, high anxiety levels, pain and medication side effects experienced by the critically ill patients.

**EFFECTS OF DISTRESS ON CRITICALLY ILL PATIENTS CONT'**

- Neurological**
- Increased response and activation of peripheral pain fibers
    - Increased sensation to pain
  - Release of neurotransmitters in the brain
    - Pain
    - Agitation
    - Delirium



**EFFECTS OF DISTRESS ON CRITICALLY ILL PATIENTS CONT'**

- Immune**
- Increased levels of prostaglandins, cortisol, glucose, cytokines,
    - Increase anti-inflammatory response
    - Decrease wound healing

**EFFECTS OF INADEQUATE SEDATION**

- |  |   |
|--|---|
| <p><b>Under sedation:</b></p> <ul style="list-style-type: none"> <li>▪ ventilator asynchrony,</li> <li>▪ increase in oxygen consumption,</li> <li>▪ unwanted removal of devices and catheters,</li> <li>▪ resource waste, and</li> <li>▪ posttraumatic stress disorder.</li> </ul> | <p><b>Over sedation:</b></p> <ul style="list-style-type: none"> <li>▪ excessive mechanical ventilation</li> <li>▪ pneumonia, lung injury,</li> <li>▪ neuromuscular irregularities.</li> <li>▪ Dyssynchronized melatonin secretion → sleep pattern derangement → delirium</li> </ul> |
|--|---|

SIGNIFICANT DISTRESS IN THE ICU PATIENT OVERALL CAUSES ORGAN ISCHEMIA AND DECREASED HEALING

### OVERSEDATION

Causes for Agitation

**Causes for Agitation**

- Prolonged sedation
- Delayed emergence
- Respiratory depression
- Hypotension
- Bradycardia
- Increased protein breakdown
- Muscle atrophy
- Venous stasis
- Pressure injury
- Loss of patient-staff interaction
- Increased cost

Sedatives

### EFFECTS OF OVERSEDATION SEDATION

Defined as compromised breathing effectiveness after opioid administration

Often reflects as a respiratory rate (RR) below a certain age specific level

Usually associated with uneven respiratory rhythm and depth (periodic or Cheyne-Stokes breathing patterns) causing an increase in CO<sub>2</sub> and decrease in O<sub>2</sub>

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### MINIMALLY ACCEPTABLE UNSTIMULATE RR

Age	Minimally Acceptable Unstimulated RR
adult >18 years	8
adolescent 13-17yr	12
child 3-12yr	14
infant 50 wks post conceptual age - 2yr	16
neonate < 50 wks post conceptual age	20

Rates below this indicate RD

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Guthrie, J. L., Cline, L., Wainert, C., & Sivik, K. (2010). Factors influencing nurse sedation practices with mechanically ventilated patients: a US national survey. *Anesth and Critical Care Nursing*, 36(1), 44-50.

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RASS Explore the Tool:

## RASS

Explore the tool

### Objectives

- Describe the guidelines for sedation management
- Identify the benefits of using a sedation protocol
- Demonstrate the proper sedation assessment approach based on the RASS tool.

### Outline

- Guidelines in sedation management
  - Society of Critical Care Medicine
  - World Health Organization
- Benefits of using a sedation protocol.
- RASS tool.
- Sedation Assessment Approach.

### Society of Critical Care Medicine guidelines

- Treatment of pain and other reversible causes should be conducted before sedating an agitated patient.
- A treatment plan/goal should be established for each patient; therapy should be assessed with a sedation scale.
- Midazolam or diazepam is useful for the acutely agitated patient.

### Society of Critical Care Medicine guidelines (CONT')

- Propofol is preferred when rapid awakening is crucial; triglyceride levels should be monitored for >2 days of continuous infusions.
- Lorazepam is recommended for longer infusions.
- Doses should be tapered daily to assess underlying mental status, and sedation protocols can be helpful and beneficial.

ALGORITHM FOR SEDATION AND ANALGESIA OF MECHANICALLY VENTILATED PATIENTS



ICU Pad Care Bundle: SCCM 2013

Figure 1: The ICU PAD Core Bundle

	PAIN	AGITATION	DELIRIUM
ASSESS	Assess pain w/ valid RAS Pain score $\geq 2$ requires analgesia • Provide analgesia to reach target (e.g. RAS 0-1) • Reassess in 15-30 min post analgesia • RAS $\geq 2$ requires analgesia	Assess agitation, delirium, & both RAS Pain score $\geq 2$ requires analgesia • RAS $\geq 2$ requires analgesia • RAS $\geq 2$ requires analgesia	Assess delirium w/ valid RAS Pain score $\geq 2$ requires analgesia • RAS $\geq 2$ requires analgesia • RAS $\geq 2$ requires analgesia
TREAT	• Non-pharmacologic treatments • Pharmacologic treatments • Reassess pain in 15-30 min • Reassess pain in 15-30 min • Reassess pain in 15-30 min	• Non-pharmacologic treatments • Pharmacologic treatments • Reassess agitation in 15-30 min • Reassess agitation in 15-30 min • Reassess agitation in 15-30 min	• Non-pharmacologic treatments • Pharmacologic treatments • Reassess delirium in 15-30 min • Reassess delirium in 15-30 min • Reassess delirium in 15-30 min
PREVENT	• Administer pain prophylaxis • Administer pain prophylaxis • Administer pain prophylaxis	• Consider daily SIRS, early mobility and nutrition • Consider daily SIRS, early mobility and nutrition • Consider daily SIRS, early mobility and nutrition	• Identify delirium risk factors • Identify delirium risk factors • Identify delirium risk factors

Society of Critical Care Medicine guidelines CONT'



WHO Sedation guidelines

- Step 1: Recognize the presence of anxiety, delirium and pain using standardized scales
- Step 2: Set sedation target
- Step 3: Give sedatives to achieve target
- Step 4: Screen for sedation interruption if continuous infusions used
- Step 5: Recognize special situations that may need neuromuscular blockade
- Step 6: Treat delirium and pain if present
- Step 7: Monitor-record-respond
- Step 8: Deliver quality care

WHO Sedation Guidelines (CONT')

- Set daily sedation targets
  - based on the patient's clinical condition, management plans
  - agreed upon by the health care team
- For most patients, target sedation so the patient is awake (0), calm (-1) or slight drowsy (-2)
  - the presence of agitation should not be a target
- Certain clinical conditions may require deeper sedation targets
  - e.g. a patient with severe ARDS may need deeper sedation to provide LPV
  - target sedation so patient is arousable to voice (-3) or movement (-4)

Benefits of using a Sedation protocol

- Reduces days of IMV (quicker time to extubation)
- Ensures regular sedation assessment schedule
- Ensures appropriate sedative administration .

by guiding nurses on the exact amount of sedative doses to add or decrease based in the sedation level noted during their assessment

SUBOPTIMAL SEDATION

- Best accomplished by the use of sedation scales to help the medical team agree on a target sedation level for each individual patient.
- Richmond Agitation Sedation Scale (RASS) has excellent inter-rater reliability in a broad range of adult medical and surgical ICU patients and to have excellent validity.

RASS: Explore your tool

Score	Term	Description
+4	Combative	Violent; immediate danger to staff
+3	Very agitated	Pulls/ removes tubes, catheters; aggressive
+2	Agitated	Frequent non purposeful movement; patient ventilator asynchrony
+1	Restless	Anxious or apprehensive
0	Alert and calm	
-1	Drowsy	Not fully alert but awakens for >10s, with eye contact, to voice
-2	Light sedation	Briefly awakens (<10s), with eye contact, to voice
-3	Moderate sedation	Any movement to voice but no eye contact
-4	Deep sedation	No response to voice but movement to physical stimulation
-5	Unarousable	No response to voice or physical stimulation

Procedure to use the RASS

- Observe patient. Is patient alert and calm (score 0)?
- Does patient have behavior that is consistent with restlessness or agitation (score +1 to -4) using the criteria listed above, under Description?
- If patient is not alert, in a loud speaking voice state patient's name and direct patient to open eyes and look at speaker. Repeat once if necessary. Can prompt patient to continue looking at speaker.
- Patient has eye opening and eye contact which is sustained for more than 10 seconds (score -1).
- Patient has eye opening and eye contact, but this is not sustained for 10 seconds (score -2).
- Patient has any movement in response to voice, excluding eye contact (score -3).
- If patient does not respond to voice, physically stimulate patient by shaking shoulder and then rubbing sternum if there is no response to shaking shoulder.
- Patient has any movement to physical stimulation (score -4).
- Patient has no response to voice or physical stimulation (score -5).



## STEP ONE:

*Assessing Respiratory Effectiveness*

Quietly, as you approach the bedside....**before** you 'stimulate' the patient by touching or saying the name, or hooking up vital sign machine .....



OBSERVE and COUNT respirations for ONE full minute to pick up ineffective breathing:

- Irregular breathing (pauses)
- shallow breathing (may alternate with periods of deep breaths)
- low RR

## Step two: verbal stimulation and physical stimulation

- After you count the RR, call the patient by NAME without touching or 'stimulating' the patient.
- Does pt. OPEN the EYES and LOOK AT YOU  $\geq 10$  seconds but NOT FULLY ALERT? = RASS -1 Drowsy; *consider requesting pain management plan modification, except immediately post op.*
- Does pt. briefly awaken and LOOK AT YOU  $< 10$  seconds = RASS -2 Light sedation; *request change to pain management plan.*

## Step two: verbal stimulation and physical stimulation

- After you count the RR, call the patient by NAME without touching or 'stimulating' the patient.
- Does pt. OPEN the EYES and LOOK AT YOU  $\geq 10$  seconds but NOT FULLY ALERT? = RASS -1 Drowsy; *consider requesting pain management plan modification, except immediately post op.*
- Does pt. briefly awaken and LOOK AT YOU  $< 10$  seconds = RASS -2 Light sedation; *request change to pain management plan.*

## Step two: verbal stimulation and physical stimulation (cont.)

- Does pt. OPEN the EYES but **not** LOOK AT YOU? = RASS -3 Moderate sedation; *requires 1:1 monitoring*
- Do you have to TOUCH pt. to have them MOVE or OPEN THEIR EYES? = RASS -4 Deep sedation\*
- Is pt. unarousable to VOICE or TOUCH? = RASS -5 Unarousable\*

\*call for respiratory/anesthesia help unless on ventilator support or dx of coma/persistent vegetative state

“

...like it was in a huge, empty gray space, sort of like a monstrous underground parking garage with no cars, only me, floating or seeming to float, on something...


-SB



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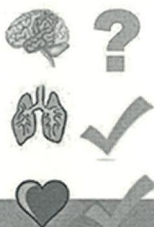


Role of Nurses .pptx

**Role of the Nurses:**

<p><b>ROLE OF NURSES IN MANAGING SEDATION</b></p>	<p><b>OBJECTIVES</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Identify the three stages of sedation:                             <ul style="list-style-type: none"> <li>□ Minimal Sedation</li> <li>□ Moderate Sedation</li> <li>□ Deep Sedation</li> </ul> </li> <li><input type="checkbox"/> Describe the approach of sedation assessment.</li> <li><input type="checkbox"/> Describe the nurses' role in prevention and management of over-sedation/Respiratory depression</li> <li><input type="checkbox"/> Describe the nurses' role in prevention and management of under-sedation/Agitation</li> </ul>
<p><b>OUTLINE</b></p> <ul style="list-style-type: none"> <li>I- Sedation Stages</li> <li>II- Sedation Assessment</li> <li>III- Nurses Role in preventing and managing under-sedation</li> <li>IV- Nurses role in preventing and managing over-sedation</li> </ul>	<p><b>MINIMAL SEDATION: ANXIOLYSIS</b></p> <p>Minimal sedation is also called anxiolysis.</p> <p><b>In this drug-induced state:</b></p> <ul style="list-style-type: none"> <li>• Patient is relaxed .</li> <li>• Patient responds normally to speech.</li>   <li>• Thinking and coordination may be affected.</li> <li>• Breathing and heart function are not affected</li> </ul>
<p><b>LEVELS OF ANESTHESIA AND SEDATION- MINIMAL SEDATION (ANXIOLYSIS)</b></p> <div style="display: flex; align-items: center;">   <div style="margin-left: 10px;"> <p>A drug induced state during which patients respond normally to verbal commands. Although cognitive function and coordination may be impaired, ventilatory and cardiovascular functions are unaffected.</p> </div> </div> <div style="display: flex; align-items: center; margin-top: 10px;">   </div> <div style="display: flex; align-items: center; margin-top: 10px;">   </div>	<p><b>MODERATE SEDATION &amp; ANALGESIA</b></p> <p><b>In this drug-induced state:</b></p> <ul style="list-style-type: none"> <li>• Patient's consciousness is depressed</li> <li>• Patient responds purposefully to spoken words, or spoken words with a light touch.</li>   <li>• The airway remains patent without help.</li> <li>• The patient's breathing is adequate.</li> <li>• Heart function is usually maintained.</li> </ul>

LEVELS OF ANESTHESIA AND SEDATION-  
**MODERATE SEDATION/ANALGESIA**



- (conscious sedation): a drug-induced depression of consciousness during which the patients respond purposefully to verbal commands, either alone or accompanied by light tactile stimulation.
- No interventions are required to maintain a patent airway, and spontaneous ventilation is adequate.
- Cardiovascular function is usually maintained.

**DEEP SEDATION/ANALGESIA**

Deep Sedation/Analgesia is the next level on the continuum.

**In this drug-induced state:**

- Patient consciousness is depressed and is difficult to awaken.
- Patient responds purposefully to repeated or painful stimulation. Reflex movement away from pain is not "purposeful".
- Patient may need help in keeping the airway open.
- breathing may not be adequate.
- Heart function is usually maintained.

LEVELS OF ANESTHESIA AND SEDATION-  
**DEEP SEDATION/ ANALGESIA**



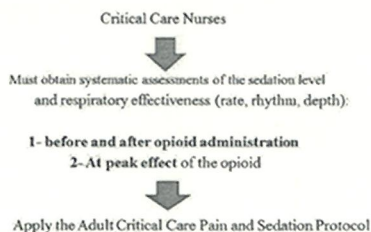
- is a drug-induced depression of consciousness during which patients cannot be easily aroused but respond purposefully following repeated or painful stimulation.
- The ability to independently maintain ventilatory function may be impaired. Patients may require assistance in maintaining a patent airway and spontaneous ventilation may be inadequate.
- Cardiovascular function is usually maintained.

*"A sedation goal or endpoint should be established and regularly redefined for each patient. Regular assessment and response to therapy should be systematically documented."*

(Grade of recommendation = C)

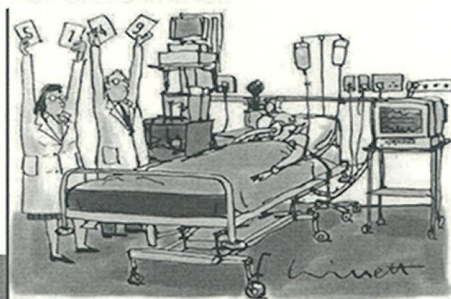


**SEDATION ASSESSMENT**



Allows for early detection of ineffective respirations and respiratory depression.

**SEDATION ASSESSMENT**





**SEDATION ASSESSMENT**

Assessment allows for early detection of ineffective respirations and respiratory depression.



Critical care nurses must:

- Look for and report trends of abnormal respiratory pattern over time (e.g., over the last several hours)
- Detect increase in sedation and decrease in respiratory effectiveness

➔ may signal impending RD

**SEDATION ASSESSMENT EQUIPMENT****Vital Supplies and Equipment**

- Oxygen delivery supplies (ex: facemask)
- Suction equipment
- NIBP
- SaO2 monitors
- EKG and ETCO2 monitor if indicated
- Emergency resuscitation equipment/crash cart
  - Must be immediately available
- Assure a dosing tool is available for emergency drugs

**NURSES ROLE IN PREVENTING OVER SEDATION****Respiratory Depression:**

- At peak opioid effect, assess your patient's
  - Un-stimulated respiratory rate/rhythm/ depth x 1 minute and sedation level
- Document
  - RR/Sedation Scores post pain score fields (prn & scheduled meds)
  - RR/Sedation Scores on the Pain Management Flow Sheet (IV/epidural PCA)
  - Related respiratory changes/interventions in Multidisciplinary sheet.

**NURSES ROLE IN PREVENTING OVER SEDATION (CONT)**

- Report increasing sedation and decreasing un-stimulated RR (toward age specific minimum) and changes in rhythm or depth
- Request a change in the pain plan to minimize the risk of RD
  - A decrease in dose
  - An increase in time between doses
- Addition of:
  - non-opioid analgesic (NSAID/acetaminophen); may reduce future opioid needs
  - non-pharmacologic (acupuncture, acupressure, hot, cold etc.)

**NURSES ROLE IN MANAGEMENT OF OVER SEDATION****Respiratory Depression**

In the event of RD (e.g. RR less than the age-specific minimum, and/or paradoxical rhythm with little chest excursion), poor respiratory effort or quality, snoring or other noisy respiration, or desaturation:

- Arouse the patient immediately and instruct them to take deep breaths, provide supplemental oxygen, consider bag/mask ventilation
- Institute Rapid Response, contact the Pain Service for Pain Service patients

**NURSES ROLE IN MANAGEMENT OF OVER SEDATION**

- Check vital signs including pulse ox, hold further opioid administration until un-stimulated RR > 2 breaths/min above the age-specific minimum
- Institute naloxone guidelines as ordered (Adult Pain and Sedation Protocol AUBMC), which includes increased monitoring of respiratory effectiveness and sedation



**AGITATION: DEFINITION & FACTS**

Is excessive motor or verbal behavior that interferes with patient care, patient or staff safety and medical therapies manifested from organic disturbances, emotional or physical discomfort or psychiatric illness.

- Agitation is a frequent clinical problem that adds significantly to the hospital course.
- Is frequently encountered in 67% of patients with delirium and may be high risk for substantial morbidity and mortality



**ROLE OF THE NURSE IN PREVENTING UNDER SEDATION**



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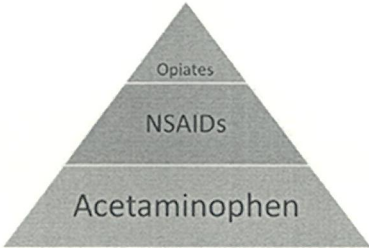
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**Sedative and Analgesic Agents Pharmacotherapy:**

<p>Sedatives and Analgesic agents Pharmacotherapy</p> 	<p><b>Objectives:</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Describe analgesic agents in terms of:             <ul style="list-style-type: none"> <li>• Indications for use</li> <li>• Pharmacokinetics</li> <li>• Side effects</li> </ul> </li> <li><input type="checkbox"/> Describe sedative agents in terms of:             <ul style="list-style-type: none"> <li>• Indications for use</li> <li>• Pharmacokinetics</li> <li>• Side effects</li> </ul> </li> </ul>
<p><b>Outline:</b></p> <ul style="list-style-type: none"> <li>• Analgesics agents             <ul style="list-style-type: none"> <li>• Opioids vs. Non-Opioids                 <ul style="list-style-type: none"> <li>• Indications for use</li> <li>• Pharmacology</li> <li>• Pharmacokinetics</li> <li>• Side effects</li> </ul> </li> </ul> </li> <li>• Describe sedative agents in terms of:             <ul style="list-style-type: none"> <li>• Indications for use</li> <li>• Pharmacology</li> <li>• Pharmacokinetics</li> <li>• Side effects</li> </ul> </li> </ul>	<p><b>Common Sedatives and Analgesic agents in the ICU</b></p> <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <p><b>Analgesics</b></p> <ul style="list-style-type: none"> <li>• Narcotics</li> <li>• Fentanyl</li> <li>• Morphine</li> <li>• Ketamine</li> </ul> </div> <div style="border: 1px solid black; padding: 5px;"> <p><b>Sedation</b></p> <ul style="list-style-type: none"> <li>• Benzodiazepines</li> <li>• Midazolam</li> <li>• Lorazepam</li> <li>• Barbiturates</li> </ul> </div>
<p><b>Analgesics</b></p> 	<p><b>Analgesics</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> <b>Indications:</b> <ul style="list-style-type: none"> <li>• Relieves Pain</li> <li>• Opioids</li> <li>• Non-Opioids</li> <li>• Can be given PRN or continuous infusion</li> </ul> </li> <li><input type="checkbox"/> <b>Pharmacokinetics:</b> <ul style="list-style-type: none"> <li>• Metabolized by the liver, excreted in the urine.</li> <li>• Morphine- Potential for histamine release and hypotension.</li> <li>• Fentanyl- Lipid soluble, 100X potency of MSO4, more rapid onset, no histamine release, expensive.</li> <li>• Demerol- Not a good analgesic, potential for abuse, hallucinations, metabolites build up and can lead to seizures</li> </ul> </li> <li><input type="checkbox"/> <b>Major Side effects:</b> <ul style="list-style-type: none"> <li>• Respiratory depression</li> <li>• Hypotension (sympatholysis, histamine release)</li> <li>• Decreased GI motility (peripheral effect)</li> <li>• Pruritis</li> </ul> </li> </ul>

<h3>WHO Pain Ladder</h3> <p><b>Moderate to severe pain</b></p> <p><b>Step three:</b> Strong opioid With or without non-opioid With or without other analgesics</p> <p><b>Moderate pain</b></p> <p><b>Step two:</b> Weak opioid With or without non-opioid With or without other analgesics</p> <p><b>Mild pain</b></p> <p><b>Step one:</b> Non-opioid With or without other analgesics</p> <p>↑ <b>When appropriate, consider oral route</b></p>	<pre> graph TD     A[Analgesics] --&gt; B[Opioids]     A --&gt; C[Non-Opioids]     </pre>
<pre> graph TD     A[Analgesics] --&gt; B[Opioids]     A --&gt; C[Non-Opioids]     </pre>	<h3>Opioids</h3> <p>Moderate to severe pain</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> <b>Indications for use:</b> <ul style="list-style-type: none"> <li>• Moderate to severe pain is treated with strong opioids, such as morphine, fentanyl and oxycodone.</li> </ul> </li> <li><input type="checkbox"/> <math>\mu</math>- and <math>\kappa</math>-receptors are most important for analgesia.</li> <li><input type="checkbox"/> Although opioids may produce sedating effects, they do not diminish awareness or provide amnesia for stressful events.</li> <li><input type="checkbox"/> <b>Tolerance:</b> fentanyl &gt; morphine             <ul style="list-style-type: none"> <li>• Antagonism of central NMDA receptors through the use of methadone/ketamine is another strategy that may slow the development of tolerance</li> </ul> </li> </ul>
<h3>Opioids</h3> <p>Moderate to severe pain (cont.)</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> The selection of an agent depends on its pharmacology and potential for adverse effects.</li> <li><input type="checkbox"/> Titrate opioid therapy using a validated pain assessment tool (either verbal or nonverbal) or other physiologic endpoints (eg, heart rate, blood pressure, or respiratory rate).</li> <li><input type="checkbox"/> The oral, transdermal, and intramuscular routes of administration are generally not recommended in patients who are hemodynamically unstable</li> </ul>	<h3>Opioids</h3> <p>Moderate to severe pain (cont.)</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> <b>Side effects:</b> <ul style="list-style-type: none"> <li>• Respiratory depression- dose dependent</li> <li>• Hypotension – BZD administered concomitantly</li> <li>• Depressed level of consciousness</li> <li>• Intestinal hypomotility</li> </ul> </li> </ul>

### Metabolism of opiates

Fentanyl
Morphine
Hydromorphone

↓ Oxidation
↓ Glucuronidation

Inactive
Active
Inactive

↓
↓

Inactive
Active
Inactive

**Opioids:**  
**Morphine**

- Predominantly  $\mu$ -opioid receptor
- Metabolized primarily in the liver

**Pharmacokinetics:**

- Onset: 15-30min
- $T_{1/2}$ : 1.7-4.5hrs
- 60% of morphine is converted to morphine-3-glucuronide (inactive), and 6-10% is converted to morphine-6-glucuronide (1/2 as active).

**Side effects:**

- respiratory depression
- GI effects
- altered mentation
- Hypotension may result: from vasodilatation
- Active metabolite may cause prolonged sedation in the presence of renal insufficiency.

**Opioids:**  
**Fentanyl**

- $\mu$ -opioid receptors

**Pharmacokinetic:**

- Highly lipophilic
- Rapid onset
- $T_{1/2}$ : 2-4hr
- Repeated dosing may cause accumulation esp. in renal dysfunction
- Less nausea, as well as less histamine-mediated itching, in relation to morphine

**Opioids:**  
**Fentanyl Patch**

- Patch usually provides consistent drug delivery but the extent of absorption varies depending on
  - the permeability
  - temperature
  - perfusion
  - thickness of the skin
- There is a large inter-patient variability in peak plasma concentrations.
- **Not for acute analgesia:** 12-24 hour delay to peak effect and similar lag time to complete offset once the patch is removed.

**Opioids:**  
**Meperidine (Demerol)**

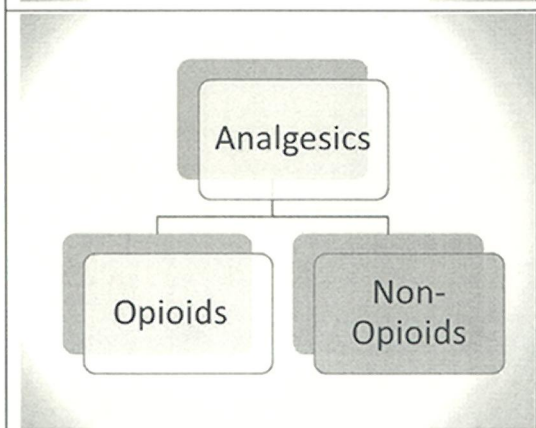
- $\kappa$  opioid receptor
- Also has
  - strong anticholinergics effect
  - local anesthetic activity due to blockage of sodium ion channels.
  - increases cerebral serotonin concentration

**Side effects:**

- Neuroexcitation: apprehension, tremors, delirium, and seizures
- Interact with antidepressants (contraindicated with MAOI and best avoided with SSRI)

**Summary:**  
**Pharmacokinetics of Opioids**

Agent	Dose (iv)	Half-life	Metabolic pathway	Active metabolites
Fentanyl	200 $\mu$ g	1.5-6 hr	Oxidation	None
Morphine	10 mg	3-7 hr	Glucuronidation	Yes (Sedation in RF)
Meperidine	75-100 mg	3-4 hr	Demethylation & hydroxylation	Yes (neuroexcitation in RF)



### Non-Opioids

Moderate Pain

**Indications for use:**

- Moderate pain is treated with *weak opioid* drugs such as codeine phosphate or tramadol.
- These are often combined with paracetamol such as tramadol, Solpadine.

**Side effects:**

- Constipation
- nausea
- drowsiness.



**Non-Opioids:  
NSAIDs**

- Indications for use:**
  - For moderate pain relieve.
- Pharmacokinetics:**

Nonselective, competitive inhibition of cyclooxygenase.

- Side effects**
  - Gastrointestinal bleeding: bleeding secondary to platelet inhibition,
  - renal insufficiency.
  - Increased risk in:
    - hypovolemia or hypo-perfusion
    - Elderly
    - CKD
    - Asthma & Aspirin sensitivity.

**Non-opioid drugs  
Acetaminophen:**

- Indications for use:**
  - can be used for most types of mild pain.
  - With an opioid, acetaminophen produces a greater analgesic effect than higher doses of the opioid alone
- Pharmacokinetics:**
  - Acetaminophen should be maintained at
    - less than 2 g per day for patients with a significant history of alcohol intake or poor nutritional status
    - less than 4 g per day for others
- Side effects:**
  - Potentially hepatotoxic especially in patients with depleted glutathione stores resulting from hepatic dysfunction or malnutrition.

**Non-opioid drugs  
Anti-inflammatory**

- Indication for use:**
  - Help reduce inflammation and swelling.
  - They are good for treating pain in the skin, muscle or bone.
- Pharmacokinetics**
- Side effects:**
  - indigestion
  - Gastric ulcers

**Sedative Agents**

- Benzodiazepines
- Propofol
- Ketamine

**Sedative Agents:  
Benzodiazepines**

- Mechanism of Action:** Benzodiazepines GABA receptor modulation at CNS
- Pharmacodynamics:** Anxiolysis Sedative/Anesthesia Anticonvulsant Relief of muscle spasm
- Indications for use:**
  - **Midazolam:** *short-term use only as it produces unpredictable awakening and time to awaken when infusions continue longer than 45-72 hours. (Grade of recommendation A)*
  - **Lorazepam:** *is recommended for the sedation of most patients via intravenous, oral, administration or continuous infusion. (Grade of recommendation B)*
- Pharmacokinetics/properties:**
  - **Lorazepam:** onset 2 - 10 minutes, half-life 10 hours, diazepamoid
  - **Midazolam:** onset 1 - 2 minutes, half-life 3 hours, metabolized by cytochrome P450, active metabolite (1,0R) accumulates in renal disease.

Benefits	Risks
<ul style="list-style-type: none"> <li><input type="checkbox"/> Anxiolytic</li> <li><input type="checkbox"/> Amnestic</li> <li><input type="checkbox"/> Sedating</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Delirium</li> <li><input type="checkbox"/> H/O analgesia</li> <li><input type="checkbox"/> Inactive sedation especially after long-term sustained use</li> <li><input type="checkbox"/> Propofol: gastric toxicity (especially in sepsis); hypotension; uncertain</li> <li><input type="checkbox"/> Evaluate when a patient has unexplained acidosis</li> <li><input type="checkbox"/> Particularly problematic if alcoholics (due to down shift) and renal failure</li> <li><input type="checkbox"/> Respiratory failure (especially with concurrent opiate use)</li> <li><input type="checkbox"/> Withdrawal</li> </ul>


**DURATION OF ACTION OF BENZODIAZEPINES**

<b>Long-acting</b>
 days <b>1-3</b> Clonazepam Flurazepam Lorazepam Oxazolepam Temazepam
<b>Intermediate-acting</b>
 4-8 Hours Alprazolam Etizepam Lorazepam Temazepam
<b>Short-acting</b>
 3-6 Hours Diazepam Flunitrazepam

	MIDAZOLAM	LORAZEPAM	DIAZEPAM
<b>LOADING DOSE</b>	0.02-0.1 mg/kg	0.02-0.06 mg/kg	0.05-0.2 mg/kg
<b>MAINTENANCE DOSE</b>	0.04-0.2 mg/kg/hr	0.01-0.1 mg/kg/hr	Rarely used
<b>ONSET</b>	1-5 min	5-20 min	2-5 min
<b>DURATION</b>	1-2 hrs	2-6 hrs	2-4 hrs
<b>CARDIAC EFFECTS</b>	Minimal	Minimal	Present
<b>RESPIRATORY EFFECTS</b>	Important depressant effect	Important depressant effect	Important depressant effect
<b>ANALGESIA</b>	None	None	None
<b>AMNESIA</b>	Potent	None	None
<b>ACTIVE METABOLITES</b>	Yes	No	Yes
<b>COST/24HRS</b>	4 mg/hr: \$37	2 mg/hr: \$52	8 mg q 4h: \$24

**Flumazenil:**  
Benzodiazepine antagonist

- Mechanism of action:**
  - Transiently antagonizes the benzodiazepine component of ventilatory depression and sedation during use with opioids
  - Reverses CNS and circulatory side effects of benzodiazepines within 2 minutes
- Pharmacokinetics:**
  - Given in incremental doses of 0.2 to 0.5 mg up to 3 mg
  - Onset - 2 min
  - Duration- 30 to 60 min

<p><b>Sedative Agents:</b>  <b>Propofol</b></p> <p>❑ <b>Pharmacology:</b> GABA agonist</p> <p>❑ <b>Pharmacokinetics/dynamics:</b> onset 1 - 2 minutes, terminal half-life 6 hours, duration 10 minutes, hepatic metabolism</p> <p>❑ <b>Benefits</b></p> <ul style="list-style-type: none"> <li>❑ Rapid onset and offset and easily titrated</li> <li>❑ Hypoxic and apnoeic</li> <li>❑ Can be used for intractable seizures and elevated intracranial pressure</li> </ul> <p>❑ <b>Risks</b></p> <ul style="list-style-type: none"> <li>❑ Not reliably amnesic, especially at low doses</li> <li>❑ NO analgesia!</li> <li>❑ Hypotension</li> <li>❑ Hypertrophic cardiomyopathy, lipid source (1.1 kcal/ml)</li> <li>❑ Respiratory depression</li> <li>❑ Propofol Infusion Syndrome</li> <li>❑ Cardiac failure, rhabdomyolysis, severe metabolic acidosis, and renal failure</li> <li>❑ Caution should be exercised at doses &gt; 30 mcg/kg/min for more than 48 hours</li> <li>❑ Particularly problematic when used simultaneously in patient receiving catecholamines and/or steroids</li> <li>❑ Urine may turn green from excretion of "phenol metabolites"</li> </ul> 	<p><b>Sedative Agents:</b>  <b>Ketamine</b></p> <p>❑ <b>Indications for use:</b></p> <ul style="list-style-type: none"> <li>- Analgesia/Sedation</li> <li>- Preserves respiratory drive - "awake" intubation</li> <li>- Release of catecholamines -             <ul style="list-style-type: none"> <li>+ ↑ heart rate,</li> <li>+ ↑ contractility,</li> <li>+ ↑ MAP</li> <li>+ ↑ cerebral blood flow</li> <li>+ causes bronchodilation</li> </ul> </li> </ul> <p>❑ <b>Pharmacokinetics:</b></p> <ul style="list-style-type: none"> <li>- Onset of action IV 1-2 minute</li> <li>- IM 3-10 minutes</li> <li>- IV - 0.5 to 2mg/kg</li> <li>- IM - 3-4 mg/kg</li> </ul> <p>❑ <b>Side effects:</b></p> <ul style="list-style-type: none"> <li>- laryospasms</li> <li>- hallucinogenic emergent reactions.</li> <li>- intracranial pressure</li> <li>- increased oral secretions</li> <li>- Potential for exacerbating myocardial ischemia.</li> </ul>
<p><b>Reference</b></p> <p>Lerch, Park. Br Med Bull. 1999;55:76-95.</p> <p>Lerch, Park. Br Med Bull. 1999;55:89.</p> <p>Pharmacology and Physiology in Anesthetic Practice. 3rd ed. 1999:138</p> <p>Prielipp et al. Crit Care Clin. 1995;11:986.</p>	<p style="text-align: center;">Thank you</p>

## Appendix D Video Script

### Codes

**Blue font** = Narrator voice

**Red font** = Patient voice

**Green font** = Nurse's voice

**Italics** = *SIM settings and movement*

**Bolding** = camera shots or headings

**Crucial scenes:** 1, 8-14

### Scene 1: Initial Assessment approach

**Description:** Verbally explaining the assessment approach while the nurse is coming inside the room and performing the respiratory assessment followed by verbal and physical stimulation.

**Voice:** "Approach the bedside quietly before you stimulate the patient physically or verbally. In other words, don't touch the patient or verbally talk to the patient. Instead, observe the respiratory depth and pattern while counting respiration for one full minute to determine if there are signs of ineffective breathing."

**Visual:**

The nurse comes into the room approaching the bed side quietly without talking or touching the patient.

Nurse looks at the *SIM who is lying in bed, head slightly elevated, asleep with respiratory rate of 12, normal depth and rhythm.*

The nurse looks at her watch or wall clock (clear shot of the watch/clock) and then camera shot to the normal breathing of the SIM as the nurse looks at the SIM's chest for 75 seconds.

**Voice:** "After you assess an un-stimulated respiratory rate, rhythm and depth, then assess for sedation. If the patient is asleep, call the patient by NAME without touching or stimulating the patient and watch for the response. If there is no response to verbally calling the patient's name, then proceed to shaking the patient's shoulder and or rubbing the sternum to obtain a sedation score using the RASS."

**Visual:**

*SIM's eyes are closed* (Close shot to the SIM's face)

Video Clip:



RASS Assessment.mp4

**Scene 2**  
**RASS +4**

**Description:** Patient is very agitated and dangerous to staff

**Visual:** SIM or actor is overtly combative, violent, immediate danger to staff (**Whole body shot x 10 seconds**). The nurse comes into the room and asks the patient “Miss Jones what is wrong are you okay?” The patient continues to pull on the tubes and hits the nurse so the nurse tries to calm down the patient and calls for help “Let me help you hold on, some help please!”.



RASS +4.mp4

Video Clip:

**Scene 4**  
**RASS +3**

**Description:** Patient is very agitated

**Visual:** SIM or actor pulls or removes tube(s) or catheter(s); aggressive (**Whole body shot x 10 seconds**). The nurse comes into the room and asks the patient “Miss Jones what is wrong are you okay?” The SIM continues to pull on the tubes so the nurse tries to calm down the patient and says: “Let me help you hold on”.



RASS +3.mp4

Video Clip:



**Scene 5**  
**RASS +2**

**Description:** Patient is agitated

**Visual:** SIM or actor shows frequent non-purposeful movements, fights ventilator (**Whole body shot x 10 seconds**). Nurse comes into the room and asks the SIM "Mrs. Jones is something bothering you, you seem to be restless. Is there any pain? Patient replies:"ya". The nurse says: where does it hurt?



**Video Clip:**

RASS +2.mp4

**Scene 6**  
**RASS +1**

**Description:** Patient is restless

**Visual:** SIM or actor shows anxious restlessness but movements not aggressive or vigorous (**Whole body shot x 15 seconds**). Nurse comes inside the room and notices that the patient is agitation and starts talking to the patient. Mrs. Jones how you feeling well. I am okay. You seem to be worried about something. No I guess I didn't get enough sleep last night.



**Video Clip:**

RASS +1.mp4

**Scene 7**  
**RASS 0,**

**Description:** Patient is calm and alert

**Visually:** Patient is alert and calm

**Visual:** *SIM sitting up in bed*, focus shot on the SIM's upper torso and head.

Respiratory rate 16 bpm

Respiratory depth is normal

Eyes wide open, pupil size is normal

**Voice:** *SIM slightly turn his head* and says "Good morning".



**Video Clip:**

**Scene 8**  
**RASS -1**

**Description:** Patient is responsive to verbal stimuli

**Verbally:** The nurse calls the SIM by name "Mr. Jones, Mr. Jones"

**Visually:**

Nurse is standing at the patient's bed side

*SIM's eyes are closed* (Close shot to the SIM's face)

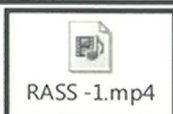
SIM opens his eyes wide open 3 seconds after the nurse calls the patient's name, pupil size is normal (**Close shot to the SIM'S face**).

SIM turns to nurse immediately after opening his eyes and keeps his eyes open for 10 seconds as the nurse talks with the patient.

**Verbally:**

*SIM says "Yes?"* *keeping his eyes open looking at the nurse* (shot of SIM and nurse from over the shoulder of the nurse).

Nurse says "Mr. Jones, it is time for you to go for your CT scan now. So, we are going to get you ready to move onto the stretcher."



Video Clip:

RASS -1.mp4

**Scene 9**  
**RASS -2**

**Description:** patient briefly awakens.

**Visually:**

*SIM's eyes are closed (Close shot to the patient's face)*

**Verbally:** The nurse calls the SIM by name "Mr. Jones"

**Visually:**

SIM opens his eyes half open and turns to nurse after opening them then closes his eyes after 5 seconds and does not reopen them (**shot of SIM and nurse**).

Respiratory rate 10, Respiratory depth shallow

*Then close his eyes. (Close shot to the patient's face).*



Video Clip:

RASS -2.mp4

**Scene 10**  
**RASS -3**

**Description:** Movement or eye opening to *voice* (but no eye contact)

**Visually:**

*SIM's eyes are closed (Close shot to the patient's face), widen to include the RN at the bedside*

**Verbally:** The nurse calls the SIM by name "Mr. Jones".

**Visually:**

SIM move slightly and open his eyes halfway for 3 seconds but doesn't turn his head towards the nurse (**Close shot to the patient's face and part of nurse's face**).



Video Clip:

RASS -3.wmv

**Scene 11****RASS -4**

**Description:** Patient is arousable only by physical stimulation.

**Visually:**

*SIM's eyes are closed, RR 12, moderate depth (Close shot of the patient's face from over the nurse's shoulder catching some of the nurse in the view but focusing on the patient's head/eyes)*

RN is at the bedside

**Verbally:** The nurse calls the SIM by name "Mr. Jones, Mr. Jones, wake-up Mr. Jones".

**Visually:**

*Pause scene on SIM's eyes that stay closed with the head moving back and forth slightly and arm moving. Then widen to show view of the nurse gently shaking the patient's shoulder then progressing to rubbing patient's sternum.*



**Video Clip:**

**Scene 12****RASS -5**

**Description:** The patient is unarousable.

**Visually:**

*SIM's eyes are closed, RR 12, moderate depth (Close shot of the patient's face from over the nurse's shoulder catching some of the nurse in the view but focusing on patient's head/eyes)*

RN is at the bedside

**Verbally:** The nurse calls the SIM by name "Mr. Jones, Mr. Jones, wake-up Mr. Jones".

**Visually:**

*Pause scene on SIM's with an eye that stay closed and who lies perfectly still. Then widen to show view of the nurse gently shaking the patient's shoulder then progressing to rubbing patient's sternum.*



<p><b>Video Clip:</b></p>	 <p>RASS -5.mp4</p>	
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**Appendix E**

**Overall Evaluation Form**

American University of Beirut Medical Center  
 Nursing Services- Clinical and Professional Development Center  
**Overall Course Evaluation**

**Activity Title: Richmond Agitation and Sedation Scale (RASS) Educational Package for Critical Care Nurses.**

**Date: January, 2015.**

Please rate the criteria for evaluation according to the following scale:

**Key: Excellent...4 Good...3 Fair...2 Needs Improvement...1**

Criteria		Score
1.	The course was well organized	
2.	Course requirements were stated clearly in the syllabus	
3.	Course expanded my understanding of the content to a new level or deeper degree.	
4.	The course assignments, exams, and projects were a good measure of my learning.	
5.	The technology part of the course was well organized, easy to navigate, and logical.	
6.	Instructional technology allowed me to achieve the course objectives	
7.	Overall organization of the educational offering	

8. Did this course/workshop meet your specific learning needs? Yes  No. If no, why not

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9. How much of the content was beneficial to you?

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10. Areas for Improvement:

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11. Future recommendations:

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**Appendix F****Sedation Assessment and Management Exam**

1. Which of the following statements defines moderate sedation?
  - a) A medically controlled state of depressed consciousness from which the patient does not respond to verbal or tactile stimuli
  - b) A pharmacologically-induced state of altered consciousness from which the patient can respond to verbal or tactile stimuli
  - c) A pharmacologically induced state resulting from morphine administration to manage post-operative pain
  - d) A medically controlled state of depressed consciousness induced by the administration of a sedative/hypnotic agent to facilitate sleep
  
2. An excellent indicator of adequate moderate sedation is:
  - a) Unconsciousness
  - b) Slurred Speech
  - c) Unresponsiveness
  - d) Normal vital signs
  
3. A patient who is breathing supplemental nasal oxygen develops complete airway obstruction during moderate sedation. Which of the following manifestations is likely to occur first?
  - a) Decrease in oxygen-saturation by oximetry
  - b) Cessation of breath sounds upon auscultation
  - c) Sinus bradycardia revealed by electrocardiogram
  - d) Hypotension by an automated blood pressure cuff
  
4. The major side effect of over sedation is:
  - a) Pain and Agitation
  - b) Muscle atrophy
  - c) Myocardial ischemia
  - d) Respiratory Depression
  
5. The use of supplemental oxygen during sedation and analgesia \_\_\_\_\_.
  - a) increases the likelihood of hypoxia
  - b) delays the detection of apnea by pulse oximetry
  - c) should be avoided during moderate sedation
  - d) decreases the likelihood of airway obstruction
  
6. The proper way to assess respiration for sedated patients is by:



- a) Counting breaths for one full minute
- b) Counting breaths for 25 seconds
- c) Measuring the depth of breathing
- d) Assessing for central and peripheral cyanosis

**For the situations designated in the below items (8-17), select the letter that best matches the statement describing the RASS level:**

- a) RASS -1
- b) RASS -2
- c) RASS -3
- d) RASS -4
- e) RASS 0
- f) RASS +1
- g) RASS +2
- h) RASS +3
- i) RASS +4
- j) RASS +5

- 7. \_\_\_\_\_ Briefly (less than 10 seconds) awakens with eye contact to voice
  - 8. \_\_\_\_\_ No response to voice, but any movement to physical stimulation
  - 9. \_\_\_\_\_ Overtly combative or violent; immediate danger to staff
  - 10. \_\_\_\_\_ Pulls on or removes tube(s) or catheter(s) or has aggressive behavior toward staff
  - 11. \_\_\_\_\_ Any movement (but no eye contact) to voice
  - 12. \_\_\_\_\_ Anxious or apprehensive but movements not aggressive or vigorous
  - 13. \_\_\_\_\_ No response to voice or physical stimulation
  - 14. \_\_\_\_\_ Alert and Calm
  - 15. \_\_\_\_\_ Frequent non-purposeful movement or patient–ventilator dyssynchrony
  - 16. \_\_\_\_\_ Not fully alert, but has sustained (more than 10 seconds) awakening, with eye contact, to voice
17. In the event of a respiratory depression, labored breathing or desaturation, the nurses' priority action is to:
- a) arouse the patient immediately and instruct to take deep breaths
  - b) initiate the Rapid Response code and contact the Pain Service team
  - c) check vital signs and document them on the flow sheet
  - d) hold further opioid administration and monitor the patient

**Case Study:** A critical care nurse is assessing a sedated patient at the beginning of the shift. After approaching the bed side and counting the respiratory rate, the nurse calls

out the patient's name. The patient awakens briefly and looks at the nurse for less than 10 seconds. The respiratory rate is 10 breath/minutes, SpO<sub>2</sub>= 98%.

18. What RASS score would the nurse give to this patient?
- a) RASS -1
  - b) RASS -2
  - c) RASS -3
  - d) RASS -4
19. How should the nurse react to the above assessment finding?
- a) Monitors the patient closely
  - b) Requests a change to the pain management
  - c) Calls the physician immediately
  - d) Discontinues sedation medications

**One hour later, the nurse returns to reassess the sedation level of the patient. After counting the respiratory rate, the nurse calls out the patient by name, but this time he only opens his eyes but does not look at the nurse, then goes back to sleep.**

20. What is the RASS level of the patient now?
- a) RASS -1
  - b) RASS -2
  - c) RASS -3
  - d) RASS -4
21. How should the nurse react to the above assessment finding?
- a) Monitor the patient closely
  - b) Request a change to the pain management
  - c) Call the physician immediately
  - d) Discontinue sedation medication

**Case Study: A 34 year old man was admitted to the intensive care unit 3 days ago after a Motor Vehicle Accident with multiple head trauma. He is on 5 mcg/min of levophed I.V. and fentanyl IV. After adjusting his sedative medications at the beginning of the duty, the nurse notices that the patient is awake, and is pulling his I.V. lines. His blood pressure is 193/90, heart rate 120, respiratory rate 34, oxygen saturations 98%. Last ABGs: pH 7.37, PCO<sub>2</sub> 43, PO<sub>2</sub> 84, BE-1. Physical exam is unchanged from the last examination in the morning.**

22. The nurse rules out any obvious physical causes for this behavior. Which of the following could be a possible cause for the patient's distress?

- a) High blood pressure
  - b) Pain
  - c) Ventilator Dysynchrony
  - d) Neuromuscular paralysis while aware
23. What time of the shift it is most important that nurses assess their sedated patients?
- a) At the beginning and end of every shift
  - b) Before and after administering/changing sedative doses
  - c) Upon noting a change in the patient status
  - d) According to the convenience of the assigned nurse
24. The nurse rushes inside the patient's room to assess his sedation level. The proper assessment starts with approaching the patient and:
- a) shouting his name out-load to wake them up
  - b) stimulating him gently by touching his hand
  - c) assessing his respiratory rate before any stimulation
  - d) making a noise inside the room to check if he is awake
25. What parameter must be monitored continuously during sedation:
- a) Level of consciousness
  - b) Oxygen saturation
  - c) Blood Pressure
  - d) Cardiac output

**After assessing the patient's sedation level, the nurse determines that his RASS score is +3, based on the protocol, Midazolam 2mg IV push is administered to the patient rapidly. The patient calms and starts to fall asleep. His heart rate, blood pressure and SpO2 level starts to drop gradually.**

26. Which of the following interventions should be the priority?
- a) Administer Midazolam IV push
  - b) Stop Levophed infusion and repeat blood pressure
  - c) Administer oxygen and page the team
  - d) Wait until SpO2 level is below 80%
27. The safest way to give any IV sedation medication is by:

- a) Giving it through IV push
  - b) Mixing it with other medications
  - c) Titrating the dose
  - d) Calculating the dose in mg/kg
28. Benzodiazepine action is associated with this neurotransmitter system
- a) Cholinergic
  - b) Adrenergic
  - c) GABA
  - d) Glycine
29. During sedation with propofol, a patient stops breathing and becomes unresponsive to verbal or tactile stimulation. The pulse oximeter reads 86%. Which of the following is most likely to improve the patient's oxygenation?
- a) Positive pressure ventilation
  - b) Supplemental nasal oxygen
  - c) Intravenous flumazenil
  - d) Intravenous naloxone
30. The time for a peak effect of fentanyl when given in IV form is:
- a) 5 to 15 minutes
  - b) 15 to 20 minutes
  - c) 30 to 60 minutes
  - d) 20 to 30 minutes

**Exam Key:**

1-b	13-j	25-b
2-b	14-e	26-c
3-a	15-g	27-c
4-d	16-a	28-b
5-b	17-a	29-a
6-a	18-b	30-a
7-b	19-b	
8-d	20-c	
9-i	21-a	
10-h	22-b	
11-c	23-b	
12-f	24-c	



**APPENDIX I**

**Sedation Assessment Competency Form  
For Critical Care Nurses**

Register Nurse: \_\_\_\_\_ Clinical Educator: \_\_\_\_\_  
Date: \_\_\_\_\_

Initial Competency: successfully completed three sedation assessments with clinical educator.

Annual Competency: successfully demonstrated one sedation assessment.

Competency	Met	Not Met	Comments
<p><b>Demonstrate the following steps for assessing sedated patients:</b></p> <ul style="list-style-type: none"> <li>• Approaches the patient quietly without producing any verbal or physical stimuli</li> <li>• Counts respiratory rate for one whole minute</li> <li>• Stimulates the patient verbally</li> <li>• Stimulates the patient physically, by shaking their shoulder or rubbing their sternum, if verbal stimulation is ineffective.</li> <li>• Identify the proper RASS level based on the patient’s clinical condition.</li> </ul> <hr/> <p><b>Demonstrates the ability to perform emergency management in cases of over-sedation and respiratory depression:</b></p> <ul style="list-style-type: none"> <li>• Ventilation using bag-valve mask.</li> <li>• Initiation of CPR</li> <li>• Activation of Code team</li> <li>• Insertion and use of oro- and nasopharyngeal airways.</li> <li>• Insertion and ventilation through a laryngeal mask airway</li> <li>• Direct laryngoscopy and endotracheal intubation</li> </ul> <hr/> <p><b>Monitors pertinent physiologic variables, including the following:</b></p> <ul style="list-style-type: none"> <li>• Blood pressure.</li> </ul>			

<ul style="list-style-type: none"> <li>• Respiratory rate.</li> <li>• Oxygen saturation by pulse oximetry.</li> <li>• Electrocardiographic monitoring</li> </ul>			
<hr/> <p><b>Secures informed Consent before initiating sedation as per the AUBMC protocol.</b></p> <hr/>			
<p><b>Manipulates medication dose based on AUBMC protocol.</b></p>			