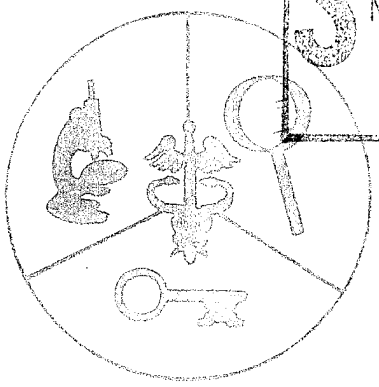

CENTER FOR
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THE READINESS TRAINING PROGRAM FOR NURSING PERSONNEL IN THE AMEDD

Volume III c

TRAINING MANUAL
to Accompany the Videotape
"Readiness Training in Nurse Anesthetist Clinical Skills"
Program Identification Number 710658

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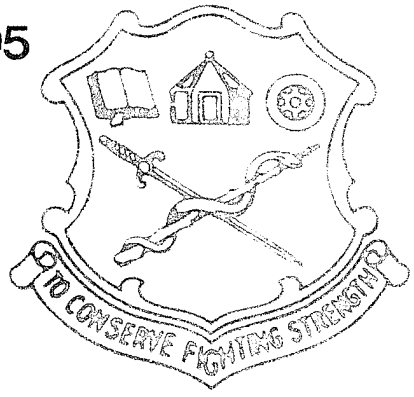

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The US Army Medical Department Study Board tasked the Center for Healthcare Education & Studies (CHES), US Army Medical Department Center & School (AMEDDC&S) to conduct two readiness studies. The purposes of the studies were to describe the readiness competency of nursing personnel in the US Army Medical Department (AMEDD) and to develop a program that would meet identified training needs. This training manual and its videotape were developed as part of the Readiness Training Program (RTP), which is a product of these two studies.

The purposes of this manual and its videotape are to provide trainers with information that will help them conduct an initial assessment of their unit's readiness competency in selected clinical nursing skills and execute their readiness training. A separate Training Support Package (TSP) provides more details regarding implementation of the entire RTP.

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PREFACE

Background

Nursing personnel responsible for conserving the fighting strength need to maintain their competencies in skills critical to their roles in a deployed or field status. In the past, these personnel have relied on their everyday experiences in fixed healthcare facilities to maintain their competencies in field nursing practice. However, there is now a widening gap between nursing practice in high-technology, automated fixed healthcare facilities and nursing practice in field medical treatment facilities. Therefore, the Joint Services Nursing Advisory Group (JSNAG), a tri-service advisory group to the Defense Medical Standardization Board (DMSB), recommended that a study be conducted to examine the extent to which job-related and training experiences currently prepare nursing personnel for patient care in a deployed or field status.

In response to JSNAG's recommendation, the US Army Medical Department Study Board tasked the Center for Healthcare Education & Studies (CHES), US Army Medical Department Center & School (AMEDDC&S) to conduct two readiness studies. The purposes of the studies were to describe the readiness competency of nursing personnel in the US Army Medical Department (AMEDD) and to develop a program that would meet identified training needs. This training manual and its videotape are designed for use as part of the Readiness Training Program, which is a product of these two studies.

The purpose of this training manual and its videotape is to provide trainers with information that will help them first to conduct an initial assessment of their unit's proficiency level in selected clinical nursing skills and then to plan and execute their readiness training. A separate Training Support Package (TSP) provides more details regarding the implementation of the entire Readiness Training Program. This TSP will be available from the Defense Technical Information Center (DTIC).

Acknowledgements

Several subject matter experts provided guidance for the two readiness studies. Most importantly, a core group of nurses with expertise in field nursing met prior to the first study to discuss the conceptualization of the readiness project, and they served on an expert panel throughout the course of both studies. The names of this group of nurses and their positions at the time they came together as a group are as follows:

COL McCall CN, FORSCOM	COL Morgan CN, 62nd Med Gp
COL Tiernan CN, 1st Med Gp	COL Chudy CN, 55th Med Gp

Other subject matter experts also provided consultation for the readiness studies. COL Schaeberle, CN, 44th Medical Brigade, served on the expert panel with this core group of nurses for both readiness studies, and COL Scherb, Medical Force 2000, served on the expert panel during the first readiness study. The following nurses met with the other subject matter experts during the second readiness study to discuss the development of a readiness training program: (a) COL Anderson, CN, 818th Medical Brigade, USAR (b) COL Bartz, Chief, Department of Nursing Science, AMEDDC&S, (c) LTC Koehler, CN, 55th Medical Group, and (d) LTC Hofman, Chief, Team S2/S3, Ireland Community Hospital.

Many other nursing personnel with field experience in the active and reserve components of the AMEDD also provided invaluable input to the two readiness studies and to the development of the TSP. For example, LTC Janny, CRNA, developed the testing materials for clinical skills related to use of the anesthesia equipment, and MAJ Burnett, CRNA, added to these materials so they could serve as training guidelines.

A special acknowledgement is extended to nursing personnel who gave their time and efforts to participate as subjects for the testing and training procedures in the two readiness studies. Data could not have been gathered without these personnel or without the evaluators who administered the competency-based exercise. The evaluators fulfilled their duties as data collectors in addition to their responsibilities as nursing personnel in the active and reserve components of the AMEDD.

Several evaluators contributed to the development of the three videotapes designed to be used as part of the Readiness Training Program. CPT Anzelon played the part of the evaluator on all three videotapes. The following individuals played the part of nursing personnel being tested in their readiness clinical nursing skills: LTC Hagan, MAJ Voyles, MAJ Robinette, CPT Smith, SFC Kessler, and SSG Greeder.

Unless stated otherwise, masculine nouns and pronouns used in this TSP do not refer exclusively to men.

-- Julie K. Zadinsky
LTC, AN
Nurse Researcher

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CHAPTER 1

THE READINESS TRAINING PROGRAM

This manual is written to accompany the videotape, "Readiness Training in Nurse Anesthetist Clinical Skills." Because the videotape is designed for use as part of the Readiness Training Program (RTP), aspects of the RTP related to training clinical nursing skills will be described. As explained in the preface, a more detailed description of the entire RTP can be found in a separate Training Support Package (TSP).

Background

The mission of the US Army Medical Department (AMEDD) is *to conserve the fighting strength* of the US Army. The AMEDD is responsible for maintaining the medical, clinical and technical readiness of medical units and personnel to support the Army in the theater of operations. In peacetime, the majority of nursing personnel in the active and reserve components of the AMEDD work and train in specialized clinical roles in high-technology fixed facilities. They use state-of-the-art, automated equipment and rely on specialized clinical support services, such as pharmacy and respiratory therapy, to provide patient care.

At the same time, these nursing personnel must be ready to provide patient care in a deployed or field status. In this status, nursing personnel must work in more generalist and expanded nursing roles in a variety of field environments, and they must use medical equipment designed to be functional under field conditions. They must provide patient care in the field without some of the automated equipment and specialized support services which they have become accustomed to using in fixed healthcare facilities.

Nursing and other personnel in the AMEDD currently receive military training through the US Army Medical Department Center and School (AMEDDC&S), Regional Training Sites - Medical, and their units. This training provides personnel with a general knowledge base, collective training, and combat casualty care instruction needed to function in their field nursing roles.

For example, the AMEDDC&S provides courses such as the Officer Basic Course (OBC), Officer Advanced Course (OAC), Basic Noncommissioned Officer Course (BNCOC), and Advanced Noncommissioned Officer Course (ANCOC) for all personnel. Some personnel also complete other military courses such as the Combat Casualty Care Course (C4). At Regional Training Sites-Medical, personnel participate in collective training focused on setting up and operating in a field environment. Units provide personnel with common task training and NBC training.

Because of the widening gap between nursing practice in high-technology, automated fixed healthcare facilities and field medical treatment facilities (MTFs), nursing personnel also need training in the clinical roles they will perform in a field environment. This training should be focused on clinical skills and functions that are critical to patient care in a field environment, but that are not routinely performed in fixed facilities. The Readiness

Training Program has been designed to meet these training needs of nursing personnel in the active and reserve components of the AMEDD.

As used in this training manual, readiness refers to the initial capabilities of individuals when placed in a field environment. It includes the ability of nursing personnel to deploy and employ without unacceptable delays (JCS Pub 1-02, 1989). Readiness competency refers to the initial capabilities of nursing personnel to provide patient care in a deployed or field status. Readiness competency can be measured on a continuum ranging from the novice to the expert level. Readiness training enables nursing personnel to become more expert and confident in their ability to provide patient care in a field environment.

Basic Premises

Following are the three basic premises of the Readiness Training Program.

Differences Between TDA and TOE Clinical Nursing Practice

In peacetime, nursing personnel develop and sustain their competencies in entry-level and advanced clinical skills used in their specialized areas of practice in fixed healthcare facilities. In the active component (AC) of the AMEDD, nursing personnel work in fixed facilities that are part of a tables of distribution and allowances (TDA) unit. Many nursing personnel in the reserve component (RC) of the AMEDD work and train in fixed facilities that belong to civilian healthcare organizations. In most of these facilities, nursing personnel function in specialized clinical roles in a high-technology, automated environment.

When in a deployed or field status, both AC and RC nursing personnel work in field MTFs that are part of tables of organization and equipment (TOE) units. In this field environment, nursing personnel function in expanded clinical roles. They use more generalist nursing skills and function without much of the automated equipment and specialized support services commonly available in fixed facilities.

Uniqueness of Functions Supporting Field Clinical Practice

Functions performed by nursing personnel in support of patient care or unit management differ from fixed to field MTFs. To provide patient care in the field, nursing personnel must perform functions that require them to interface with systems unique to the field environment--such as command and control, medical evacuation, and medical supply systems. Other functions involve the application of healthcare principles--such as principles of infection control and sustainment of the MTF--to patient care in a field environment. There is a unique knowledge base underlying performance of these functions in a field environment.

Limited Resources for Training

Training resources are limited and therefore available resources must be maximized to meet identified training needs. Resources can be maximized by focusing training on selected skills and functions. Trainers should focus on clinical skills that (a) are performed frequently or performed as life-saving measures in a field environment but (b) are not routinely performed in fixed MTFs. Skills should be selected for training separately for each area of concentration/military occupational specialty (AOC/MOS). Likewise, trainers should

concentrate on functions that (a) are critical to the support of patient care or unit management in a field environment but (b) are not routinely performed in fixed MTFs. These functions are referred to as battle-focused functions (BFFs).

Goals

The two goals of the Readiness Training Program are as follows:

- To develop competencies in clinical nursing skills that are performed frequently or performed as lifesaving measures in a field environment, but are not routinely performed in fixed MTFs.

- To develop proficiencies in battle-focused functions, which refer to activities performed by nursing personnel in support of patient care or unit management in a field environment.

These skills and functions are referred to as tasks. While competency refers to a soldier's ability to perform a particular skill, proficiency refers to his ability to perform a skill and/or function.

The videotape, "Readiness Training in Nurse Anesthetist Clinical Skills," is concerned with accomplishing the first goal of developing competencies in clinical nursing skills for nurse anesthetists functioning in a deployed or field status in the active and reserve components of the AMEDD.

Clinical nursing skills that are performed frequently or performed as lifesaving measures in a field environment, but are not routinely performed in fixed MTFs can be categorized as (a) equipment skills, (b) basic skills, and (c) expanded role skills. These categories of clinical skills provide guidance for training, but they are flexible enough to accommodate the various training needs of units in different settings. Trainers should individualize the skills selected for training based on their unit's mission-essential task list (METL) and the AOC/MOS of nursing personnel being trained. Following is a description of the three categories of clinical nursing skills. Training objectives for clinical skills presented on the videotape are included in Chapter 2.

Equipment Skills.

The first category of skills are those performed using field medical equipment. These pieces of equipment usually are operated differently from equipment used to perform the same or similar skills in fixed facilities. For example, anesthesia equipment differs from the fixed to the field MTF. Also, the Hewlett-Packard cardiac monitor-recorder is different from most fixed facility cardiac monitor-recorders in that it uses a 5-lead electrode system.

Basic Skills.

The second category of skills are those performed in the field without automated equipment or specialized support services commonly available in fixed MTFs. For example, nurse anesthetists may need to assemble a water manometer system to measure central venous pressure (CVP) in a field MTF, whereas CVP monitoring is automated in fixed MTFs.

Expanded Role Skills.

The third category of skills are those performed by nursing personnel in aspects of their role that are expanded from the fixed facility to the field environment. The nature

of field nursing practice requires that all nursing personnel be prepared to perform skills in their field nursing roles that they do not routinely perform in their fixed facility roles. Expanded role skills differ for each AOC/MOS. For example, operating a blood recovery and delivery system may be considered an expanded role skill for nurse anesthetists because most of these personnel currently do not routinely perform this skill in fixed facilities. However, current guidelines state that the nurse anesthetist is responsible for the operation of the blood recovery and delivery system in a field environment (DMSB, 1990).

Expanded role skills are needed to function in a field environment for two reasons. First, both battle injuries and also disease and non-battle injuries (DNBI) cut across the entire field of healthcare. To be prepared to function in any level of care to which they are assigned, nursing personnel must have both a broad knowledge base of healthcare principles and also hands-on experience in a wide range of clinical skills critical to the care of battle injuries and DNBI commonly seen during military operations. Second, in many instances in the field, such as mass casualty situations, nursing personnel cannot expect that specialty personnel, such as a respiratory specialist, will always be available to meet patient care needs. Thus, nursing personnel must sustain their competencies in a broad base of generalist nursing skills critical to their roles in a field environment.

Training Principles

The following principles are critical to the success of a training program designed to prepare nursing personnel for their patient care roles in a field environment. These principles are emphasized in current Army training guidance (FM 25-100, 1988; FM 25-101, 1990). Moreover, their importance in effective readiness training for nursing personnel has been demonstrated in recent studies. These principles provide a standard direction for training, but they are flexible enough to accommodate various training environments.

Make Leaders Responsible for Training

The success of a unit's training depends on competent, dedicated leaders who are personally involved in ensuring that time is protected for training and that training is well-planned, vigorously executed to standard, and continuously evaluated. Commanders and leaders can help develop junior leaders by providing them with opportunities to serve as trainers. Even so, leaders must be personally involved in training to ensure that it is meeting the needs of nursing personnel in the unit. For example, as nursing personnel undergo training with the Readiness Training Program, leaders should be able to detect an improvement in their confidence to provide patient care in a deployed or field status

Train the Trainer

Before executing the training, trainers must be able to master the clinical skills being trained. They should know the skills well enough to be able to answer soldiers' questions. Also, they should have received instruction in the type of training being conducted--such as performance-oriented training for clinical nursing skills. Finally, trainers should rehearse the training as they plan to present it and obtain feedback on their presentation from their chain of command.

Use Appropriate Doctrine

Training must be consistent with Army doctrine. Trainers should consult doctrinal manuals that provide principles, procedures, and other critical information needed to train nursing skills. These manuals include the following:

- Army Regulations (ARs).
- Field Manuals (FMs).
- Mission Training Plans (MTPs).
- Soldier's Manuals (SMs).
- Technical Manuals (TMs).
- Technical Bulletins (TBs).

When doctrinal manuals do not contain information about clinical skills that need to be trained, trainers should use other materials--such as operating manuals for field medical equipment and healthcare literature--together with their own experiences to develop new standards and training materials.

Throughout the training cycle, trainers must use evaluations of their training to continuously improve their training materials. These evaluations may highlight issues that need to be incorporated into the doctrinal manuals.

Use Performance-Oriented Training

Performance-oriented training should be used when training nursing personnel in skills required to provide patient care in a field environment. Performance-oriented training stresses the importance of training soldiers to standard, not to time. Some personnel will require more time than others to train to standard on any given skill. The training schedule must be flexible enough to accommodate individual training needs.

Nursing personnel must understand the skills in which they are being trained to standard and the conditions of the skills. The same standards must be enforced for a skill regardless of the AOC/MOS of personnel being trained. As performance levels improve, conditions under which skills are performed can be made more demanding, but the standards should remain constant.

Train Using Realistic Field Conditions

Routine training conducted with nursing personnel must replicate conditions they will encounter when providing patient care in a deployed or field status. This can be done by incorporating realistic conditions into training. In the absence of actual patient care situations, nursing personnel must train with realistic training aids, such as mannequins, and with the actual equipment and supplies they would use in a deployed or field status. Moreover, they must use these training aids, equipment, and supplies for training skills they would be expected to perform in a field environment.

Maintain Mission-Essential Equipment and Supplies

To conduct effective training, nursing personnel must have access to mission-capable field medical equipment, equipment parts, and expendable supplies they would use in a deployed or field status. Moreover, all equipment must be maintained in an operational state of readiness for use in patient-care situations consistent with the current mission of the unit. Thus, responsible equipment operators and maintenance personnel must perform regular preventive maintenance checks and services (PMCS).

Ideally, all equipment and supplies required for training should be easily

accessible to nursing personnel at the unit level. This may not always be the case, especially for some units in the reserve component of the AMEDD. In these instances, unit leaders should consider conducting training for nursing personnel at their Regional Training Site-Medical (RTS-MED) facility.

Train to Challenge

Leaders must ensure that training in clinical skills is mentally challenging and as close to field conditions as possible. Nursing personnel are excited and motivated to learn when they are presented with challenging and realistic training in patient care skills they would be expected to perform in a field environment. As nursing personnel undergo this type of training, confidence in their own ability to provide patient care in a field environment improves along with their demonstrated proficiencies in the skills being trained.

Train to Sustain Proficiency

Once nursing personnel have mastered a group of skills identified as critical to the unit's mission, a method of sustaining their task proficiencies needs to be incorporated into the unit training plans. Sustainment training --

- Focuses on training that will build on tasks already mastered.
- Uses opportunity training to enable personnel to become more expert in their performance of critical tasks.

Opportunity training, sometimes referred to as hip pocket training, is training that is preselected, preplanned, and rehearsed, but is not conducted until unexpected training time becomes available. For example, opportunity training can be conducted when there are slow times in field exercises or when scheduled training is completed early.

Nursing personnel in a unit will fluctuate in their ability to perform critical skills because of several factors, including training frequency, personnel turnover, new equipment fielding, and training resource constraints. Leaders should plan their yearly sustainment training so that the unit's level of proficiency in the selected skills can be maintained in a band of excellence. That is, training in critical skills should be repeated at the minimum frequency necessary for sustainment, but frequently enough to prevent deep valleys in proficiencies.

Training Management

The management of readiness training for nursing personnel can be pictured as a cycle consisting of the following four processes:

- Select Tasks for Training.
- Plan Training Based on an Assessment of Selected Tasks.
- Execute Training Using Methods Designed to Train to Standard.
- Assess Training Based on a Continuous Evaluation of Tasks.

It should be emphasized that the readiness training for nursing personnel outlined in the Readiness Training Program should NOT be conducted in isolation from the rest of the unit's training. Instead, training nursing skills must be integrated with the unit's training management cycle. Following is a more detailed description of the four processes in the training cycle.

Select Tasks for Training

Leaders must selectively identify and train tasks that accomplish the unit's critical wartime mission. These tasks, which are based on the mission essential task list (METL), focus the training plan for the entire unit and thus allow the unit's training requirements to be narrowed to an achievable number.

When the unit training plan is being developed, leaders must also select for training those clinical nursing skills that support performance of the unit's METL. The training objectives for clinical skills presented in Chapter 2 can be used and adapted as appropriate in support of a unit's METL. These objectives have been developed for training clinical skills critical to patient care in a field environment. They have not been selected separately for different field environments, and they do NOT need to be used in any particular order.

The training objectives for clinical nursing skills have been selected separately for each AOC/MOS. Again, they should be adapted as needed to support a unit's METL. For example, a unit should train with equipment they will use in a deployed or field status. If a unit has something other than a Hewlett-Packard cardiac monitor, they should adapt the cardiac monitor training objective for use with the monitor they will have for patient care in a deployed or field status.

Plan Training Based on an Assessment of Selected Tasks

Trainers must make an initial assessment of the skill levels of nursing personnel in tasks that have been selected for training based on mission requirements. This assessment involves an evaluation of each individual's capability to perform the clinical skills. This assessment should be as objective as possible. For example, a hands-on pre-test of critical elements of the clinical skills selected for training can be given to personnel prior to the execution of training. The videotape, "Readiness Training in Nurse Anesthetist Clinical Skills," illustrates this type of pre-test for the clinical nursing skills described in Chapter 2. Equipment and supplies needed for the testing together with the testing set-up are included in Appendix A.

Trainers should use the results of this initial assessment to help them focus their training plans. Personnel will not need intensive training in skills that they pass on the pre-test. Furthermore, personnel with demonstrated expertise in skills on the pre-test can be assigned to assist with training.

Execute Training Using Methods Designed to Train to Standard

Training in clinical nursing skills should include presentation of principles underlying skill performance with skill demonstration and a hands-on practicum. Additionally, nursing personnel would benefit from the opportunity to practice their newly-acquired skills during a patient play exercise. Chapter 2 includes training objectives for clinical nursing skills that should be used to develop a principle-focused training plan emphasizing (a) a review of principles underlying skill performance and (b) actual hands-on practice in carrying out skills as they would be performed during patient care. Hands-on practice should focus on aspects of the skills that differ from the fixed facility to the field environment because of differences in equipment, supplies,

availability of support services, and/or roles of nursing personnel.

Assess Training Based on a Continuous Evaluation of Tasks

The skill levels of nursing personnel should be evaluated on a continuous basis throughout the training process. Furthermore, a formal post-test should be conducted to assess individuals' skill levels after training has been completed. It is preferable that a hands-on test be used to evaluate the clinical skills for the post-test. This type of assessment will allow trainers to determine whether nursing personnel have been trained to standard on the selected skills.

Periodic after-action reviews of training throughout the training process will allow leaders, trainers, and participants to reflect on what is happening during training and thus to refine the focus for future training as needed. Formal reports of the status of training in nursing skills should be made to those responsible for overseeing the training of nursing personnel. For example, the Unit Status Report should include a summary of the number of personnel in the unit who have been trained to standard in the skills selected for training.

Timeline for Training Clinical Skills

Trainers should develop a timeline for planning, executing, and assessing their training. Again, the timeline should NOT be made in isolation from the timeline for training battle-focused functions or the rest of the unit's training. Instead, the timeline for training clinical nursing skills must be integrated with the unit's master training timeline. Following is one example of a unit's timeline for training clinical skills. The times can be adjusted and more detail can be added as needed.

Oct-Nov

- Select Tasks for Training.
  - Review unit METL.
  - Select clinical skills for training.

Dec-Feb

- Plan Training.
  - Obtain required equipment and supplies.
  - Identify and train the trainers.
  - Assess unit's proficiency level in selected skills.
  - Develop training materials.
  - Select training sites and dates.
  - Schedule personnel for training.

Mar-Jun

- Execute Training in Clinical Skills.
  - Set up training sites.
  - Rehearse training.
  - Present training.
    - Discuss underlying principles.
    - Demonstrate skills.
    - Conduct hands-on practicum.

Jul-Sep

- Assess Training.
  - Conduct post-test of skills trained.
  - Conduct after-action reviews.
  - Prepare formal report of training.
  - Plan for next year's training cycle.

CHAPTER 2

TRAINING OBJECTIVES FOR CLINICAL NURSING SKILLS

Recall that the first goal of the Readiness Training Program is to help nursing personnel develop competencies in clinical nursing skills that are performed frequently or performed as life-saving measures in a field environment, but are not routinely performed in fixed MTFs. These clinical nursing skills can be placed in one or more of the following categories of skills:

- Skills performed using field medical equipment.
- Skills performed without automated equipment or special support services.
- Skills performed in an expanded role in a field environment.

The clinical nursing skills presented in the videotape, "Readiness Training in Nurse Anesthetist Clinical Skills," have been identified as training priorities for nurse anesthetists in a field environment.

The videotape demonstrates an initial assessment of the proficiency level of nurse anesthetists in skills selected for training. Training plans should be made based on the results of this assessment. Trainers can use the training objectives included in this chapter to help them train the clinical skills presented in the videotape. While the initial assessment demonstrated in the videotape focuses on critical elements of the selected clinical skills, the training objectives provide more information needed for training.

Brief explanations of components of the training objectives are as follows:

- Task Title. Performance under consideration.
- Conditions. Circumstances under which a task is performed, including equipment and supplies provided.
- Standards. How well or at what level a task must be performed.
- Performance Measures. What must be done to perform the task successfully.
- References. Sources that provide more detailed explanations and information.
- Warnings. Possible personnel injury or equipment damage.
- Notes. Supportive explanation of the performance standard.

Note that the training objectives should not be used as complete study guides for training nursing personnel in any of the skills. They should not be used to replace hands-on practice of the clinical nursing skills being taught.

Rather, the training objectives are designed to serve as guides for training the clinical skills. Trainers must consult the listed references for further information regarding both the underlying principles and the hands-on performance for all of the skills. Some skills, such as operating the

anesthesia equipment and setting up and operating the Blood Recovery and Delivery System, require even more in-depth training than other skills. In these cases, use of additional training materials is essential for sound training.

Operate an 885A Anesthesia Apparatus

Conditions

You are in a field environment and are checking your field anesthesia equipment. You have been asked to set up the 885A field anesthesia apparatus and insure its safe and effective use for the adult and pediatric patients you are about to receive. You have the following equipment and supplies: An 885A anesthesia apparatus in its carrying case; an 885A anesthesia apparatus set up with 4 deficiencies that would prevent its safe and effective use; a pediatric partial rebreathing circuit; an Ohmeda ventilator; 2 "D" oxygen cylinders, 1 "H" oxygen cylinder, 2 CO_2 absorption canisters; an electrical source; a flow calculator.

Standards

Assemble a functional 885A anesthesia apparatus and describe its safe and effective use with adult and pediatric patients IAW the references.

Performance Measures

1. Assemble a fully functional anesthesia system utilizing an adult rebreathing system.
   a. Raise control head to full and upright position. Secure with hinged thumb bolt.
   b. Attach the oxygen analyzer monitor.
   c. Assemble and attach adult breathing circuit.
   d. Secure two (2) "D" oxygen cylinders to holder behind oxygen flowmeter.
   e. Momentarily open oxygen cylinders, blowing clean the outlets.
   f. Mount pressure regulators to cylinders.
   g. Connect short supply hose to pressure regulator and oxygen gas supply inlet.
   h. Establish waste gas evacuation system using hoses supplied.
   i. Establish oxygen flow to the adult rebreathing circuit.

2. Describe how to fill, drain, and activate the vaporizer.
   a. Describe the ON and OFF control settings.
   b. Describe filling procedure.
   c. Describe draining procedure.

3. Establish a second oxygen source from the "H" oxygen cylinder to the 885A anesthesia apparatus.
   a. Locate regulator, large tank adaptor, and long tubing.
   b. Attach regulator to cylinder.
   c. Connect cylinder to oxygen gas supply inlet.

4. Perform a pre-use check-out of the 885A anesthesia apparatus.
   a. Verify oxygen flow through oxygen flow meter (metabolic).
   b. Verify oxygen flow through vaporizer oxygen flow meter.

c. Check inhalation and exhalation check valves.

d. Perform leak test to assess regulator integrity.

e. Perform leak test to assess flowmeter integrity.

f. Perform leak test to assess APL integrity and ability to deliver positive pressure.

g. Demonstrate oxygen monitor calibration.

5. Describe the procedure for changing from a large to a small tank oxygen source during use of the 885A anesthesia apparatus.

6. Describe utilization of the vaporizer.

a. Describe the correct utilization of the vaporizer and the flow calculator.

7. Set up a ventilator to the 885A anesthesia apparatus.

a. Establish a 50 psi oxygen source.

b. Establish an electrical power source.

c. Establish a waste gas evacuation hose.

8. Connect a ventilator to an 885A anesthesia apparatus

a. Install a ventilator-bag diverter valve.

b. Connect a ventilator delivery hose and breathing bag to diverter valve.

c. Connect a low pressure sensor to breathing circuit.

d. Ventilate a test lung with the system.

9. Convert the adult rebreathing system to a pediatric partial rebreathing circuit.

a. Assemble the pediatric partial rebreathing circuit.

b. Establish gas flow to the circuit.

c. Establish a waste gas evacuation hose.

d. Perform leak test to assess ability to deliver positive pressure.

e. Perform waste gas evacuation test to assess scavenging ability.

10. Identify and explain how to correct deficiencies that are in an 885A anesthesia apparatus that would prevent its safe and effective use.

a. Loose canister.

b. Large leak in breathing circuit.

c. Missing exhalation check valve leaflet.

d. Protective closure device has not been removed from the inspiratory outlet.

References

HQDA. (1990). Unit, direct support, and general support maintenance manual: Anesthesia apparatus (TM 8-6515-001-24&P). Washington, DC: Author.

Ohmeda. (1986). Model 885 Conversion Anesthesia apparatus, gas, nitrous oxide, oxygen and volatile liquid anesthetics, portable 4 cylinder capacity: Instruction and service manual with illustrated parts list (NSN 6515-01-003-4133 & 6515-01-185-8446). Madison, WI: Author.

Note. On the following page is an example of a written pre-test that can be used as part of the initial assessment of nurse anesthetists' skill and knowledge level for this task.

Answers to the Pre-Test

1. False	6. a
2. c	7. a
3. e	8. True
4. b	9. e
5. e	10. False

PRE-TEST FOR OPERATION OF THE 885A ANESTHESIA APPARATUS

Circle the correct answer for each of the following questions.

1. TRUE or FALSE: Nitrous Oxide is supplied as part of TOE deployable medical supplies.

2. Waste gas lines are to be established when utilizing the 885A. These lines can be established using:
   1. the hospital supplied vacuum system
   2. a passive evacuation system
   3. a suction device in the OR for removing irrigation fluids
   4. an active evacuation system

   a. 1, 2, 3
   b. 1, 3
   c. 2, 4
   d. 4 only
   e. all are correct

3. The cylinder regulator assembly includes:

   1. a pin-index system
   2. pressure gauge
   3. relief valve
   4. quick coupler indexed check valve

   a. 1, 2, 3
   b. 1, 3
   c. 2, 4
   d. 4 only
   e. all are correct

4. The ball-float in the flowmeter is read at:

   a. the top of the ball
   b. the middle of the ball
   c. the bottom of the ball

5. Using which gas law allows you determine the volume of gas available in a compressed gas cylinder?

   a. Herny's
   b. Charles'
   c. Dalton's
   d. Graham's
   e. None of the above

6. The pressure gauge on the E-cylinder registers 1650 psi. The full cylinder contained 165 gallons of oxygen. How many gallons remain in this cylinder?

   a. 125
   b. 80
   c. 132.5
   d. 82.5
   e. 110

7. Using the answer obtained in Question 6, for how many hours could you deliver a 5 liter/min flow rate?

   a. 1.5
   b. 0.5
   c. 1.0
   d. 2.0
   e. 2.5

8. TRUE or FALSE: The 885A Anesthesia Apparatus possesses a "Fail-safe" mechanism.

9. The vaporizer on the 885A is _____ compensated.

   a. Temperature
   b. Flow
   c. Pressure
   d. All of the above
   e. None of the above

10. TRUE or FALSE: Once the initial unpacking of the 885A has occurred, all of the component parts can never be repacked into the storage case.

Operate a Universal PAC Draw-Over Anesthesia System

Conditions

You are in a field environment and are checking your field anesthesia equipment. You have been asked to set up a Universal PAC Draw-Over anesthesia apparatus and insure its safe and effective use for patients you are about to receive. You have the following equipment and supplies: A complete Universal PAC Draw-Over anesthesia apparatus in its carrying case and a low pressure oxygen source with a L/M control valve.

Standards

Assemble a functional Universal PAC Draw-Over anesthesia apparatus and describe its safe and effective use IAW references.

Performance Measures

1. Assemble a fully functional Universal PAC Draw-Over anesthesia system utilizing a non-rebreathing adult circuit.

   a. Assemble an adult non-rebreathing circuit.

   b. Position an oxygen monitor.

   c. Attach a low pressure oxygen source to supplemental fitting.

   d. Establish a waste gas evacuation hose.

2. Configure the Universal PAC vaporizer for isoflurane use

   a. Secure the isoflurane agent concentration dial.

   b. Describe use of the vaporizer with enflurane.

   c. Describe use of the vaporizer with halothane.

   d. Describe the filling procedure.

   e. Describe the draining procedure.

3. Perform a pre-use check-out of the Universal PAC Draw-Over anesthesia apparatus.

   a. Demonstrate the flow of gas through the vaporizer.

   b. Perform internal leak vacuum test assessing integrity of one-way valves.

   c. Perform external leak test assessing ability to deliver positive pressure.

   d. Check for proper function of one-way valves at E-valve assembly.

   e. Demonstrate oxygen monitor calibration.

4. Utilize a Universal PAC vaporizer.

   a. Describe how the amount of liquid agent in the universal PAC vaporizer is monitored.

   b. Demonstrate the delivery of 1% and then 3% isoflurane.

   c. Describe how the delivered percentage of oxygen is a function of the oxygen flow and the patient's minute volume. For example: If the oxygen supplemental flow is 2 L/min. & the patient's minute volume of ventilation is doubled, what happens to the percentage of inspired oxygen?

References

Condon, B. C., et al. (1991). Anesthesia guidelines. In R. Zajtchuk, D. P. Jenkins, R. F. Bellamy, C. M. Quick, & C. C. More (Eds.), Combat casualty care guidelines: Operation desert storm (pp. 25-26). Washington, DC: Office of The Surgeon General.

Ohmeda. (1990). Ohmeda Universal PAC: Operation and maintenance manual. West Yorkshire, England, U.K.: Author.

Set Up a Blood Recovery and Delivery System

Conditions

A surgeon in your field MTF has asked you to set up a Haemonetics Cell Saver 4 Autologous Blood Recovery System for use during the next surgical procedure. You have the following equipment and supplies: 1 Haemonetics Cell Saver 4 Autologous Blood Recovery System (NSN 6516-01-240-6883); 1 Haemonetics Basic Collection Pack (NSN 6515-01-185-2406); 1 Haemonetics Basic High Speed Cell Saver Pack (NSN 6515-01-169-7785); 2 bags of Sterile Normal Saline solution (1 or 3 liter bags); 1 assembled intermittent suction-aspirator system (NSN 6515-01-267-2726 & NSN 6515-01-267-2727).

Note. This training objective is a training aid taken from the references. (See Supervisor Evaluation Guide.) It should serve as a guide for trainers to use together with the listed references and other training materials when providing in-depth training in this skill.

Standards

Set up a Haemonetics Cell Saver 4 Autologous Blood Recovery System for use during a surgical procedure using sterile technique and IAW the Haemonetics Cell Saver 4 Autologous Blood Recovery System Owner's Operating and Maintenance Manual.

Performance Measures

1. Prepare 1 liter of saline with 30,000 units of Heparin.
2. Use HELP program to set up the system.
3. Raise IV pole to full extension.
4. Secure sterile collection liner at all 4 corners of the autotransfusion reservoir.
5. Secure reservoir door closed with handle locked forward, and top clamp rotated down.
6. Close reservoir drain clamp.
7. Aseptically pass double lumen suction tubing into sterile field.
8. Secure blue-tipped tubing tightly to blue inlet port on reservoir liner.
9. Clamp anticoagulant line on the suction tubing.
10. Spike anticoagulant solution.
11. Hang anticoagulant bag on IV pole.
12. Firmly attach suction apparatus tubing to vacuum inlet at rear of reservoir.
13. Connect sterile transfer tubing from reservoir liner to transfer port (top port) at rear of reservoir.
14. Adjust suction flow to required level (under 400 mm Hg).
15. Open anticoagulant line and prime reservoir with 100 cc of anticoagulant.
16. Adjust anticoagulant drip rate to 1 drop per second.
17. Hang waste bag on 3 waste bag support pins.
18. Hang reinfusion bag on IV pole opposite of anticoagulant solution.
19. Close 2 red slide clamps on reinfusion bag and insure that large fill line is open.
20. Inspect centrifuge well for debris.
21. Insure that "O" ring in centrifuge is lightly lubricated.

22. Install centrifuge bowl in well so that a click is heard, indicating that bowl is seated in the well.

23. Hold check in place with check tool and rotate bowl left and right to check free movement.

24. Tighten three chuck screws until chuck tool gives a distinct click.

25. Lock left and right feed tube support arms in place with hook.

26. Rotate cam lock to the 6 o'clock position.

27. Close centrifuge cover.

28. Remove caps from the waste bag and centrifuge effluent tubing.

29. Aseptically connect centrifuge bowl tubing to waste bag.

30. Open pump head and install tubing in pump, with tubing situated between guides located on left and right of the pump and pump door closed.

31. Firmly seat tubing in air detector and under tubing guide.

32. Install feed tube in appropriate color-coded clamps.

33. Close feed tube clamps.

34. Firmly seat red feed tube on reservoir drain and open drain clamp.

35. Close both slide clamps on yellow wash lines.

36. Spike 1 or 2 saline containers.

37. Hang saline bag(s) in a cascade manner on push handle and lower IV pole solution bag holder.

38. Open slide clamps on saline wash lines.

39. Firmly seat blue line in reinfusion bag connection.

40. Open blue reinfusion line.

41. Fully seat all connections, ensuring that there are no loose connections.

42. Open and close all slide clamps appropriately.

43. Route tubing in appropriate feed tube clamps.

44. Route tubing through roller pump and air detector without twists.

References

Haemonetics® Corporation. (1987). Haemonetics® Cell Saver® 4 autologous blood recovery system: Owner's operating and maintenance manual (Rev. C). Braintree, MA: Author.

Haemonetics® Corporation. (1988). Haemonetics® Cell Saver® 4 service manual (NSN 6515-01-240-6883; Rev. B). Braintree, MA: Author.

U.S. Army Medical Matériel Agency. (n.d.). Blood recovery and delivery system: Maintainer training guide (NSN 6516-01-240-6883). Fort Detrick, MD: Author.

U.S. Army Medical Matériel Agency. (n.d.). Blood recovery and delivery system: Operator training guide (NSN 6516-01-240-6883). Fort Detrick, MD: Author.

U.S. Army Medical Matériel Agency. (n.d.). Blood recovery and delivery system: Supervisor evaluation guide (NSN 6516-01-240-6883). Fort Detrick, MD: Author.

Pre-Test for Setting Up a Blood Recovery and Delivery System

Conditions

The trainer tests the soldier's knowledge of the Blood Recovery and Delivery System by stating, "Here is a Blood Recovery and Delivery System that has been set up with several deficiencies. Each of the deficiencies would prevent the safe and effective use of the equipment. Identify and correct the deficiencies." You have the following equipment and supplies: 1 Blood Recovery and Delivery System set up with the following deficiencies: Bottom 2 corners of sterile collection liner not secured; autotransfusion reservoir door closed but handle not locked, top clamp rotated up, & bottom clamp rotated down; centrifuge bowl seated loosely in well & screws not tightened; feed tube support arms not locked in place; tubing lying loosely by open pump head; tubing not threaded through air detector; red & blue tubes reversed in position; red & blue tubes not connected to any bag; normal saline bag connected to anticoagulant tubing, but bag not labeled as having an anticoagulant added.

Standards

Identify and correct each of the deficiencies that would prevent the safe and effective use of the equipment.

Performance Measures

1. Identify that the sterile collection liner is not properly secured in the autotransfusion reservoir. Secure collection liner at all 4 corners of the reservoir.

2. Identify that the autotransfusion reservoir door is not completely closed. Secure reservoir door closed with the handle locked forward, the top clamp rotated down, & the bottom clamp rotated up.

3. Identify that the centrifuge bowl is not securely seated. Install centrifuge bowl. (A click will indicate that the bowl is seated in the well.) Hold chuck in place with chuck tool and rotate bowl left & right to check free movement. Tighten 3 chuck screws. (Screws are tight when the chuck tool gives a distinct click.)

4. Identify that the feed tube support arms are not locked in place. Lock left & right feed tube support arms in place with hook. Rotate cam lock to the 6 o'clock position. Close centrifuge cover.

5. Identify that tubing is not properly threaded through the pump head. Open pump head & install tubing between the guides located on the left and right of the pump. Close the pump head.

6. Identify that tubing is not properly threaded through the air detector. Firmly seat the tubing in the air detector & under the tubing guide.

7. Identify that the red & blue tubes are reversed in position. Install red & blue feed tubes in appropriate color-coded clamps. Close feed tube clamps.

8. Identify that the red & blue tubes are not connected to any bag. Connect red tube to the reservoir drain. Connect blue tube to the reinfusion bag connection.

9. Identify that the normal saline bag is not marked as having an anticoagulant added. Verbalize that the anticoagulant

should be added & the bag should be labeled.

10. Verbalize that 30,000 units of Heparin normally is added for each 1 liter of normal saline in the bag.

Operate a Blood Recovery and Delivery System

Conditions

You are responsible for the operation of the Haemonetics Cell Saver 4 Autologous Blood Recovery System (CS4) during the next case. You have the following equipment and supplies: 1 Haemonetics Cell Saver 4 Autologous Blood Recovery System (NSN 6516-01-240-6883) with all disposable items installed IAW operator's instructions; 2 bags of Sterile Normal Saline solution (1 or 3 liter bags); a supply of blood; an assembled intermittent suction-aspirator system (NSN 6515-01-267-2726 & NSN 6515-01-267-2727).

Note. This training objective is a training aid taken from the references. (For example, see Supervisor Evaluation Guide.) It should serve as a guide for trainers to use together with the listed references and other training materials when providing in-depth training in this skill.

Standards

You must demonstrate your knowledge of safely and effectively preparing the Haemonetics Cell Saver 4 Autologous Blood Recovery System (CS4) for blood collection, processing blood in the automatic mode, and removing processed blood from the system.

Performance Measures

1. Prepare the CS4 for blood collection.

a. Check that disposable items have been assembled on the CS4 IAW operator's instructions and using aseptic technique.

b. Check that the anticoagulant solution consists of a 1,000 ml bag of normal saline (0.9%) with 30,000 units of heparin.

c. Turn suction on suction aspirator system to a minimum acceptable flow (100 mm Hg) - noting that if flow exceeds 400 mm Hg, destruction of red blood cells could occur.

d. Open anticoagulant line to prime sterile collection reservoir with approximately 100 cc solution.

e. Regulate the anticoagulant drip rate to 1 drop per second.

2. Process blood using the CS4 in automatic mode.

a. When asked, state that collection of 600-900 ml of blood is required before beginning to process blood - noting that processing blood with less than 600-900 ml will produce a product with less than the desired hematocrit and will compromise the blood being returned to the patient.

b. Initiate autoprocessing of blood from the reservoir using the START/AUTO button.

c. When asked, state that reinfusion can begin when 2 inches of blood enters the reinfusion bag.

d. When told to discontinue all processing, press the STOP button.

e. Given the requirement to begin processing again, press the PAUSE/RESUME button.

f. Given the requirement to concentrate processed blood upon receiving the RESERVOIR EMPTY message, press the FINAL CYCLE button used to concentrate blood.

3. Remove processed blood from the CS4 for storage or continued patient reinfusion in the recovery area.

a. Close red slide clamps on reinfusion bag.

b. Lower reinfusion bag below level of centrifuge bowl with ports facing up.

c. Open pump door and manually open blue line pinch valve allowing blood to drain to reinfusion bag.

d. Close roller pump.

e. Press REMOVE AIR button and hold it down until red cells begin to exit the reinfusion bag.

f. Close white clamp on reinfusion bag.

g. Disconnect reinfusion bag from system.

References

Haemonetics® Corporation. (1987). Haemonetics® Cell Saver® 4 autologous blood recovery system: Owner's operating and maintenance manual (Rev. C). Braintree, MA: Author.

Haemonetics® Corporation. (1988). Haemonetics® Cell Saver® 4 service manual (NSN 6515-01-240-6883; Rev. B). Braintree, MA: Author.

U.S. Army Medical Matériel Agency. (n.d.). Blood recovery and delivery system: Maintainer training guide (NSN 6516-01-240-6883). Fort Detrick, MD: Author.

U.S. Army Medical Matériel Agency. (n.d.). Blood recovery and delivery system: Operator training guide (NSN 6516-01-240-6883). Fort Detrick, MD: Author.

U.S. Army Medical Matériel Agency. (n.d.). Blood recovery and delivery system: Supervisor evaluation guide (NSN 6516-01-240-6883). Fort Detrick, MD: Author.

Assemble a Water Manometer System & Measure CVP

Conditions

You are providing patient care in a field environment and need to obtain an intermittent central venous pressure (CVP) reading on a patient who has a central venous line. You have the following equipment and supplies: CVP manometer that is not assembled; 1 liter bag of IV fluid with IV tubing; 1 small basin; IV pole; 1 mannequin on a bed.

Standards

Correctly assemble and position a water manometer system and obtain a CVP reading IAW the references.

Performance Measures

1. Maintain aseptic technique throughout the procedure.

2. Prepare IV administration set-up, priming tubing with IV solution and making certain that no air bubbles are present in tubing. Close clamp on tubing.

3. Secure manometer on IV pole.

4. Connect IV administration set to manometer.

5. Turning stopcock so that manometer and IV solution are open to each other, open clamp on IV tubing and fill manometer with IV solution to between 18 and 20 cm.

Note. Overfilling the manometer may expose the patient to contamination resulting from overflow.

6. Close clamp and rotate stopcock so that IV solution is open to patient.

7. Prime IV fluid path to the patient and connect tubing to IV catheter.

8. Place patient flat in bed, without a pillow, if possible. If not, raise head of bed 15°-30°. Use same position each time a CVP reading is made.

9. Locate patient's right atrium (midaxillary line at fourth intercostal space).

10. Adjust level of manometer so that zero on manometer scale is the same level as patient's right atrium.

11. Turn stopcock to open position for manometer-IV solution, filling manometer with additional solution as needed to a level slightly above expected reading.

12. Turn stopcock to the manometer-patient position and watch the level of the solution in the manometer fall to the pressure level existing in the right atrium.

Note. Changes in the CVP readings over time are more important than one pressure level reading.

13. Observe meniscus at eye level and watch rise and fall of fluid column in response to patient's breathing.

Note. Respiratory fluctuations reflect changes in intrathoracic pressures during respiratory cycle and indicate that manometer is functioning properly.

14. When equilibrium is reached, take CVP reading at highest level of meniscus during end of expiration.

15. Reset stopcock so that IV flow is from solution bag to patient. Adjust rate of infusion as needed.

16. Return patient to desired position and record CVP reading.

References

American Pharmaseal Company. (1986). Pharmaseal® procedure set-up: Central venous pressure monitor. Valencia, CA: Author.

Ayim, E., Bewes, P. C., Bion, J. F., Cory, C., Farman, J. V., Kisia, A., & Prior, F. N. (n.d.). Primary anaesthesia. Oxford University Press.

Smith, S. F., & Duell, D. J. (1992). Clinical nursing skills (3rd ed.). Norwalk, CT: Appleton & Lange.

Operate a Cardiac Monitor-Recorder

Conditions

A patient in your field MTF needs an EKG tracing. You have identified the patient, explained the procedure to him, and washed your hands. You have the following equipment and supplies: Hewlett-Packard cardiac monitor-recorder, 5-lead electrode set, 4 metal plate limb electrodes with holding straps; 1 suction cup electrode; 1 tube of electrode gel; 1 roll of recorder paper; 1 box of alcohol pads; 1 mannequin with arms and legs on a bed.

Standards

Set up a cardiac monitor-recorder, connect a patient (mannequin) to the machine, and use appropriate procedure to obtain an EKG tracing IAW the references.

Performance Measures

1. Ask or assist the patient to lie supine on the bed.

2. Insure that patient's body is not in contact with metal objects and that limbs are firmly supported.

Note. Some metal objects, watches, or jewelry may interfere with the accurate recording of the electrical impulse.

3. Instruct patient to relax and breathe normally throughout the entire procedure.

4. Turn machine on and connect 5-lead electrode lead set.

a. Push POWER ON key to turn monitor-recorder module on.

b. Connect electrode lead set to six pin female connector on monitor-recorder module.

Note. The monitor-recorder can be used with an electrical source or with the internal battery. Battery charge time is 2 hours for 90% capacity. Battery capacity is 4 hours monitoring or 1 hour recording.

5. Select Lead II for monitoring the patient.

a. Press LEAD SELECT key to sequentially change EKG source between leads I, II, III, aVR, aVL, aVF, and V.

b. Check CRT screen for display of lead selected.

6. Activate high and low alarms.

a. Press ALARMS ON/OFF key to activate heart rate alarms.

b. Note that the red ALARMS OFF LED is on when heart rate alarms are deactivated and off when alarms are activated.

7. Place high and low alarms at desired settings.

a. Use SELECT key to select HI ALARM limit indicator. Press up/down arrow keys to adjust high alarm limit.

Defaults to 140 bpm when module is turned on.

b. Use SELECT key to select LO ALARM limit indicator. Press up/down arrow keys to adjust low alarm limit. Defaults to 40 bpm when module is turned on.

8. Apply limb electrodes.

a. Clean sites for electrode placement by wiping areas with alcohol to remove dead skin and oils.

Note. An area of broken down or irritated skin should not be used for the electrode connection.

b. Apply small amount of electrode gel to sites.

c. Position limb electrodes and secure with holding straps.

(1) Secure leg electrodes on medial or lateral aspect of calf.

(2) Secure arm electrodes on inner aspect of arm or forearm, ensuring that connections are not on or immediately adjacent to an IV site.

(3) Insure that connections are made over a fleshy area, not over bone.

Note. Make the usual electrode connection to a fleshy part of the stump if the patient is missing a limb. Secure the electrode with tape if necessary.

9. Push the Run/Stop button while in Lead II to obtain an EKG tracing.

10. Prepare the report.

a. Remove EKG tracing from recorder.

b. Mark EKG tracing printout with patient's identification, date, time and your initials.

11. Remove electrodes from patient and clean gel from skin or continue to monitor the patient in Lead II.

References

Hewlett-Packard. (1989). Hewlett Packard 43110MC defibrillator/monitor-recorder operating guide. McMinnville, OR: Author.

HQDA. (1990). Soldier's manual and trainer's guide: MOS 91C practical nurse, skill levels 2/3/4/5 (STP 8-91C25-SM-TG, Task 081-835-3007). Washington, DC: Author.

Set Up & Operate a Field Portable Oropharyngeal Suction Apparatus

Conditions

You are providing patient care in a field environment and need to suction oropharyngeal secretions from a patient. You have the following equipment and supplies: 1 field portable oropharyngeal suction apparatus (NSN 6515-01-304-6497); sterile patient suction tubing and suction catheter; 1 small container of water; 1 pair of clean gloves.

Standards

Operate a field portable oropharyngeal suction apparatus to perform a clean procedure IAW the references.

Performance Measures

1. Determine location for use of suction apparatus and mode of electrical operation as follows:

a. Field medical treatment facility area or ward - AC power source.

b. Ambulance or other evacuation vehicle - DC (12V) power source.

c. Litter - internal battery pack.

Note. Suction apparatus will operate on internal battery pack for 20 minutes when using maximum vacuum. The Charge indicator illuminates when connected to 115VAC. The internal battery pack takes approximately 16 hours to recharge from a completely discharged condition.

2. Mount suction apparatus securely if using it with a patient on a litter.

a. Locate 2 black webbed nylon straps with hook-and-loop fasteners on each end.

b. Position suction apparatus and patient onto litter.

c. Thread straps through D-ring fasteners located near lower front and back of case and secure suction apparatus to the litter.

3. While operating mode selector switch is in Off/Charge position, connect power cable or vehicle power cord to appropriate source of electrical power.

4. Attach short connecting tubing from vacuum pump to collection canister.

Note. An optional filter which is both hydrophobic and bacterial can be connected between the vacuum pump and the collection canister furthest from the patient. This filter should be replaced when discoloration of its membrane occurs, the membrane comes in contact with aspirate, or following 150 hours of use. This filter is designed to retain bacteria which would otherwise be exhausted into the immediate vicinity.

5. Verify that all tubing connections are tight and that black collection canister end caps are firmly in place. No kinks should be in connecting tubing.

Note. Multiple collection canisters may be connected, in series, if a large quantity of aspirate is anticipated.

6. Turn operating mode selector switch to either AC, 12V DC, or Battery position as required.

7. Pinch and hold clear, plastic tubing connected to the collection canister and then rotate the Vacuum Adjust control knob to desired maximum deliverable vacuum level. Release tubing.

Note. Deliverable vacuum will not exceed preset level. If suction is too low, secretions cannot be removed. If suction is too high, mucous membranes may be forcefully pulled into catheter opening.

Warning. Rotating Vacuum Adjust control knob without pinching tubing connected to the collection canister will change the maximum deliverable vacuum level to an unknown setting.

8. Attach patient suction tubing to collection canister.

9. Open suction catheter package to expose suction port of catheter.

10. Put on clean gloves.

11. Remove catheter from package and attach suction catheter to tubing.

12. Test patency of catheter.

a. Insert catheter tip into container of clean water.

b. Place thumb over suction port to create suction until water can be seen entering the collection canister.

c. During operation of the suction apparatus, periodically observe the vacuum gauge setting and the collection canister for potential overflow.

Warning. Do not operate the suction apparatus with the lid of the case closed unless an optional overflow safety device is used. Do not use the suction apparatus for more than 27 minutes per hour.

13. Change collection canister without spilling patient aspirate.

a. Disconnect tubing from both collection canister connectors.

b. Connect 9-inch section of tubing to both collection canister connectors.

c. Dispose of aspirate IAW standard unit procedures.

d. Clean and disinfect collection canister and end caps IAW standard unit procedures.

Warning. Do not clean cylinder with abrasive cleaning agents, alcohol, or chlorinated hydrocarbon agents. Do not steam sterilize (autoclave) the collection canister.

References

HQDA. (1993). Unit, direct support, and general support maintenance manual: Suction apparatus, oropharyngeal model 308M (TM 8-6515-004-24&P). Washington, DC: Author.

Impact Instrumentation, Inc. (1992). Instruction manual operation & service: 308M series, oropharyngeal suction apparatus, portable, battery operated (Rev. E). West Caldwell, NJ: Author.

Set Up & Operate a Ventilator

Conditions

A respiratory specialist has checked a Uni-Vent Model 750 ventilator for proper functioning and has placed it on standby. A patient in your field MTF needs to be placed on a ventilator immediately, and no respiratory specialist is available to set up the ventilator and adjust it to the prescribed settings. You have been given the prescribed settings for the ventilator. You have the following equipment and supplies: A Uni-Vent Model 750 ventilator (NSN 6530-01-327-0686); a nearby electrical source, required ventilator circuits, oxygen connecting tubing, 50 psi oxygen regulator, test lung, "H" oxygen cylinder in a secured position. All ventilator settings are initially

at 0--except high alarm is at maximum setting.

Standards

Set up and calibrate a Uni-Vent Model 750 ventilator, perform a pressure check and adjust the ventilator to the prescribed settings IAW the references.

Performance Measures

Note. The Uni-Vent 750 ventilator is portable, electronically controlled, time-cycled, and pressure limited.

1. Take the following steps to connect the ventilator to an electrical source.

a. Connect AC power assembly of the multivoltage power supply to an electrical source.

b. Connect multivoltage power supply to the electrical jack on the ventilator marked EXT POWER.

Note. The multivoltage power supply provides for operation of the ventilator on AC and DC power sources, and it has a voltage selector switch which adjusts for 110 VAC or 230 VAC. It also serves as a source of electrical power for recharging the ventilator's internal batteries. Recharge time ranges from 14 to 16 hours, depending on the initial state of discharge. When the batteries are completely recharged, the ventilator can operate on internal battery power for 9 hours of continuous use.

2. Take the following steps to connect the ventilator to a gas source. (See Task 1.05 for cracking the oxygen cylinder and connecting the regulator.)

a. "Crack" oxygen cylinder to flush out any debris.

b. Attach 50 psi pressure regulator to oxygen cylinder.

c. Connect green high pressure hose from regulator to the GAS IN fitting on connector panel of ventilator.

Note. Refer to TM 8-6530-009-24&P for detailed procedure of interconnecting a blender between oxygen source and ventilator.

Warning. The FLOW ADJUST control on the control module is calibrated to a 50-psi input pressure.

3. Connect the 10-mm spiral hose between the GAS OUT tapered barb on the connector panel of the control module and the gas inlet port of the patient valve.

4. Connect the 1/8-in id hose between the TRANSDUCER hose barb on the connector panel of the control module and the transducer port of the patient valve.

5. Connect the 3/16-in id hose between the DEMAND VALVE barb on the connector panel of the control module and the demand valve port of the patient valve.

6. Perform transducer calibration prior to using the ventilator on each patient.

Warning. Do not connect the patient valve to the patient during this procedure.

a. Set MODE selector switch to CAL.

b. Observe control module displays for the following:

(1) Alphanumeric display is blank.

(2) Digital bar graph illuminates one or more indicator lamps.

c. Depress and hold down the MEAN AIRWAY PRESSURE/CAL membrane switch for approximately 3 seconds.

d. Listen for a tone to start during the 3-second period.

e. Observe that the alphanumeric display remains blank during the 3-second tone.

f. When the tone stops, observe the following:

(1) the alphanumeric display shows "00" and

(2) the digital bar graph lamp illuminates between 0 and 2 cm H_2O.

g. Turn MODE selector switch to another mode or to the OFF position.

7. Allow ventilator to undergo a self-test process.

a. Set the MODE selector switch to CTRL, ASSIST, or SIMV to start the self-test process.

b. Observe as the self-test displays current values of the following:

(1)TRANSDUCER CALIBRATION.

(a) Alphanumeric display will show "00" if transducer is calibrated.

(b) If transducer calibration baseline exceeds ± 1 cm H_2O, an audible tone will activate and display will alternately flash "---" and the current transducer calibration value. Do not attempt patient use.

(2) RATE.

(3) INSPIRATION TIME.

(4) LOW PRESSURE ALARM.

(5) ASSIST/SIMV SENSITIVITY.

Note. The self-test values show in the alphanumeric display for 1-second intervals. Their respective indicator lamps are also illuminated for 1-second intervals.

c. If the ventilator fails the microprocessor memory portion of the self-test as indicated by the alphanumeric display continuously displaying FAL and a beeping alarm, turn the MODE selector switch to the OFF position and repeat the self-test.

d. If the self-test fails twice, notify the unit Medical Equipment Repairer.

Warning. The self-test will only be performed with the patient valve disconnected from the patient. Do not attempt to use the ventilator on the patient if the self-test fails.

8. Adjust machine to initial settings, such as:

a. Flow Adjust - 1,000 ml/sec

b. Inspiration - 1.0 seconds

c. Rate - 12 breaths/minute

Note. When you push the button next to a knob or adjust the knob itself, the current value will display for 3 seconds in the digital window.

9. Perform a pressure check by occluding the circuit at the patient connector during the inspiratory phase. Monitor the digital bar graph display and alarms for leaks.

Note. There should be a steady rise in the digital bar graph display until it reaches the pressure limit, at which time the ventilator should cycle into the expiratory phase. If a leak is found in the patient circuit, the soldier should obtain a new circuit and repeat the pressure check.

10. Set MODE as prescribed. For example, set the mode to IMV.

11. Set FIO_2 as prescribed.

a. FIO_2 at 100% without a blender.

b. Connect oxygen blender to set FIO_2 lower than 100%.

12. Set RATE as prescribed. For example, set the rate to 12 bpm.

13. Set the tidal volume as prescribed.

a. Tidal volume can be calculated by multiplying the FLOW ADJUST control setting (using ml/sec scale) by the INSPIRATION TIME control setting in seconds or fractions of seconds.

b. For example, set the FLOW ADJUST to 1000 & INSPIRATION to 0.8 sec. to get a tidal volume of 800 ml.

c. Refer to the decal affixed to the back of the control module for a tidal volume computation chart.

14. Set the high and low pressure alarms.

a. Depress the PEAK membrane switch to obtain the peak airway pressure. Hold membrane switch for 3 respirations to check the average peak pressure.

b. Set the high and low pressure alarms 10 cm H_2O from the average peak airway pressure.

15. Adjust the ASSIST/SIMV SENSITIVITY control setting as prescribed to select the activation point of each assisted breath relative to the patient's inspiratory effort. Sensitivity of -2 is most commonly used. (Higher values may not trigger the ventilator because of the anti-asphyxiation valve.)

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Following are general references used in the preparation of this manual. References specific to training objectives are included with the objectives themselves in Chapter 2.

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APPENDIX A

DESCRIPTION OF TESTING LANES

Following is a description of equipment and supplies needed for testing the clinical skills described in Chapter 2:

Operate an 885A Anesthesia Apparatus

885A Anesthesia Apparatus in its carrying case, NSN 6515-01-003-4133 & NSN 6515-01-185-8446 (2).
"E" oxygen regulator with green oxygen connector (1).
"D" oxygen cylinders (2).
Carbon dioxide absorption canisters (4).
Ohmeda 7000 anesthesia ventilator (1).
Ohmeda positive end expiratory pressure valve (PEEP valve) (1).
Ohmeda 5120 oxygen monitor (1).
"H" oxygen cylinder (1).

Operate a Universal PAC Draw-Over Anesthesia System

Table with PAC on it.

Set Up a Blood Recovery and Delivery System
Operate a Blood Recovery and Delivery System

Haemonetics Cell Saver 4 Autologous Blood Recovery System, NSN 6516-01-240-6883 (1).
Haemonetics Basic Collection Pack, NSN 6515-01-185-2406 (1).
Haemonetics Basic High Speed Cell Saver Pack, NSN 6515-01-169-7785 (1).
Sterile Normal Saline solution, 1 or 3 liter bags (1-2 bags for saline wash lines).
Sterile Normal Saline solution, 1 liter bag (1 bag for heparinized saline solution).
Assembled intermittent suction-aspirator system, NSN 6515-01-267-2726 & NSN 6515-01-267-2727 (1).

Assemble a Water Manometer System & Measure CVP

Hospital bed with the following supplies:
Mannequin with upper extremities (1).
IV pole (1).
1-liter IV bag of any solution (1).
IV connecting tubing (1).
Central Venous Pressure Monitor, Pharmaseal Cat. No. 4338A, unassembled (1).
Small emesis basin (1).

Operate a Cardiac Monitor-Recorder

Field table with the following supplies:
Hewlett-Packard Cardiac Monitor-Recorder, NSN 6515-01-291-1198, OR
Hewlett-Packard Defibrillator/Monitor-Recorder System, NSN 6515-01-291-1199 (1).
Recorder paper (1 roll).
5-lead electrode lead set (1 set).
Metal plate limb electrodes (4) with rubber straps (4).
Suction cup electrode (1).
Tube of electrode gel (1).
Box of alcohol wipes (1).
Hospital bed with mannequin that has 4 extremities.

Set Up & Operate a Field Portable Oropharyngeal Suction Apparatus

Field table with the following equipment and supplies:
Field Oropharyngeal Suction Apparatus, Model 308M, by Impact,
NSN 6515-01-304-6497 (1).
Suction tubing (1).
Suction catheter (1).
Small container of tap water (1).
Gloves (1 pair).

Set Up & Operate a Ventilator

"H" oxygen cylinder in secured position.
Field table with the following equipment and supplies:
Uni-Vent Model 750 Ventilator by Impact, NSN 6530-01-327-0686.
Required circuits (1 set).
Oxygen connecting tubing (1).
50 psi pressure regulator (1).
Test lung (1).
Non-sparking wrench (1).

APPENDIX B

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