RESPIRATORY THERAPY PROGRAM

HANDBOOK and CLINICAL PRACTICE MANUAL

2025-2026

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CLINICAL

Welcome

The Faculty welcomes you to the Madison College Respiratory Therapy Program.

During your experience here, you will apply information from the classroom into the laboratory and clinical setting. You will develop and draw on many skills, from critical thinking to empathy. In the clinical setting every patient, every situation is unique. You cannot memorize all the answers, but you will be expected to apply the Respiratory Care skills that you have learned.

Your professional behavior is also essential. Those qualities, over and beyond the knowledge you gain and the skills you learn, are essential for your success in school and in your later work as a Respiratory Therapist. In broad terms, you will be expected to demonstrate respect for others, communicate effectively, cooperate with fellow workers, and display the dependability expected of a professional. Give 100% and treat your classmates, instructors, patients, and co-workers, as you would like to be treated.

Those who make the most of the program learn early on that the program faculty, clinical staff, instructors, and other college personnel work extremely hard to build a bridge for you to successfully graduate and realize your dream. You can become a Respiratory Therapist and enjoy a rewarding and successful career. It is up to you to be successful; we are here to help you achieve your goals.

In our experience, we have come to know our success is dependent upon your success both in the program and in clinical practice after you graduate; therefore, we look forward to assisting you in your efforts to become a knowledgeable and skilled Respiratory Therapist.

Sincerely,

The Madison College Respiratory Therapy Program Faculty

Madison College Mission, Vision, and Values

Mission

Madison College provides open access to quality higher education that fosters lifelong learning and success within our communities.

Vision

To be the leader in accessible, affordable education that meets the evolving needs of our diverse communities.

Values

- Excellence
- Respect
- Commitment to students and diverse communities

Program Vision and Philosophy

Vision

It is the desire of the program faculty to continue to develop a Respiratory Care Program whose graduates and faculty enjoy a reputation of excellence.

Philosophy

The Faculty of the Respiratory Therapy Program believes that:

- The purpose of the program is to serve students who wish to become Respiratory Therapists; and that by so doing, the program serves the future patients of these students.
- Knowledge, skills, behavior, and attitude are of equal importance in the development of respiratory care practitioners.
- The graduates of the program should possess competence at the level of the advanced practitioner, with adequate knowledge in the scientific foundation; critical thinking skills; and strong ethical principles.
- The program faculty hold sacred the dignity and worth of all people regardless of race, creed, sex, disadvantage, disability, or social status.

Program Description

The Respiratory Care Program prepares the graduate to take an active role in the maintenance and/or restoration of cardiopulmonary homeostasis. The curriculum includes intensive course work in the supporting sciences and general education areas. Classroom instruction is supplemented with learning experiences in the campus laboratory and in area clinical affiliates. Students enrolled in the Respiratory Care Program are required to achieve a minimum grade of "C" in each Respiratory Care course and each required science course.

The program is 21 months in length and results in graduates receiving an Associate of Applied Science (AAS) degree in Respiratory Therapy upon successful completion of the curriculum.

Acceptance into the Respiratory Therapy Program at Madison College indicates that the faculty and staff in the

program have chosen to dedicate their time, effort, and expertise to train you to become an allied health practitioner. Your acceptance of our invitation to enter the program indicates that you are committed to becoming a professional in the cardiopulmonary sciences by fulfilling the degree requirements and taking all the appropriate board exams. Your acceptance also marks the beginning of an intense two-year didactic and clinical preparation to become a competent and caring professional in respiratory therapy. Successful completion of the Program demands the fullest commitment of time, effort and energy from all parties involved. This handbook outlines the specific qualities, attributes and learning strategies required of a successful student in the Program, and further serves to define resources and references you may need throughout your course of study as well as those you may need in your career as a professional in the cardiopulmonary sciences.

In order to ensure effective education in the Respiratory Therapy Program, each individual participating in the program must have a full understanding of the responsibility involved. The Respiratory Therapy Student Handbook is designed to provide the student with the necessary information regarding policies, procedures, and expectations in the Respiratory Therapy Program. This handbook is meant to be a guide to assist the student in attaining their goal to become a competent Respiratory Therapy. Revision of the handbook is an ongoing process, and every effort will be made to keep students advised of any changes to the handbook, as well as to minimize the inconvenience such changes might create. The handbook will be posted on the program's webpage. Students are expected to read the handbook thoroughly. Students will be required to sign an acknowledgement form indicating their understanding of the program handbook. Any questions regarding the handbook should be directed to the program faculty.

Textbooks

1. Madison College Respiratory Therapy Program, Clinical Practice Manual. 2. Kacmarek, Stoller, Heuer. Egan's Fundamentals of Respiratory Care, 13th ed., Elsevier, 2024.
Both books above are available in the Madison College Bookstore.
3. NBRC Exam Review Book – Title to be determined
4. *Classmates* online clinical simulation program by Kettering. License can be purchased through the Madison College Bookstore.

Accreditation

The most important goal of the Madison College Respiratory Therapy Program is the graduation of competent Respiratory Care Practitioners in the areas of knowledge, technical skills, and professional behaviors. Using National Board for Respiratory Care (NBRC) exam results as well as student, graduate, employer and faculty surveys, the program strives to continually improve. To document and assist in maintaining high quality education, the Commission on Accreditation for Respiratory Care (CoARC) accredits the program. If you have questions/concerns regarding the program's accreditation status, you can contact CoARC at:

CoARC
1248 Harwood Road
Bedford, TX 76021-4244
817-283-2835 (Office)
http://www.coarc.com/
Information related to the program's success on NBRC exams, job placement as well as other outcomes could be found at the following link: https://coarc.com/students/programmatic-outcomes-data/

Career Description, Credentialing and Licensure

Description of the Career

Respiratory Therapists are members of a team of health care professionals and work in a wide variety of clinical settings. They evaluate, treat, and manage patients of all ages with respiratory and cardiopulmonary disease. In addition to performing therapies, Respiratory Therapists are involved in clinical decision-making and patient education. Respiratory Therapists work primarily in hospitals providing and assessing the clinical status of patients and performing diagnostic testing. They may also work in diagnostic labs, such as pulmonary function and sleep labs. Therapists work in emergency rooms, intensive care units and participate in life support procedures including airway care, mechanical ventilation, and resuscitation. In addition to other therapies, they provide the delivery of medication to patients' airways, including patients with asthma, emphysema, chronic bronchitis, and cystic fibrosis. Other employment options for Respiratory Therapists include home care, sales, education, and research.

Goals

This program is designed to prepare graduates with demonstrated competence in the cognitive (knowledge), psychomotor (skills), and affective (behavior) learning domains of respiratory care practice as performed by registered respiratory therapists (RRTs).

Outcomes

1. Upon completion of the program, graduates will demonstrate the ability to comprehend, apply, and evaluate clinical information relevant to their roles as advanced-level respiratory therapists. Graduates will be competent in the application of problem-solving strategies, clinical decision-making, and patient education in the patient care setting.
2. Upon completion of the program, graduates will demonstrate the technical proficiency in all skills necessary to fulfill their roles as advanced-level respiratory therapists. Graduates will be competent to perform all respiratory care diagnostic and therapeutic procedures required of a respiratory therapist entering the profession.
3. Upon completion of the program, graduates will demonstrate personal behavior consistent with professional and employer expectations for advanced-level respiratory therapists. Graduates will be competent in the application of ethical decision-making and professional responsibility. Graduates will be able to function within inter-professional teams and communicate effectively with patients and other members of the health care team, both as individuals and in groups, regardless of their beliefs, languages, and abilities. The ability to communicate effectively to diverse groups is basic to the provision of respiratory care services in a safe and effective manner.

Credentialing

The Therapist Multiple-Choice (TMC) Examination and the Clinical Simulation Examination are the professional credentialing examinations taken by graduates of CoARC accredited programs to earn the Certified Respiratory Therapist (CRT) credential and Registered Respiratory Therapist (RRT) credential, which are offered by the National Board for Respiratory Care (NBRC). The American Association for Respiratory Care, the CoARC, and the NBRC recognize the RRT credential as the "standard of excellence" for respiratory care professionals. Upon graduation, graduates meet the admission requirements for the Therapist Multiple- Choice Examination administered by the National Board for Respiratory Care (NBRC). Following successful completion of the Therapist Multiple-Choice Examination, one earns the CRT credential and is recognized as a Certified Respiratory Therapist. Passing the Therapist Multiple-Choice Examination with a score above a certain high cut score also

makes one eligible to take the Clinical Simulations Examination. Likewise, after successful completion of the Clinical Simulations Examination, one earns the RRT credential and is recognized as a Registered Respiratory Therapist. The CRT and RRT credential must be earned within three years of completing the respiratory therapy program. Individuals whose three-year time limit has expired must retake and pass the Therapist Multiple-Choice Examination above a certain cut score to reinstate their eligibility for the Clinical Simulations Examination. For more information on NBRC CRT and RRT credentialing, see (http://www.nbrc.org/)

Licensure

The CRT and/or RRT credentials are used as the basis for the licensure in all the 49 states, including Wisconsin, which regulate the practice of respiratory care (Alaska does not have licensure). Students are encouraged and aided by Faculty during the months leading up to graduation to start the application process with the Wisconsin Department of Safety and Professional Services (DSPS https://dsps.wi.gov/pages/Home.aspx) to become a licensed respiratory Therapy (LRT). A felony conviction may affect a graduate's ability to sit for the NBRC examinations or attain state licensure. Please contact the DSPS for further details.

Core Workforce Skills

Madison College's employability skills are eight key workplace/soft skills that local employers told us were important. Development of these skills will aid students in becoming life-long learners on the job, at home, and in the community. Students will be assessed on these skills. This program addresses the following 8 Core Workforce Skills, in order of importance as determined by local industry surveys:

1. Self-Management
2. Critical Thinking
3. Social Interaction
4. Ethics
5. Communication – Listening
6. Communication – Speaking
7. Communication – Reading
8. Communication – Writing

Essential Functions for the Respiratory Therapy Program

The Respiratory Therapy Program complies with the American with Disabilities Act (ADA), and consistent with the ADA, the Essential Functions list on the next page provides the framework to relate functional ability categories and representative activities/attributes to any limitations/deficits in functional abilities. These standards shall be used by the Respiratory Therapy Program to make decisions related to the ability of the respiratory therapy student to perform the essential functions of respiratory therapy.

If a prospective student is or becomes unable to meet the required Essential Functions, the Respiratory Therapy Program, in consultation with Madison College's Disability Resource Services (DRS) (Truax Campus, Main Building, Room C1434, (608) 246-6716), will determine on an individual basis whether reasonable accommodations can be made that would permit the student to meet the Essential Functions, thus allowing the student to continue in the program.

Gross Motor Ability:

- Move within confined spaces
- Sit and stand to maintain balance
- Reach above shoulders and below waist

Fine Motor Ability:

- Pick up large and small objects with hands
- Grasp/pinch/squeeze small objects with hands or fingers
- Write clearly and neatly with pen or pencil
- Use a computer
- Twist or turn knobs with hands
- Adequate manual dexterity as to be capable of maintaining sterility

Physical Endurance:

- Stand at client's side during procedure
- Sustain repetitive movements
- Maintain physical tolerance throughout 8-hour shift
- Work and complete tasks at a reasonable pace

Physical Strength:

- Relocate 25 lbs., push/pull/roll 60 lbs.
- Move objects weighing 10-50 lbs.
- Carry equipment/supplies
- Squeeze with hands
- Body Mobility:
- Twist, bend, stoop, and squat
- Move quickly
- Climb ladders/stools/stairs
- Walk

Hearing:

- Hear faint to normal speaking sounds
- Hear faint body sounds (i.e., breath and heart sounds)
- Hear auditory alarms, telephones
- Hear sounds via stethoscope

Visual:

- Visually assess clients
- See object up to 20 inches away and see object more than 20 feet away
- Use peripheral vision
- Distinguish color and color intensity
- See emergency lights/lamps

Tactile:

- Feel vibrations (i.e., pulses)
- Feel difference in surface characteristics (i.e., palpate artery/vein)
- Detect client temperature and environmental temperature

Smell:

- Detect odors from client
- Detect smoke, gas, or noxious smells

Reading:

- Read and interpret physicians' orders
- Read and understand written documents
- Read very fine or small print

Arithmetic:

- Read and understand columns of writing, digital displays, and graphic printouts (i.e., flow sheets)
- Calibrate equipment
- Convert numbers to metric
- Tell time and measure time (duration)
- Count rates (i.e., pulses, breathing rate)
- Use measuring tools (i.e., thermometer, scales)
- Able to perform basic arithmetic functions; add, subtract, multiply, divide, compute fractions, use a calculator and record numbers

Emotional Stability:

- Establish therapeutic boundaries
- Provide client with appropriate emotional support
- Adapt to changing environment/stress
- Deal and cope with the unexpected (i.e., crisis, grief)
- Focus attention on task despite distractions
- Perform multiple responsibilities concurrently
- Show appropriate compassion through communications

Critical Thinking Skills:

- Transfer/extrapolate knowledge from one situation to another
- Process information
- Evaluate outcomes
- Problem solve, prioritize tasks
- Use long- and short-term memory
- Identify cause-effect relationships
- Plan/control activities for others
- Synthesize knowledge and skills
- Sequence information

Interpersonal Skills:

- Negotiate interpersonal conflict appropriately
- Respect differences in clients and co-workers
- Establish rapport with clients and co-workers
- Work effectively with physicians, staff, clients, and clients' families

Communication Skills:

- Teach (i.e., client, family, co-worker)
- Speak clearly and distinctly
- Explain procedure
- Interact with others
- Direct activities of others
- Convey information through writing (i.e., progress notes)

Program Policies and Guidelines

Equitable Application of Program Policies and Procedures

The Respiratory Therapy Program at Madison College is a traditional RT program. We can admit up to 30 students per year, based on our CoARC agreement and available resources. All didactic and laboratory work will take place on the Truax campus. Students will be rotated through clinical rotations at area clinical facilities. College and program policies will apply to all students and faculty. In addition, each clinical site will have its own policies that will be followed when students or faculty are practicing at that location.

Curriculum

- General Chemistry and Written Communication must be completed or in process when petitioning for the program or during the petitioning semester. The curriculum sheet for the Respiratory Therapy Program as well as course descriptions can be found at this link: https://madisoncollege.edu/program/respiratory-therapist
- Required Respiratory Therapy courses are designated with a 515 number as the middle three digits. Each of these courses are offered only once a year and are prerequisites for subsequent 515 courses so they must be taken in sequence. Required science courses must be taken in or before the semester they are listed on the curriculum sheet. Many of these are prerequisites for 515 courses so failure to complete them in time may preclude you from continuing in the program.
- Continuous enrollment (semesters) in the program and a grade of "C" or better in all courses required of the Respiratory Therapy Program is necessary for successful completion. A student who withdraws from a course or earns lower than a grade of "C" in a Respiratory Therapy (515) course or a required science course will be dropped from the Respiratory Therapy Program with the possibility for re-entry into the program the following year. (See re-entry for more information).

Transfer of Credits

- Transfer of course work/credits completed at other colleges or universities will be evaluated when official transcripts are received at the college. All courses completed at other institutions are considered for transfer credit only if they were taken at fully accredited institutions and are equivalent in content and credit value. The transfer credit department will review your transcripts. In addition, your assigned faculty advisor will review your course work and determine if there are courses that should be considered for advanced standing. Please consult with your assigned advisor if you have questions regarding your courses.

Grading Policy

The grading scale below is the program grading scale and will be utilized in all program courses and clinical rotations.

A	94-100
AB	90-93
B	85-89
BC	80-84
C	75-79 (minimum requirement to continue in program)
D	70-74
F	<70

Grades will not be rounded, so for example a 74.5% is not rounded to 75% and is not a passing grade to continue in the program.

You have one week to challenge a grade (assignments, quizzes, exams). After one week, a grade is considered final. Final exams will need to be challenged within **48 hours**.

Point breakdowns, how points are distributed, and grade makeup is determined by each individual instructor and will be covered in individual course syllabi. It is the students' responsibility to track their academic progress in courses throughout the program. When a student has trouble mastering competencies in any course, he/she is expected to seek help from the instructor for that course. Each student is expected to complete his/her own work. Any student caught cheating or plagiarizing another's work will be given an F for that work. See Madison College Student Code of Conduct for the colleges' plagiarism/cheating policies here: https://madisoncollege.edu/academic-integrity

Late or Missing Assignments, Quizzes or Tests

All assignments (including labs) must be turned in at the beginning of class on the day that the assignment is due unless a different due date/time are set by the course instructor. Assignments that are turned in after the start of class on the due date will be penalized by 50% of the total points earned. All late assignments must be turned in within one week of the original due date, or 0 points will be given. There will be a maximum of 3 late assignments allowed per course. More than 3 late assignments in a course will result in a required meeting with the faculty instructor to discuss penalties and possible remediation for the course in question. Guidelines/policies that are more specific are in each class syllabi. If a test is missed due to an absence the test can be retaken for 50% credit unless prior arrangements were made with the instructor. Again, please refer to the specific class syllabi for guideline/policy.

Withdrawal and Reentry

Any student who receives less than a C in a respiratory therapy course, a required science course or withdraws from the Respiratory Therapy Program may request to reenter the program by contacting the Program Director and completing the following steps. A student may reenter the program only once.

Note: It is the responsibility of the student to withdraw from a Respiratory Therapy course. The student must initiate the withdrawal process according to the procedures, by dropping courses through your myMadisonCollege portal or by contacting Enrollment Services.

Step 1: Meet with the Program Director to discuss student status and reenrollment/reentry options. Failure to discuss withdrawal with the Program Director may jeopardize the student's ability to reenroll/reenter. The student is responsible for following the Madison College Procedure for course/program withdrawal.
Step 2: A written request to the Program Director is required for reenrollment/reentry consideration. All requests are considered on a space-available basis.

Step 3: If approved the student will sign an extension agreement allowing the student to reenter the program the following year based on space limitations.

Step 4: The student must work with faculty and create an action plan for future success in the program. This plan lays out the steps the student will take to overcome the barriers that are preventing success. For example, a student may be asked to work in an entry-level healthcare position while waiting for reentry to the program or take an entry-level math course to improve their math skills.

Step 5: Students will be required to complete competency testing to determine course placement; remedial work may be required along with auditing courses. Individualized remediation will be determined by the Program Director and faculty recommendations. The student's entire file will be reviewed for purposes of evaluation for placement in the program.

A student reentering the program will continue in the course sequence but may be required to audit courses necessary to regain competency, keeping in mind that fees for auditing courses will apply.

A student that withdraws from the program and does not complete a reentry agreement will not be able to reenter the program and must reapply to the program submitting the required application.

If a student chooses to reenter, they MUST follow Steps, 1, 2, 3, 4 and 5 listed above in the Withdrawal and Reentry section.

Auditing Courses

To audit a class, you must meet the following requirements:

- The class MUST be a degree credit class. Non-credit, non-degree and enrichment classes cannot be audited.
- A seat must be available.
- You must meet all enrollment requirements.
- You must declare your intent to audit at the time of registration, which must be prior to the class start date.
- Staff assistance is required to enroll as an audit. You may call the Enrollment Center or visit in person.
- Tuition and fees are not modified except for students 60 years old or older who are eligible for a Fee Exemption.
- You must meet attendance requirements, participate in the classroom work, and complete assignments, but may not participate in examinations/evaluations.
- Audited classes have a final grade of "AU," which is not calculated in your GPA. Audited classes do not:
    - Fulfill admission or enrollment requirements
    - Count towards a student's enrollment status
    - Count towards program certification or graduation requirements

- Count for financial aid or veteran's educational benefit calculations
- Factor into satisfactory academic progress for financial aid purposes

Classroom Attendance and Timeliness

Attendance is mandatory for all Respiratory Therapy courses. Absences will be excused if you contact the instructor for any given course before the start of the course on that day. Failure to do so will result in an unexcused absence. Any student receiving more than one unexcused absence will be required to meet with the course instructor and Program Director to set up an action plan for future attendance.
You are expected to be on time for every class or lab. Arriving late or leaving early is unprofessional and disruptive to other students and the instructor. Arriving after the scheduled start time or leaving before the scheduled dismissal time without notifying the course instructor will be documented as one occurrence. After two occurrences, the student will have to meet with the course instructor and program director to set up an action plan for future attendance.

Class and Clinical Cancellation

Besides local radio & TV stations and the Madison College website, students can call the hotline to inquire about weather related school closings at (608) 246-6606. The **Wolf Pack Alert** is the college system to contact students via text message and/or email. It is highly recommended that every student signs up. Directions can be found here: https://students.madisoncollege.edu/safety/alerts If the college is closed due to adverse weather or another unforeseen event, clinical is automatically called off. If an instructor needs to cancel a clinical day, they will contact students ahead of time.

WOLFPACK ALERT

Sign up is easy. Follow these simple steps:
1. Go to www.madisoncollege.edu/wolfpack-alert
2. Select device (Android or Apple)
3. Download Informacast Mobile
4. Log-in to Informacast Mobile using your full Madison College email (yourname@madisoncollege.edu) and password.
5. Enter your telephone number.
6. Follow the on-screen directions.

Your device should now be able to receive Wolfpack Alert messages.
Tablets and iPads can also be used to receive Wolfpack Alerts.
If you experience any technical issues, please contact the Madison College Technology Services Help Desk at (608) 246-6666.

Reasonable Accommodations

Students with disabilities who require accommodations can contact the Disability Resource Services to set up any accommodations needed. The DRS information can be found here: https://madisoncollege.edu/disability-resource-services

Student Code of Conduct and Dismissal from the Program

All students are required to follow the Madison College student code of conduct. Failure to do so can result in removal from the Respiratory Therapy Program with no chance of re- entry.

The code of conduct can be found here: https://madisoncollege.edu/student-rights-responsibilities

In addition to violations of the college's code of conduct, a student can be dismissed from the program with no chance of re-entry for

- Receiving a less than passing grade of C (<75%) in 2 core Respiratory Courses in one semester
- Code of Conduct violation/Unethical Behavior
- Failure to maintain compliance with the Essential Functions for the Respiratory Therapy Program
- HIPAA violation
- Endangering any patient's life
- Coming to class, lab or clinical under the influence of drugs or alcohol.

All dismissals from the program must be reviewed and approved by the Dean of the School of Health Sciences, Director of Clinical Education, and the Program Director.

Ethical Practices

Smoking or Substance Abuse: as a future Respiratory Therapist, it is not acceptable for you to leave clinical at any point to go outside of our hospitals to smoke. We, as the faculty of this program, are in complete agreement that smoking is not acceptable due to patient sensitivities to tobacco odors. We also feel that smoking reflects poorly on our profession. Much like perfumes or colognes, residual smoke on your uniform can be offensive to patients, visitors, and fellow health care professionals. To extend this concern further, a student cannot practice in our profession while under the influence of alcohol, drugs or any substance that impairs judgment including prescription drugs. A student suspected to be under the influence of drugs or alcohol in the clinical setting may be required to be drug-tested by the facility. A positive result will result in immediate removal of the student from the program. Any student failing to abide by any of these requirements will be removed from clinical on that day. You will be required to meet with the college's Behavioral Intervention Team (BIT), which could result in removal from the course and/or program. Furthermore, any Unethical Behavior/Gross Misconduct or other serious nonconformance with Program or SoHS policies may result in immediate termination from the program.

Use of Electronic Devices

The use of cell phones and/or smart watches is not acceptable during lecture, laboratory or clinical. All cellular phones must be turned off or put on vibrate in lecture and laboratory classes. Students may not carry personal cell phones in the hospitals while in clinical unless allowed by your clinical instructors. Students may have a cell phone in a purse, backpack or in a locker, but it must be turned off. Messages can be checked during breaks or lunch. This ensures patient privacy and hospital policies state that photos may never be taken in any patient care areas. Hospital employees have been fired for taking a seemingly harmless photo that unintentionally included patient or family. Please inform childcare providers of this policy. In some cases, the instructor may approve that you carry your phone in light of an extenuating circumstance. Cell phones and smart watches are never allowed to be used

during testing.

Calculators may be required for course work. Personal digital assistants (PDA's), IPAD's, Tablets or cellular phones cannot be used for calculators. Texting is disruptive and will not be tolerated in class. If caught texting during an organized class discussion or lecture, you phone will be confiscated and returned to you after class. Smart watches are not allowed during exams.
Audio recording is strictly prohibited in the clinical setting; it is a HIPAA violation and may result in termination from the program. It may be used in the classroom if part of an accommodation, but only with the permission of the instructor for that course.

Acceptable RT Program Communication Modes

Students as well as faculty should always use their Madison College accounts for email.

The RT Program also uses the Microsoft Teams App for direct messaging between faculty and students. Each class will have an account set up by the faculty for direct messaging. It is up to the individual faculty members whether students can report absences or tardy's via the Teams app. The app is available for both iPhone and Android.

Social Media Code of Conduct

This code provides Madison College respiratory therapy students with rules for participation in social media, including media hosted by clinical affiliates as well as non- clinical affiliate social media. HIPAA regulations apply to comments made on social networking sites, and violators are subject to the same prosecution as with other HIPAA violations.

The term "social media" includes but is not limited to blogs; social networks such as Myspace®, Facebook, Instagram, Snapchat, Twitter®; podcasts; video sharing; Really Simple Syndication (RSS) feeds; and on-line collaborative information and publishing systems.

The term "clinical affiliate" includes ANY clinical affiliate used by Madison College for health career education.

Guidelines:

- Students must, always, abide by the Madison College Code of Ethics when using or participating in social media. All the policies that apply to the Respiratory Therapy Program apply to our clinical affiliates.
- Students must, always, remain respectful of the clinical affiliates, their patients, visitors, vendors, medical and allied health staff, and former and current employees. Materials may not be posted which are obscene, vulgar, defamatory, threatening, discriminatory, harassing, abusive, hateful, or embarrassing to another person or entity. Students may not engage in any activity that reflects negatively on a clinical affiliate.
- Students may not disclose any confidential or proprietary information regarding any clinical affiliate, its patients, visitors, vendors, medical, nursing, allied health staff, former and current employees including but not limited to, business, medical and financial information; represent that they are communicating the views of any clinical affiliate unless authorized by that clinical affiliate and Madison College; or act in any manner which creates the false impression that they are communicating on behalf of or as a representative of a clinical affiliate.

- Students may not use or disclose any patient identifying information of any kind in any social media. This rule applies even if the patient is not identified by name where the information to be used or disclosed may enable someone to identify the patient.
- Students should not participate in online discussions of specific patients, even if all identifying information is excluded. Removal of an individual's name does not constitute proper de-identification of protected health information. Inclusion of data such as age, gender, race, diagnosis, date of evaluation, or type of treatment may still allow the reader to recognize the identity of a specific individual.
- This policy applies to students when using social media while at a clinical affiliate site and while using social media when away from a clinical affiliate site. This policy does not apply to content that is unrelated to a clinical affiliate, its patients, visitors, vendors, medical and allied health staff, and former and current employees.
- Students are not permitted to use a clinical affiliate logo or Madison College logo in any internet posting.
- Students are personally responsible for what they post.
- Students may not establish a clinical affiliate hosted social media site.
- Violation of this policy will result in corrective action up to and including removal from the program.

Service Credit

Students are required to complete a minimum of 20 professional credits during their time in the program. These Service Credit points are included in the Evaluation Score for Respiratory Clinical 5 and must be completed prior to beginning the internship in the 4th semester. There will be many opportunities available throughout your time in the program to satisfy this requirement. Examples of professional credits include student involvement in the state and national professional organization, as well as service to community. This may include visits to local schools to promote respiratory therapy, volunteer at educational or healthcare promotional events, set up a booth at a school to talk about the impact of smoking/vaping, to name a few.

Attendance at State and National Conferences

Students will have the chance to attend the state Respiratory Care Conference as a first-year student. Attendance is optional as a first-year student but is a wonderful opportunity for networking, furthering knowledge in the field, and becoming engaged in the WSRC. During the second year of the program, students are required to attend at least one day, but full attendance is encouraged. The conference is generally held in late April/Early May.

Graduation Requirements

- Complete all 515 didactic, laboratory and clinical courses with a minimum grade of 75% within a 3-year academic calendar timeframe.
- Successfully checked off on all state-mandated clinical skills
- Complete all general study courses required to complete AAS degree
- Complete at minimum 20 hours of community service during program completion
- Attend the NRRCC conference or complete in lieu of project
- Completion of mock certification and registry exams
- Attend 2-day NBRC review seminar
- Complete required licensure paperwork and testing

Self-Assessment Exams

Prior to graduation, you will be required to pass the Self-Assessment Exams (SAE's) for the Therapist Multiple

Choice Exam (TMC) at the CRT and RRT level, according to the national pass rates. The exams are proctored by program faculty. Fees for these exams are included in your total tuition costs.

To assure success on these Self-Assessment Exams, students will review content and take practice exams/computerized clinical simulation exams. Success on these exams leads to higher national pass rates in accordance with the National Board of Respiratory Care (NBRC) and the Wisconsin Department of Safety and Professional Services (DSPS).

Professionalism

Transitioning to Professionalism

Your tenure as a student in the Respiratory Therapy Program will be unlike your past educational experiences. Unlike the general curriculum required for most associate degrees, your coursework will be streamlined and specialized to the cardiopulmonary sciences and will traverse classroom examination to demonstration of competency in clinical settings. The most successful graduates from the Respiratory Therapy Program demonstrate a triad of qualities including professional decorum, professional integrity, and educational leadership. The integrated incorporation of these qualities eases the transition from college student to health care professional.

Professional Decorum

First impressions go a long way in determining how one is perceived and treated in the classroom and in the clinic. In order to earn respect on both a professional and personal level, one must project the appearance of a competent professional. Arriving on time or early demonstrates that you understand and respect the importance of your attendance in both the clinic and the classroom. Health care professionals should be well groomed, dressed in the appropriate attire, and prepared for the task at hand whether it be classroom activities (books, assignments, prior readings, etc.) or in the clinic (scrubs, name badge, black pen, stethoscope, etc.). Students should also be respectful of those who may be sensitive to strong odors by limiting the use of scented products (i.e., colognes, lotions, cigarette smoke, etc.). Taken together, these guidelines define the professional decorum expected of each student enrolled in the Respiratory Therapy Program as they pertain to both the classroom and clinical environments.

As a student, you are expected to:

- Arrive on time, in proper uniform and ready for the task at hand
- Be well-groomed with practiced bodily hygiene
- Dress in the appropriate attire
- Have the needed materials/equipment
- Wear your Identification Badge (on campus and in Hospital)
- Manage time wisely and complete assigned tasks
- Always demonstrate a positive attitude in caring for patients and interactions with peers and health care professionals
- Strive to identify own weaknesses and develop strategies to improve
- Display honesty and demonstrate responsibility for own actions
- Show respect for peers, fellow health care professionals, patients and their families/visitors
- Show compassion for patients and always treat them with dignity
- Always protect patient confidentiality

- Perform all patient care procedures, upholding all medical, legal and ethical standards of the profession (follow AARC Clinical Practice Guidelines and abide by the AARC's Code of Ethics)
- Maintain a positive attitude and contribute to a positive environment for learning
- Maintain a cooperative learning environment by offering to help fellow students with questions or reach out to others when in need of assistance

Professional Integrity

As a respiratory therapist, your professional success will be determined in part by your professional integrity. The successful student is one who possesses effective communication skills, is self-directed and willingly participates in all aspects of the educational process. These students demonstrate great respect for themselves, their professors, and colleagues; they are honest and embrace clinical practice with ethical and moral standards. Furthermore, these students are admired by those with whom they interact for their sympathetic and empathetic standard of care in the clinical setting.
As a student, you are expected to:

- Utilize effective interpersonal communication skills
- Be self-directed and motivated in your studies and in clinic
- Demonstrate respect for yourself, the faculty and staff, and your peers
- Provide sympathetic and empathetic care

Professionalism as a Student

There are numerous opportunities available for students to develop their professionalism. These include participation in service-learning projects, health fairs, mentoring, membership in professional organizations, attendance at state and national conferences, and membership in the Madison College Respiratory Therapy Club.

Student Responsibilities

Students are expected to be familiar with Madison College policies and procedures. Many of the important policies and procedures are on the Madison College website, located at http://madisoncollege.edu/student-rights-responsibilities

Students in this program are expected to:

- Take responsibility for their own learning
- Be prepared for class and be an enthusiastic participant during class
- Treat others with tolerance and respect
- Act responsibly and reliably in group work
- Set high standards for all work

AARC statement of Ethics and Professional Conduct

In the conduct of professional activities, the Respiratory Therapist/student shall be bound by the following ethical and professional principles. Respiratory Therapists/students shall:

- Demonstrate behaviors that reflect integrity, supports objectivity, and fosters trust in the profession and its professionals.
- Seek educational opportunities to improve and maintain their professional competence and document their participation accurately.

- Perform only those procedures or functions in which they are individually competent, and which are within the scope of accepted and responsible practice.
- Respect and protect the legal and personal rights of patients they treat, including the right to privacy, informed consent, and refusal of treatment.
- Divulge no protected information regarding any patient or family unless disclosure is required for responsible performance of duty, authorized by the patient and/or family, or required by law.
- Provide care without discrimination on any basis, with respect for the rights and dignity of all individuals.
- Promote disease prevention and wellness.
- Refuse to participate in illegal or unethical acts.
- Refuse to conceal, and will report, the illegal, unethical, fraudulent, or incompetent acts of others.
- Follow sound scientific procedures and ethical principles in research.
- Comply with state or federal laws, which govern and relate to their practice.
- Avoid any form of conduct that is fraudulent or creates a conflict of interest and shall follow the principles of ethical business behavior.
- Promote health care delivery through improvement of the access, efficacy, and cost of patient care.
- Encourage and promote appropriate stewardship of resources.

Effective 12/94
Revised 12/07
Revised 07/09
Revised 05/14
Revised 05/16
Revised 11/17

Educational Leadership

Your proficiency as a respiratory therapist will also be evaluated on your educational leadership. The most successful professionals not only understand and are proficient at the "how" of the tasks in their field, but also understand the "why" behind the actions on a fundamental level. It is not enough to memorize the material presented; students must possess an understanding of the material beyond recall. Such understanding of fundamental procedures and disease processes allows a professional to make the most informed decisions and anticipate realistic outcomes and complications in patient care. Furthermore, health care professionals are expected or required to continue their education after completion of the degree program. In fact, it is now the policy of some hospitals to require continued education (RRT credential, asthma educator, etc.) for advancement. Educational leaders share their knowledge and skills with others (e.g., preceptor, serving on advisory committees, hospital committees, WSRC Board of Directors, or WSRC District representatives).

As a student, you are expected to:

- Master the presented material beyond the recall level
- Demonstrate mastery of the fundamental principles and techniques
- Familiarize yourself with current topics in professional journals (RC Journal, www.aarc.org)
- Demonstrate competency in diagnostic and/or therapeutic procedures and patient care

Academic Integrity

This is an expectation in all Madison College classes. Plagiarism, cheating, and collusion are prohibited at Madison College. Plagiarism is defined as passing of another person's work as your own. Students who fail

to observe these standards are subject to disciplinary action. Madison College has a strong policy on Academic Misconduct which is published on the Madison College website. Please refer to this page on the Madison College website to review all Academic Integrity and Misconduct policies located at http://madisoncollege.edu/academic-integrity. If you are caught cheating on any exam, quiz or assignment, a grade of "F" will be given for that exam, quiz or assignment. In addition, you will be referred to student services for discipline based on college policy. A severe or repeat occurrence may result in the student being given an F for the course, and subsequently dropped from the program.

> ***Policy Example:*** A student, for whatever reason, fails to hand in the required homework assignment before the start of class, and hands it in after class. This results in a 50% penalty. The student earns 9/10 points, but because the assignment is late, the student will receive only 4.5/10 points.
>
> ***Policy Example:*** A student misses class, and therefore doesn't hand in the assignment on time. The student then hands the assignment 2 weeks later. Since this time frame is longer than the allowed 1-week rule, the student receives 0 points for the assignment.
>
> ******Emailing an assignment to your instructor if you know you will be absent for a class will mitigate any penalties as long as the instructor receives said email before the start of class.******

Program Support and Resources

Faculty Advising

You will each be assigned a faculty advisor. This will be a member of the Respiratory Therapy faculty who will work with you over the 2 years of the program with any academic or program issues you have. We will ask that you meet with us once per semester to assure that you are on track for completion of courses and to get your perspective on the courses and program.

All faculty members are dedicated to your success in the program. We are also dedicated to the highest quality of care that patients can receive. Therefore, we want to be available to you at any time that you have questions, comments, or concerns during the time you are in the program. Many times, it is just that you need to talk to one of us about something that happened in class, or it may be specific information that you do not understand. Our doors are open, and we ask you to come and talk to us. There will be times that we have other classes or meetings, but in general, we all have an open-door policy for students. If you need more than 15 minutes to talk, you might need an appointment, but in general, we are always available to you.

Our goal for all of you is successful completion of this program. The respiratory therapy program staff is truly dedicated to your success and wants you to always feel free to contact us with any questions and concerns.

Faculty

Program Director:
Patty Montgomery, BS, RRT
Office 202 G
608-246-6698
pmontgomery@madisoncollege.edu

Director of Clinical Education:
Chris Becker, MSE, RRT
Office 202 L
608-246-6167
crbecker@madisoncollege.edu

Program Faculty:
Lauren Kante, BS, RRT
Office 202 D
608-243-4662
lkante@madisoncollege.edu

Joe Punzel, BS, RRT
Office 208 K
608-246-6703
jmpunzel@madisoncollege.edu

Amy Setchell, BS, RRT
Office 208 P
608-246-6527
setchell@madisoncollege.edu

Study Area Availability

Group study is encouraged and is beneficial to each of you being successful in the program. Students are able to use room 270 in the Health Education Building as study areas when available. Please see one of the program faculty to set up times for group study. There are also several areas in the Health Education Building that can be used as study areas.

Student Hours and Open Lab

Program Faculty take pride in being available to help students outside of regularly scheduled class times. Faculty have scheduled student hours most days and are regularly available to assist students with practicing in the open lab setting. Some faculty have online student hours in the evening. Students are encouraged to take advantage of open lab times to assure they have a firm grasp on the equipment, procedures, and concepts they are expected to know.

Helpful Hints for Success

- **Commit Yourself**
  You cannot go about learning respiratory therapy in a halfhearted fashion. In order to integrate the many concepts of cardiopulmonary sciences you must be aggressive and be devoted to your studies. This may mean spending less time with family, friends, and co-workers and more time with fellow students, faculty, and patients.
- **Ask Yourself Why**
  Whenever possible, ask yourself why something is the way that it is, or happens the way that it does. If you are unsure of the answer, ask the instructor. This method will help you remember and integrate material and increase your level of understanding. The beauty of respiratory therapy is that so much of the physiology, pathophysiology, diagnostic techniques, and treatment modalities make sense. If something does not make perfect sense to you, make every effort to see that it does. Do not

simply give in and memorize the material.

- **Take Responsibility for What You Don't Know**

  If you do not understand something, and you are like most students, you will do one of two things. You can forget about the material, attempt to learn it the day before the test when it is too late, completely botch it on the exam, and then blame the teacher for not explaining it to your satisfaction. Better yet, you can ask the teacher, preferably on the day of the lecture, about the material that you do not understand. The teacher is here to help you, so take advantage of their knowledge. You cannot and must not be afraid of asking questions. You are paying for this, so get your money's worth.

- **Focus on the Material, not on the Exam**

  In order to make your time here a rewarding and enjoyable (well, at least less stressful) experience, your goal must be to learn the material, not just pass the exams. The primary purpose of the exams is to get you to study. If you work hard and dedicate yourself to learning the material, the exams will take care of themselves. Do not continually ask, "Do we need to know this for the test?" If you familiarize yourself with everything presented in class, as well as each reference indicated by the instructor, you will do well.

- **Do Not Cram**

  If you enjoy headaches, then by all means study the material at the last minute. However, if you want to reduce stress in your life, keep up with the material!

Academic Information Disclosure Form

Students may request faculty or staff release academic information to prospective employers. Staff or faculty receiving this authorization from the student are responsible to retain it. The form will expire three years from the start date unless an earlier date is noted on the form.

Additional Opportunities

Mentoring

By becoming a mentor to your fellow students, you are helping to provide them with the skills necessary to achieve their highest potential and thus strengthening your profession and community. Mentoring can be done silently by setting an example to others, or mentoring can be hands-on through sharing proven study skills, time management, knowledge, and experience with fellow students.

Therapists often give of their time, knowledge, and expertise to the advancement of their profession by becoming clinical instructors/preceptors, unit coordinators, shift supervisors, and managers. They participate in research, and provide seminars, in services and continuing education.

Membership in Professional Organizations

Membership in the AARC is critical to ensure a united, strong voice for patient advocacy in the areas of access to services and quality patient care by appropriate health care professionals. The respiratory therapy profession has a national organization called the American Association for Respiratory Care (AARC, www.aarc.org), with an AARC State affiliate in most states. In Wisconsin, the AARC State affiliate is the Wisconsin Society for Respiratory Care (WSRC, www.wsrc.online). Since 1947, the AARC has been committed to enhancing our professionalism as respiratory care practitioners, improving our performance on the job, and helping us broaden the scope of knowledge essential to our success. Your support of the AARC and WSRC is integral to the success of the profession. By joining the AARC, you help gain access and strengthen positions and credibility with

lawmakers and administrative agencies. Each of you has the ability to both indirectly and directly strengthen the foundation of the respiratory profession by becoming a member today. The AARC is dedicated to helping you grow and develop as a respiratory care professional. They offer news, authoritative and up-to-date information, and resources, and provide life-long learning through continuing education, and career assistance. During the state and national meetings, you will have the opportunity to hear the latest research regarding the profession, be introduced to new technology and equipment, and network with other professionals from around the nation.

Membership in the Madison College RT Club

Madison College has a student run Respiratory Therapy Club, which is open to all RT program students. The goals of the club are to promote collaboration between the first- and second-year students, allow for mentoring by the second-year students and fundraise to help offset some of the conference fees. Membership is not mandatory but is a wonderful way to engage with fellow classmates in both years.

Student Employment

Several local area hospitals offer Student Respiratory Therapy positions, which can be applied for after completion of the first semester of the program. These offer excellent opportunities to earn money while furthering your knowledge. These positions are not affiliated with the Madison College Respiratory Therapy Program and are solely employment opportunities within the specific hospitals. Student jobs are a great opportunity to further your skills, but your priority must be on school. Absences from class due to student employment will not be tolerated and will be considered an unexcused absence. All the local hospitals understand this and will work with you to ensure that you are able to fully commit to being at school for all your classes. Students are not allowed to function as an employee during clinical time. Students may not engage in work activities and clinical practice simultaneously. The only exception to this policy is if a student is enrolled in an approved apprenticeship program.

Advisory Board

The program Advisory Board is an advice-giving body assisting the program in meeting the needs of the community in a manner consistent with the college mission. In this context, the committee serves in an advisory capacity to the faculty and administration to ensure the program meets the needs of the community by providing graduates who have the necessary skills and knowledge for success in the workplace.

Composition of Advisory Board:

The Advisory Board shall be comprised of representatives from area employers, community members, former graduates of the respiratory care program, current students in the respiratory care program, college administrators and faculty members who support the curriculum of the respiratory care program. (CoARC also requires a member from the general community.)

Two students from each class will be selected to serve on the program's advisory committee. These representatives will be the liaisons between the class and the advisory committee during their tenure in the program.

Additional Policies and Resources

Family Educational Rights and Privacy Act (FERPA)

It is the policy of Madison College to comply with the Family Educational Rights and Privacy Act of 1974 (FERPA), 20 U.S.C. Section 1232g. Notice is hereby given to Madison Area Technical College students as follows:

It is the intention of Madison College to fully comply with provisions of the above referenced federal law. The administrative procedures to implement compliance may be reviewed during normal business hours in the following campus location: Enrollment Center, Truax Campus.
This law permits the college to make public certain "directory" information about students. It is the intention of the college to do so, as may be appropriate to the normal course of college business and operations. The following information is regarded to be directory type, and some or all of it may be made public: student name, major field of study (program), dates of attendance (by term), enrollment status (full- or part-time), degrees and awards received, participation in officially recognized activities and sports, weight, and height of members of athletic teams and email address.

Any student objecting to his/her directory information being made public must file a Notice of Non-Disclosure with the Enrollment Center, Madison College 1701 Wright St, Madison, WI 53704. The Notice of Non-Disclosure must be filed within ten (10) days after the beginning of each semester.

Health Insurance Portability and Accountability Act (HIPAA)

The HIPAA Privacy Rule provides federal protections for personal health information held by covered entities and gives patients an array of rights with respect to that information. At the same time, the Privacy Rule is balanced so that it permits the disclosure of personal health information needed for patient care and other important purposes. The Security Rule specifies a series of administrative, physical, and technical safeguards for covered entities to use to assure the confidentiality, integrity, and availability of electronic protected health information.

HIPAA regulations apply to comments made on social networking sites, and violators are subject to the same prosecution as with other HIPAA violations. Patient privacy measures taken in any public forum apply to social networking sites as well. Online discussions of specific patients should be avoided, even if all identifying information is excluded. It is possible that someone could recognize the patient to which you are referring based upon the context and treatment information. Removal of an individual's name does not constitute proper de-identification of protected health information. Inclusion of data such as age, gender, race, diagnosis, date of evaluation, or type of treatment may still allow the reader to recognize the identity of a specific individual.

Making Higher Education Available to All

Madison College is committed to diversity and does not discriminate. We strive to grow and sustain a culture where all people are valued for who they are and who they will become. The nature of diversity includes but is not limited to gender, race, sexual orientation, ethnicity, disability, age, and religion. Each person is treated with respect, and all students are given the tools to find success.

Instructor Responsibilities

As program instructors, we commit to communicating openly and frequently with students about program classed. We will maintain a professional, safe learning environment adhering to the policies of the college. Students can expect a reply to communication, be it via e-mail, through online discussions, voicemail or in person, within 24-48 business hours.

Technical Assistance

The Student Help Desk is located in the Truax Library room A3000. Student lab assistants are available in person and by phone at (608) 243-4444; toll-free at (866) 277-4445; by email at https://madisoncollege.edu/student-computer-help to provide computer support to fellow students. These services are available Monday - Thursday: 7:30 a.m. - 9:00 p.m., Friday: 7:30 a.m. - 4:30 p.m. and Saturday: 9:00 a.m. - 1:00 p.m. In addition, students can call an after-hours help desk until 10:00 p.m. most evenings, by calling (608) 246-6666.

Brightspace

Courses have been created in Brightspace for all program classes. You can access these courses by logging in to the following page: https://learn.madisoncollege.edu/d2l/home

- Brightspace Student Support information
  You can contact Student Technology Help by calling 608-243-444 or emailing at helpdesk@d2l.com. You can also find additional assistance here: https://libguides.madisoncollege.edu/techhome

- Brightspace Outages
  Madison College does its best to keep our Brightspace classroom up and running. However, despite our best efforts, our virtual classroom may go down unexpectedly. If you cannot access our classroom, phone the Student Help Desk: (608) 243-4444; toll-free: (866) 277-4445

Disability Act Statement

Madison College complies with all provisions of the Americans with Disabilities Act and makes reasonable accommodations upon request. Please contact Disability Resources Services at (608) 246-6716 (Students who are deaf via Relay 711), room C1434 at Truax or via email at drs@madisoncollege.edu. If a student has an accommodation card from the DRS office indicating a disability which requires academic accommodations, please present it to faculty so we can discuss the accommodations that might be needed in the class. Please request these accommodations at the beginning of, if not before class a class begins, so there is ample time to make the accommodations which are within the boundaries of the Essential Functions of the Respiratory Therapy Program, as found in RT Program Handbook: https://madisoncollege.edu/academics/programs/respiratory-therapist (scroll to Resources)

Tutoring Services at Madison College

http://libguides.madisoncollege.edu/tutoring

Counseling Services at Madison College

608-246-6076
http://madisoncollege.edu/counseling

Career Resources at Madison College

608) 243-4598
https://madisoncollege.edu/student- experience/services/career

Student Writing Center Assistance

(608)243-4289
https://madisoncollege.edu/writing-center

Syllabus Changes

As course instructors, we retain the right to make changes in the syllabus based on the timeline of the class, feedback from learners and/or logistical issues and will inform students when a change is made.

Student Email

Madison College offers a student e-mail account for all students. Each student is responsible for monitoring their student e-mail account. Student e-mail can be accessed at:
http://madisoncollege.edu/email

AARC Statement on Cultural Diversity and Inclusion

The AARC professional community embraces diversity and multi-culturalism in all its forms and promotes respect, cultural competence, and inclusion in every facet of its mission.

The AARC is enriched by the unique differences found among its diverse members, their patients/ clients, and other stakeholders. The AARC values and embraces equal opportunity and promotes the use of personal and cultural backgrounds to enhance our profession. The AARC accomplishes this by:

- Demonstrating sensitivity to all forms of diversity and multiculturalism including, but not limited to age, gender and gender identity, race, color and ethnicity, nationality and national origin, ancestry, religious affiliation and creed, sexual orientation, socioeconomic status, political affiliation, physical and mental abilities, veteran and active armed service status, job responsibilities and experience, education and training.
- Acknowledging the varied beliefs, attitudes, behaviors, and customs of the people that constitute its communities of interest, thereby creating a diverse, multicultural, and inclusive professional environment.
- Promoting an appreciation for communication between, and understanding among, people with different beliefs and backgrounds.
- Accommodating the needs of the physically disabled at events and activities.
- Using multicultural content and gender-neutral references in documents and publications.
- Promoting diversity and inclusion through education and cultural competence in its education programs.
- Actively recruiting candidates from under-represented groups for leadership and mentoring programs.

Effective 12/94
Revised 12/07, 04/13
Reaffirmed 07/10
Revised 07/18

Equity and Inclusion Statement

The Respiratory Therapy Program will be a safe and affirming learning space for all students, regardless of age, race, ethnicity, citizen status, gender, sex, sexual orientation, parental status, religion, ability, or socioeconomic status. As instructors, we pledge to respect all students based upon these factors, including the use of preferred names and pronouns, and encourage open communication. Students are welcome and encouraged to share any/all viewpoints relevant to course material, and respectful, relevant debate is encouraged, provided all materials for the day can still be covered.

Gender Inclusion Statement

The instructors and students in program courses are expected to respect others' identities, names, and pronouns. We will gladly honor your request to address you by your chosen name or gender pronoun. Please advise us of this at any point in the semester so that we may make appropriate changes to my records. If you would like to change your name with the college, do so via the form found at Student Records are corrected after making a mistake or misgendering another student, briefly apologize, correct yourself, and move on. If you feel your identities are not being respected, including by your instructors, we invite you to reach out about the issue, in whatever manner makes you comfortable so that we can make every effort to correct the error. If you do not feel comfortable doing so, consider reaching out to other resources like the Office of College Culture and Climate, Dean of Students Office, or Equal Opportunity and Civil Rights.

Madison College is a Safe Space for All

Madison College is committed to providing a safe space for all students, employees, and staff. Negative attitudes and fear during the COVID-19 pandemic can lead to discrimination against people and communities. Prejudiced behavior violates our values and our policies and should be reported. If you experience or observe harassment or discrimination, Madison College's Harassment and Discrimination Policy outlines the procedure for filing a complaint. Madison College does not tolerate discrimination of any type. We strive to provide an educational environment free from harassment.

Conflict Management Process

If you feel you have been treated unfairly, you should follow the procedures provided by Madison College on the website under Students Rights & Responsibilities – link: https://students.madisoncollege.edu/academic-integrity You MUST follow these procedures to assure fair treatment.

Students with Disabilities (ADA Statement) and Title IX Pregnancy and Parenting Requirements

Madison College is committed to creating conditions that empower and support students with disabilities to reach their learning goals. The College ensures equal access to all academic programs and activities by offering qualified students reasonable accommodations and support.

To receive consideration for reasonable accommodations for your disability, you must contact the Disability Resource Services. If approved for accommodations, Disability Resource Services will provide you with an accommodation plan. Students with questions regarding available accommodations and support should contact Disability Resource Services at 608-246-6716 or email drstransition@madisoncollege.edu (link sends e-mail). If approved for accommodations, please share your accommodation plan with faculty as early as possible. If you feel your accommodation needs are not being met, please inform faculty or Disability Resource Services as soon as possible.

Students must be allowed to take time off school for pregnancy, childbirth, miscarriage, abortion, and recovery for as long as their doctor says is medically necessary. Students with pregnancy-related conditions should submit the Student Pregnancy Accommodation Request form or contact Disability Resource Services at 608.246.6716 or drstransition@madisoncollege.edu to make a request for accommodations.

For the protection of the student and her unborn child, any student who is pregnant upon entry into the program or becomes pregnant during her time in the program is required to obtain a 'safe practice' note from their physician indicating what is/is not acceptable for the student during the pregnancy. This is especially important in the clinical setting. The documentation must be updated EACH semester and as deemed necessary.

The pregnant student is required to meet all class and course objectives the same as other students in her class.

Mental Health Support

As a student you may experience a range of issues that can cause barriers to learning. These might include strained relationships, anxiety, high levels of stress, alcohol/drug concerns, feeling down, or loss of motivation. Learn about the free, confidential mental health services available on campus by calling 608-246-6076 or visiting https://students.madisoncollege.edu/counseling. For afterhours mental health emergencies, please call the National Suicide Prevention Hotline at 1-800-273-TALK, 911, Madison College Public Safety 608-243-2222, the Center for Suicide Awareness – text the word "Connect" to 741741, and for Dane County residents, Journey Mental Health Crisis Unit 608-280-2600.

Virtual Counseling with BetterMynd

Madison College is partnered with BetterMynd to offer you access to private online therapy sessions from their diverse network of licensed mental health counselors. Sessions are available during the day, at night, and on the weekends. Please note, BetterMynd is not a crisis service. BetterMynd also provides free self-help resources and free group workshops to all Madison College students.

Additional Program-Related Costs to Students

Required	**Approximate Costs**
My Clinical Exchange UW subscription	$35 - $70
Castle Branch account/background check	$68
Drug Screening for certain clinical sites	$37
Scrubs	$50 - $200
Stethoscope	$50 - $200
Conference fees	$100 - $300
NRP exam fee	$45
Hospital ID Badges	$22
State of Wisconsin Licensure fee	$150
Strongly Suggested Profession-Related Fees	
AARC student membership	$25 per year

Clinical

Madison College Respiratory Therapy Program

Welcome to the clinical learning component of the Madison College Respiratory Therapy Program!

This is where you will put all of the skills and knowledge learned in the classroom and RT Lab into practice. There are 5 Respiratory Clinical courses to complete in which you will learn clinical skills, gain experience, and hone your clinical practice abilities. On this journey, every program student will rotate through every one of our main clinical hospital affiliates here in Madison. There will also be 1 day "specialty" rotations at various other facilities where students will experience the other facets of respiratory therapy that may not be seen in our larger Madison hospitals. To help you with this journey, the RT Faculty has put together this Clinical Practice Manual to help guide you.

Within this Clinical Practice Manual, you will find all of the information you will need about each of the 5 clinical courses, the 29 clinical skills each student is required to become competent in, and other important information such as course descriptions, grading rubrics, the Dress Code, etc. The faculty highly recommends that each student bring this Clinical Practice Manual to the hospital each and every clinical day. You will find it's a very useful tool in helping you to navigate through all 5 of your clinical courses. If you have any other questions that this manual doesn't answer, please contact one of the program's full-time faculty at the contact information below.

Primary Faculty Contact Information, Including Phone Numbers For Clinical Affiliates:

Instructor Email@madisoncollege.edu	Office	Office Phone	Hospital Affiliate	RT Dept Phone
Patty Montgomery (PD) pmontgomery@madisoncollege.edu	202G	(608) 246-6698	UPH-Meriter	(608) 417-7467
Chris Becker (DCE) crbecker@madisoncolege.edu	202L	(608) 246-6167	Select Specialty	(608) 260-3245
Lauren Kante lkante@madisoncollege.edu	202D	(608) 243-4662	SSM-St. Mary's	(608) 220-8028
Amy Setchell setchell@madisoncollege.edu	208P	(608) 246-6527	VA Hospital	(608) 256-1901 ext. 17549
Joe Punzel jmpunzel@madisoncollege.edu	208K	(608) 246-6703	UW Health Hospitals	Adult: (608) 576-8179 AFCH: (608) 575-0094

Adjunct Clinical Faculty

American Family Children's Hospital: ***Carolyn Adams & Tori Talg***
UW Health Hospital & Clinics: ***Brian Amundson & Jason Noel***
Mercyhealth Hospital and Trauma Center-Janesville: ***Afton Workman-Ralph***
UnityPoint Health-Meriter: ***Jessica Kramer, Jen Turner & Marina Younger***
SSM Health St. Mary's-Madison: ***Jason Leiber, Tammy Kundinger***
Select Specialty Hospital-Madison: ***Lisa Drouin & Jen Turner***

This program would not be possible without the dedication and hard work of these awesome RT's!!!

Clinical Affiliates

Select Specialty Hospital (Madison)
Unity Point Health - Meriter Hospital (Madison)
UW Health Hospital and Clinics (Madison)
The American Family Children's Hospital (Madison)
St. Mary's Hospital (Madison)
VA Hospital (Madison)
Mercy Hospital (Janesville)

In addition, some clinical experience may be provided at

UW Health East Madison Hospital (EMH)
Central Wisconsin Center (Madison)
Multiple Rural Hospitals in the surrounding area
Madison College Simulation Hospital (Madison)

Clinical Course Description

The 5 Respiratory Clinical courses make up a full year of clinical practice. The clinical orientation will provide you with knowledge for safe clinical environment, including PPE and environmental hazards and patient safety. During clinical hours, you will not be substituted for clinical, instructional, or administrative staff. In no incident will students be paid for their clinical time or gain the responsibility of the clinical instructor.

Respiratory Clinical 1-4 courses will start after the second semester of the program. These clinical rotations are 8-hour day shifts that take place on Tuesdays and Thursdays, and you will rotate throughout the various hospitals in the Madison area. Each hospital will have one of our full-time faculty assigned to it to act as a primary instructor, who will also coordinate the instruction provided by the part-time clinical instructors. At all times that students are in clinical rotations, there will be a Madison College employed faculty member (full or part-time) responsible for the students. The instructor's responsibilities include coordinating student activities, providing direct student instruction and supervision, and completing student evaluations of performance (through skills testing on respiratory care procedures, as well as with daily and rotational clinical performance evaluations). You may occasionally be assigned to other staff therapists to watch an interesting therapy that they may be performing. However, the faculty will always perform all your clinical competency testing. Students working with patients in the clinical setting will always be working under the State of WI RT license of their instructor or any hospital staff that is working in a preceptor role.

Strategy for Success

Before the start of the program, each student should come up with a Plan B and Plan C for those situations that may prevent you from attending your required clinical rotations. Some examples would be back-up childcare arrangements if your day care were to close, or a back-up ride to clinical if your car were to need repair.

Respiratory Clinical 1 begins mid-May and will be 6 weeks long. The student will utilize the same hospital for the entirety of Clinical 1. This course will introduce you to many assessment skills and teach you how to apply several forms of routine oxygen and aerosol therapy.

Respiratory Clinical 2 will begin in the fall semester in your second year and will be 8 weeks long. You will continue with an emphasis on the routine forms of oxygen and aerosol therapy and add hyperinflation therapies, mucous clearance techniques and non-invasive forms of ventilation.

Respiratory Clinical 3 will begin in the second half of the fall semester and will be 8 weeks long. This rotation will focus on developing knowledge and skills in intensive/critical care units. While students are entering into intensive respiratory care, they will be studying specific mechanical ventilation and will be able to apply learned concepts in the clinical arena.

Respiratory Clinical 4 will take place during the spring semester in the second year and will be 8 weeks long. This rotation will consist of general intensive care rotations. Each student must complete their entire clinical competency testing requirements before the end of Respiratory Clinical 4 in order to enter Respiratory Clinical 5. All the Program's didactic courses in the 4th semester will finish by the 8th week. After that point, you will only have the Internship phase of Respiratory Clinical 5 to complete. At the beginning of the Internship phase, students must complete the following required advanced certifications and pass the TMC SAE per clinical course requirements.

- Advanced Cardiac Life Support (ACLS) certification
- Neonatal Resuscitation Program (NRP) certification
- Pediatric Advanced Life Support (PALS) certification (if available)
- National Board for Respiratory Care TMC SAE (Therapist Multiple Choice Self-Assessment Exam) at the national pass rate of 62% (the Certified Respiratory Therapist, or CRT, level)

Respiratory Clinical 5 Internship takes place during the final six weeks of the program. During Clinical 5, we primarily use Madison - area hospitals to provide clinical internships for each student, during which time you will be working under direct supervision of a hospital therapist and not program faculty. Students will spend 32-36 hours per week in a critical care unit. Typically, this is split between 3 weeks in an Adult Intensive Care Unit and 3 weeks in a Neonatal/Pediatric Intensive Care Unit. During this time, students will perfect their knowledge and technical skills, as well as learn how to manage their time effectively with heavier patient workloads so that upon completion of the program, students are well prepared to handle a typical workload for a new graduate.

Students working with patients in the clinical setting will always be working under the State of WI RT License of their instructor or any hospital staff that is working in a preceptor role. Students must always respect this arrangement. Some preceptors will not be as willing to let students do all therapies, while other preceptors will. This is understandable and reasonable given that students are working under each preceptor's license. The student may perform no invasive procedures, specifically arterial punctures and changing of ventilator parameters (except for FiO2) unless in the immediate presence of a State of WI licensed RCP (Respiratory Care Practitioner). The student shall not leave early on ANY shift during the Internship portion of Clinical Practice 5, despite the staff offering this as being permissible. This does not pertain to illness or prior arrangements. Students are responsible for making sure that their preceptors

complete the daily evaluation after each assigned internship day.

- As a reminder, students may not perform any invasive procedures, specifically arterial punctures, unless in the immediate presence of a State of WI licensed RCP (Respiratory Care Practitioner).
- Additionally, students may not change any ventilator parameters, with the exception of FiO2, unless in the immediate presence of a State of WI licensed RCP.
- **Finally, students shall not leave early on ANY shift during the Internship portion of Respiratory Clinical 5, even if the RT staff offers this as being permissible.** It is not permissible, as students have a minimum number of clinical hours that they need to complete. This does not pertain to illness or prior arrangements, such as job interviews.

NRP

All students are required to obtain the Neonatal Resuscitation Program (NRP) certification in preparation for Internship rotations in the NICU/PICU areas. Student failure in the Neonatal Resuscitation Program, and therefore failure to earn the NRP credential, may preclude the student from their NICU or PICU rotation during the Internship part of the RT Program, at the discretion of the faculty. The student would instead be allowed to complete all 6 weeks of the Internship in Adult ICU's.

Clinical Discussion

This portion of your clinical experience in the second year of the program is designed in part to help integrate what you have learned previously or are learning currently with your current clinical practice. This portion of the clinical course is 2 hours per week. It is a board exam review course, including units on such topics as ECG, Chest X-Ray Interpretation, Arterial Blood Gas and Acid-Base Balance Review, Infection Control, Fluid and Electrolytes, as well as self-guided equipment, physiology, and pathophysiology reviews. We will also use this time to prepare you for the mock board exams that you will take during Respiratory Clinical 4 and 5. All quizzes or tests covering such material will be given during this portion of the course and will account for 50% of your Respiratory Clinical 1 – 5 grades. If you are unable to attend the Clinical Discussion class that meets on Friday mornings, you must contact the instructor before the start of the class. Failure to do so may result in your not being allowed to take exams/quizzes being given on that day. Exams/quizzes/assignments that are missed and allowed to be made up must be arranged for make-up within one week of the original quiz date. Missing any assignment, quiz or exam will result in only being able to make it up for 50% of the original points available according to the RT Program Policy on Grading. This policy is posted on Blackboard, in course syllabi for every RT Course, as well as in the RT Program Handbook. Cell phones and smart watches are not allowed to be used during testing. This is considered academic misconduct.

Total Respiratory Clinical 1-5 Credits: 14

Course Format: Face to face in the clinical environment. Occasionally human patient simulator adjuncts are used to supplement clinical practice.

Pre-Clinical Requirements

CastleBranch

Once admitted to the Respiratory Therapy Program all students must purchase an account from Castle Branch. This account will cost you $68 and is a onetime fee. This is where your criminal background check, immunization record, drug screening and related documents will be housed during the program. The account must be purchased before the program's orientation day in August. You will be informed of the date once you are admitted to the program.

To purchase your account, click on the following link, open the + sign that says Please Select, choose Respiratory Therapy and select <MG89: I need to order a Background Check and Medical Document Manager>. https://portal.castlebranch.com/MJ23/package-selection

The clinical affiliates we use as part of the program have several requirements that you must follow in order to be allowed in their facilities. Below is an overview of what is required. All this information will be kept in your Castle Branch account and is your responsibility for maintaining. Failure to stay up to date with any of the standards will result in removal from any clinical rotation and the chance of dismissal from the program.

Caregiver Background Check

Automatically done when you purchase a Castle Branch account. Good for the length of the program. Must be completed by the program orientation day. Refer to the course catalog for this WI Department of Health Services Policy, or click the link: https://www.dhs.wisconsin.gov/caregiver/cbcprocess.htm

****** If at any time a student has been involved in an event that would change their CBC (Caregiver Background Check) status, they must immediately report the details of the event to the Program Director. This is a School of Health Education policy. Failure to disclose any CBC changes will result in immediate termination from the program.******

Vaccination and Health Requirements

- **Tuberculosis Screening -** One of the following is required:
  - A 2-step skin test (1-3 weeks apart). This requires a minimum of four doctor visits; dates placed, dates read, and results must be documented.
  - Three consecutive annual test results; with no more than 12 months between tests and most recent test within the past 12 months*.
  - QuantiFERON or T-SPOT.TB test results reflecting negative TB status.
  - In the case of positive TB test results, a negative (clear) chest x-ray must be provided.

    If a student should test positive via TB skin test and has an abnormal chest x-ray confirming active TB, the student will be immediately removed from the program until such a time as the student can prove they no longer have active TB. To return to the program, a letter from the student's physician confirming lack of active TB will be necessary. The student may then reenter the program via the Reentry Policy. TB testing is an annual requirement, and it is the students' responsibility to keep in compliance with this requirement, which includes having the test done and uploading the results to Castle Branch.
- **MMR (measles, mumps, and rubella) -** One of the following is required:
  - Two vaccination dates, a minimum of 28 days apart.

- A positive titer lab report for Measles, Mumps, and Rubella. NOTE: If the titer is negative or equivocal, you must document two MMR vaccinations.

- **Varicella (Chicken Pox) Vaccine -** One of the following is required:
  - Two vaccination dates, a minimum of 4 weeks apart.
  - A positive titer lab report. NOTE: If the titer is negative or equivocal, you must document two vaccinations.
- **Hepatitis B Vaccine -** One of the following is required:
  - Documentation of three vaccinations.
  - A positive titer lab result. NOTE: if the titer is negative or equivocal, you must complete and document a three-dose vaccine series.
  - Note the three-shot series only needs to be started to be in compliance. It does not need to be completed before the start of clinical rotations.
- **Tetanus/Diphtheria/Pertussis (TDaP) or Tetanus/Diphtheria**
  - TDaP or TD booster within the past 10 years.
- **Influenza (Flu) Vaccine (Seasonal) Required**
  - A flu shot administered during the current flu season. The renewal will be set for the start of the next flu season.
  - Flu Shots are an annual requirement, and it is the students' responsibility to keep in compliance with this requirement, which includes receiving the shot and uploading the proof to Castle Branch.
  - If a student declines required vaccinations, faculty will address it at that time.

Current CPR Card (BLS for healthcare providers)

All students must have a current healthcare provider BLS card during their entire time in the Respiratory Therapy Program. CPR cards are good for 2 years from the time the class was taken. It is the students' responsibility to find a healthcare provider BLS course and upload the card to Castle Branch before Oct. 1st of the year in which you start the program.

Physical exam and completed Health History Form

Must be on file in Castle Branch. The TB test and all vaccinations, including the annual flu shot and Covid shots and boosters, must be completed and kept up to date on Castle Branch. ***If it isn't on Castle Branch, then it is not done!***

Signed agreement and compliance with **Essential Functions** for the Respiratory Therapy Program. These can be found in the RT Program handbook.

Drug Screen

Students ***are required*** to undergo drug screening by our clinical affiliates. This can be done through Castle Branch. Students will be notified prior to the start of the clinical course in order to complete this requirement. The student is responsible for any costs associated with processing and evaluation of the drug screen. Any student who refuses or fails a required drug screen or has a positive drug screen result without appropriate physician documentation may result in the student not being able to complete the required clinical hours mandated by our accrediting body, the CoARC. A deficiency in clinical hours would result in the student not being able to complete the program. Currently, both Select Specialty Hospital and SSM Health St. Mary's Hospital require that every student pass a drug screen.

Evidence of Current Health Insurance

Students are required to have current health insurance in order to enter our clinical affiliates. If a student does not have health insurance, Madison College offers coverage for students for minimal cost each semester. Information can be found at the following link: https://madisoncollege.edu/academics/areas-of-study/health-sciences/health-education-policies

Additional Training Requirements

The following training requirements must be completed before a student will be allowed to perform any patient care at any of the program hospital affiliates:

- **UW Health** Epic training is provided by at one of their training centers, and must be completed before going to UWHC or any other UW hospitals, such as AFCH. A photo ID is also required with a non-refundable $12 fee. This ID must be returned to the hospital at the end of the program.
- **SSM Health** St. Mary's Hospital will be giving students a link to their E-Learning website to train on the use of their Epic system. This can be done from any computer at any time. It is estimated that it will take you approximately 90 minutes to complete. ID badges are now required. SSM Health requires that every student pass a drug screen.
- **UnityPoint Health - Meriter Hospital** will provide students their Epic training, usually on the first clinical day there. Students will also need to purchase a Meriter ID badge for $10, which will be used throughout the second year of the program. At the end of the program, students can return the ID badge at Guest Services for a $10 refund.
- **VA Hospital** onboarding and training is extensive. Students will be notified regarding this by the instructor. Students are required to be fingerprinted and will receive a picture ID.
- **Select Specialty Hospital** has both online and in-hospital training which must be completed before students are allowed on the patient floors. This training can take 3 – 5 hours.
- **Mercyhealth Janesville** has minimal requirements aside from the Castle Branch requirements at this time.

****** All clinical requirements must be entirely completed and uploaded to Castle Branch no later than April 1st. This is a hard deadline and there will be no exceptions. Failure to meet the April 1st deadline will prevent the student from taking Respiratory Clinical 1. Furthermore, students must keep all requirements up to date for the rest of the program. Failure to keep requirements up to date in Castle Branch will result in the student not being allowed to attend all or part of Respiratory Clinical 2-5 courses, which could result in grade drops or even the student being given a grade of an F due to the resulting lack of attendance. This, in turn, would prevent the student from being able to continue in the program.******

Faculty is not responsible for making sure that each students clinical requirements are completed on time and then kept up to date. All of our clinical affiliates require these items to be done before you may step into their hospitals.

Clinical Course Policies

Student Clinical Experience

To ensure that each student has equivalent clinical learning experiences, all students must complete rotations at all of our affiliated hospitals, which includes:

American Family Children's Hospital
Select Specialty Hospital
UW Hospital and Clinics
UnityPoint Health-Meriter Hospital
SSM Health St. Mary's Hospital-Madison
Mercyhealth Hospital and Trauma Center in Janesville
(Madison VA Hospital is used periodically)

This ensures that each of our program students has received comparable experiences of clinical education as required by the Commission on Accreditation for Respiratory Care (CoARC), the accreditation agency for all respiratory care practitioner programs in the United States. The relevant CoARC standard on Equivalency 4.09 states:

Equivalency, Standard 4.09
The program must ensure that course content, learning experiences (didactic, laboratory, and clinical), and access to learning materials are equivalent for each student regardless of where that experience was acquired.

Evidence of Compliance

- Documentation that students at various program locations have access to similar course materials, laboratory equipment and supplies, and academic support services;
- Documentation that student exposure to clinical experiences is equivalent regardless of the clinical locations attended.
- Results of CoARC Student-Program Resource Surveys;
- Results of student evaluation of the clinical sites and preceptors;
- Program action plan and follow-up when results of these evaluations warrant intervention;
- Results of student clinical course evaluations;
- Evidence of procedures to ensure inter-rater reliability for clinical experiences.

Clinical Dress Code

- HUNTER GREEN scrub pants and top the top must also completely coveryour abdomen when you are reaching over your head
- White or solid-colored T shirt (plain-no writing or images) with no longer than ¾ length sleeves may be worn underneath for warmth
- Full and comfortable rubber soled shoes (no sandals, clogs, or open-toed shoes)
- Madison College issued nametag should be displayed on your uniform. Additional identification may be required by hospitals at your cost.
- Stethoscope, watch with a second hand (optional, as some hospitals no longer allow any jewelry on the hands and wrists due to infection control concerns) and small hand-held calculator

Note on Personal Hygiene

- Your uniform must be clean and well ironed.
- Long hair must be tied back. Long bangs must be secured with a clip to not interfere with your vision.
- Hair color should be professional in nature. This is the UW Health policy: "Hair should be clean and professional in appearance. Unless prohibited by departmental policy, working conditions, or directives, non-traditional hair color may be allowed if vibrant hair color doesn't cause a distraction for patients and their families. Leaders with advanced notice may require natural hair color for certain meetings or events."
- Do NOT wear any perfumes, colognes, or fragrances due to patient allergies/sensitivities. Underarm deodorant is required.
- No jewelry will be allowed that dangles from the ears/face/neck or that could place a student at risk of infection resulting from splatters of blood or body fluids. Small (1/2 inch) hoops or stud earrings will be allowed.
- Facial piercings must be removed during clinical rotations.
- Artificial nails are forbidden due to their propensity to harbor bacteria.
- Students must be in full uniform at the time the clinical rotation is to begin. If dress is not acceptable, the instructor will send the student home, and they may not return until the appropriate uniform is worn. This will result in the loss of clinical hours, which may cause your grade to drop.

****** Students must be in full uniform (this includes OneCard and ID badge) and with acceptable hygiene at the time the clinical rotation is scheduled to begin. If dress is not acceptable, the clinical instructor will send the student home and they may not return until the appropriate uniform is worn. This will result in the loss of clinical hours, which may result in a grade drop in the clinical course. ******

Disruptive Behavior

Disruptive behavior will not be tolerated. Any pattern of behavior which disrupts the clinical education of any student, including chronic tardiness or absenteeism, may lead to a grade of F for the clinical course, which will result in the student not being able to continue in the program.

Clinical Policy for Poor Student Performance

If a student is performing in clinical at a level of competency below what is expected, the Madison College instructor will discuss apparent deficiencies with the student. The student will be informed about what clinical skills must be retested and will set a date for completion. The student must obtain 100% on the retested skills as well as all other clinical objectives in order to successfully complete any clinical course. A student will only have three chances to successfully complete a skill. Failure to be successful may result in a grade of F, and the student may be unable to continue in the program. If the Madison College instructor believes that the student will not satisfactorily complete clinical within the clinical time available, the instructor will, along with the Director of Clinical Education and Program Director, meet with the student. The deficiencies will again be discussed and a plan for correcting the deficiencies will be written and implemented. The student and instructors will sign the written plan and a date for correcting the deficiencies will be decided upon by the instructors. If the student has not corrected the deficiencies within the stated period, the student and the RT Program instructors involved will meet with the Dean of the School of Health Sciences (SoHS) and discuss the situation. It will be decided at this meeting whether the student will be allowed to continue with the clinical course.

During Respiratory Clinical 1, 2, 3 & 4 the student must complete all objectives as specified in the clinical manual at 100% proficiency prior to moving on to the subsequent clinical course. The student must also achieve an

average passing score of C (≥ 75%) on clinical evaluations, as well as in the clinical discussion course. A student receiving two clinical performance evaluations with scores below a passing level may be removed from the clinical course.

During Respiratory Clinical 5, the student must have an average passing score on evaluations and, most critically, must be able to efficiently manage the defined (See Internship Clinical Objectives) patient care load in their adult care rotation and their neonatal/pediatric care rotation. Furthermore, failure to be able to manage the defined patient care load safely and efficiently will result in removal from the clinical course.

Removal from or extension of any clinical course requires that the student meet with the clinical instructor(s) involved, Director of Clinical Education, Program Director and SoHS Dean prior to reentry, during which time a written agreement will be drawn up and signed by all.

It is imperative that you act professionally and abide by the Code of Ethics adopted by the American Association for Respiratory Care (see page 20). These ethical principles are designed to safeguard the public and contribute to the provision of quality and efficient respiratory care. If a student's performance at any time endangers the life of a patient, the student may be dropped from that clinical practice course and terminated from the program.

Students are not allowed to attend a clinical day if they have worked a night shift at their job immediately before the clinical day. This is a patient safety issue and is against program policy. Please make arrangements well ahead of time if you are currently a night shift worker. There will be no exceptions to this policy.

Professionalism in the Clinical Setting

Students are encouraged to have respectful conversations, setting a positive tone; this includes active listening and appreciating diverse perspectives.

In a professional setting, avoid discussing sensitive topics such as religion and politics, as they can lead to controversy and discomfort among colleagues. These types of conversations are not acceptable in the clinical setting. If someone tries to involve you in these conversations, change the subject by directing the conversation to a more neutral or work-related topic. Keep the focus on patient care and learning.

Foster an environment where everyone feels valued and respected, regardless of their beliefs or background. Demonstrate professionalism and respect in all your interactions, as others may follow your lead.

As a student, you are a guest at all clinical sites, and we deeply value the partnerships we have with these healthcare organizations. It's important to honor the agreements in place and respect their policies during your time there. Think of this experience as an opportunity to make a positive impression—it's like a "job interview." By maintaining professionalism at all times, you can set yourself up for future success in your career.

Ethical Practices

- Smoking and substance abuse. As a future Respiratory Therapist, it is not acceptable for any student to leave clinical at any point to go outside of our hospitals to smoke. We, as the faculty of this program, are in complete agreement that smoking is not acceptable due to patient sensitivities to odors and

chemicals. We also feel that smoking reflects poorly on our profession. Much like perfumes or colognes, residual smoke on a uniform can be offensive to patients, visitors and fellow health care professionals. To extend this concern further, a student cannot practice in our profession while under the influence of alcohol, drugs or any substance that impairs judgment including prescription drugs. A student suspected to be under the influence of drugs or alcohol in the clinical setting may be required to be drug-tested by the facility. A positive result will result in immediate removal of the student from the program. Any student failing to abide by any of these requirements will be removed from clinical on that day. A meeting with the college's Conflict Management team will be required, which could result in removal from the course and/or program.

- HIPAA. The HIPAA Privacy Rule provides federal protections for personal health information held by covered entities and gives patients an array of rights with respect to that information. At the same time, the Privacy Rule is balanced so that it permits the disclosure of personal health information needed for patient care and other important purposes. The Security Rule specifies a series of administrative, physical, and technical safeguards for covered entities to use to assure the confidentiality, integrity, and availability of electronic protected health information.
- It is unethical for any student to be checked off on a clinical skill by anyone other than the Full and Part Time Faculty of the RT Program. Students employed in Student RT or RT Assistant positions are forbidden from being checked off on any skills while being paid on the job by anyone, including any faculty.
- Unethical behavior/gross misconduct or other serious nonconformance may result in immediate termination from the program.

*****Any student failing to abide by these requirements and policies will be removed from clinical on that day. You will be required to meet with the college's Behavioral Intervention Team (BIT), which could result in removal from the course and/or program. Furthermore, any Unethical Behavior/Gross Misconduct or other serious nonconformance with Program or SoHS policies may result in immediate termination from the program.*****

In summary, withdrawals from clinical may occur for any of the following reasons:

1. Endangering any patient's life
2. HIPAA incident/violation
3. Two performance evaluations with a score less than passing (< 2.0 or < 75%).
4. A final performance evaluation, in any clinical course, with a score less than passing.
5. Code of Conduct violation/Unethical behavior.
6. Behavioral and disruptive issues
7. Failure to meet clinical and Madison College attendance policies.
8. Conviction of a Felony
9. Reporting to a clinical site under the influence of drugs or alcohol

Dismissal from the Program with no re-entry opportunity may occur for any of the following reasons:

1. Receiving a less than passing grade of C (< 75%) in 2 core courses in a given semester
2. Code of Conduct violation/Unethical Behavior
3. Reoccurring behavioral and disruptive issues
4. Failure to maintain compliance with Essential Functions
5. HIPAA violation
6. Endangering any patient's life

*****All terminations must be reviewed and approved by the Dean, DCE, and Program Director.*****

Program Organization Related to Clinical Practice

Students should follow this order of communication when dealing with clinically related concerns:

- First contact: Clinical instructor at affiliate at which complaint occurs.
- Second contact: Director of Clinical Education – Chris Becker
- Third contact: Program Director – Patty Montgomery
- Last contact: Dean of School of Health Sciences – Marissa Tokarczyk

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Clinical Attendance Policy

Attendance at every clinical day is essential for the success of each student. Therefore, we have very strict rules regarding attendance and tardiness that are outlined below. Good work ethics begin by being on time and ready to work for each and every clinical day. This includes arriving in appropriate uniform (including display of OneCard and ID badge), as well as with a stethoscope, calculator, clinical manual, and review books. Our hospital affiliates are unpaid providers of your clinical experiences. Therapists arrange their patient care workloads to provide you with optimal experience in our field. Your absence or tardiness without notice places unnecessary strain on therapists. It is also very unprofessional behavior that will be noticed by hospital staff! Any "no call-no show" incidents are considered to be very unprofessional behavior that is sure to be noticed by hospital staff. Any occurrence of a "no call-no show" incident requires a meeting with appropriate faculty and the Director of Clinical Education.

Attendance Policy for Respiratory Clinical 1

Since this class is only 12 days in length, with only 11 clinical days, and since you will learn the foundations of patient care for the rest of the clinical practice courses in this class, the following attendance policy is in effect for Respiratory Clinical 1:

- The orientation day on Day 1 of the course is ***REQUIRED*** in order for a student to move on to the hospital orientation day. ***Missing the Day 1 orientation will result in the student being dropped from the course.***
- Students are highly discouraged from missing the hospital orientation on Day 2 of this course and may be dropped from the course if not in attendance. Instructors do not have time to orient students to the hospital in subsequent clinical days, and this is also unfair to the other students.

• It is each student's responsibility to arrive at the proper clinical site each day. Failure to do so, even if the student is "on time", will count as a 4-hour absence and be added to the Clinical Days Missed for the semester. Students who show up to the wrong clinical site will be redirected to the proper site, if possible.

Absences:

- Missing one 8-hour day of Clinical 1 will result in a 1 letter grade drop, regardless of the reason.
- Missing a second 8-hour day will result in the student being dropped from the program, regardless of the reason.
- Missing 2 full clinical days out of the 11 days in the hospital is missing almost 20% of the course. This is unacceptable and not safe for our patients.
- Any occurrence of a "No call – No show", where the student is absent and never calls in to inform the instructor, is grounds for being dropped from the program.

Policy Example: Student A was receiving a BC in Respiratory Clinical 1, and had already missed one day of clinical, which brought his grade down 1 letter to a C. Student A then missed his flight back to Madison on a long weekend getaway and consequently missed another clinical day. This absence brought his final grade down 1 more letter, from a C to a D. Since a grade of D is not passing for the course, Student A was unable to continue in the RT Program.

Tardiness:

• Tardiness can be very disruptive at the start of a clinical shift, and therefore, will not be tolerated. Tardiness means being even 1 minute late for the start of clinical! Instructors pick a patient load based on the number of students they have for a given day. If you aren't on time, and don't notify the instructor, they won't take any patients for you. They may also leave the RT Department very promptly at the start of a shift, which will make it very difficult for you to find your clinical group, especially in the larger hospitals.

- For the 1st Tardy the student:
  * will receive a warning if the student informs their instructor before the start of the shift.
  * will incur a 1 letter grade drop if the student didn't inform their instructor before the start of the shift.
- A 2nd Tardy will result in a 1 letter grade drop, or an additional letter grade drop if the instructor wasn't informed, regardless of the reason. The faculty considers this to be chronic tardiness, which will not be tolerated!
- A 3rd Tardy may result in the student being dropped from the program.
- Extenuating circumstances may be taken into account by the faculty.

Attendance Policy for Respiratory Clinical 2-5

1. Each student will be allowed one (1) eight-hour excused absence ***per semester***. To clarify, students will be allowed 1 eight-hour excused absence during each of the 3 semesters of clinical courses. Any absence(s) above the 1 eight-hour allowed absence will result in your grade dropping by 1 letter grade in the current clinical course for each additional eight-hour absence. These absences are carried over to the next clinical course during the semester in which they occur. So, absences (and tardies) occurring in Respiratory Clinical 2 will be carried over to Respiratory Clinical 3 and absences (and tardies) occurring in Respiratory Clinical 4 will be carried over to Respiratory Clinical 5. We are unable to provide opportunities for students to make up missed clinical time due to the

considerable expense that would be incurred by the hiring of additional faculty that would be needed to monitor individual students while they make up their missed clinical time. There may be other alternatives available to make up some clinical hours. If you are ill and have a physician's note excusing you from clinical, you may not incur the grade-drop penalty at the discretion of the faculty. However, if there are excessive absences, whether or not excused by physician notes, faculty reserves the right to drop the student from the program, especially if the student is deemed unsafe to practice in clinical due to excessive missed time. See Policy Example of this policy at the bottom of this section.

2. It is each student's responsibility to arrive at the proper clinical site each day. Failure to do so, even if the student is "on time", will count as a 4-hour absence and be added to the Clinical Days Missed for the semester. Students who show up to the wrong clinical site will be redirected to the proper site, if possible.

3. Tardiness will not be tolerated. Any tardiness will affect your grade. Tardy is arriving late for a clinical rotation, even 1 minute late, to the clinical site (waived in an emergency per instructor's discretion). Each incident of being tardy will result in a 4-hour absence recorded in the gradebook. Two tardies during any clinical course will equate to an absence of 8 hours, resulting in an immediate grade drop for your final grade. More than two instances of tardiness will require a meeting with the Director of Clinical Education and may result in the student being given a grade of F for the course, which will result in the student not being able to continue in the program. As with absences, tardies are also carried over to the next clinical course in the semester. Absences beyond 16 hours per clinical course result in the drop of one letter grade in the final grade. The letter grade subsequently will be dropped for each additional 8 hours missed, as per program policy. Also, be aware that any tardiness will be recognized by supervisors & department directors that could be responsible for hiring or not hiring you in the future. Treat every clinical day like you were going to a job interview, as staff will be watching you as possible future employees. Any pattern of behavior that disrupts the clinical education of a student, including chronic tardiness or absenteeism, may lead to a grade of F for the clinical course, which as stated above, will result in the student not being able to continue in the program.

Unavoidable Illness or Tardiness

Illness or tardiness must be called in to the clinical instructor AND hospital RT personnel prior to the beginning of your clinical shift. If you are ill or know that you will be late, call the R.T. Department (see phone numbers provided on your clinical schedule) at your clinical affiliate and ask for the charge therapist. Inform them of your absence or tardiness. Also, contact your clinical instructor personally. Calling after the start of the shift will be treated as if no call was made unless there are extenuating circumstances. Texting your absence or tardiness to a classmate is not acceptable. If you are ill or know that you will be late, call the RT Department (see phone numbers provided on your clinical schedule and on page 5 of this clinical manual) at your clinical affiliate and ask for the charge therapist. If your call goes to voicemail, please leave a message. Inform them of your absence or tardiness. Email and texting are not currently approved methods to call in sick or late to clinical, unless an exception is made by the primary clinical instructor at a specific clinical site. We are unable provide opportunities for students to make up missed clinical time due to the considerable expense that would be incurred by the hiring of additional faculty to monitor individual students in order to make up time. To repeat, having a classmate report your absence or lateness to the instructor in any manner is not acceptable, and is not professional conduct.

In the event that the clinical instructor calls in sick, all students from the clinical group must report to the RT Lab, room 270, in the Health Education building. These students are required to spend at least 4 hours working in the lab. Access to the lab can be provided by any full-time faculty who might be at the college, or by asking the School of Health Sciences office staff in room 103 to open the door to the lab.

Teams App

It is up to the individual faculty members whether students can call in absences or tardy's via the Teams app. Full time faculty may set up text groups in Teams that include all students as well as any part time instructors, so no one is left out of the communication loop. In addition, the RT department phone numbers for each hospital are always posted on the Clinical Schedule for each Respiratory Clinical 1 – 5 course and should be utilized should Teams not be an option.

Accommodations for Absence due to Disability or Illness

If you are absent due to a documentable disability (pregnancy, surgery, hospitalization, etc.) and if the instructor and clinical coordinator decide that you must make up the missed time, the arrangements will be made by the Director of Clinical Education. This type of clinical make up time is often done at the end of a semester or during the final exam week. Failure to make up the required time will result in an "Incomplete" in that Respiratory Clinical course. Failure of the student to resolve an "Incomplete" will result in the student being unable to continue on to the next clinical course, and therefore unable to continue in the program.

If the faculty feels that a student has had excessive absences and/or tardies to the point that it effects their ability to safely provide patient care, the student can be removed from the course and possibly terminated from the program, per faculty discretion.

Policy Example: A student in Respiratory Clinical 2 is frequently absent and tardy, missing 3 clinical days totaling 24 clinical hours and being tardy to clinical twice for an additional 8 hours missed per program policy for a total of 32 hours missed. Since there is no penalty for the first 8 hours missed (as long as the student calls in), there is a total of 24 hours missed that will affect the student's final grade for the class. The student's grade will be dropped 2 letter grades for missing 16 additional hours (1 letter grade drop for each 8 hours missed), as well as dropping 1 more letter grade due to the 8 hours of tardiness. This adds up to 3 letter grade drops. If the student were to receive a grade of B before the grade drops were imposed, the student would then end up with a grade of D (B > BC > C > D), which would cause the student to drop from the program because the grade is below the minimum grade of C that is required by program policy to continue on. However, if the student received a grade of A, the grade would drop 3 letters to BC (A > AB > B > BC), and the student is allowed to continue on to Respiratory Clinical 3. Please note that any unexcused absences or tardies over 8 hours in Respiratory Clinical 3 will incur a letter grade drop for each 8 hours missed. In this example, the student is required to meet with the Director of Clinical Education to discuss penalties and possible remediation due to excessive absences.

Shift Scheduling and Parking

Respiratory Clinical 1 – 5: Shift Scheduling

- Any Respiratory Clinical course may contain rotations on both day shifts and evening shifts. The starting times at each of the Madison area hospitals varies slightly but are generally from 6:30 to 2:30. Depending on class size and staff availability, an evening shift may be used at any of our clinical affiliates. Students will be informed in advance of the need for evening shifts (they would typically run from approximately 3:00 p.m. to 11:00 p.m.). Please check the Clinical Schedule for

correct shift times.

• The student is responsible for finding transportation and parking as necessary on their own (see parking and bus recommendations below). No exceptions will be made in these time schedules, as we are required to be present at the hospitals at the same shift times as hospital staff.

• Students are expected to be on time. The starting times at each of the Madison area hospitals varies slightly. Please check the Clinical Schedule for the correct shift time for a given hospital. Policies are in place to drop a student's grade for excessive absences and/or tardiness, which could result in a failing grade. Students who are employed shall be responsible for arranging with their employers so that they can attend their scheduled rotations. Instructors will not be responsible for rearranging the clinical schedule around a student's work schedule.

• Students who are employed shall be responsible for making arrangements with their employers so that they can attend their scheduled clinical rotations. ***Under no circumstances will the clinical schedule be changed to work around a student's work schedule, as this would be unfair to the other students.***

• The program prohibits a student working a night shift to attend clinical immediately afterward (on the same morning).

Parking Suggestions for Clinical Rotations

Unfortunately, parking has always been a challenge for our program students. Here are some tips for our hospital affiliates:

UWHC/VA: South of University Avenue you may find parking off of Regent St. near the Forest Hill Cemetery on Speedway Rd. or S. Franklin Ave. Do not park in 2 hour parking, as parking tickets are very expensive. Do not park in the main hospital parking lots, as you may be banned from attending clinical by the institution if caught. You may be able to park in Ramp #76. Take Highland Ave. past the UW Hospital Visitor parking lot.
Turn right on Marsh Dr. and it will be directly on the left. This is a pay to park lot. You will receive a ticket and then pay by credit card upon exiting. Typically it costs $12 per 8 hour shift. You may also be able to get a parking pass through UW Transportation Services at https://transportation.wisc.edu/ . Think about carpooling to lessen the cost. When at the VA Hospital, you may also find parking off of Regent St. near the Forest Hill Cemetery on Speedway.

St. Mary's: Most side streets around the hospital are 2-hour parking zones. There are a few streets with unrestricted parking (High St. near St. Mary's and several streets near the Henry Vilas Zoo). The St. Mary's shuttle lot is located on Plaenart St. The shuttles run about every 5-10 minutes and drop you off at the Mills St. entrance of the hospital. They start by at 4:50 am and run through 6:00 pm. No tag or sticker is required for your vehicle.

Meriter: The Meriter shuttle lot is on Plaenert St. The Meriter shuttle runs until 8:10 pm. Students on the night shift may park in the ramp on 5th floor or above for a fee. Ask Patty for details. All students must have a hang tag for the rearview mirror for their vehicle. These can be obtained at Guest Services just off of the lobby. On the street parking is available, but is quite a long distance away from the hospital.

Select: In 2022, Select started allowing students to park in their permit parking area of the Madison Medical Center ramp on the Meriter side of Park St. A pass is required for your dashboard.

Mercyhealth Janesville: Adequate free parking is available.

****** These are good options to utilize to avoid parking tickets from the City of Madison and to avoid the cost of parking in ramps.******

Clinical Grading Policy

There are several areas that determine a student's grade in clinical courses. These include clinical skills testing, clinical performance evaluations completed by your clinical instructor, and any quizzes, exams, worksheets, labs, assignments or presentations given during the course. Following is the grading emphasis and methodology for these areas:

Clinical Skills Testing:	**Pass/Pass with Remediation/Fail**
Clinical Performance Evaluations:	**Pass/Pass with Remediation/Fail**
Graded Assignments:	**Minimum grade of 75%**
Testing with Quizzes & Exams:	**Minimum grade of 75%**

***The Testing and Assignments points are averaged to determine a letter grade for the course, but *each* must be passed at a minimum grade of C (≥75%).**

Skills Testing

Students will be required to perform a total of 29 clinical skills/competencies under the direct supervision of a Madison College RT Clinical Instructor, demonstrating 100% proficiency on each to PASS these competencies, before the beginning of your clinical internship in Respiratory Clinical 5. We have identified 7 of the most common oxygen and aerosol therapy skills that you must complete by the end of the Respiratory Clinical 1 course. The student will be allowed to continue to the next course if they successfully check off on 6 of the 7 required skills. The student may also proceed on to complete additional skills as time allows. By the end of the Respiratory Clinical 2 there will be an addition of 8 more skills. The student must complete 14 of 15 total skills by the end of this course. The remaining 14 skills must be completed before the end of Respiratory Clinical 4. This will allow students to enter the final 6-week Clinical Internship without having the burden of additional skills testing, as well as assuring our hospital affiliates that our students are checked off/PASS on all 29 required clinical skills.

Performance Evaluations

The program uses the **Clinical Trac Clinical Management** System for many aspects of our clinical courses. Students are required to use this system, and the cost is part of the program tuition. Students will receive Daily/Weekly Evaluations from Clinical Trac after each clinical day. Students will also receive Summative Evaluations for the end-of-rotation grade. Students must achieve a PASS or PASS with REMEDIATION grade for each Summative Evaluation in order to continue in the program. These evaluations assist us in identifying strengths and weaknesses in a student's ability to: develop and maintain good interpersonal relationships, solve clinical problems, make clinical judgments, assess patient condition, make appropriate recommendations regarding patient care or the need to modify care to treat physiological disturbances. Each performance

evaluation will include the clinical instructor's recommendation that the student has accumulated adequate knowledge and skills to continue to the next clinical rotation or will require that the faculty meet with the student to discuss deficiencies and possible options for remediation. Faculty recommendation could include removal from the clinical course.

Students should thoroughly review all of their evaluations in Clinical Trac, then sign and date them. It is your responsibility to discuss any discrepancies over evaluations with the clinical instructor(s) responsible for the affiliate rotation from which the evaluation originated. If you are not satisfied after meeting with that clinical instructor, you may ask to discuss issues with the Director of Clinical Education. If you do not contest your clinical evaluation within 2 weeks of its completion, it can no longer be contested. Thus, your timely review of your evaluations is essential. Important student deficiencies must be addressed and discussed immediately in order to deal with them effectively. Any student may view prior clinical evaluations or exams in the office of the Director of Clinical Education, where student clinical files are stored, by first making an appointment with the DCE.

Currently available functions for students on Clinical Trac include:

- Clocking In/Out on clinical days
- Estimating Procedure Counts performed
- Entering MD/NP/APNP/PA interactions (can be done via voice to text)
- Checking Daily and Summative Evaluations and signing off on them

Grading Rubric

Clinical grading is done on a "**PASS/PASS with REMEDIATION/FAIL**" basis for Daily/ Weekly performance, Summative clinical rotation performance and for skills check offs. Every student will receive a Daily/Weekly Evaluation via the Clinical Trac App after every clinical day, as well as a Summative Evaluation via the Clinical Trac App after each clinical rotation. The Summative Evaluation will be the final grade for the clinical portion of the rotation. Clinical Trac utilizes different rubrics for the Daily/Weekly and the Summative evaluations. The Respiratory Therapy Program has adopted our own version of these rubrics:

	Overall Clinical Grade	
PASS	**PASS with REMEDIATION**	**FAIL**
• The student meets the overall basic requirements for the level of training. • The student is able to function in a safe and competent manner.	• Performance deficient in several areas but overall meets minimal clinical performance standards. • Student is placed on clinical probation and must achieve a **PASS** in the next clinical rotation. • A second **PASS with REMEDIATION** will result in the student failing that clinical course.	• Student's overall performance is below the anticipated level of training. • Student is not able to continue in the program.
	Daily/Weekly Evaluations	
	The program uses the current Daily/Weekly Evaluation sections in Clinical Trac, but changes the numbering to reflect the below:	
3-Acceptable Performance	**2-Improving Performance**	**1-Unacceptable Performance**
• Skills/knowledge/behavior is appropriate for clinical expectations. • Zero or minimal errors and student can self-correct with minimal instructor intervention	• Skills/knowledge/behavior is appropriate for clinical expectations. • Few to frequent errors that student can self-correct with instructor intervention	• Skill/knowledge/ behavior is inappropriate for clinical expectations. • Frequent errors with limited or no ability to self-correct even with instructor intervention
	Final Summative Evaluation	
• The Program will use the Summative Evaluation rubric in Clinical Trac as is. Any section that gets a 1 or 2 is required to have specific documentation as to why a 1 or 2 was given. • Rubric score will convert to a letter grade, which will determine **PASS/PASS with REMEDIATION/FAIL**	• Students who get a C receive a **PASS with REMEDIATION** grade in the gradebook. • These students are required to meet with faculty to create an action plan to help them be successful in the next clinical course. • A second **PASS with REMEDIATION** will result in the student failing that clinical course.	• Anyone who gets below a C gets a **FAIL** in the gradebook and cannot progress in the program. • Anyone who gets an A through a BC gets a **PASS** in the gradebook.

The RT Program grading scale for the ***Summative Evaluation*** of our 5 clinical courses is below:

Summative Eval Points	Converted To 4.0	Converted To %	Letter Grade	Final Clinical Grade
24 x 4.0 = 96	4.0	100%	A	PASS
94-95	3.9	99	A	PASS
93	3.85	98	A	PASS
92	3.8	97	A	PASS
90-91	3.75	96	A	PASS
89	3.7	95	A	PASS
87-88	3.6	94	A	PASS
84-86	3.5	93	AB	PASS
82-83	3.45	92	AB	PASS
81	3.35	91	AB	PASS
80	3.3	90	AB	PASS
77-79	3.2	89	B	PASS
76	3.15	88	B	PASS
75	3.1	87	B	PASS
74	3.05	86	B	PASS
72-73	3.0	85	B	PASS
69-71	2.9	84	BC	PASS
67-68	2.8	83	BC	PASS
65-66	2.7	82	BC	PASS
62-64	2.6	81	BC	PASS
60-61	2.5	80	BC	PASS
58-59	2.4	79	C	P w/ R
55-57	2.3	78	C	“Pass
53-54	2.2	77	C	With
50-52	2.1	76	C	Remediation”
47-49	2.0	75	C	P w/ R
44-46	1.9	74	D	FAIL
39-43	1.7	73	D	FAIL
34-38	1.5	72	D	FAIL
30-33	1.3	71	D	FAIL
26-29	1.1	70	D	FAIL
24-25	≤1.0	0-69%	F	FAIL

The RT Program grading scale for the ***non-clinical aspects*** of the clinical courses is below. These non-clinical aspects are divided into ***Testing***, which includes Quizzes & Exams, and ***Assignments***, which can include Classmate Simulations, reflection papers, service credits, etc. Students must pass ***both*** of these parts, Testing and Assignments, ***with a minimum grade of 75% on each part.***

Policy Example: A student passes the Assignments part of the course at 95%, but fails the Testing part at 70%. This student will fail the course because they did not pass the Testing part at 75%. The same would hold true if the student passes the Testing part at 95%, but failed the Assignment part at 70%.

4.0 Scale	%	Letter
4.0	100%	A
3.9	99	A
3.85	98	A
3.8	97	A
3.75	96	A
3.7	95	A
3.6	94	A
3.5	93	AB
3.45	92	AB
3.35	91	AB
3.3	90	AB
3.2	89	B
3.15	88	B
3.1	87	B
3.05	86	B
3.0	85	B
2.9	84	BC
2.8	83	BC
2.7	82	BC
2.6	81	BC
2.5	80	BC
2.4	79	C
2.3	78	C
2.2	77	C
2.1	76	C
2.0	75	C
1.9	**74**	**D**
1.7	**73**	**D**
1.5	**72**	**D**
1.3	**71**	**D**
1.1	**70**	**D**
≤1.0	**0-69%**	**F**

***A grade below 75% is not a passing grade**

Clinical Success

To move on to the next rotation, students must: 1) achieve a PASS or PASS with REMEDIATION grade on the clinical rotation summative evaluation, ***and*** 2) pass the Testing + Assignment portions of the class with a minimum grade of C (≥75%) on each part. (Remember, if the student receives a PASS with REMEDIATION, they will be required to meet with faculty to create an action plan to help them be successful in the next clinical course. A second PASS with REMEDIATION will mean a student cannot continue in the program.)

Clinical Skill/Competency Check Off Policy

1. It is each student's responsibility to seek out the clinical instructor when the student feels ready to check off on any of the 29 required clinical skills, as listed on page 3 of this manual.
2. Students are also responsible for bringing their clinical manual to the clinical site every day. This is so the instructor can sign the student off in their clinical manual on the very same day of the skill check off.
3. If a student does not have their manual with them when they check off on a skill, the instructor is not responsible for remembering whether or not the student checked off on that skill.
4. Students are responsible for making sure they check off on at least the minimum number of skills that are required for each clinical course. See the Respiratory Clinical Skills Testing Log on page 3 of this manual to see the skill check off requirements for each Respiratory Clinical course 1-4.
5. If a student has not met the minimum required number of skill check offs for a clinical course, as listed on the Respiratory Clinical Skills Testing Log on page 3 of this manual, the student's final grade for that course will be dropped by 1 letter. If the minimum skill requirement continues to be unmet by the end of the next clinical course, the student's letter grade for that course will be dropped by 2 letters, and a meeting with the faculty will be required. This could result in the student being unable to continue in good standing in the program.
6. All of the required 29 skills must be successfully checked off before the end of Respiratory Clinical 4***.*** This ensures that each student is competent in all skills before starting the Internship in Respiratory Clinical 5. Each hospital's Respiratory Care Department has the expectation during the Internship that every student is competent in all 29 required skills. ***Failure by a student to check off on all 29 skills will prevent the student from proceeding to the Respiratory Clinical 5 Internship.***

******Exceptions to this policy may be made by faculty only for certain objectives that may not be available to students at every hospital, for example Arterial Puncture, CPT and Tracheostomy Care. But even these skills must be checked off in the RT Lab before a student will be allowed to proceed to Respiratory Clinical 5.******

Policy Example: At the end of Respiratory Clinical 3, a student has only checked off on 20 of the 24 required skills. Per program policy, the student needs to have checked off on 23 of 24 skills at the end of Respiratory Clinical 3. The student's grade of B in the class is lowered 1 letter to a final grade BC due to being behind on skills check offs. At the end of Respiratory Clinical 4, the student has checked off on all 6 skills specific to this course, but still has not checked off on the skills missed from Respiratory Clinical 3. The students grade of BC for Respiratory Clinical 4 will now incur 2 letter grade drops for not completing the missed skill check offs, resulting in a grade of D. A grade of D

will prevent the student from advancing to Respiratory Clinical 5, and therefore prevent the student from graduating from the program. It should also be noted that if the student finished with a final grade of C, they still wouldn't be permitted to continue with the program because they have not successfully checked off on all 29 required skills.

******All skills listed on the Clinical Competency Testing Log on page 3 of this manual must be completed and checked off by the end of Respiratory Clinical 4 before a student will be allowed to enter the Internship phase of clinical training during Respiratory Clinical 5.******

RT Program Clinical Practice Performance Standards

Communication:

- Introduces self to nursing staff caring for assigned patients
- Properly identifies patient (wristband/electronically)
- Introduces self to patient and explains purpose of your visit
- Addresses patient by last name and asks if they prefer being called by first name (or nickname)
- Thoroughly explains to patient what you are doing, no matter what level of consciousness the patient has
- Obtains basic history before seeing a patient for first time
- Provides clear and concise instructions for patients and reinforces as necessary to gain their full understanding of expectations
- Shows interest in patients' well-being:
- Asks questions about where they are from/what they like to do
- Asks questions about how they are feeling
- Asks questions re: whether therapy is helping
- Actively listens to patient and/or family replies and concerns
- Confirms physicians orders for therapy and follows up re: recommendations for changes after discussion with licensed staff therapist/instructors
- Clearly articulates indications, side effects, contraindications for therapies performed
- Clearly articulates theory of respiratory care equipment used
- Maintains notes about patients' histories, therapies, labs, CXR's, respiratory assessments, updates throughout shift
- Provides a complete verbal report on assigned patients at end of shift (taped or in-person) including at minimum – age, admitting diagnosis, current problems, code status, allergies, therapies, equipment control settings, doses & times of medications administered
- Completes patient assessment forms without prompting by instructors
- Uses available resources to look up answers to questions related to patient's histories, pathophysiology, or pharmacologic treatment (i.e. medical dictionary, drug handbooks, medical reference books, journals, internet, etc.) ***without prompting.*** This could also mean discussion with nurses, physicians, or other allied health care professionals.
- Maintains appropriate, respectful, and cooperative interpersonal communication with peers, instructors and all hospital staff.
- Updates nursing/medical staff re: all changes or when recommendations for changes need to be made

- Follows up on test results during each shift (i.e. ABG's, PFT's, CXR's, CBC's, cultures, etc.)

Technical Skills And Knowledge:

- Articulates the indication for therapy or for the form of mechanical support of ventilation being provided
- Interprets arterial blood gases correctly and makes appropriate recommendations for changes
- Interprets basic labs (CBC, differential, electrolytes, cultures, etc.) and correlates them with patient's medical/surgical history
- Interprets vital signs and correlates them with patient's medical/surgical history
- Accurately identifies breath sounds and correlates them with patient's medical/surgical history
- Accurately identifies basic features on a CXR:
  - Quality of film (rotation, inspiration, penetration)
  - Type of film view
  - Diaphragm position (at what rib)
  - Cardiac size/mediastinal shift
  - Presence & location of infiltrates (use of silhouette sign)
  - ET tube position and presence of other lines in the chest
- Discusses patient's code status, isolation status and any allergies
- Discusses primary medications patient is receiving (especially IV drips):
  - Antibiotics
  - Anti-arrhythmics
  - Bronchodilators
  - Diuretics
  - Paralytics
  - Pressors
  - Sedatives
  - Steroids
- Accurately describes the theory of operation of routine respiratory care equipment
- Demonstrates the ability to correctly assemble routine respiratory care equipment and troubleshoot equipment that is malfunctioning
- Accurately performs respiratory care procedures according to objectives during testing and maintains these skills after successful completion
- Completes accurate & thorough assessments of patients on mechanical ventilation:
  - Breath sounds
  - Vital signs
  - Cardiac rhythm
  - Volumes/pressures/flows/times
  - Patient synchrony/air-trapping (by use of observations & airway graphics)
  - Compliance/resistance (by use of observations & airway graphics)
  - Adequacy of oxygenation & ventilation
  - Spontaneous breathing trial assessments
  - Discusses potential side effects/contraindications for therapy/mechanical support of ventilation

Attitudes, Work Ethic and Professionalism:

- Arrives on time, in proper uniform, prepared to receive report at designated starting time
- Manages time wisely, completing assigned tasks, reviewing patients' medical records and completing all patient assessments
- Demonstrates a positive attitude at all times in caring for patients and interacting with peers and health care professionals
- Strives to identify own weaknesses and develop strategies to improve • Displays honesty and demonstrates responsibility for own actions
- Shows respect for peers, fellow health care practitioners, patients and their families/visitors
- Shows compassion for patients and always treats them with dignity
- Protects patient confidentiality at all times
- Performs all patient care procedures upholding all medical, legal and ethical standards of the profession (follows AARC Clinical Practice Guidelines and abides by the AARC's Code of Ethics)
- Maintains a positive attitude and contributes to a positive environment for learning in the clinical setting
- Maintains a cooperative learning environment by offering to help fellow students with questions or reaches out to others when in need of assistance

Extras:

- Self-initiates using resources within RT Dept. to review equipment
- Self-initiates group study during free time
- Asks for additional patients or offers to help others
- Willing to stay late if learning opportunity arises (never asks if they can leave early unless a medical/family emergency)
- Shares new things learned from review of reference books, medical literature, electronic resources, manufacturer's resource materials, etc.
- Checks on patients between scheduled times showing extra concern for well-being
- Offers assistance to nurses above and beyond expectations
- Recognizes limitations regarding what information is appropriate for a student to share with a patient and/or family and avoids overstepping professional boundaries in doing so
- Protects patient confidentiality at all times by not using patients names or personal identifying information outside of the clinical practice setting (does not discuss specific patient information in elevators, cafeterias, waiting rooms or other public areas)
- Avoids using phrases that leave a patient suspicious or lacking in confidence in your skills (i.e. don't say "I've never done this before" or "I'm just a student")

Infectious Diseases Recommendations by the Madison College School of Health Sciences

Recommendations for preventing transmission of hepatitis, AIDS and other infectious diseases caused by fluid-borne microorganisms:

All students enrolled in Madison College School of Health Sciences programs who perform procedures involving contact with body fluids are encouraged to follow these recommendations. These recommendations are intended to control and prevent the transmission of infectious diseases caused by blood or other fluid- borne microorganisms.

1. Handwashing Is The Single Most Important Means Of Preventing The Spread Of Infection! Indications for handwashing and/or use of antiseptic hand wash or gel:

a. In the absence of a true emergency, personnel should always wash hands:

- before performing invasive procedures;
- before taking care of particularly susceptible patients, such as those who are severely immunocompromised and newborns;
- before and after touching wounds, whether surgical, traumatic, or associated with an invasive device;
- after situations during which microbial contamination of hands is likely to occur, especially those involving contact with mucous membranes, blood or body fluids, secretions, or excretions;
- after touching inanimate sources that are likely to be contaminated with virulent or epidemiologically important microorganisms; these sources include urine-measuring devices or secretion-collecting apparatuses;
- after taking care of an infected patient or one who is likely to be colonized with microorganisms of special clinical or epidemiologic significance, for example, multiple drug-resistant bacteria;
- between contacts with different patients in high-risk units.
- visibly soiled hands must be washed

b. Routine, brief patient-care activities involving superficial patient contact, e.g. taking a blood pressure, do not require handwashing; however, prolonged intense contact does require handwashing.

2. For the maximum protection of personnel and patient, the following procedures should be followed. Please refer to your clinical or affiliation manual for specific procedure.

a. Gloves must always be worn when:

- touching blood, open tissues, saliva, sputum, mucous membranes, feces, or semen.
- touching blood-soiled items, body fluids, secretions, or tissues as well as surfaces contaminated with them.
- examining all lesions.

All work must be completed on one patient and the hands must be washed/sanitized and re-gloved with a new pair of gloves before performing procedures on another patient.

b. Surgical masks and/or chin-length plastic face shields must be worn when splashing, splattering, or aerosolization of blood or other body fluids is likely to occur.

c. Protective eyewear must be worn when splashing or splattering of blood or other body fluids is likely

to occur.

d. Reusable or disposable gowns, laboratory coats or uniforms must be worn when clothing is likely to be soiled with blood or other body fluids. Laboratory coats may be washed using a normal laundry cycle. Gowns must be changed at least daily or when visibly soiled with blood. Affiliating institution and individual program isolation policies must be followed.

3. Use extreme care in handling sharp instruments and needles.

a. Sharp items (needles, scalpel blades and other sharp items) must be placed into puncture- and leak-proof containers located as close as practical to the area in which they were used.

b. Disposable needles should not be recapped, bent, broken, removed from disposable syringe, nor manipulated by hand after use.

4. Health Occupations students and faculty who have exposed exudative lesions or weeping dermatitis should refrain from all direct patient care and handling instrument and equipment used in patient care until the condition resolves.

5. Students and illnesses suggestive of an infectious etiology should report to the instructor or immediate supervisor and seek advice regarding fitness and duty prior to providing direct patient care.

6. Solid waste contaminated with blood or other body fluids should be placed in sealed, sturdy impervious bags to prevent leakage of the contained items and be disposed of according to local or state environmental regulatory agencies and published recommendations.

7. To minimize the need for mouth-to-mouth resuscitation, mouth pieces, resuscitation bags or other ventilation devices should be strategically located in clinic areas.

Exposure To Undiagnosed Infectious Disease In Patient

1. If a student is exposed during clinical to a patient with undiagnosed active tuberculosis, hepatitis, or other infectious disease and upon the school's notification by the affiliating agency of the change in diagnoses, the student will be advised of the change in diagnosis and is to take the following steps:

A. An affiliating agency incident report must be filed immediately, and a school incident report must be filed within 24 hours of knowing of the incident.

B. The student must consult with the school nurse or other certified health care professional to determine procedures to be followed.

References: CDC Guidelines on Infection Control (www.cdc.gov)

Standard Precautions

The Centers for Disease Control (CDC) have published detailed recommendations for the prevention of HIV infection in health care workers called Standard Precautions (previously known as Universal Precautions).

Standard Precautions should be used for all patients whether or not medical history and examination can identify them as infected with HIV and other blood-borne pathogens.

Standard Precautions state

1. All health care workers routinely should use barrier precautions (gloves, masks, protective eyewear, and gowns, as appropriate) to prevent skin and mucous membrane exposure whenever contact with blood or other body fluid of any patient is anticipated.

2. All body surfaces should be washed immediately if contaminated with blood or other body fluids.

3. Needles and other sharp devices should be handled with extreme care and disposed of in appropriate sharps containers.
4. Ventilating devices should be available to eliminate the need for emergency mouth-to-mouth resuscitation.
5. Health care workers with open lesions should not handle patients or patient-care equipment until the condition resolves.

These guidelines should be incorporated into a more complete infection control program in which other category-or disease specific isolation precautions are utilized as appropriate and vaccination with Hepatitis B vaccine is stressed.

Standard Precautions have recently been clarified to specify for which body fluids these guidelines should apply. Thus, because of the low risk of transmission of blood-borne diseases in certain body fluids - feces, nasal secretions, sputum, sweat, tears, urine, and vomitus that do not contain visible blood - standard precautions need not apply. Others, however, have suggested an alternative isolation method called "body substance isolation," which involves the use of barrier precautions for anticipated exposure to any body fluids, less frequent handwashing in lieu of appropriate gloving, and elimination of the category and disease specific isolation guidelines except for the use of private rooms for patients with some diseases spread by the airborne route or who soil the environment.

Communicable Disease Information from the State of Wisconsin Statutes

This document covers everything from TB to HIV to Food Borne disease to body piercing. You should read and be familiar with the relevant sections:
https://docs.legis.wisconsin.gov/statutes/statutes/252/

STUDENT NAME:				RESPIRATORY CLINICAL COMPETENCY TESTING LOG		
*RT Program curriculum requires completion of:			Skill Check-off Reqmts. R = Req'd in clinical	SIMULATED	CLINICAL	100% Passing Instructors: Please Sign and Date this Page *AND* the corresponding Checklist Page
PAGE #'s	6/7 skills by end of Respiratory Clinical 1					
	14/15 skills by end of Respiratory Clinical 2					
	22/23 skills by end of Respiratory Clinical 3					
	ALL 29 skills by end of Respiratory Clinical 4					
	All Required (**R**) & Simulated (**S**) skills require a 100% passing score using criteria listed in this Manual					
Respiratory Clinical 1 (1st Year - Summer Session)		**Clinical Trac #**	**S = Simulated**			
62	Administer Oxygen Therapy	**A.01**	**R**			
66	Administer Aerosolized Medication	**A.05**	**R**			
70	Inhaler Instruct-Provide Education to Patient and Family	**A.06 and/or A.07**	**R**			
75	Perform Pulse Oximetry	**B.01**	**R**			
78	Administer Hyperinflation Therapy Adjuncts	**A.08 & A.12**	**R**			
83	Perform a Pulmonary Exam	**F.10**	**R/S**			
88	Demonstrate Cylinder Safety	**A.02**	**R**			
Respiratory Clinical 2 (1st 8 Weeks of Fall - 2nd year)						
92	6 Minute Walk Test (Home O_2 Evaluation)	**B.23**	**S**			
95	Administer Bronchial Hygiene Adjuncts	**2 of 4: A.11, A.21, A.22, A.24**	**R**			
96	Set Up Large Volume Nebulizer (Cont. Aero.)	**A.03**	**S/R**			
99	Administer Chest Physical Therapy	**A.10**	**S/R**			
103	Non-Invasive Positive Pressure Ventilation	**C.08 & C.20**	**R/S**			
109	Perform Arterial Puncture	**B.02**	**R/S**			
113	Perform Tracheostomy Care	**A.20**	**R**			
115	Manage Artificial Airway - Cuff Pres. & VAE	**A.14**	**R**			
Respiratory Clinical 3 (2nd 8 Weeks of Fall – 2nd year)						
119	Manual Resuscitation via Mask & Artificial AW	**C.13**	**S/R**			
124	Open System Suction w/Kit and Nasotracheal Suction (Optional)	**A.13 A.04**	**R/S**			
129	Closed System Suction (Ventilated Patient)	**A.19**	**R**			
133	Assist with Intubation	**C.14**	**S**			
136	Implements Weaning Protocols/Spontaneous Breathing Trial	**C.12 then C.07**	**R**			
139	Perform Extubation	**C.10**	**R**			
141	Ventilator System Safety/Pre-use Check	**C.23**	**S**			
142	Initiate Mechanical Ventilation + Pt-Vent Assess	**C.03 then C.01**	**R/S**			
Respiratory Clinical 4 (1st 8 Weeks of Spring– 2nd year)						
147	Change Ventilator Circuit	**C.02**	**S**			
148	Mechanical Ventilation-Neo/Pediatric Patient	**D.60**	**S/R**			
153	Evaluate Hemodynamic Data	**B.21**	**S**			
156	Interpret Capnography Results	**B.09**	**S/R**			
159	Perform Screening Spirometry	**B.08**	**S**			
164	Perform 12 Lead ECG	**B.07**	**S**			

Optional or Miscellaneous Skills: **Performed, Assisted and/or Observed** **(Instructors: Date & Initial the appropriate column)**	**Performed**	**Assisted**	**Observed**
Perform a Tracheostomy Tube Change (Optional)			
Perform Sputum Induction (Optional)			
Assist with Bronchoscopy (Optional)			
Assist with Thoracentesis (Optional)			
Manage the Use of Heliox (Optional)			
Manage the Use of Nitric Oxide (Optional)			
Transcutaneous Monitoring (Optional)			
Assist with Sleep Lab Procedures (Optional)			
Perform a Complete PF Test (Optional)			
Perform an Arterial Line Draw (Optional)			
Monitor Pleural Drainage Systems (Optional)			
Create a Respiratory Care Plan (Optional)			
Perform Cardiopulmonary Stress Testing (Optional)			
Perform an Apnea Test - brain death determination (Optional)			
Other:			
ECMO			
Intubation			
Nasotracheal Suctioning			
Liquid Oxygen			
Pulmonary Rehabilitation			
Insertion of Swan-Ganz or other Vascular Catheter			
Cardiac Catheterization			
Labor and Delivery			
Swallow Study			
Tracheostomy (indicate surgical or percutaneous)			
Surgery (specify type of surgery observed):			
Other: Pulmonary Function Testing.			
Pre/post bronchodilator testing			
Methacholine challenge			
Body plethysmography			
Metabolic testing			
Other (specify):			

Madison College – Respiratory Therapy Program
Clinical Skill Competency Checklist

ADMINISTER OXYGEN THERAPY

RATING SCALE:
0 = Inappropriate, incorrect, or omitted
1 = Needs additional study and/or practice
2 = Completed appropriately and correctly
N/A = Not applicable

Procedural steps:	RATINGS Lab/Peer	Lab/Instr	Clinical	Clinical	Clinical
1. Reviews medical record, verifies order for therapy and completes patient assessment form					
2. States indications for oxygen therapy and any potential side effects					
3. Disinfects hands before and after therapy, following standard precautions					
4. Identifies patient by wristband and/or electronic identification					
5. Introduces self/instructor to patient and explains procedure					
6. Checks oxygen therapy equipment for proper flow setting, adequate water supply, and tubing connections					
7. Accurately estimates FIO_2, and can identify if it is a high flow or low flow system					
8. Assesses vital signs and listens to breath sounds anteriorly and posteriorly					
9. Makes recommendations for changes as necessary					
10. Documents therapy appropriately in medical record					
11. Reports to other members of the interdisciplinary care team regarding the therapy as necessary					
Total:	**__/22**	**__/22**	**__/22**	**__/22**	**__/22**

Oxygen Therapy FAQ's

Knowledge and Technical Skills Expectations:

- What are the common indications for oxygen therapy?
  - To treat hypoxemia
  - To reduce the work of breathing
  - To reduce the work of the heart
- What are some of the precautions/hazards of oxygen therapy?
  - Depression of ventilation in some patients with chronic hypercapnia
  - Atelectasis when using FIO2's > 0.50
  - Oxygen toxicity when using FIO2's > 0.50
  - In premature infants, PaO2's > 80 mmHg may cause retinopathy of prematurity
  - In infants with congenital heart disease, high PaO2's may cause closure of the ductus arteriosus
  - Increased fire hazard

What type of equipment is used to administer oxygen therapy and specify approximate FIO2's?

Nasal Cannula: 1-6 Liters/minute in the adult; may use fractions of a liter in pediatric patients or patients with COPD

- Estimated FIO2's in adults, from cannulas running at the following flowrates:
  - L/min = 0.24
  - L/min = 0.28
  - L/min = 0.32
  - L/min = 0.36
  - L/min = 0.40
  - L/min = 0.44
- These FIO2's depend on the patient meeting the following criteria:
  - Respiratory rate < 25/min
  - Tidal volume 300-700 mL
  - Ventilatory pattern that is regular and consistent
- Humidifying oxygen by a nasal cannula is necessary whenever the flowrate is 4 L/min or greater or whenever a patient requests it or complains of excessive nasal dryness or nosebleeds

Simple Mask: A low flow plastic mask without a reservoir bag; must have a minimum of 5 L/min of oxygen flowing through it with adults to prevent CO2 retention; usual flowrates are 5-12 L/min and approximate FIO2's are 0.35 - 0.50; not used very often in adults due to the venti-mask having similar FIO2 range

Venturi Mask: A high flow plastic mask with an attached air entrainment venturi that provides a higher and very consistent inspiratory flow at a stable pre-set FIO2, each pre-set FIO2 setting has a recommended oxygen flowrate setting which should produce a total inspiratory gas flowrate of between 30-40 L/min and the range of FIO2's available on most venti-masks are 0.24 - 0.50, though some brands go as high as 0.55.

- To determine Air:Oxygen Entrainment Ratio of a Venti-Mask:

$\frac{100\% - FIO2}{FIO2 - 21\%}$	Example for a 40% Venti-Mask:	$\frac{100-40}{40-21} = \frac{60}{19}$ OR 3.15:1

- To calculate total flow from the Venti-Mask: If we have a 40% Venti-Mask running at 6 lpm and you calculated the air: oxygen entrainment ratio to be 3:1; add the two numbers of the ratio together multiply that by the flowrate that you are running the oxygen at:

  Example 3:1 = 3 + 1 = 4; 4 X 6 = 24 L/min total flow to patient

- To determine whether the Venti-Mask is a high flow or low flow device: To be considered a high flow device, the device must supply the entire inspiratory flow demands of the patient. We can estimate the patient's peak inspiratory flowrate by estimating their tidal volume (use 300 mL if patient is breathing shallow, 500 mL for normal, and 1000 mL if patient appears to be taking very large inspirations), multiplying that by their counted respiratory rate and then multiplying that minute ventilation by 3 to estimate peak inspiratory flow

Example: Patient has a respiratory rate of 40/min, is breathing very shallowly and is on a 40% Venti-Mask running at 6 L/min.

Vt of .300 L X R.R. of 40 = $\dot{V}$E of 12 L/min
$\dot{V}$E of 12 L/min X 3 = Peak inspiratory flowrate of 36 L/min

- Note from our above calculation of total flow, the Venti-Mask would NOT be considered a high flow system for this patient because it does not provide the entire peak inspiratory flowrate needs from the device alone. We then would need to increase the oxygen flowrate into the device in order to increase its total flow.

Partial Re-breather Mask: A higher flow plastic mask with no valves and a reservoir bag attached; must have sufficient flow to keep the reservoir bag at least half full at all times; usual flowrates are 8-15 L/min and approximate FIO2's are 0.40 - 0.70; because this mask has no valves it is subject to considerable air entrainment which will dilute the FIO2, thus the FIO2 is very much dependent on the patient's ventilatory pattern.

Non-rebreather Mask: A high flow plastic mask with valves on the mask and on the connection between the mask and the attached reservoir bag; must have sufficient flow to keep the reservoir bag at least half full at all times; usual flowrates are 10-15 L/min and approximate FIO2's are 0.60 - 0.80, though it is theoretically possible to near 100% in patients breathing with a very shallow ventilatory pattern.

High Flow Nasal Cannula (HFNC): These devices can deliver both FiO_2 and relative humidity greater than 90% by using heated, humidified O_2 flows of up to 40 – 50 L/min depending on the manufacturer. They have the ability to maintain a consistent FiO_2 under varying patient breathing patterns, making these devices suitable for a great many patients. Main features include:

- Delivery of a high FiO_2 and high humidity
- Meeting or exceeding the patient's minute ventilation and therefore acting as a fixed oxygen delivery device
- Generating a distending positive airway pressure (CPAP)

What essential assessments are needed to evaluate the appropriate response to oxygen therapy?

- Assessment of pulse
- Assessment of color
- Assessment of work of breathing
- Assessment of pulse oximetry or arterial blood gases
- Evaluation of subjective measures (patient statements)

References:

Kacmarek, Stoller, Heuer (2017). Egan's Fundamentals of Respiratory Care, 11th Edition. St. Louis, MO: Elsevier. Pages 1-1372.

For additional references on Oxygen Therapy go to the AARC website, www.aarc.org and click on Resources, then click on Clinical Practice Guidelines and finally scroll down to: AARC Clinical Practice Guideline: Management of Adult Patients With Oxygen in the Acute Care Setting (2022)

Or click here:

https://www.aarc.org/wp-content/uploads/2022/10/cpg-clinical-mangement-adult-o2-acute-settings.pdf

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Clinical Skill Competency Checklist

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ADMINISTER AEROSOLIZED MEDICATION

Procedural steps:	RATINGS Lab/Peer	Lab/Instr	Clinical	Clinical	Clinical
1. Reviews medical record, verifies order for therapy, and completes patient assessment form					
2. Locates and selects appropriate equipment					
3. Obtains appropriate medication from secure storage identifying dosage/dilution					
4. States goal of therapy and any potential side effects					
5. Disinfects hands before and after therapy, following standard precautions					
6. Identifies patient by wristband and/or electronic identification					
7. Introduces self/instructor to patient and explains procedure					
8. Assembles and pre-tests equipment					
9. Utilizes appropriate gas source and flowrate setting justifying selections					
10. Dispenses medication appropriately for either small volume or large volume nebulizers					
11. Assesses vital signs and listens to breath sounds anteriorly and posteriorly					
12. Positions patient appropriately for therapy					
13. Initiates therapy with appropriate settings					
14. Instructs patient in proper relaxation and breathing techniques (proper use of diaphragm and breath holds)					
15. Reassesses patient during treatment as necessary (i.e. if WOB changes or patient appears in any distress)					
16. Terminates treatment at appropriate time and repositions patient as necessary					
17. Solicits cough from patient and assists as necessary (i.e. splinting incisions)					
18. Disassembles equipment and stores appropriately					
19. Documents therapy appropriately in medical record					
20. Reports to other members of the health care team regarding the therapy as necessary					
Total:	**__/40**	**__/40**	**__/40**	**__/40**	**__/40**

Aerosol Treatment – FAQ's

Knowledge and Technical Skills Expectations:

- What are the common indications for aerosol treatments?
  - To mobilize secretions
  - To improve alveolar ventilation
  - To administer specific medication to the lower (or occasionally upper) airways:
    - Bronchodilators (beta-adrenergics, anticholinergics)
    - Antibiotics
    - Anti-inflammatory agents (corticosteroids)
    - Antivirals
    - Antifungals
    - Enzymes (mucokinetics)
    - Vasoconstrictors (racemic epinephrine) –upper airway
    - Surfactant
- What are some of the precautions/hazards of aerosol treatments?
  - Bronchospasm - most often seen in patients with hyperreactive airways
  - Complications to the administration of the medication being aerosolized
  - Exposure risk to therapist administering some medications (Ribavirin, Pentamidine, or aerosols exhaled by patients with active tuberculosis)
  - Under/overdosing as a result of improper technique or malfunctioning device
- What type of equipment is used for administration of aerosol treatments?
  - Small volume nebulizers
    - Used to administer 3-5 mL doses of aerosolized medication
    - Typical gas flowrates used to operate the nebulizer are 6-8 lpm:
      - Flowrates > 8 lpm will reduce treatment and may actually reduce the total volume of medication inspired by the patient
      - Flowrates < 6 lpm will reduce nebulizer efficiency and extend treatment time beyond what the patient may tolerate
    - Typical total fluid output is approximately 0.1-0.5 mL/min.
    - Device should be able to produce an aerosol with a Mean Mass Aerodynamic Diameter (MMAD) of 1-5 microns in order to reach the lower airways
    - Equipment should consist of the nebulizer, connecting oxygen tubing, a T-piece, mouthpiece and 50 ml corrugated tubing reservoir (an aerosol mask may be used when patients are not able to maintain a seal around a mouthpiece)
    - Realize that only about 10% of the actual dose of the nebulized medication actually reaches the lower airways.
  - Specialty nebulizers
    - BAN - breath-actuated nebulizers
      - Reusable for up to 7 days
      - Inspiratory-only nebulizer maximizes aerosol output
      - Inhaled dose up to 3 times more than continuous or breath-enhanced nebs
      - No medication loss to the patient or environment

        - Mouthpiece or mask may be use
        - 0.5 – 6.0 mL capacity
    - Vibrating Mesh Nebulizers
        - Active VM nebulizers have an aperture plate with funnel-shaped holes vibrated by a piezoelectric transducer (Aeroneb).
        - Passive VM nebulizer uses an ultrasonic horn to push fluid through a stationary mesh (iNeb).
    - Ultrasonic nebulizers
        - Electric current produces high frequency sound wave vibrations
        - High frequency vibrations are applied to a piezoelectric transducer which controls the frequency at 1.35 MHz that is transmitted through the fluid to be nebulized
        - Particle size is controlled by the frequency, while total output is controlled by an amplitude control
        - Typical total fluid output is greater at up to 6 mL/min
        - Ultrasonic devices should be capable of producing an aerosol with a Mean Mass Aerodynamic Diameter of 1-10 microns with the average around 3 microns
        - Large electrical ultrasonic nebulizers are available in most hospitals
        - Small hand-held, battery-powered ultrasonic nebulizers are available for home use
    - PARI nebulizers
        - Used to administer 3-5 mL doses of aerosolized medication (often in the patient's home)
        - Reusable inspiration-only nebulizer which maximizes aerosol output to the patient on inspiration and minimizes aerosol output during their expiratory phase
        - Requires the use of the PARI electrical compressors or medical gases in the hospital
        - Primarily a nebulizer used by home care patients (also recommended when nebulizing Pulmacort)
    - HEART nebulizers
        - Larger volume nebulizers used for continuous administration of beta adrenergic bronchodilators
        - Typical gas flowrates used to operate the HEART nebulizer is 10 L/min, however you can use up to 15 L/min in patients with higher inspiratory flow demands (medication dosing has to be adjusted according to this flowrate)
        - Typical total fluid output is 30-60 mL/hr
        - Typical particle size is a MMAD of 2 microns
    - HOPE nebulizers
        - Larger volume nebulizers used for continuous administration of beta adrenergic bronchodilators while also being able to blend in helium to administer heliox (helium/oxygen) therapy concurrently
        - Typical total fluid output is 25-30 mL/hr
        - Typical particle size is a MMAD of 3.5 microns
- Small Particle Aerosol Generator (SPAG) – the SPAG is a special nebulizer developed by ICN Pharmaceuticals to administer their antiviral agent, ribavirin (Virazole) to treat patients with lower respiratory tract inflammation due to infection with the respiratory syncytial virus.
    - Large volume jet nebulizer that employs two flowmeters, one to create the nebulization and the second flowmeter directs dry gas into a drying chamber where the aerosol enters

resulting in reduction of particle size
    - Particle size is very consistent and stable at 1.2-1.4 □m, enhancing deposition to the smaller bronchioles where the inflammation in RSV infection dominates
    - Ribavirin aerosols can induce bronchospasm, conjunctivitis, rash and can be toxic to caregivers, thus it must be administered to the patient in an enclosed mist tent with exhaust filters and the patient must be placed in a negative pressure room
    - Personnel should utilize the CDC's Airborne Precautions and wear HEPA masks, gowns, gloves and goggles whenever working with a patient while receiving aerosolized Ribavirin
- What essential assessments are needed to evaluate the appropriate response to aerosol treatments?
    - Comparison of work of breathing before and after treatment (respiratory rate, pattern of breathing, accessory muscle use)
    - Comparison of heart rate before and after treatment
    - Comparison of breath sounds before and after treatment:
        - Reduction in stridor (when administering a vasoconstrictor)
        - Reduction in wheezing if patient had productive cough
        - Increase in wheezing if patient has improved aeration
        - Improved aeration
    - Evaluation of effectiveness of cough/ability to produce sputum
    - Comparison of pulmonary function indicators before and after treatment (FEV1 or PEF)

References:

Aerosol Treatments: Go to the AARC website, www.aarc.org and click on Resources, then click on Clinical Practice Guidelines and finally scroll down to the following CPG's for review:

Selection of a Device for Delivery of Aerosol to the Lung Parenchyma
Selection of Aerosol Delivery Device
Delivery of Aerosols to the Upper Airway
Assessing Response to Bronchodilator Therapy at Point of Care

Kacmarek, Stoller, Heuer (2017). Egan's Fundamentals of Respiratory Care, 11th Edition. St. Louis, MO: Elsevier. Pages 1-1372.

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Clinical Skill Competency Checklist

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INHALER INSTRUCTION-
PROVIDE EDUCATION TO PATIENT & FAMILY

Procedural steps:	RATINGS Lab/Peer	Lab/Instr	Clinical	Clinical	Clinical
1. Reviews medical record, verifies order for therapy, and completes patient assessment form					
2. Locates and selects appropriate equipment					
3. Obtains appropriate medication from secure storage identifying dosage/dilution					
4. States goal of therapy and any potential side effects					
5. Disinfects hands before and after therapy, following standard precautions					
6. Identifies patient by wristband and/or electronic identification					
7. Introduces self/instructor to patient and explains procedure					
8. Assembles /dispenses medication appropriately					
9. Assesses vital signs and listens to breath sounds anteriorly and posteriorly					
10. Positions patient appropriately for therapy					
11. Instructs patient (and family) in proper breathing techniques, i.e. proper use of diaphragm and breath holds					
12. Instructs patient on proper use of device, i.e. use of spacer, need for shaking & warming MDI's, priming, and proper timing between doses					
13. Properly coaches patient through the administration of all ordered inhaled medications including rinsing with water and spitting if using a inhaled corticosteroid					
14. Terminates treatment at appropriate time and repositions patient as necessary					
15. Solicits cough from patient and assists as necessary (i.e. splinting incisions)					
16. Reassesses patient's vital signs and breath sounds					
17. Disassembles equipment and stores appropriately					
18. Documents therapy appropriately in medical record					
19. Reports to other members of the interdisciplinary care team regarding the therapy as necessary					
Total:	**_/38**	**_/38**	**_/38**	**_/38**	**_/38**

Inhaler Instruction – FAQ's

Knowledge and Technical Skills Expectations:

- What are the common indications for metered dose inhaler administration?
  - Administration of inhaled medications to intubated and non-intubated patients
  - Transition patient from aerosolized medication
  - Enhance patient convenience and compliance with use of inhaled medications
- What are some of the precautions/hazards of metered-dose inhaler administration?
  - Bronchospasm
  - Paroxysmal coughing
  - Poor technique resulting in inadequate dosing of medication
  - Increased airway resistance and air-trapping from airway collapse
  - Adverse reaction to medication, propellants, or additives
- What type of equipment is used to administer metered-dose inhaler treatments?
  - **Metered dose inhalers (MDI's):**
    - Canister – a small, pressurized canister containing the prescribed drug, propellant and a dispersing agent.
    - Propellant – a substance with a high vapor pressure that propels the metered dose of medication out the actuator nozzle for dispersal into the airway
      - CFC's – chlorofluorocarbons such as Freon have been associated with adverse effects and will be prohibited in the near future
      - HFA's – hydrofluoroalkanes are more environmentally safe and are replacing CFC's
      - Dispersal agents – these agents are added to the propellants and medication to help keep the medication in suspension after the evaporation of the propellant; they have been known to cause adverse reactions in some patients (examples: soya lecithin, sorbitan trioleate and oleic acid). Approximately 60-80% of the MDI spray consists of propellant, with only about 1% being active drug (usually 50 mcg to 50mg)
    - **Spacers and Holding Chambers** – accessory devices used with the metered dose inhaler placed between the canister and the patient's mouth
      - Why use a spacer or holding chamber?
        - Reduce pharyngeal impaction of the drug
        - Improve the hand activation to breath coordination
        - Reduce the undesirable taste of some medications
        - Reduce the cold aerosol induced hyper-reactivity of the airways
      - What happens to dose delivery with a spacer or holding chamber?
        - Less pharyngeal impaction results in more inhaled drug
        - Larger particles impact the walls of the spacer, leaving only smaller particles to be inhaled by the patient
        - Poor inspiratory effort can be followed by repeat attempts to inhale from spacer to extract remaining suspended particles
      - How does technique impact the effectiveness of MDI administered medication?
        - MDI needs to be at hand or body temperature (warm canister by vigorously rolling it in the palm of your hand)

- Canister should be shaken to mix medication and propellant before each actuation
- Canister must be vertical and spacer or holding chamber needs to be horizontal
- Patient must have the physical grip strength to grasp the canister and the spacer or holding chamber and actuate it
- Patient must be able to coordinate actuation of the MDI and the beginning of a deep inspiration
- Patient must inspire slowly and deeply to achieve optimum deposition of medication
- Patient should wait 30 to 60 seconds between puffs to allow time for previous dose to be absorbed

- **Dry Powder Inhalers (DPI's):**
  - Dry powder medication capsule – several different designs of DPI's are available; however they all contain medication in some form of capsule or channel. The carrier substance is lactose or glucose, which can result in oropharyngeal irritation. The device ruptures the capsule or channel and the speed of the inspiratory airflow creates the drug aerosol as the air is drawn through the fine powder.
  - Breath actuation – unlike MDI's, dry powder inhalers depend on high inspiratory flowrates of at least 50 L/min to produce an inspirable powder aerosol. No spacer device is necessary
  - Why use a dry powder inhaler?
    - Some drugs are only available in dry powder form
    - When a patient reacts to cold aerosols, propellants or additives present in MDI's
    - For portability and convenience (no need for a large spacer or holding chamber device)
  - What factors will affect the function of a DPI and subsequently have an effect on dose delivery?
    - Patient must be capable of inspiring rapidly (not appropriate for infants or children < 5 years old)
    - High humidity can cause dry powders to clump up reducing the ability to form a dry powder aerosol of a size small enough to inhale
    - Sensitivity to carrier substances
- **Respimat Soft mist inhaler (SMI):**
  - What are the common indications for soft mist inhaler administration?
    - Administration of inhaled medications to intubated and non-intubated patients
    - Transition patient from aerosolized medications
    - Enhance patient convenience and compliance with use of inhaled medications
  - What type of equipment is used to administer soft mist inhaler treatments?
    - Soft Mist Inhaler has a unique delivery mechanism, which is propellant-free and delivers a metered dosage of medication as a fine mist.
  - What are some of the precautions/hazards of soft mist inhaler administration?
    - Bronchospasm
    - Paroxysmal coughing
    - Poor technique resulting in inadequate dosing of medication
    - Increased airway resistance and air-trapping from airway collapse
    - Adverse reaction to medication

- Mist inhaler parts:
  *The Dose-Release Button: When the dose-release button is pressed, the energy released from the spring forces the solution through the uniblock and the unique, slow-moving, long-lasting Soft Mist™ is released.
  *Dosing Chamber: The dosing chamber is the space where the exact dose is present before you press the doses-release button.
  *The Capillary Tube: The tube slides into a canal in the cartridge and the dosage is drawn through this tube into a micro pump.
  *The Transparent Base: The transparent base slides off to allow for easy insertion of the cartridge.
  *The Spring: A simple 180° twist of the inhaler's base compresses the spring and builds up mechanical power. No chemical propellant or battery is necessary, which of course means no adverse effects on the environment.
  *The Cartridge: Medication delivered by Respimat® SMI is stored in a collapsible plastic bag in a sealed plastic container inside the cartridge. With each actuation, the correct dosage is drawn from the inner reservoir and the flexible bag contracts accordingly.
  *Dose Indicator: The dose indicator tells how many doses are left. Once the dose indicator reaches the red zone approximately 30 doses are left. Once the dose indicator has reached the end of the scale the inhaler locks automatically.

- What essential assessments are needed to evaluate the appropriate response to metered dose inhaler treatments?
  - Comparison of pulmonary function indicators (PEF, FEV1, FVC, etc.) before and after treatment
  - Comparison of heart rate before and after treatment
  - Comparison of breath sounds before and after treatment:
  - Reduction in wheezing/rhonchi if patient had productive cough
  - Increase in wheezing or clearing of breath sounds if patient has improved aeration
  - Improved aeration
  - Comparison of work of breathing before and after treatment (respiratory rate, pattern of breathing and accessory muscle use)
  - Evaluation of effectiveness of cough/ability to produce sputum

References:

For Metered Dose Inhaler Administration, go to the AARC website, www.aarc.org and click on Resources, then click on Clinical Practice Guidelines and finally, scroll down to the following CPG for review: *Aerosol delivery device selection for spontaneously breathing patients (2012)*

Or click on this link:
https://www.aarc.org/wp-content/uploads/2014/08/aerosol_delivery_2012.pdf

Kacmarek, Stoller, Heuer (2017). Egan's Fundamentals of Respiratory Care, 11th Edition. St. Louis, MO: Elsevier. Pages 1-1372.

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PERFORM PULSE OXIMETRY

Procedural steps:	RATINGS Lab/Peer	Lab/Instr	Clinical	Clinical	Clinical
1. Reviews medical record, verifies order for therapy, and completes patient assessment form					
2. Explains theory of operation of a pulse oximeter and the goal of the procedure					
3. Locates and selects appropriate equipment					
4. Disinfects hands before and after therapy, following standard precautions					
5. Identifies patient by wristband and/or electronic identification					
6. Introduces self/instructor to patient and explains procedure					
7. Assesses vital signs and listens to breath sounds anteriorly and posteriorly					
8. Determines the FIO_2 and assures the patient has been on the ordered FIO_2 for a minimum of 15 minutes					
9. Properly sets up oximeter and selects site with adequate perfusion					
10. Monitors patient's pulse to assure accurate tracking by pulse oximeter					
11. After allowing a minimum of 10 seconds for stabilization, assures strong signal and records the SpO_2					
12. Removes probe and stores oximeter properly					
13. Documents therapy appropriately in medical record					
14. Reports to other members of the interdisciplinary care team regarding the therapy as necessary					
Total:	**__/28**	**__/28**	**__/28**	**__/28**	**__/28**

Pulse Oximetry FAQ's

Knowledge and Technical Skills Expectations:

- What are the common indications for pulse oximetry?
  - To monitor the adequacy of oxygenation
  - To determine a patient's response to oxygen therapy
  - To satisfy requirements for reimbursement by health care insurers
- What are some of the precautions/hazards/limitations of relying on pulse oximetry?

- Overestimation of hemoglobin saturation in presence of abnormal hemoglobins and excessive bright light
- Underestimation of hemoglobin saturation in patients with anemia or in the presence of some vascular dyes
- Poor signal quality in presence of poor perfusion, excessive motion, dark nail polish or artificial nails
- Fetal hemoglobin and high bilirubin have been proven to have NO EFFECT on the accuracy of pulse oximetry values

Pulse oximetry is contraindicated when there is a need to also evaluate acid-base balance or whenever there is known presence of abnormal hemoglobins.

- Describe the theory of operation for the pulse oximeter.
  - ***Principles of spectrophotometry and photoplethysmography:*** A pulse oximeter is a device which combines these two principles by transmitting 2 wavelengths of light, red (660 nm) and infrared (940 nm) across the chosen tissue bed and a photodetector on the other side measures the light not absorbed by the tissues. Oxygenated hemoglobin will absorb more infrared light, whereas deoxygenated hemoglobin will absorb more red light. A comparison of these light absorbencies is made between when tissues are at a baseline (diastole) and when they are at a pulsatile phase (systole) for each of the two wavelengths. An accurate pulse oximetry value requires that the device can recognize peak systolic waveforms that allow sampling only at times when there is increased arterial blood in the tissues (peak systolic waveform).
  - ***Difference between functional and fractional hemoglobin saturations and which one is measured by a pulse oximeter***: Fractional hemoglobin saturation is obtained by actually measuring oxygenated hemoglobin and dividing by the total of four common forms of hemoglobin (O2Hb, HHb, COHb and MetHb). This can only be performed by a CO-Oximeter. Functional hemoglobin saturation is calculated by measuring oxygenated hemoglobin and then dividing by the concentration of hemoglobin that is capable of carrying oxygen (O2Hb + HHb). Functional hemoglobin saturation is what a pulse oximeter is capable of estimating.
  - ***How accurate can you expect a pulse oximeter to be under optimal conditions?*** Pulse oximeter values, at best, are within +/- 3-5% of the actual arterial saturation. Furthermore, when true arterial saturation falls below 80%, pulse oximetry readings cannot be relied onto be accurate. Whenever possible, the practitioner should correlate initial SpO2 measurements with an arterial blood gas to validate the accuracy of the SpO2.
- What types of equipment concerns are unique to the assessment of pulse oximetry?
  - ***Pulse waveforms/pulse amplitude bar:*** All pulse oximeters utilize a display for the practitioner to assess whether the unit is tracking the patient's pulse adequately. This is usually through the use of an "arterial-like" pulse waveform or a vertical pulse amplitude bar. Pulse oximetry data should only be trusted when the waveform or pulse bar is adequate and the pulse displayed matches a palpated pulse within approximately 5 beats/minute.
  - ***Probe type:*** Selection of type of probe will depend in part on the peripheral perfusion status and activity of the site (motion artifact)
  - ***Non-disposable finger clip probe:*** One of the most commonly used probes due to ready access to fingers; limited by motion artifact and perfusion of extremities
  - ***Non-disposable ear clip probe:*** Often used when low perfusion limits the use of finger probes; limited by motion artifact and perfusion to the ears

- ***Adhesive wrap probes:*** Especially useful when motion artifact is a problem with clip probes; limited because of increased expense and occasionally by allergies to adhesive
- ***Alarms:*** Continuous pulse oximeters are designed with a variety of alarm features. The most common alarms are for high and low SpO2 and for high and low heart rates. The most important alarm is the low SpO2 alarm which is recommended to be set between 88-92% for most adults and children. However, you should consult with the patient's primary physician to ascertain what minimum oxygen saturation level is acceptable. It is often written within the patient's oxygen therapy order to provide "oxygen to maintain SpO2 > _____%".

- What essential assessments are needed to evaluate the reliability of pulse oximetry data?
  - Assessment of pulse assuring strong correlation of palpated pulse and pulse detected by oximeter
  - Assessment of patient's color
  - Assessment of patient's work of breathing
  - Evaluation of subjective measures (patient statements)

****Never believe a pulse oximeter value that isn't consistent with the clinical appearance of the patient. A healthy respect for the limitations of this device should always lead the practitioner to recommend obtaining an arterial blood gas when in doubt.***

References:

Kacmarek, Stoller, Heuer (2017). Egan's Fundamentals of Respiratory Care, 11th Edition. St. Louis, MO: Elsevier. Pages 1-1372.

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ADMINISTER HYPERINFLATION THERAPY
ADJUNCTS: i.e. IS, IPPB, PAP

Procedural steps:	RATINGS Lab/Peer	Lab/Instr	Clinical	Clinical	Clinical
1. Reviews medical record, verifies order for therapy, and completes patient assessment form					
2. States goal of therapy and any potential side effects					
3. Locates and selects appropriate equipment					
4. Disinfects hands before and after therapy, following standard precautions					
5. Identifies patient by wristband and/or electronic identification					
6. Introduces self/instructor to patient and explains procedure					
7. Assembles necessary equipment					
8. Assesses vital signs and listens to breath sounds anteriorly and posteriorly					
9. Positions patient appropriately for therapy					
10. Initiates therapy utilizing appropriate techniques according to equipment specifications					
11. Instructs patient in proper relaxation and breathing techniques (proper use of diaphragm and breath holds)					
12. During therapy, estimates patient's inspiratory capacity and pattern of breathing (assures patient does not hyperventilate)					
13. Instructs patient on effective coughing techniques (explosive cough vs. huff cough and splinting)					
14. Terminates treatment at appropriate time and repositions patient as necessary					
15. Reassesses vital signs and breath sounds after therapy					
16. Disassembles equipment and stores appropriately					
17. Documents therapy appropriately in medical record					
18. Reports to other members of the interdisciplinary care team regarding the therapy as necessary					
Total:	**__/36**	**__/36**	**__/36**	**__/36**	**__/36**

Incentive Spirometry/Coughing & Deep Breathing FAQ's

Knowledge and Technical Skills Expectations:

- ***What are the common indications for incentive spirometry and coughing & deep breathing patients?***

  - ✓ To treat pulmonary atelectasis
  - ✓ To mobilize retained pulmonary secretions
  - ✓ To prevent post-operative pulmonary complications (especially for patients undergoing upper abdominal or thoracic surgery or in patients with COPD undergoing surgery)

- ***What are some of the precautions/hazards associated with incentive spirometry and coughing & deep breathing patients?***

  - ✓ This may be inappropriate therapy for patients who cannot cooperate due to poor pain management, excessive muscle weakness, need for more aggressive therapy or altered levels of consciousness.
  - ✓ Hypoxemia may limit a patient's ability to cooperate
  - ✓ Deep breathing and coughing could exacerbate bronchospasm requiring other therapy
  - ✓ Unstable surgical incisions, pulmonary air leaks, rib fractures and other forms of trauma may be contraindications for this type of therapy
  - ✓ Temporary hyperventilation may occur during therapy resulting in dizziness, numbness and tingling sensations and even altered sensorium
  - ✓ Unstable head, neck, spinal, thoracic or abdominal injuries may be contraindications for this type of therapy (i.e. elevated intracranial pressures)
  - ✓ Neuromuscular weakness whether pathologic or pharmacologic would usually require more aggressive forms of therapy
  - ✓ Incentive spirometry is contraindicated when a patient's vital capacity is < 10 mL/kg of body weight or when their inspiratory capacity is < 1/3 of their predicted value which warrants more aggressive therapy

  ****Incentive spirometry and coughing & deep breathing patients requires that a patient is alert and oriented and can follow simple directions in order to be successful.***

- ***What types of equipment or techniques are used to perform incentive spirometry and coughing & deep breathing?***

  - ✓ **Incentive spirometers** – Incentive spirometers are either volume-oriented or flow-oriented devices that provide a visual cue to motivate patients to breathe more deeply. They are not accurate reflections of a patient's actual volume inhaled, but rather an approximation that is used as a stimulus to improve. Most devices consist of a clear plastic tube with a ball or disk inside. The patient breathes through a mouthpiece and corrugated tubing attached to it and upon a slow, deep inspiration the ball or disk is raised up to a level with reference values marked on the side. The therapist sets a volume or flowrate goal for the patient each day and recommends that the patient try to use the incentive spirometer every hour for 5-10 maximal inspirations

  - ✓ **Directed cough** – A directed cough is a technique of breaking down the explosive type of cough into its individual steps as follows:

    - Maximal inspiration
    - Breath hold (closure of the glottis)

- Contracting of the abdominal muscles against closed glottis to build up pressure
- Opening of glottis and forcefully expelling the air
- By introducing each step, the practitioner can identify what portion of the cough is problematic and provide remedial instruction.

✓ **Huff cough (Forced Expiratory Technique)** - The huff cough or FET is a technique used especially in patients with COPD or any form of bronchial hyper-reactivity. Huffing requires the individual to perform rapid, forced expirations without closing the glottis. This maneuver is also performed from mid to low lung volumes rather than following a maximal inspiration in order to prevent the tendency for air trapping. Relaxed, diaphragmatic breathing should follow each huffing attempt.

✓ **Assisted cough** – This is a maneuver much like the abdominal thrust used to clear an obstructed airway in CPR. Assisted coughs should be reserved for patients with neuromuscular compromise of their abdominal muscles (patients with quadriplegia or neuromuscular diseases that result in significant muscle weakness). The practitioner places the palms of their hands, one on top of the other, in the epigastric region and when the patient closes their glottis after their maximal inspiratory effort, an inward and upward thrust helps produce the forced expiratory assisted cough. Great caution must be taken with this maneuver. It must not be performed on unconscious patients that cannot protect their airway. It also must never be performed on patients with abdominal aortic aneurysms, hepatomegaly, hiatal hernia or any other form of abdominal pathology.

✓ **Splinting** – This is a technique used to provide support to surgical incisions during coughing. Patients are encouraged to sit upright with bent knees and a pillow or blanket roll is held firmly against their incision to minimize pain while coughing. Pressure is applied firmly, but gently during the expiratory phase of the cough only, so as to not reduce the patient's maximal inspiratory effort.

➢ ***What essential assessments are needed to evaluate the appropriate response to incentive spirometry and coughing & deep breathing?***

✓ Comparison of breath sounds before and after therapy
- Improved aeration
- Reduction in wheezing/rhonchi if patient had a productive cough

✓ Comparison of work of breathing before and after therapy (respiratory rate, pattern of breathing and accessory muscle use)
✓ Comparison of heart rate before and after therapy
✓ Improved oxygenation indices ($\uparrow PaO_2$, $\uparrow SpO_2$ and $\downarrow P_{(A-a)}\ O_2$)
✓ Restoration of pre-operative vital capacity or inspiratory capacity to acceptable levels
✓ Comparison of chest x-rays looking for resolution of atelectasis or infiltrates

References:

For Incentive Spirometry and Coughing & Deep Breathing go to the AARC website, www.aarc.org and click on Resources, then click on Clinical Practice Guidelines and finally scroll down to the following CPG's for review:

Incentive Spirometry
Directed Cough

Kacmarek, Stoller, Heuer (2017). *Egan's Fundamentals of Respiratory Care,* 11th Edition. St. Louis, MO: Elsevier. Pages 1-1372.

Intermittent Positive Pressure Breathing FAQ's
Knowledge and Technical Skills Expectations:

- ***What are the common indications for IPPB therapy?***

  - ✓ To treat pulmonary atelectasis unresponsive to other therapies (i.e. IS, PEP, CPT, CPAP, etc.)
  - ✓ To improve the effectiveness of a patient's cough and assist in mobilizing secretions
  - ✓ To provide short-term ventilatory support to treat hypoventilation and prevent intubation in patients with respiratory muscle fatigue or neuromuscular compromise (i.e. spinal cord injuries, muscular dystrophy, kyphoscoliosis, etc.)
  - ✓ To improve pulmonary function (when patient's VC is < 10 mL/kg, FEV_1 < 65% or FVC is < 70% acutely)

- ***What are some of the precautions/hazards of IPPB therapy?***

  - ✓ Hyperventilation (hypocarbia)
  - ✓ Gastric distension (rarely a risk unless inspiratory pressures are > 20 cmH_2O)
  - ✓ Air trapping/hyperinflation (generally only a problem with patients with obstructive lung diseases)
  - ✓ Bronchospasm
  - ✓ Barotrauma/pneumothorax
  - ✓ Hemoptysis
  - ✓ Decreased venous return
  - ✓ Increased intracranial pressure
  - ✓ Increased V/Q mismatch
  - ✓ Nosocomial infection
  - ✓ Psychological dependence

- ***What types of equipment/techniques are used to administer IPPB therapy?***

  - ✓ **IPPB Device** – generally a pneumatically driven device that is patient triggered, pressure cycled and usually designed to deliver FIO2's > 0.40

  - ✓ **IPPB Circuitry –** includes large bore tubing, a nebulizer/exhalation valve manifold and mouthpiece or artificial airway connector (treatment usually given while nebulizing 5 mL of normal saline solution)

  Spirometer (Volume Measuring Device) – necessary to objectively measure and determine effectiveness of therapy. A patient's inspiratory capacity can be predicted as ~50 mL/kg. The minimum delivered volume with IPPB should approximate 1/3 of the predicted IC of the patient. Another rule of thumb suggests measuring the patient's spontaneous V_t before IPPB and you should be able to deliver a volume that is 25% greater with the IPPB to justify its use

  - ✓ **Initial Recommended Settings:**
    - Inspiratory pressure setting of 10-15 cmH_2O
    - Sensitivity set so patient can trigger with minimal effort (~ negative 1-2 cmH_2O)
    - Encourage ventilatory rate of 6-10 breaths/min
    - Volume goal should be 1/3 of predicted IC

- Lowest FIO_2 reasonably available or FIO_2 closest to patient's current oxygen therapy
- Terminate treatment when patient consistently meets goal(s) of therapy, experiences side effects that limit ability to continue or have continued treatment for 15-20 minutes

✓ **Common Troubleshooting:**
- Patient can't initiate breath – increase the sensitivity control
- Patient can't cycle breath into expiration – look for leaks, decrease pressure or increase flow
- Pressure drops or draws negative as inspiration begins – increase flowrate setting
- Pressure rises too rapidly and cycles into expiration – decrease flowrate setting, increase pressure
- Volumes measured are below expected – increase pressure, decrease flowrate setting, encourage diaphragmatic breathing and discourage accessory muscle use
- Patient complains of dizziness or numbness/tingling in extremities – patient is hyperventilating; stop treatment temporarily, encourage patient to breathe slowly and resume therapy after several minutes as tolerated by the patient

➢ ***What essential assessments are needed to evaluate the appropriate use of IPPB therapy?***
- ✓ Comparison of work of breathing before and after therapy (R.R., pattern of breathing and accessory muscle use)
- ✓ Comparison of heart rate before and after therapy
- ✓ Comparison of breath sounds before and after therapy:
  - Improved aeration
  - Reduction in rhonchi/wheezing especially if patient had a productive cough
- ✓ Evaluation of effectiveness of cough/ability to produce sputum
- ✓ Comparison of inspiratory capacity (IC) before, during and after therapy
- ✓ Improvement in CXR findings (i.e. reduction in or resolution of pulmonary atelectasis)

For additional references on IPPB Therapy, go to the AARC website, www.aarc.org and click on Resources, then click on Clinical Practice Guidelines and finally, scroll down to the following CPG for review:

Kacmarek, Stoller, Heuer (2017). *Egan's Fundamentals of Respiratory Care,* 11th Edition. St. Louis, MO: Elsevier. Pages 1-1372.

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PERFORM A PULMONARY EXAM

Procedural steps:	RATINGS Lab/Peer	Lab/Instr	Clinical	Clinical	Clinical
1. Reviews medical record and completes patient assessment form					
2. Disinfects hands before and after therapy, following standard precautions					
3. Identifies patient by wristband and/or electronic identification					
4. Introduces self/instructor to patient and explains procedure					
5. Positions patient comfortably in an upright position (seated at edge of bed, sitting in a chair)					
6. Assesses vital signs					
7. Begins chest assessment with general inspection including observing for: General appearance/size of patient Level of consciousness Posture, thoracic deformities, scars Color, presence of any clubbing Ventilatory pattern Speech					
8. Continues chest assessment with palpation to evaluate: Position of trachea Bilateral expansion of rib cage Anterior to posterior diameter of chest wall Use of diaphragm Use of accessory muscles Presence of tactile fremitus					
9. Continues chest assessment with percussion to identify: Normal landmark positions of heart, liver, stomach and diaphragm Pitch of resonance over lung fields					
10. Continues chest assessment with auscultation to identify: Normal or abnormal breath sounds over each lobe Abnormal breath sounds based on what phase of breathing (inspiratory or expiratory)					
11. Upon completion of chest assessment, assures patient is comfortable and thanks them for their participation					
12. Completes the Chest Physical Assessment form completely and accurately and discusses findings					
Total:	__/24	__/24	__/24	__/24	__/24

PERFORM PULMONARY EXAM:

I. OBSERVATION

Size

_____ Frail
_____ Average
_____ Overweight
_____ Obese

State of Sensorium

____ Alert and oriented
____ Anxious
____ Disoriented and confused/Obtunded
____ Lethargic
____ Semi-comatose
____ Comatose

Speech

_____ Normal
_____ Increased work of breathing while speaking
_____ Unable to speak more than three words between breaths

Posture

_____ Normal breathing in any position
_____ Orthopneic (explain) _____
_____ Thoracic deformities (explain) _____
_____ Surgical scars (explain) _____

Color

	NORMAL	DUSKY	CYANOTIC	
Nailbeds (all extremities)	_____	_____	_____	Clubbing _____
Lips	_____	_____	_____	
Tongue	_____	_____	_____	
Tragus of ear	_____	_____	_____	

Ventilatory Pattern

Tidal Volume

___ Less than 300cc (less than 5cc/lb. of ideal body wt.)
___ Approximately 5cc/lb. of ideal body wt.
___ Greater than 700cc (greater than 5cc/lb. of ideal body wt.)

Frequency

___ Less than 8/minute (bradypnea)
___ 10-20/minute
___ Greater than 20/minute (tachypnea)

Consistency

___ Regular
___ Irregular
___ Periods of apnea (explain) _____
___ Cheyne-Stokes
___ Biot's
___ Kussmaul

I:E Ratio

___ Approximately 1:2
___ Less than 1:2
___ Greater than 1:2

Subjective views

___Complains of dyspnea
___ Complains of tightness in chest
___ Complains of chest pain
___ Other (explain) _____

Position of Trachea

_____ Midline
_____ Shifted left
_____ Shifted right

Temperature
_____ Afebrile
_____ Febrile _____ ˚F
_____ Diaphoretic
____ Extremity circulation (Pulses, temperature, etc. - explain) _____

Activity Level
____ Ambulatory
____ Assisted ambulation (x/day) _____
____ Up in chair (x/day)
____ Bedrest
____ Physical therapy (x/day) _____
____ Occupational therapy (x/day) _____
____ Other activities (explain) _____

II. PALPATION

Bilateral Expansion	Symmetrical (equal)	Asymmetrical (unequal)	Diminished
Apices	_____	_____	_____
Bases	_____	_____	_____

Anterior-Posterior Diameter
____ Normal
____ Increased

Use of Diaphragm
____ Normal bilateral excursion
____ Decreased excursion on the ____ Right, ____ Left or ____ Bilaterally

Use of Accessory Muscles
____ Use of sternocleidomastoid muscle seen on inspiration
____ Use of pectoralis major muscle seen on inspiration
____ Use of abdominal muscles seen on expiration
____ Intercostal retractions seen on inspiration

Tactile Fremitus (have patient say "99", while palpating the chest wall)
____ Normal
____ Increased (specify over what lobe or lobes) _____
____ Decreased (specify over what lobe or lobes) _____
____ Absent (specify over what lobe or lobes) _____

III. PERCUSSION

Location of specific landmarks by percussion for normal or abnormal position. If abnormal, explain:

	Normal	Dull	Hyperresonant	Tympanic
Heart	____	____	____	____
Liver	____	____	____	____
Diaphragm	____	____	____	____
Abdomen	____	____	____	____
RUL	____	____	____	____
RML	____	____	____	____
RLL	____	____	____	____
LUL	____	____	____	____
LLL	____	____	____	____

IV. AUSCULTATION

Identify and demonstration positions of all lobes and segments on your assigned patient:

Right Lung				**Left Lung**
Apical				**A**pical-posterior
Posterior	← **RUL**	**UPPER LOBES**	**LUL** →	**A**nterior
Anterior				
Lateral	←**RML**	**MIDDLE LOBES**	**Lingula** →	**S**uperior-lingular
Medial				**I**nterior-lingular
Posterior basal				**P**osterior basal
Anterior basal				**A**ntero-medial basal
Lateral basal	←**RLL**	**LOWER LOBES**	**LLL** →	**L**ateral basal
Medial basal				**S**uperior basal
Superior basal				

Identify the presence of the following breath sounds and specify over what lobes they were heard, using the abbreviations of RUL, RML, RLL, LUL, & LLL and specify during what phase of ventilation they are heard:

____ Vesicular (normal) _____
____ Bronchial (tubular) _____
____ Decreased _____
____ Absent _____
____ Crackles (rales) _____
____ Rhonchi _____
____ Wheezes (bronchospasm) _____
____ Pleural friction rub _____
____ Stridor _____
____ Other (explain) _____

IMPRESSION

According to the data recorded above and your knowledge of this patient's history, interpret your results to aid in a chest physical diagnosis:

Also see this video from the University of Alabama at Birmingham: https://www.youtube.com/watch?v=rrsnaVoZklU

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DEMONSTRATE CYLINDER SAFETY

Procedural steps:	RATINGS Lab/Peer	Lab/Instr	Clinical	Clinical	Clinical
1. Locates and selects appropriately sized cylinder for transport situation					
2. Opens and closes cylinder valve (cracking the cylinder) and places cylinder in cylinder truck using appropriate safety precautions					
3. Locates appropriate regulator and attaches it to the cylinder utilizing appropriate safety precautions					
4. States the type of regulator and flow metering device being used					
5. Opens cylinder valve and states cylinder pressure					
6. Calculates how long the cylinder will last running at a given oxygen flow rate					
7. Describe safety precautions necessary when using oxygen cylinders for transport					
8. Attaches proper oxygen delivery device to cylinder and assures proper function					
9. Removes oxygen delivery device and regulator from cylinder and returns all equipment to proper storage					
Total:	**__/18**	**__/18**	**__/18**	**__/18**	**__/18**

O_2 Transport with Cylinder & Regulator FAQ's

Knowledge and Technical Skills Expectations:

- ***What are the common indications for oxygen transport with a cylinder and regulator?***

  - ✓ To transport patients who are on continuous forms of oxygen therapy within the hospital
  - ✓ To provide emergency oxygen therapy when a wall oxygen outlet is not readily available
  - ✓ To transport patients on continuous forms of oxygen therapy outside of the hospital (i.e. when patients go out on pass or are transferred to other health care facilities or to their homes)
  - ✓ To provide patients mobile oxygen use when on home oxygen therapy

- ***What are some of the precautions/hazards associated with the use of oxygen by cylinder and regulator for transport?***
  - ✓ Oxygen supports combustion and will accelerate fires, thus cannot be used near any open flame or where sparks could be generated
  - ✓ Cylinders should be stored and used in areas that will not expose them to excessive heat (>110^{o}F)

- ✓ Cylinders with or without attached regulators must be move with care to avoid tipping them over or dropping them, which could cause leaking or in a worst case scenario, an explosive, missile-like projectile
- ✓ Cylinders should not be used for transport oxygen therapy into an MRI scanner, as the strength of the magnetic field could pull the cylinder into it, placing the patient at great risk of injury
- ✓ Cylinders must be properly secured at all times, either in a stand, chained to a wall or in a cylinder cart (truck) to avoid tipping over
- ✓ Prevent gas leaks by assuring all regulator connections are secure, using new washers with each cylinder change
- ✓ Depending on the regulator used, the flowrate displayed may NOT reflect the actual flow being delivered to the patient – KNOW YOUR EQUIPMENT!

➢ ***What types of equipment are used for oxygen transport with a cylinder and regulator?***

Cylinder markings – common markings on the shoulder of a cylinder include the type of metal (3A, 3AA, & 3AL), the service pressure (2015 psig), **+** means that the cylinder can be filled to 10% above the service pressure (2200 psig), ***** means the cylinder received approval to be retested every 10 years rather than every 5 years, DOT (Dept. of Transportation) as the regulatory agency

- ✓ **Safety Systems**
  - **ASSS** – American Standards Safety System regulates all high pressure (>200 psig) connections for large cylinders (F & H/K) – they regulate number of threads, internal vs. external threading and right vs. left threading for specific gases
  - **DISS** – Diameter Index Safety System regulates low pressure (<200 psig) connections for large cylinders (F & H/K) by regulating threading as above. DISS connections are found after the reducing valves on regulators, on flowmeters and on wall outlets/quick connects for central piping systems
  - **PISS** – Pin Index Safety System regulates high pressure (>200 psig) connections for small cylinders (AA & E). The cylinder yoke has two holes (gas specific) that receives pins from the regulator necessary to properly seat the regulator for that specific gas (the pin positions for oxygen are 2 & 5)
- ✓ **Volume-pressure conversions** - cylinder factors are derived from known volume of gas in cubic feet ($ft.^3$) in each common cylinder size when filled to 2200 psig as follows:

$$\frac{\text{cubic feet} \times 28.3}{2200 \text{ psig}} = \text{Cylinder conversion factor}$$

*Each cubic foot will contain 28.3 liters of gas

E cylinder = 22 ft^3, 622 L, yields a cylinder conversion factor of ***0.28***

H/K cylinder = 244 ft3, 6900 L, yields a cylinder conversion factor of ***3.14***

- ✓ **Cylinder Duration** – using the cylinder factor, you can calculate how long the cylinder will last at the pressure it has at the beginning of its use

E cylinder = $\frac{\text{psig pressure displayed on the regulator x factor (.28)}}{\text{liter flow to oxygen therapy device}}$

H/K cylinder = $\frac{\text{psig pressure displayed on the regulator x factor (3.14)}}{\text{liter flow to oxygen therapy device}}$

✓ **Color Coding – U.S.**

* Oxygen	Green
* Carbon dioxide	Gray
* Nitric oxide	Teal/white
* Nitrous Oxide	Blue
* Helium	Brown
* CO_2/O_2	Gray/Green
* He/O2	Brown/Green
* Nitrogen	Black
* Air	Yellow
* N_2/O_2	Black/Green

✓ **Regulators** – reduce cylinder pressures down to the usual "working pressure" of 50 psig that is compatible with most medical equipment

- **Bourdon gauge regulator** – an adjustable regulator combined with a flow metering device which measures pressure but displays flow. Advantage – not gravity dependent, can read flow while laying down. Disadvantage – will not read accurately when there is downstream resistance

- **Preset regulator with Thorpe tube flowmeter** – this is a regulator that has a preset reducing valve which reduces cylinder to the 50 psig and then it is usually combined with a pressure-compensated Thorpe tube flowmeter to provide accurate metering of oxygen flow to the patient. Advantage – very accurate flows even in the face of downstream resistance. Disadvantage – must remain vertical to read the flowrate setting.

- **Preset regulator with variable flow restrictors** – these are regulators that have a reducing valve to reduce cylinder pressure down to 50 psig. This pressure then flows through a fixed resistance (orifice) that allows only a calibrated amount of flow out. A dial adjusts the orifice size from the 0-6 or 1-15 L/min equivalent. Advantage – very inexpensive and very small in size. Disadvantage – will not reflect accurate flowrate readings against downstream resistance.

➢ ***What essential assessments are needed to evaluate appropriate use of oxygen transport with a cylinder and regulator?***

✓ Evaluate the patient's order for oxygen therapy
✓ Review most recent oximetry and vital signs data
✓ Assessment of pulse
✓ Assessment of color
✓ Assessment of work of breathing

- ✓ Determine the length of time patient is to be using transport oxygen
- ✓ Select most appropriate oxygen therapy device for the transport
- ✓ Calculate how long the cylinder will last given the cylinder pressure and the liter flow of the oxygen therapy device
- ✓ Inform transport personnel about necessary safety precautions and how long oxygen supply will last (provide them with a phone number or beeper number to contact for help)

Reference:

Kacmarek, Stoller, Heuer (2017). *Egan's Fundamentals of Respiratory Care,* 11th Edition. St. Louis, MO: Elsevier. Pages 1-1372.

Madison College – Respiratory Therapy Program
Clinical Skill Competency Checklist

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Six Minute Walk Test (aka 6MWT)

Procedural steps:	RATINGS Lab/Peer	Lab/Inst	Clinical	Clinical	Clinical
1. Reviews medical record, verifies order for therapy					
2. Locates and selects appropriate equipment: SEE LIST provided in FAQ'S					
3. Prepare the area by applying markers such as cones for the endpoints and 10 ft. intervals, or a walking tape or another distance measuring device may be used.					
4. Disinfects hands before and after therapy, following standard precautions					
5. Identifies patient by wristband and/or electronic identification					
6. Introduces self/instructor to patient and explains procedure					
7. Assesses vital signs: BP, HR, SpO2 and listens to breath sounds anteriorly and posteriorly					
8. Explain the use of the modified Borg scale (0-10) for assessing breathlessness.					
9. Documents baseline vitals appropriately in medical record					
10. Reassesses patient's vital signs during testing as necessary (i.e. if WOB changes or patient appears in any distress)					
11. Terminates test at appropriate time and provides patient with rest and O2 as necessary					
12. Records distance at which the oxygen saturation drops < 88%.					
13. Documents end of test data appropriately in medical record					
14. Reports to other members of the health care team regarding the therapy as necessary					
15. Disassembles equipment and stores appropriately					
Total:	**__/30**	**__/30**	**__/30**	**__/30**	**__/30**

Six Minute Walk FAQ's

Knowledge and Technical Skills Expectations:

The Six Minute Walk is an assessment of lung function. Usually the walk should follow shortly after bronchodilation (for participants with COPD and/or asthma). It can be referred to as the "**6MWT"** on the TMC and CSE exams.
The testing area must be a **100 ft. segment of straight, unimpeded hallway with 10 ft. markers.**
Prepare the area by applying markers such as cones for the endpoints and 10 ft. intervals to the baseboard on one side of the hall. You may also use a walking tape or another distance measuring device.

Gather the following materials:

- ✓ stopwatch/timer
- ✓ worksheet
- ✓ oximeter
- ✓ Borg scale sheet
- ✓ a chair that can be easily moved along the walking course
- ✓ emergency equipment (according to local policy)
- ✓ telephone
- ✓ Sphygmomanometer
- ✓ oxygen tank and O2 device
- ✓ Measuring tape, walking tape, or other type of distance measuring device

A "warm-up" period before the test **should not be performed.**
Participants should use their usual walking aids during the test (cane, walker, etc.) and be dressed in comfortable clothing and walking shoes.
In general, it is preferable to use room air. If the participant is on long-term oxygen therapy with a resting saturation off oxygen of less than 88%, supplemental oxygen may be used during the test.
Prior to the test, the participant should sit in a chair, located near the starting position for at least 10 minutes before assessing pulse and SpO2 (and Blood Pressure if not taken and recorded within 4 hours prior to test).

****If resting SpO2 is < 88% the participant is not eligible to continue the test (exception noted above for participants on long-term oxygen therapy).**

Explain the use of the **modified Borg scale (0-10) for assessing breathlessness**.
If available record the distance at which the oxygen saturation drops < 88%.

Discontinue testing if:

- systolic BP is > 200mmHg or < 60mmHg, or diastolic blood pressure > 110mmHg
- If resting heart rate is > 120 or < 50 beats per minute
- if SpO2 falls below 80%
- the participant asks to stop the test
- if the participant experiences chest pain
- intolerable dyspnea
- leg cramps
- staggering
- diaphoresis
- pale or ashen appearance

SIX MINUTE WALK TEST WORKSHEET

Name:_____ **DOB:**_____ **Test date:**_____
Gender: M/F Race _____
Height ____**ft** ____**in Weight** _____**lbs.**

Medications taken before the test (dose and time)

_____

_____

Supplemental O2: no yes ____ L/min **Assistive device:** no yes _____

Pre-Test Baseline	***End of Test***
BP_____	**BP**_____
HR _____	**HR** _____
SpO2_____	**SpO_2**_____
Dyspnea (Borg) _____	**Dyspnea (Borg)** _____

Stopped or paused before 6 minutes completed? No Yes, reason_____

_____

Other symptoms at the end of test: angina dizziness hip, knee, calf pain
other _____

distance walked in 6 minutes: _____ **feet**
distance at which the oxygen saturation drops < 88%: _____
Comments:_____
Technician: _____

Table 3. Revised Borg Scale For Grading Severity Of Dyspnea.

0	Nothing at all
1	Just noticeable
2	Very slight
3	Slight
4	Slight-moderate
5	Moderate
6	Some difficulty
7	Moderately severe
8	Severe
9	Very severe
10	Panic level, maximal shortness of breath

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ADMINISTER BRONCHIAL HYGIENE ADJUNCTS
(IPV, PEP/FLUTTER, HFCWO, METANEB, AEROBIKA, INEXSUFFLATOR)

Procedural steps:	RATINGS Lab/Peer	Lab/Instr	Clinical	Clinical	Clinical
1. Reviews medical record, verifies order for therapy					
2. States indications for therapy (reviewing patient's arterial blood gases) and identifies any potential side effects					
3. Locates and selects appropriate equipment					
4. Disinfects hands before and after therapy, applies gloves and follows standard precautions					
5. Identifies patient by wristband and/or electronic identification					
6. Introduces self/instructor to patient and explains procedure					
7. Assembles necessary equipment and selects appropriate interface					
8. Dispenses medication or solution appropriately					
9. Assesses vital signs and listens to breath sounds anteriorly and posteriorly					
10. Assures patient is comfortably positioned					
11. Initiates therapy and adjusts controls per institution guidelines					
12. Adjusts device application to patient's comfort allowing rest periods and reinstructs patient when necessary					
13. Reassesses vital signs and breath sounds during and after treatment					
14. Encourages cough periodically					
15. Disassembles equipment and stores properly					
16. Documents therapy in medical record accurately and completely					
17. Reports to other members of the interdisciplinary care team regarding the therapy as necessary					
Total:	**__/34**	**__/34**	**__/34**	**__/34**	**__/34**

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SET UP LARGE VOL MED NEBULIZER (CONTINUOUS AEROSOL)

Procedural steps:	RATINGS Lab/Peer	Lab/Instr	Clinical	Clinical	Clinical
1. Reviews medical record, verifies order for therapy					
2. States indications for therapy continuous (bland) aerosol therapy and any potential side effects					
3. Disinfects hands before and after therapy, following standard precautions					
4. Identifies patient by wristband and/or electronic identification					
5. Introduces self/instructor to patient and explains procedure					
6. Checks continuous aerosol therapy equipment for proper flow setting, adequate water supply, heating, tubing connections and application to the patient					
7. Accurately estimates FIO_2, and can identify if it is a high flow or low flow system					
8. Assesses vital signs and listens to breath sounds anteriorly and posteriorly					
9. Analyzes FIO_2 and explains the theory of operation of a Galvanic cell oxygen analyzer					
10. Makes recommendations for changes as necessary					
11. Documents therapy appropriately in medical record					
12. Reports to other members of the interdisciplinary care team regarding the therapy as necessary					
Total:	**__/24**	**__/24**	**__/24**	**__/24**	**__/24**

Continuous (Bland) Aerosol Therapy FAQ's

Knowledge and Technical Skills Expectations:

- ***What are the common indications for continuous (bland) aerosol therapy?***

COOL AEROSOL THERAPY (using sterile water or hypotonic saline)

- ✓ To treat upper airway edema:
  - Subglottic edema (i.e. croup, severe laryngitis, tracheitis, etc.)
  - Post-extubation edema
  - Post-operative management of upper airway surgeries (i.e. cleft palate repair)

- ✓ To help patients mobilize pulmonary secretions
- ✓ **Hypertonic saline aerosol therapy (3-10%)**
  - To induce coughing to obtain sputum specimen (i.e. to assist in diagnosing TB or *pneumocystis jerovecii* less invasively than by bronchoscopy)

HEATED AEROSOL THERAPY

- ✓ To replace heat and humidification to the lower airway when the upper airway is bypassed
  *The use of bland aerosol for humidification of the lower airway when the upper airway has been bypassed is NOT as effective as a heated humidifier or HME type of humidifier

➢ ***What are some of the precautions/hazards of continuous (bland) aerosol therapy?***

- ✓ Bronchospasm or bronchial hyperreactivity
- ✓ Difficulty maintaining adequate temperature of the heated aerosol resulting in inadequate hydration of the lower airway and thickening/retention of pulmonary secretions
- ✓ Risk of infection due to microbial contamination of large reservoir nebulizers (especially heated nebulizers)
- ✓ Overhydration – only probable in infants and small children (continuous aerosols should be replaced by continuous heated humidity)

➢ ***What types of equipment are used to administer continuous (bland) aerosol therapy?***

- ✓ **Large volume nebulizers (LVN)** – these are nebulizers that have a large reservoir capacity (usually 400-2200 mL) and are generally operated from a pneumatic gas source. They can be cool or heated and have a typical aerosol particle size ranging from 2-5 μm. They are designed to be used with aerosol masks, face tents, trach masks/collars, Briggs T-pieces (also called T-adaptors or T-bars). The water used in LVN's must be either sterile or distilled (never tap) and any condensate that collects in the corrugated tubing or water trap must never be drained back into the nebulizer to minimize contamination of aerosol being produced. Furthermore, the CDC recommends changing continuous aerosol equipment every 24 hours due to their increased risk of causing nosocomial infections.

  - **Pneumatic, jet nebulizers**

    - Pneumatically operated from either an oxygen or compressed air flowmeter
    - Typical operating flowrates are 5-15 L/min
    - Air-entrainment venturi system provides variable FIO_2's usually from 0.28-1.00
    - Large capacity reservoirs hold 400-2200 mL depending on brand
    - Available in non-disposable and disposable brands
    - Heaters are available in hot base plate, immersion rod, yolk or donut collar and wrap around designs, but rarely are able to consistently heat aerosol to above 85^{o}F

- ✓ **Ultrasonic nebulizer –** these are electrically operated nebulizers that are available in small battery-powered units for home use or large electrically powered units for use in hospital settings. Ultrasonic aerosols can be very irritating to breathe and can induce coughing and bronchospasm, thus making them ideal for sputum inductions.

- **Electrically powered large volume USN's**

  - Electric current produced high frequency sound wave vibrations
  - High frequency vibrations are applied to a piezoelectric transducer which controls the frequency at 1.35 MHz that is transmitted through the fluid to be nebulized
  - Particle size is controlled by the frequency, while total output is controlled by an amplitude control
  - Typical total fluid output is greater, at up to 6 mL/min
  - Ultrasonic devices should be capable of producing an aerosol with a particle size range of 1-10 μm and an MMAD of 3 μm

➢ ***What essential assessments are needed to evaluate the appropriate response to continuous (bland) aerosol therapy?***

- ✓ Comparison of work of breathing before and after initiation of therapy (respiratory rate, pattern of breathing, accessory muscle use)
- ✓ Comparison of heart rate before and after initiation of therapy
- ✓ Comparison of breath sounds before and after initiation of therapy:
  - Reduction in stridor (cool aerosols)
  - Reduction in rhonchi/wheezing if patient able to cough productively
  - Improved aeration if patient able to mobilize secretions
- ✓ Sputum obtained is evaluated for adequacy for analysis
- ✓ Determine if patient experiences improved comfort (reduction in sore throat, hoarseness, difficulty in coughing, etc.)

References:

For Continuous (Bland) Aerosol Therapy go to the AARC website, www.aarc.org and click on Resources, then click on Clinical Practice Guidelines and finally scroll down to the following CPG's for review:

Bland Aerosol Administration
Delivery of Aerosols to the Upper Airway
Selection of a Device for Delivery of Aerosol to the Lung Parenchyma
Selection of Aerosol Delivery Device

Kacmarek, Stoller, Heuer (2017). *Egan's Fundamentals of Respiratory Care,* 11th Edition. St. Louis, MO: Elsevier. Pages 1-1372

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ADMINISTER CHEST PHYSICAL THERAPY

Procedural steps:	RATINGS Lab/Peer	Lab/Instr	Clinical	Clinical	Clinical
1. Reviews medical record, verifies order for therapy, and completes patient assessment form					
2. States indications for therapy, identifies lobes to be drained and any potential side effects					
3. Disinfects hands before and after therapy, following standard precautions					
4. Identifies patient by wristband and/or electronic identification					
5. Introduces self/instructor to patient and explains procedure					
6. Assesses vital signs and listens to breath sounds anteriorly and posteriorly					
7. Positions patient appropriately to treat affected lung field(s) and assures patient comfort					
8. Instructs patient in proper relaxation and breathing techniques (proper use of diaphragm and breath holds)					
9. Initiates therapy percussing over each affected lobe for 3-5 minutes as tolerated					
10. Solicits cough and assists as necessary					
11. Reassesses patient during treatment as necessary (i.e if WOB changes or patient appears in any distress)					
12. Repeats step 9-11 for each position necessary					
13. Terminates treatment at appropriate time and repositions patient as necessary					
14. Documents therapy appropriately in medical record					
15. Reports to other members of the interdisciplinary care team regarding the therapy as necessary					
Total:	**__/30**	**__/30**	**__/30**	**__/30**	**__/30**

Postural Drainage and Percussion Therapy FAQ's

Knowledge and Technical Skills Expectations:

- ***What are the common indications for postural drainage and percussion therapy?***

Also known as chest physiotherapy, this is a collective term used to describe a variety of techniques used to clear airway secretions and improve distribution of ventilation. These techniques include breathing exercises, directed coughing, postural drainage, chest percussion and vibrations.

- ✓ To treat refractory atelectasis – atelectasis that fails to resolve with routine coughing and deep breathing and incentive spirometry
- ✓ To mobilize retained secretions or assist patients with excessive sputum production (> 25-30 mL/day)
- ✓ To prevent mucus plugging in patients with chronic obstructive pulmonary diseases such as cystic fibrosis, bronchiectasis or chronic bronchitis
- ✓ To improve alveolar ventilation and oxygenation impaired by secretion retention

- ***What are some of the contraindications, precautions, or hazards associated with postural drainage and percussion therapy?***

CONTRAINDICATIONS:

- ✓ Barotrauma or tension pneumothorax including any actively leaking pulmonary air leak (bronchopleural fistulas, subcutaneous emphysema, etc.)
- ✓ Elevated intracranial pressures (> 20 cmH_2O)
- ✓ Unstable head and/or neck injuries
- ✓ Active hemoptysis
- ✓ Unstable hemodynamic status
- ✓ Pulmonary disorders not effectively treated by PD & P (empyema, pulmonary edema, pulmonary emboli, pleural effusions, bronchopleural fistulas, pulmonary abscesses, etc.)
- ✓ Unstable rib fractures or flail chest

PRECAUTIONS OR HAZARDS:

- ✓ Increased risk of vomiting and aspiration (continuous tube feedings should be turned off 1-2 hours before therapy and residual in stomach checked)
- ✓ Increased risk of bleeding with coagulopathies (when platelet count is < 75,000 or patient is on anticoagulant therapy)
- ✓ Increased pain due to recent surgical incisions of thorax or upper abdomen, skin grafts, open wounds or burns
- ✓ Increased risk of fractures from percussion (severe osteoporosis)
- ✓ Hypoxemia resulting from compromised ventilation and/or obstruction with secretions
- ✓ Elevated intracranial pressures due to position changes
- ✓ Bronchospasm or unstable ventilatory status

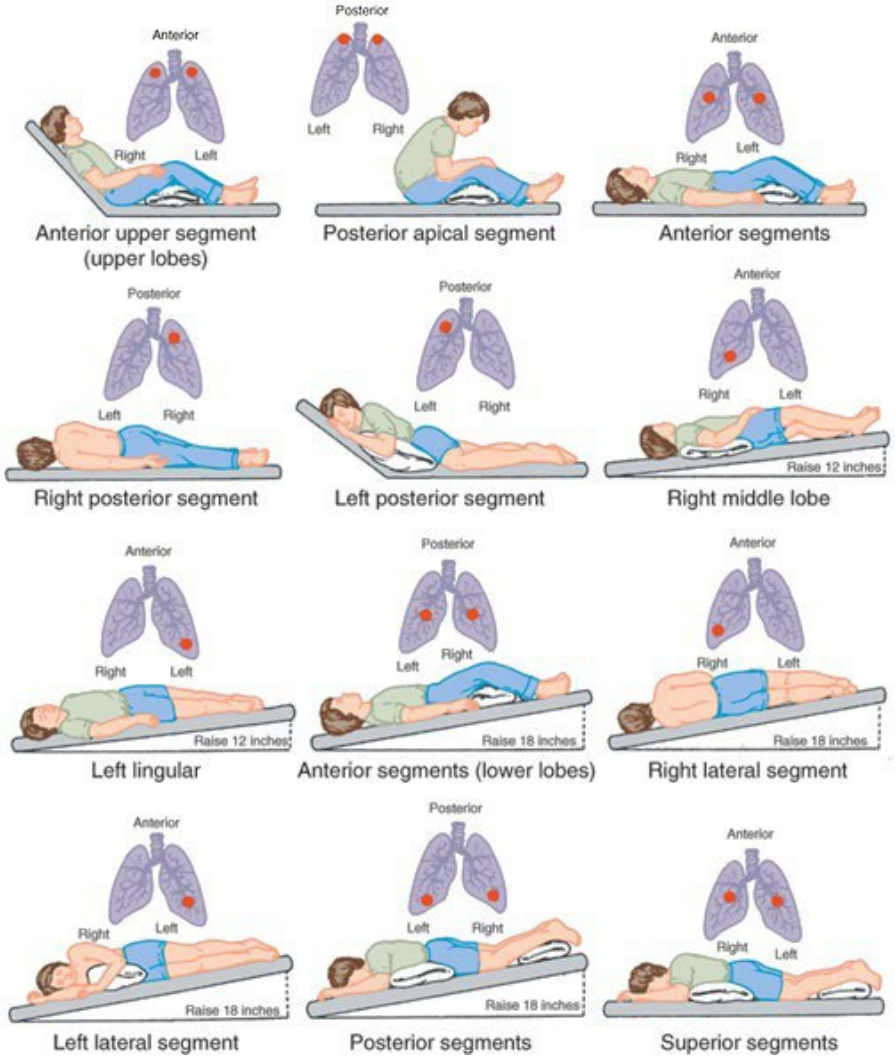
- ***What type of equipment might be used in performing postural drainage and percussion therapy?***

  - ✓ **Manual percussors** – these are soft vinyl or silicone cups (often referred to as palm cups) that fit in the palm on the hand and provide a greater cushioned effect when percussing over the chest wall (available in sizes appropriate for infants up to adults)

  - ✓ **Pneumatic percussors** – these are percussors that operate on a 50 psig gas source and consist of a high pressure hose and a body containing a concave cushioned head that percusses at variable frequencies and depths

  - ✓ **Electrical percussors** – these are percussors that used electricity to operate a small motor that drives a percussion head that moves perpendicular to the chest wall at variable intensities and frequencies (common brand names include the Flimm Fighter, Vibramatic, and the Neocussor, the latter being a small battery-powered unit for use with neonates)

- ***What are the common positions used to drain secretions from the different segments of the lungs?***



- ***What essential assessments are needed to evaluate the appropriate response to postural drainage and percussion therapy?***

  - ✓ Comparison of work of breathing before, during and after therapy (R.R., pattern of breathing and accessory muscle use)
  - ✓ Comparison of heart rate/rhythm before and after therapy
  - ✓ Assessment of oxygenation, especially if there is concern regarding how a patient will tolerate Trendelenburg positioning (SpO_2)
  - ✓ Comparison of breath sounds before and after therapy
    - Reduction in rhonchi, wheezing and possibly crackles, especially if patient had a productive cough
    - Improved aeration
  - ✓ Evaluation of effectiveness of cough/ability to produce sputum
  - ✓ Improvement in CXR findings (reduction in or resolution of pulmonary infiltrates and/or atelectasis)

References:

For Postural Drainage and Percussion Therapy go to the AARC website, www.aarc.org and click on Resources, then click on Clinical Practice Guidelines and finally, scroll down to the following CPG for review:

Postural Drainage Therapy

Kacmarek, Stoller, Heuer (2017). *Egan's Fundamentals of Respiratory Care,* 11th Edition. St. Louis, MO: Elsevier. Pages 1-1372.

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NON-INVASIVE POSITIVE PRESSURE VENTILATION (NIV/BiPAP®/CPAP)

Procedural steps:	RATINGS Lab/Peer	Lab/Instr	Clinical	Clinical	Clinical
1. Reviews medical record, verifies order for therapy, and completes patient assessment form					
2. States indications for therapy (reviewing patient's arterial blood gases) and identifies any potential side effects					
3. Locates and selects appropriate equipment					
4. Disinfects hands before and after therapy, following standard precautions					
5. Identifies patient by wristband and/or electronic identification					
6. Introduces self/instructor to patient and explains procedure					
7. Assembles necessary equipment					
8. Assesses vital signs and listens to breath sounds anteriorly and posteriorly					
9. Assures patient is comfortably positioned					
10. Determines appropriate type & size of mask and secures it appropriately on the patient					
11. Initiates therapy using appropriate initial settings of FIO_2, rate, inspiratory time, pressure levels, slope (rise time) & flows					
12. Adjusts device application to patient's comfort (readjusting mask fitting, flows, etc.)					
13. Sets alarms according to hospital policy					
14. Reassesses vital signs and breath sounds					
15. Reassesses patient after approximately 30 minutes on non-invasive ventilation for adequacy of ventilation (including auscultation, work of breathing and obtaining arterial blood gases as necessary and evaluating acid base balance and oxygenation)					
16. Documents therapy appropriately in medical record accurately and completely					
17. Reports to other members of the interdisciplinary care team regarding the therapy as necessary					
Total :	**__/34**	**__/34**	**__/34**	**__/34**	**__/34**

Non-Invasive Positive Pressure Ventilation (NPPV or NI-PPV) Therapy FAQ's

Knowledge and Technical Skills Expectations:

- ***What are the common indications for NPPV therapy?***

  - ✓ To treat refractory hypoxemia (when hypoxemia fails to respond to administration of high FIO_2's with an appropriate increase in SpO_2 or PaO_2)
  - ✓ To treat obstructive sleep apnea (OSA)
  - ✓ To treat cardiogenic pulmonary edema (CHF) and avoid need for intubation and mechanical ventilation
  - ✓ To provide nighttime respiratory muscle support
  - ✓ To treat or prevent acute respiratory failure and avoid the need for intubation and mechanical ventilation
  - ✓ To assist in mobilizing retained pulmonary secretions consistent with x-ray evidence of atelectasis, mucus plugging or pulmonary infiltrates
  - ✓ To facilitate weaning and prevention of reintubation by providing bilevel support using inspiratory positive airway pressure (IPAP) expiratory positive airway pressure (EPAP) with the difference between IPAP and EPAP as pressure support (PS)

  ****Evidence based research has shown that the duration of the beneficial effects (↑FRC, stabilization or decrease in $PaCO_2$) in the post-operative patient with atelectasis may be limited to as little as 10 minutes after removal of NPPV. Thus, it is recommended that NPPV be used on a continuous rather than an intermittent basis.***

- ***What are some of the contraindications, precautions, hazards or limitations associated with NPPV therapy?***

CONTRAINDICATIONS:

- ✓ Patients unable to or unwilling to cooperate with mask N-IPPV therapy
- ✓ Elevated intracranial pressures (> 20 mmHg)
- ✓ Hemodynamic instability
- ✓ Oro-facial complications (oral, facial or esophageal surgeries, acute sinusitis, epistaxis, etc.)
- ✓ Nausea and vomiting
- ✓ Barotrauma or untreated pneumothorax
- ✓ Active hemoptysis/intrapulmonary bleeding

PRECAUTIONS, HAZARDS OR LIMITATIONS:

- ✓ Reduced venous return – may lead to decreased blood pressure and compromised cardiac output
- ✓ Gastric insufflation – usually not a problem until EPAP exceed 15-20 cmH_2O
- ✓ Claustrophobia – especially related to use of full-face mask N-IPPV
- ✓ Skin break down/ pressure sores – can be alleviated by use of soft cushion skin barriers or use of silicone type masks
- ✓ Elevated intracranial pressures – terminate use if ICP's increase above 20 mmHg
- ✓ Barotrauma – there is only a remote risk of NPPV inducing barotraumas (at greatest risk are those patients with bullous disease as with emphysema)

- ✓ Reserved for use with patients who are spontaneously breathing and are generally able to understand, follow commands and cooperate with NPPV therapy

➢ ***What types of equipment are used to administer NPPV therapy?***

- ✓ **Electric NPPV generators** – these devices are electrically operated units with compressors/blowers which direct room air to the patient. Pressures can be regulated throughout inspiration and expiration independently, I:E ratios can be set and back-up mandatory rates can be set. These units often employ high and low pressure alarms and even apnea alarms. FIO_2 variability may require "bleeding in" oxygen at the outflow port of the unit, while other units control FIO_2 variability from the source gas inlet.

- ✓ **NPPV circuitry –** this generally consists of large bore tubing to a mask (nasal or full face), head gear to secure the mask, humidifier (recommended when in use for more than one hour to reduce risk of epistaxis), pressure manometer (to monitor pressures throughout the breathing cycle) and an alarm system to identify high and low airway pressures. Flows need to exceed a patient's peak inspiratory flow which is usually estimated to be ~2-3 times their minute ventilation.

- ✓ **Initial Recommendations:**

  - Begin with +10 cmH_20 IPAP and +5 cmH_20 EPAP; back-up rate 8 – 10 breaths/minute; FiO2 100% or at a percentage that is similar to the current therapy given.
  - Increase IPAP in response to increasing PaCO2 or increased work of breathing.
  - Increase EPAP in response to inadequate SpO_2 or PaO_2 or if atelectasis/infiltrates fail to resolve on CXR
  - Decrease EPAP in response to deteriorating hemodynamic status
  - First, wean FIO_2 down to a value < 0.50 and then, decrease IPAP levels down to +8 cmH_20 and EPAP levels down to +5 cmH_20 before discontinuing its use. Always monitor the patient's work of breathing and overall disease state before discontinuing use

- ✓ **Common Troubleshooting:**

  - IPAP/EPAP pressure drops below IPAP/EPAP level – look for leaks around the mask, circuit, or heater device
  - Patient's blood pressure drops – consult with the physician and consider reducing the EPAP level or discontinuing its use if other alternatives for improving blood pressure are not advisable (if BP drops suddenly and there is a loss of breath sounds, patient should be evaluated for barotraumas)
  - Patient's level of consciousness changes – if a patient becomes increasingly lethargic, confused, disoriented or has any other significant mental status changes, consult with the physician, recommend arterial blood gases be drawn to evaluate the patient for hypoventilation (hypercarbia)

➢ ***What essential assessments are needed to evaluate the appropriate use of NPPV therapy?***

- ✓ Comparison of work of breathing before, during and after therapy (R.R., pattern of breathing and accessory muscle use)
- ✓ Comparison of heart rate and rhythm before, during and after therapy
- ✓ Comparison of breath sounds before, during and after therapy

- Improved aeration
- Reduction in rhonchi/wheezing/crackles

✓ Comparison of $PaCO_2$ and PaO_2 (SpO2) before, during and after therapy (continuous pulse oximetry is advisable or evaluation of blood gases comparing oxygen therapy with NPPV therapy)
✓ Evaluation of effectiveness of cough/ability to produce sputum
✓ Improvement in CXR finding (i.e. reduction in or resolution of pulmonary atelectasis, mucus plugging or pulmonary infiltrates)

References:

For NPPV Therapy, go the AARC website, www.aarc.org and click on Resources, then click on Clinical Practice Guidelines and finally, scroll down to the following CPG for review:

Use of Positive Airway Pressure Adjuncts to Bronchial Hygiene Therapy

Kacmarek, Stoller, Heuer (2017). *Egan's Fundamentals of Respiratory Care,* 11th Edition. St. Louis, MO: Elsevier. Pages 1-1372.

Continuous Positive Airway Pressure (CPAP) Therapy FAQ's
Knowledge and Technical Skills Expectations:

➢ ***What are the common indications for CPAP therapy?***

✓ To treat refractory hypoxemia (when hypoxemia fails to respond to administration of high FIO_2's with an appropriate increase in SpO_2 or PaO_2)
✓ To treat postoperative atelectasis that is unresponsive to other therapies (i.e. coughing and deep breathing, IS, PEP, etc.)
✓ To treat cardiogenic pulmonary edema (CHF) and avoid need for intubation and mechanical ventilation
✓ To assist in mobilizing retained pulmonary secretions consistent with x-ray evidence of atelectasis, mucus plugging or pulmonary infiltrates

****Evidence based research has shown that the duration of the beneficial effects (↑FRC) in the post-operative patient with atelectasis may be limited to as little as 10 minutes after removal of CPAP. Thus, it is recommended that CPAP be used on a continuous rather than an intermittent basis. (Wilkins, Stoller and Scanlan, 2003)***

➢ ***What are some of the contraindications, precautions, hazards or limitations associated with CPAP therapy?***

Contraindications:

✓ Patients unable to or unwilling to cooperate with mask CPAP therapy
✓ Elevated intracranial pressures (> 20 mmHg)
✓ Hemodynamic instability
✓ CO_2 retention/ impending respiratory failure
✓ Oro-facial complications (oral, facial or esophageal surgeries, acute sinusitis, epistaxis, etc.)

- ✓ Nausea and vomiting
- ✓ Barotrauma or untreated pneumothorax
- ✓ Active hemoptysis/intrapulmonary bleeding

Precautions, Hazards or Limitations:

- ✓ Reduced venous return – may lead to decreased blood pressure and compromised cardiac output
- ✓ Gastric insufflation – usually not a problem until pressures exceed 15-20 cmH_2O
- ✓ Claustrophobia – especially related to use of full-face mask CPAP
- ✓ Skin break down/ pressure sores – can be alleviated by use of soft cushion skin barriers or use of silicone type masks
- ✓ Elevated intracranial pressures – terminate use if ICP's increase above 20 mmHg
- ✓ Barotrauma – there is only a remote risk of CPAP inducing barotraumas (at greatest risk are those patients with bullous disease as with emphysema)
- ✓ Reserved for use with patients who are spontaneously breathing and are generally able to understand, follow commands and cooperate with CPAP therapy

CPAP therapy will not effectively treat hypoventilation (hypercarbia)

➢ ***What types of equipment are used to administer CPAP therapy?***

- ✓ **Pneumatic CPAP generators** – these devices operate from a 50 psig oxygen source and generally employ a venturi to entrain room air to enable variable FIO_2 delivery. One common unit, the variable Downs' flow generator can provide FIO_2's ranging from 0.30 – 1.00 and total flows of 30-100 L/min. The CPAP is created by a spring loaded fixed expiratory resistor. The CPAP valves are typically available in sizes from 2.5 to 15 cmH_2O.

- ✓ **"Free-standing" CPAP devices –** can be devised by joining a compressed air and oxygen source together from individual flowmeters or by using an air/oxygen blender, then the mixed FIO_2 flow is directed to the patient and the exhaled gases are directed through a fixed expiratory resistor CPAP valve.

- ✓ **Electric CPAP generators** – these devices are electrically operated units with compressors/blowers which direct room air to the patient. Pressures can be regulated throughout inspiration and expiration independently, I:E ratios can be set and back-up mandatory rates can be set. These units often employ high and low pressure alarms and even apnea alarms. FIO_2 variability may require "bleeding in" oxygen at the outflow port of the unit, while other units control FIO_2 variability from the source gas inlet.

- ✓ **Electric self-regulating CPAP generators –** these are devices used mainly in sleep diagnostic centers or by patients with obstructive sleep apnea (OSA) in their own homes. They regulate the amount of CPAP is needed to maintain a fixed flow through to the patients airway, allowing the positive airway pressure to ramp up and down in response to degrees of airway obstruction.

- ✓ **CPAP circuitry –** this generally consists of large bore tubing to a mask (nasal or full face), head gear to secure the mask, humidifier (recommended when in use for more than one hour to reduce risk of epistaxis), pressure manometer (to monitor pressures throughout the breathing cycle) and an alarm system to identify high and low airway pressures. Flows need to exceed a patient's peak inspiratory flow which is usually estimated to be ~2-3 times their minute ventilation. To assure that the PIF is

being met with a "free-standing" CPAP system, a 1-2 liter reservoir bag should be included in the circuit.

- ✓ **Initial Recommendations:**
  - Begin with +5 cmH_20 and a flow sufficient to exceed the patients PIF (in systems with a reservoir bag, it is easy to set flow so the bag doesn't deflate by more than ½ its maximum volume upon the patient's inspiration; otherwise, assure that during inspiration the CPAP level doesn't fall by more than 1-2 cmH_2O)
  - Increase CPAP in response to inadequate SpO_2 or PaO_2 or if atelectasis/infiltrates fail to resolve on CXR
  - Decrease CPAP in response to deteriorating hemodynamic status
  - First, wean FIO_2 down to a value < 0.50 and then, decrease CPAP levels down to +5 cmH_2O before discontinuing its use

- ✓ **Common Troubleshooting:**

  - CPAP pressure drops below CPAP level – look for leaks or insufficient flow (if pressures are low all of the time, it is probably a leak; if pressure drops only during inspiration, the problem is most likely insufficient flow)
  - CPAP pressures exceed the desired setting – set flows are too high or there may be an obstruction to flow causing pressures to rise
  - Patient's blood pressure drops – consult with the physician and consider reducing the CPAP level or discontinuing its use if other alternatives for improving blood pressure are not advisable (if BP drops suddenly and there is a loss of breath sounds, patient should be evaluated for barotraumas)
  - Patient's level of consciousness changes – if a patient becomes increasingly lethargic, confused, disoriented or has any other significant mental status changes, consult with the physician, recommend arterial blood gases be drawn to evaluate the patient for hypoventilation (hypercarbia)

- ➢ ***What essential assessments are needed to evaluate the appropriate use of CPAP therapy?***

  - ✓ Comparison of work of breathing before, during and after therapy (R.R., pattern of breathing and accessory muscle use)
  - ✓ Comparison of heart rate and rhythm before, during and after therapy
  - ✓ Comparison of breath sounds before, during and after therapy
    - Improved aeration
    - Reduction in rhonchi/wheezing/crackles
  - ✓ Comparison of oxygenation before, during and after therapy (continuous pulse oximetry is advisable or evaluation of blood gases comparing oxygen therapy with CPAP therapy)
  - ✓ Evaluation of effectiveness of cough/ability to produce sputum
  - ✓ Improvement in CXR finding (i.e. reduction in or resolution of pulmonary atelectasis, mucus plugging or pulmonary infiltrates)

References:

For CPAP Therapy, go the AARC website, www.aarc.org and click on Resources, then click on Clinical Practice Guidelines and finally, scroll down to the following CPG for review:

Use of Positive Airway Pressure Adjuncts to Bronchial Hygiene Therapy

Kacmarek, Stoller, Heuer (2017). *Egan's Fundamentals of Respiratory Care,* 11th Edition. St. Louis, MO: Elsevier. Pages 1-1372.

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PERFORM ARTERIAL PUNCTURE
Via Radial Artery

Procedural steps:	RATINGS Lab/Peer	Lab/Instr	Clinical	Clinical	Clinical
1. Reviews medical record, verifies order for therapy, and completes patient assessment form					
2. States indications for therapy (reviewing patient's arterial blood gases) and identifies any potential side effects					
3. Locates and selects appropriate equipment					
4. Determines FIO_2 and assures the patient has been on that ordered FIO_2 for at least 20 minutes					
5. Disinfects hands before and after therapy, following standard precautions					
6. Identifies patient by wristband and/or electronic identification					
7. Introduces self/instructor to patient and explains procedure					
8. Assesses vital signs and listens to breath sounds anteriorly and posteriorly					
9. Assembles necessary equipment maintaining sterile technique throughout entire preparation					
10. Prepares syringe and other items necessary: Needle to syringe with needle guard if available Syringe set to proper collection sample size (~2ml) Skin cleansing wipes Sterile gauze Syringe cap, extra needle and labels					
11. Palpates radial artery and completes modified Allen's test to evaluate adequacy of collateral circulation					
12. Performs puncture with proper sterile technique assuring : Proper needle angle and bevel position Redirects properly as necessary Obtains sample and withdraws needle applying pressure to site with sterile gauze (asks for assistance with applying pressure for 5 minutes, while preparing sample to send to the lab)					
13. Prepares syringe for transport to the lab by: Inserting needle into needle guard device Removing needle from syringe Removing any air bubbles and caps syringe Rolling gently in palms to mix anticoagulant t/o sample Placing in biohazard bag with proper labeling and completed and signed requisition slips Icing sample only when analysis may be delayed Discarding needle/needle guard in sharps container					

Procedural steps:	RATINGS Lab/Peer	Lab/Instr	Clinical	Clinical	Clinical
14. Transports sample to lab according to hospital policy (pneumatic tube system or hand carried)					
15. Reassesses patient and puncture site after pressure has been applied for at least 5 minutes or longer if patient is on anticoagulant therapy or until all bleeding stops and assure return of pulse					
16. Cleans up after procedures					
17. Documents therapy appropriately in medical record					
18. Reports to other members of the interdisciplinary care team regarding the procedure as necessary					
19. Obtains the arterial blood gas results and interprets both the acid base status and the oxygenation status of the patient and makes appropriate recommendations for changes as necessary					
Total:	**__/38**	**__/38**	**__/38**	**__/38**	**__/38**

Arterial Puncture FAQ's

Knowledge and Technical Skills Expectations:

- ***What are the common indications for performing an arterial puncture?***

  - ✓ To evaluate the adequacy of oxygenation when non-invasive measures are inadequate or unreliable
  - ✓ To evaluate the adequacy of alveolar ventilation through the assessment of acid-base balance
  - ✓ To evaluate a patient's response to specific therapy or changes made in therapy (from their oxygen therapy to control settings on mechanical ventilators)
  - ✓ To assess the progression of pulmonary disease (often in conjunction with diagnostic pulmonary function testing or as part of a pulmonary rehabilitation program)
  - ✓ To project post-operative risk for pulmonary complications in patients with cardiopulmonary disease
    - Students will only be trained in radial artery puncture! This site continues to be the preferred site for arterial sampling for the following reasons:
      - ✓ ***It is near the surface and is relatively easy to palpate and stabilize***
      - ✓ ***Effective collateral circulation normally exists in the ulnar artery***
      - ***√ The artery is not near any large veins minimizing the risk of obtaining a venous sample***

- ***What are some of the contraindications, precautions, hazards and limitations of arterial puncture to the radial artery?***

  Contraindications:

  - ✓ Negative results to the modified Allen's test – indicating inadequate collateral circulation through the ulnar artery
  - ✓ Absence of radial arteries due to prior coronary artery bypass graft surgery
  - ✓ Presence of a shunt for hemodialysis

Precautions/hazards/limitations:

- ✓ Prior hematoma or excessive scar tissue formation from prior punctures (repeated punctures at the same site increase the likelihood of hematoma, scarring or laceration of the artery on subsequent punctures)
- ✓ Arteriospasm – this is a relative risk; many arteries will spasm when nicked by a needle before actually being punctured resulting in diminished or absent pulse
- ✓ Infection – this should **not** be a risk if proper antiseptic procedure and sterile technique are followed
- ✓ Hemorrhage – this is an increased risk in patients who are being anticoagulated (i.e. heparin or aspirin type of therapy) or in patients with abnormal clotting factors (i.e. patients with hemophilia or leukemia)
- ✓ Hypotension – when a patient's blood pressure is below 80 mmHg systolic, the radial artery perfusion begins to diminish significantly making it more difficult to palpate and puncture
- ✓ Trauma to the vessel – trauma that can result from arterial puncture can include laceration to the artery, damage to the nerve, hematoma, emboli (clot or air), scar tissue formation and in the severest of cases loss of perfusion to the hand (loss of hand)
- ✓ Needle stick injury to the therapist performing the puncture – to reduce this risk, the therapist should always be following CDC recommendations which include:
  - use of personal protective equipment (gloves and goggles)
  - use of only one finger to palpate the artery during the puncture
  - after the sample is obtained, recap the needle using either a one-handed technique or a needle guard that can be snapped down over the needle using one hand
  - dispose of the needle in a sharps container, but never force a needle into an overfilled container

➢ ***What types of equipment are used to perform an arterial puncture to the radial artery?***

- ✓ Safety equipment – necessary equipment to minimize risk of contamination with bloodborne pathogens include gloves, goggles, needle guard (optional), sharps container
- ✓ Blood gas kit including the following:
  - Pre-heparinized 1-5 mL low diffusibility plastic syringe
  - Two 1" - 1.5", 22-25 gauge pre-heparinized needles (for adults)
  - Isopropyl alcohol and/or providone iodine single use pads to cleanse the site
  - Sterile gauze to apply pressure over site after puncture
  - Biohazard bag to transport sample to the lab in
  - Ice for transport if specimen will not be analyzed with 10-15 minutes
  - Needle guard – not essential, but highly desirable to eliminate post puncture needle stick injuries
- ✓ Pre-printed patient labels for the syringe and requisition/order slips as needed by specific hospital laboratory to identify specimen and tests being requested
- ✓ Sharps container to discard contaminated needle after puncture

➢ ***What essential assessments are needed to evaluate the appropriate use of radial artery puncture?***

- ✓ Assure patient has been on current therapy for 20-30 minutes prior to the arterial puncture without changes (note the FIO_2)
- ✓ Assess the patient's vital signs immediately before the puncture including the pulse, respiratory rate, blood pressure and temperature (the latter two from nurses notes) and pulse oximetry
- ✓ Evaluate adequacy of radial artery pulse before (Allen's test) and after the puncture, noting whether there was a hematoma or bleeding at the site and taking appropriate action
- ✓ Assure the sample obtained is from a free-flowing pulsatile artery
- ✓ Remove any visible air bubbles from the sample before sending it for analysis
- ✓ Vigorously roll the sample in the syringe in the palms of both hands to mix the heparin with the blood sample to prevent any clotting

- ✓ Apply pressure to puncture site for as long as needed to assure that bleeding has ceased (this is usually within 5 minutes, but in an anticoagulated patient this could be as long as 20-30 minutes)
- ✓ Re-evaluate radial puncture site after the sample has been sent to the lab to assure that there is good return of pulse and no hematoma or bleeding
- ✓ Evaluate arterial blood gas results:
  - Confirm that the values are consistent with an arterial sample (look primarily at PaO_2 and SaO_2)
  - Evaluate adequacy of oxygenation and make suggestions for changes in O_2 therapy
  - Evaluate adequacy of acid-base balance and make suggestions for changes in other therapy

References:

For Arterial Puncture go to the AARC website, www.aarc.org and click on Resources, then click on Clinical Practice Guidelines and finally, scroll down to the following CPG for review:

Sampling for Arterial Blood Gas Analysis

Kacmarek, Stoller, Heuer (2017). *Egan's Fundamentals of Respiratory Care,* 11th Edition. St. Louis, MO: Elsevier. Pages 1-1372.

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PERFORM TRACHEOSTOMY CARE

Procedural steps:	RATINGS Lab/Peer	Lab/Instr	Clinical	Clinical	Clinical
1. Wash hands and apply standard precautions and transmission-based isolation procedures as appropriate					
2. Gathers the necessary equipment to include; tracheostomy care kit, suction kit, gloves, peroxide, sterile water or saline, and a spare inner cannula or disposable cannula					
3. Introduce self and identifies patient by wristband and/or electronic identification					
4. Explain procedure and ensure patient understanding					
5. Suction tracheostomy thoroughly					
6. Remove the old dressing and discard in infectious waste container					
7. Remove the inner cannula					
8. Open the tracheostomy care kit and fill the basin with sterile water or normal saline					
9. Scrub the cannula with a brush in peroxide solution and rinse with sterile water if replacing the permanent cannula. If using a disposable cannula, remove the dirty cannula and replace with a clean disposable cannula					
10. Clean the stoma site and exterior portions of the tube using peroxide solution , cotton tipped applicators, and pipe cleaners					
11. Replace the dressing using a precut 4x4 gauze drain sponge					
12. Remove old ties. If using a scissors, *be careful not to cut the pilot line!*					
13. Attach twill tape or a commercial tube holder following manufacturer's guidelines.					
14. Ensure that the tube is in proper position, and reassess the patient					
15. Dispose of all equipment and soiled material in the proper waste container					
16. Remove gloves and wash your hands					
17. Reports to other members of the interdisciplinary care team regarding the procedure as necessary					
Total:	__/34	__/34	__/34	__/34	__/34

Daily Trach Care FAQ's

Knowledge and Technical Skills Expectations:

Why are Tracheostomy dressings changed?

It is very important to change tracheostomy dressings as soon as they become soiled. While changing the tracheostomy ties or holders, one clinician holds the tube in place while the other removes the old ties or holders and replaces them with new. NEVER tie tracheostomy ties with a bow. Ties should always be tied with a square knot.

Why is it necessary to keep the stoma clean?

The care of the skin around the stoma site should be considered one of the more important procedures in the care of the tracheostomy patient. The new surgical site needs to be cleaned and dressed frequently as it heals. As the incision heals, the frequency will decrease.

What supplies are needed to perform a dressing change:

- ✓ Tracheostomy dressings (NOTE: Plain sterile gauze pads should not be used to create tracheostomy dressings, as fibers that become loose may be aspirated into the airway).
- ✓ Clean tracheostomy ties or a Velcro® tracheostomy tube holder
- ✓ 1⁄2-strength hydrogen peroxide and sterile water
- ✓ Dry sterile pad or towel.
- ✓ Cotton tipped applicators

What is the procedure?

- ✓ Remove old dressing, being careful to keep tracheostomy tube in place.
- ✓ Clean around tube at stoma site with hydrogen peroxide solution.
- ✓ Replace inner cannula with a disposable variety or clean current cannula
- ✓ Place clean tracheostomy dressing under the flange, inserted from below.
- ✓ Change tracheostomy ties as necessary.
- ✓ Change dressing as necessary.

Reference:

Kacmarek, Stoller, Heuer (2017). *Egan's Fundamentals of Respiratory Care,* 11th Edition. St. Louis, MO: Elsevier. Pages 1-1372.

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MANAGE ARTIFICIAL AIRWAYS
CUFF PRESSURE & VAE'S

Procedural steps:	RATINGS Lab/Peer	Lab/Instr	Clinical	Clinical	Clinical
1. Reviews medical record and completes a patient assessment form					
2. States indications for cuff pressure monitoring and identifies any potential complications					
3. Locates and selects appropriate equipment					
4. Disinfects hands before and after therapy, following standard precautions					
5. Identifies patient by wristband and/or electronic identification					
6. Introduces self/instructor to patient and explains procedure					
7. Assesses vital signs, listens to breath sounds anteriorly and posteriorly, and listens at the neck for any cuff leak					
8. Suctions the patient through their ET or trach tube and also orally to prevent aspiration of oral secretions during cuff pressure measurement					
9. Attaches pressure manometer to pilot line of artificial airway and observes cuff pressure while auscultating at the neck for a leak. IDEAL CUFF PRESSURE IS 20 - 30 cmH_2O					
10. If pressure is above 30 cmH_2O, remove some air until cuff pressure is within the suggested range or follows hospital policy					
11. Observes cuff pressure reading at peak inspiration					
12. Documents cuff pressure in medical record					
13. Identifies 5 modalities to prevent VAE's – Ventilator Associated Events					
14. Reports to other members of the interdisciplinary care team regarding the procedure as necessary					
Total:	__/30	__/30	__/30	__/30	__/30

Cuff Pressure Measurement FAQ's

Knowledge and Technical Skills Expectations:

- ***What are the common indications for measuring cuff pressures on the ventilated patient?***

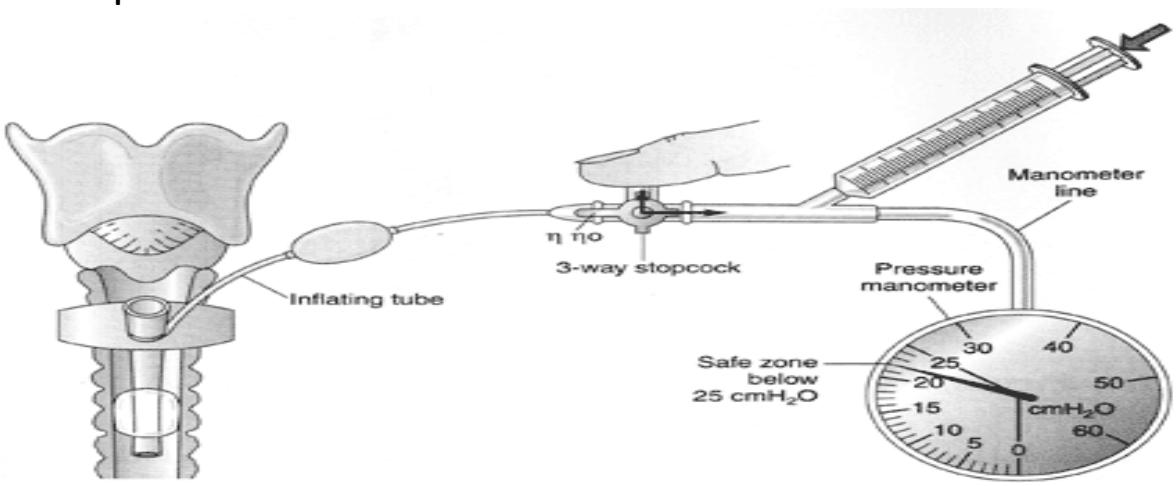
  - ✓ To assure a sealed airway for positive pressure ventilation
  - ✓ To prevent or minimize the potential for aspiration
  - ✓ To reduce the incidence of ventilator associated pneumonia (VAP)

- What are some of the precautions/hazards associated with measuring cuff pressures on the ventilated patient?

  - ✓ ***Producing a cuff leak during measurement that results in inadequate ventilation (tidal volume loss)***
  - ✓ ***Producing a cuff leak during measurement that results in aspiration of oral secretions***
  - ✓ ***Adding too much air to a cuff resulting in cuff pressures that reduce tracheal wall perfusion which can result in tissue ischemic changes***

- What types of equipment are used to measure cuff pressures on ventilated patients?

  - ✓ **Three way stopcock/pressure manometer method** – this consists of a 3-way stopcock, a syringe and an aneroid pressure manometer. One port of the 3 way stopcock is connected to the syringe, another port to the manometer and the final port we would attach the pilot line from the patient's ET or trach tube. This system requires pre-pressurization of the system to the patient's previous cuff pressure or 25 cmH_2O if unknown. Pre-pressurization is necessary to prevent a sudden drop in pressure as the tubing & manometer equilibrates with the ET tube cuff pressure. If the patient is on a ventilator, the cuff pressure is recorded as the pressure required to maintain a sealed airway at the **peak of inspiration.**



  - **Technique:**
    - Suction the patient's endotracheal or tracheostomy tube and oropharynx before measuring cuff pressures to prevent the potential for oral secretions to be aspirated into the lungs
    - Notes position of endotracheal tube at lips(teeth)
    - Attach manometer to one port of 3 way stopcock and 10-12 mL syringe (almost full of air) to another port, leaving the third port open but turn the stopcock off to that open port
    - Pre-pressurize the manometer to the previous cuff pressure or 25cmH_2O by pushing air from the syringe into the manometer system
    - Attach the pilot line from the patient's airway to the open port and turn the lever of the stopcock so that all three ports are open
    - Auscultate at the patient's neck to listen for a leak – if no leak is heard withdraw a small amount of air from the cuff with the syringe and listen for the initial point of leaking. Observe the cuff pressure at the point you begin to hear a leak and then add just

enough air back into the cuff to eliminate this leak. This is identified as the Minimal Occlusion Volume Technique of measuring cuff pressures and should be used with all mechanically ventilated patients.
    - Assures endotracheal tube position has not changed following the procedure

✓ **One-Piece Bulb Aneroid Manometer (Posey)** – concept of the syringe and the pressure manometer. The most common of these is the bulb style device known as the Posey Cufflator shown below:

- **Technique:**
    - Suction the patient's endotracheal or tracheostomy tube and oropharynx before measuring cuff pressures to prevent the potential for oral secretions to be aspirated into the lungs
    - Notes position of endotracheal tube at lips or teeth per hospital policy
    - There is no need to pre-pressurize these manometers because the volume loss out of the cuff to equilibrate with the pressure manometer is usually minimal
    - Auscultate at the patient's neck to listen for a leak – if no leak is heard withdraw a small amount of air from the cuff by depressing the red release button on the side and listen for the initial point of leaking. Observe the cuff pressure at the point you begin to hear a leak and then add just enough air back into the cuff (by compressing the bulb) to eliminate this leak. This is identified as the Minimal Occlusion Volume Technique of measuring cuff pressures and should be used with all mechanically ventilated patients.
    - Assures endotracheal tube position has not changed following the procedure

Tracheal Wall Perfusion Pressures

Tracheal Arteries	**30 mmHg or 41 cmH_2O**
Tracheal Veins	**24 mmHg or 18-20 cmH_2O**
Tracheal Lymphatics	**5 mmHg or 7 cmH_2O**

Recommendations for ideal cuff pressures: If we obstruct tracheal arterial flow with excessive cuff pressures, the result is necrosis of tracheal tissue, whereas obstructing venous flow only results in vascular congestion and minor ischemic changes and obstructing lymphatic drainage will result in minor edema. All of the above perfusion pressures are assuming that your patient has a normal blood pressure. The tracheal tissue is at greater risk of ischemia and necrosis when a patient is hypotensive, as tracheal perfusion pressures will be much lower. Thus, our goal is to maintain arterial blood flow by not allowing our cuff pressures to exceed the tracheal artery pressures. **Recommended ideal cuff pressures are between 20-30 cmH_2O or 15-22 mmHg to minimize risk of aspiration, VAP and to assure adequate ventilation of our patients.**

➢ ***What essential assessments are needed to evaluate the most appropriate cuff pressure for a mechanically ventilated patient?***

- ✓ Comparison of vital signs (especially blood pressure) before and after measuring cuff pressures
- ✓ Comparison of breath sounds (tracheal wall leak sounds) before and after measuring cuff pressures
- ✓ Comparison of work of breathing before and after measuring cuff pressures (R.R., pattern of breathing, accessory muscle use, symmetry of chest wall, etc.)
- ✓ Comparison of endotracheal tube position at the lips (teeth) before and after measuring cuff pressures
- ✓ Comparison of ventilator's peak inspiratory pressures before and after measuring cuff pressures

- ✓ Pulmonary and oral secretions are cleared before measurement

- Ventilator Associated Events/Ventilator Associated Pneumonia Prevention Steps:

  - ✓ Perform appropriate hand hygiene
  - ✓ Perform gentle suctioning
  - ✓ Place patient in semi-recumbent position
  - ✓ Do not routinely change ventilator circuits
  - ✓ Drain and discard inspiratory tube condensate away from the patient
  - ✓ Prevent condensate formation by use of heated wire circuits or HME's
  - ✓ Perform regular oral hygiene at least every 4 hours
  - ✓ Use MDI's or vibrating disc nebulizers rather than SVN
  - ✓ Daily sedation vacation
  - ✓ Assess patient for ability to perform SBT
  - ✓ Use closed suction systems

References:

Kacmarek, Stoller, Heuer (2017). *Egan's Fundamentals of Respiratory Care,* 11th Edition. St. Louis, MO: Elsevier. Pages 1-1372.

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MANUAL RESUSCITATION W/ MASK & ARTIFICIAL AIRWAY

Procedural steps:	RATINGS Lab/Peer	Lab/Instr	Clinical	Clinical	Clinical
1. Reviews medical record					
2. Locates and selects appropriate equipment					
3. Disinfects hands before and after therapy, following standard precautions					
4. Identifies patient by wristband and/or electronic identification					
5. Introduces self/instructor to patient and explains procedure					
6. Assembles equipment utilizing appropriate source gas, reservoir systems, and PEEP attachments as necessary					
7. Pre-tests equipment for proper function: Checks for leaks/function of exhalation valve Adjusts oxygen source gas to proper flowrate Checks pop-off when applicable Obtains appropriately sized mask					
8. Assesses vital signs and listens to breath sounds anteriorly and posteriorly					
9. Positions patient appropriately using hyperextension of neck when possible and utilizing an oral airway when necessary					
10. Applies mask, using little finger of dominant hand to lift mandible, thumb and index finger to seal mask over nose/mouth and other fingers to seal mask over cheeks					
11. Inflates resuscitator with non-dominant hand at a rate of 12-20 breaths/min. and observes for adequate chest rise					
12. If leaks occur and inadequate chest rise results, reposition the head, reseal the mask, and reassess chest rise					
13. If unable to obtain adequate chest rise, switch to 2 person manual resuscitation – one person holds the mask using both hands, while another person compresses the resuscitator					
14. Continues to ventilate for 1-2 minutes and allows interruptions for suctioning (or intubation, if applicable) for no longer than 15-20 seconds before resuming ventilations					
15. Reassesses vital signs and breath sounds, including auscultation over the stomach to assess for gastric insufflation					
16. Terminates manual resuscitation appropriately and returns patient to prior source of oxygen therapy					

Procedural steps:	RATINGS Lab/Peer	Lab/Instr	Clinical	Clinical	Clinical
17. Disassembles and stores equipment appropriately					
18. Documents therapy appropriately in medical record					
19. Reports to other members of the interdisciplinary care team regarding the therapy as necessary					
Total:	**__/38**	**__/38**	**__/38**	**__/38**	**__/38**

Manual Resuscitation with Mask/Artificial Airway FAQ's

Knowledge and Technical Skills Expectations:

- ***What are the common indications for the use of manual resuscitation (ventilation)?***

  - ✓ Apnea
  - ✓ Cardiac and/or respiratory arrest
  - ✓ Airway obstruction (partial or complete)
  - ✓ Impending respiratory failure/hypoventilation
  - ✓ Severe laryngospasm/bronchospasm

- ***What are some of the contraindications, precautions, hazards and limitations of manual resuscitation (ventilation)?***

  CONTRAINDICATIONS:

  - ✓ When patient or family has designated their wishes for no intubation or resuscitation efforts to be made
  - ✓ When resuscitation has been determined to be medically futile because of underlying disease

  PRECAUTIONS, HAZARDS AND LIMITATIONS:

  - ✓ Inability to secure a patent airway position:
    - Head/neck/facial trauma
    - Upper airway edema or foreign body obstruction
    - Laryngospasm/bronchospasm
  - ✓ Hypoxemia
  - ✓ Aspiration
  - ✓ Dental injuries
  - ✓ Failure to recognize intubation of the esophagus
  - ✓ Failure to recognize an endobronchial intubation
  - ✓ Arrhythmias/complications induced by hypoxemia
    - Tachycardia
    - Ventricular ectopy
    - Hypertension
  - ✓ Arrhythmias/complications induced by vagal stimulation
    - Bradycardia

- Hypotension

✓ Hypoventilation due to:
- Inadequate rate/depth of ventilations
- Inadequate seal of mask
- Inadequate seal of endotracheal/trach tube

✓ Hyperventilation due to too vigorous of rate/depth of ventilations
✓ Gastric insufflation/rupture of stomach when mask ventilating or with esophageal intubations
✓ Barotrauma/pneumothorax
✓ Prolonged interruption of ventilations for intubation attempts

➢ ***What types of equipment are used to provide manual resuscitation (ventilation) with a mask or artificial airway?***

MANUAL RESUSCITATORS:

✓ The device should be capable of delivering 95-100% oxygen at 15 LPM (bag reservoirs are recommended as a visible cue is provided if there is loss of source oxygen)
✓ There should be no pressure relief valve active (with adults)
✓ The bag volume should be between 1800-200 mL, capable of delivering tidal volumes of 200-1000 mL
✓ The patient connector of the resuscitator must have a 15 mm inner diameter to be compatible with standard ET tubes and trachs and a 22 mm outer diameter to fit standard masks
✓ The device must be easily restored to function if the exhalation valve becomes obstructed with secretions or vomitus
✓ Expiratory resistance must be ≤ 5 cmH_2O with flows up to 50 L/min
✓ Allow for delivery of PEEP

MASKS:

✓ Masks must have 22 mm adaptors that securely attach to the standard manual resuscitator
✓ The body of the mask must be clear to be able to visualize secretions or vomitus

AIRWAY DEVICES:

✓ Oropharyngeal airways – hard plastic, curved airway intended to prevent patient from biting and maintaining a patent airway (especially useful with manual resuscitation with a mask to keep posterior oropharynx patent)
✓ Esophageal Tracheal Combitube – this is generally a pre-hospital airway that is inserted blindly into the oropharynx until the teeth line up between two black lines. The tube has two lumens and two cuffs. The larger "pharyngeal" cuff is inflated first with 100 mL, followed by inflation of the "tracheal" cuff with 15 mL. Ventilation always begins on the longer blue lumen and assessment of ventilation is made. If adequate ventilation occurs and no gastric sounds are detected, ventilation continues on this lumen. However, if breath sounds are absent and gastric sounds are present, you switch to the shorter, clear lumen, begin ventilations and reassess breath sounds and gastric sounds. This airway has been adopted by EMS services in many states and has few reported complications.

- ✓ Endotracheal tube – this can be a pre-hospital or hospital airway, but requires highly trained individuals to assure proper insertion and recognition of potential complications. The following is a list of airway equipment you must be familiar with related to manual resuscitation with an artificial airway:
  - Oral airways/bite blocks (Mr. Bills, epistix, etc.)
  - Suction equipment (Yankauer, Suction regulator/collection jar/connecting tubing, Suction kits, Closed Circuit Suction System)
  - Laryngoscope (Curved vs. straight blades with replacement bulbs, Handle with extra batteries)
  - Magill forceps
  - Stylet
  - Endotracheal tubes – how to determine appropriate size for patient, how to prepare ET tube for intubation by testing cuff and applying lubricant, etc.

- ✓ **Initial American Heart Association Recommendations for Manual Ventilation:**

  - Left hand is used to elevate mandible with the last 2-3 fingers, while the index finger and thumb wrap around the mask to apply downward pressure against the bridge of the nose
  - Right hand is used to compress the manual resuscitator 10-12 times/minute (higher at the request of the physician in situations such as the acutely head injured patient), at a depth sufficient to observe adequate chest rise
  - Each ventilation should be delivered long and slow, over about 2 seconds to minimize gastric insufflation
  - Bag and mask ventilation is often difficult for one person to maintain elevation of the mandible and keep a good seal, thus whenever possible have one person hold the mask with two hands while the other compresses the resuscitator
  - If ventilations are being coordinated with compressions for CPR, the ventilation should be forced in at the very beginning of the release of the compression (never during the down stroke of the compression)
  - Applying cricoid pressure during bag and mask ventilation can prevent gastric insufflation

- ✓ **Common Equipment Troubleshooting:**

  - Cannot observe chest rise and no breath sounds are audible during manual ventilation
    - Check function of resuscitator (occlude 15 mm against gloved hand and compress bag, OK if tight seal is maintained and there is no visible secretions/vomitus occluding the valve)
    - Observe for inadequate seal of mask against the face (reposition airway and mask and try again, ask for extra person to help hold mask or compress bag)
    - Auscultate for leak around the ET tube at neck (cuff could be deflated or damaged)
    - Check for tracheal deviation (barotraumas)
  - Hissing sound is coming from the resuscitator during every compression of the bag
    - If the bag has a high pressure relief valve, check to see if it is active (occlude against gloved hand); if it is, deactivate it and resume bagging
    - Check for leaks around any other components of the exhalation valve (tighten all connections)
    - Replace resuscitator with a new one
  - No resistance is felt as manual ventilations are attempted and air sounds like it is escaping

    - Check exhalation valve for leak, tighten all connections

- Check for missing valves (exhalation valve or valve at the tail of the bag where the reservoir attaches)
- Replace resuscitator with a new one

- Upon attempts to manually ventilate patient, when compressing the bag it provides extreme resistance to compression (feels rock hard)
  - Check for occlusion of exhalation valve with secretions or vomitus
  - Check for appropriate position of airway – this can occur with Combitubes that are inserted into the trachea and when ventilating through the longer blue tube, you will be over-distending the stomach and meeting significant resistance; this can also occur if the tip of the tube is up against the carina
  - Check for tension pneumothorax

➢ ***What essential assessments are needed to evaluate the effectiveness of manual resuscitation by mask or artificial airway?***

- ✓ Comparison of vital signs before and after initiation of manual ventilations (pulses, blood pressure, spontaneous respirations (if any), pulse oximetry, etc.)
- ✓ Comparison of work of breathing before and after initiation of manual ventilations (R.R., pattern of breathing, accessory muscle use, symmetry of chest wall, etc.)
- ✓ Comparison of breath sounds before and after initiation of manual ventilations
- ✓ Comparison of end-tidal CO_2 before and after initiation of manual ventilations
- ✓ Results of arterial blood gases drawn after initiation of manual ventilations (may not be drawn until after patient is stabilized on a mechanical ventilator or other form of assisted ventilation)
- ✓ Evaluation of CXR to assure proper placement of artificial airways, adequacy of ventilation and absence of barotraumas

References:

For Manual Resuscitation with Mask/Artificial Airways, go to the AARC website, www.aarc.org and click on Resources, then click on Clinical Practice Guidelines and finally, scroll down to the following CPG's for review:

Resuscitation in Acute Care Hospitals
Management of Airway Emergencies

Kacmarek, Stoller, Heuer (2017). *Egan's Fundamentals of Respiratory Care,* 11th Edition. St. Louis, MO: Elsevier. Pages 1-1372.

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Clinical Skill Competency Checklist

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PERFORM OPEN SYSTEM SUCTION w/ KIT
PERFORM NASOTRACHEAL SUCTION

Procedural steps:	RATINGS Lab/Peer	Lab/Instr	Clinical	Clinical	Clinical
1. Reviews medical record, verifies order for therapy, and completes patient assessment form					
2. States indications for suctioning and identifies any potential side effects					
3. Locates and selects appropriate equipment					
4. Disinfects hands before and after therapy, following standard precautions					
5. Identifies patient by wristband and/or electronic identification					
6. Introduces self/instructor to patient and explains procedure					
7. Assesses vital signs and listens to breath sounds anteriorly and posteriorly					
8. Adjusts vacuum of suction pressure regulator appropriately: Adult 120-150 mmHg Pediatrics 100-120 mmHg Neonates 80-100 mmHg					
9. Hyperoxygenates patient with a manual resuscitator or with the mechanical ventilator for at least 6-10 breaths (30-60 seconds) with maximum obtainable FIO_2. Assure patient's baseline SpO_2 is acceptable (usually >92%)					
10. Opens suction kit verifying proper size (no more than ½ the internal diameter of the artificial airway)					
11. Pours sterile water into sterile container without contaminating any surface					
12. Maintains sterile technique while putting gloves on, picking up suction catheter, and attaching it to the suction connecting tubing					
13. Occludes thumb port while tip of catheter is inserted into sterile water cup to make final determination of appropriateness of suction regular pressure setting					
14. Introduces catheter (with the thumb port open) into airway advancing it quickly as far as it will go without unnecessary force. You should be able to advance the catheter to within an inch of the thumb port on most adult patients.					
15. Occludes the thumb port and withdraws the catheter slowly while gently rotating the catheter between your thumb and forefinger. Suction should not be applied for > 15 seconds.					

Procedural steps:	RATINGS Lab/Peer	Lab/Instr	Clinical	Clinical	Clinical
16. After the catheter is removed, assures that the patient is hyper-oxygenated again for 1-2 minutes or until vital signs and SpO_2 return to baseline before suctioning again					
17. Clears secretions from catheter by aspirating sterile water through it while maintaining sterile technique					
18. Repeats steps 14-16 as necessary until suction return is clear and minimal. If secretions are tenacious, 3-5 mls of sterile normal saline should be instilled at the beginning of the suctioning procedure with several hyperinflations following before attempting to suction.					
19. Terminates suctioning attempts at appropriate time based on secretions or hemodynamic instability and hyperoxygenates patient assuring vital signs and SpO2 return to baseline					
20. Disposes of catheter and glove in hazardous waste container, rinses vacuum connecting tubing with remaining sterile water, discards cup and turns regulator off					
21. Checks bedside to be sure that all supplies are adequate for future suctioning procedures					
22. Documents suctioning procedure appropriately in medical record including color, amount and consistency of aspirated secretions					
23. Reports to other members of the interdisciplinary care team regarding the procedure as necessary					
Total:	**__/46**	**__/46**	**__/46**	**__/46**	**__/46**

Suctioning with a kit and NTS-FAQ's

Knowledge and Technical Skills Expectations:

Naso-Tracheal Suction is intended to remove accumulated saliva, pulmonary secretions, blood, vomitus, and other foreign material from the trachea and nasopharyngeal area that cannot be removed by the patient's spontaneous cough or other less invasive procedures. NTS has been used to maintain a patent airway thus ensuring adequate oxygenation and ventilation and avoiding intubation that was solely intended for the removal of secretions.

NTS refers to the insertion of a suction catheter through the nasal passage and pharynx into the trachea without a tracheal tube or tracheostomy (although a nasopharyngeal airway may be used) in order to aspirate accumulated secretions or foreign material.

The clearance of secretions is accomplished by application of negative pressure applied to a sterile, flexible, multi-eyed catheter on withdrawal only. Appropriate negative pressures are:

- ✓ Neonates: 60-80 mmHg
- ✓ Infants: 80-100 mmHg
- ✓ Children: 100-120 mmHg
- ✓ Adults: 100-150 mmHg

Negative pressures should not exceed 150 mmHg as higher pressures have been shown to cause trauma, hypoxemia, and atelectasis

INDICATIONS:

The need to maintain a patent airway and remove saliva, pulmonary secretions, blood, vomitus, or other foreign material from the trachea.

- Inability to clear secretions when audible or visible evidence of secretions in the large/central airways that persist in spite of patient's best cough effort. This is evidenced by one or more of the following :
  - ✓ Visible secretions in the airway
  - ✓ Chest auscultation of coarse, gurgling breath sounds, rhonchi, or diminished breath sounds
  - ✓ Feeling of secretions in the chest (increased tactile fremitus)
  - ✓ Suspected aspiration of gastric or upper airway secretions
  - ✓ Clinically apparent increased work of breathing
  - ✓ Deterioration of arterial blood gas values suggesting hypoxemia or hypercarbia
  - ✓ Chest radiographic evidence of retained secretions resulting in atelectasis or consolidation
  - ✓ Restlessness
- To stimulate cough or for unrelieved coughing
- To obtain a sputum sample for microbiological or cytological analysis

RESOURCES:

- Equipment:
  - ✓ Vacuum source
  - ✓ Calibrated, adjustable regulator
  - ✓ Collection vessel and connecting tubing
  - ✓ Sterile, flexible, multiple-eyed suction catheter of appropriate caliber
  - ✓ Sterile disposable gloves
  - ✓ Sterile water and cup
  - ✓ Water-based lubricant and/or normal saline
  - ✓ Local anesthetic is sometimes used to reduce discomfort.
  - ✓ Nasopharyngeal airway when frequent NTS is required
  - ✓ Resuscitation bag with mask
  - In the acute care setting, with initiation of NTS, or when working with the unstable patient, the following are recommended:
    - ✓ Electrocardiogram (EKG) monitor
    - ✓ Oxygen (hyperoxygenation with appropriate delivery device as indicated)
    - ✓ Personnel protective equipment for Standard Precautions
    - ✓ Stethoscope

MONITORING:

The following should be monitored before, during and following the procedure.

- Breath sounds
- Skin color

- Breathing pattern and rate
- Pulse rate, dysrhythmia, electrocardiogram (EKG) if available
- Color, consistency, and volume of secretions
- Presence of bleeding or evidence of physical trauma
- Subjective response including pain
- Cough
- Oxygenation (pulse oximeter)
- Intracranial pressure (ICP), if equipment is available
- Laryngospasm

CONTRAINDICATIONS:

- Occluded nasal passages
- Nasal bleeding
- Epiglottitis or croup (absolute)
- Acute head, facial, or neck injury
- Coagulopathy or bleeding disorder
- Laryngospasm
- Irritable airway
- Upper respiratory tract infection
- Tracheal surgery
- Gastric surgery with high anastomosis
- Myocardial infarction
- Bronchospasm

HAZARDS/COMPLICATIONS:

- Mechanical trauma (mucosal hemorrhage, tracheitis, epistaxis from laceration of nasal turbinates, and perforation of the pharynx)
    - ✓ Laceration of nasal turbinates
    - ✓ Perforation of the pharynx
    - ✓ Nasal irritation/bleeding
    - ✓ Tracheitis
    - ✓ Mucosal hemorrhage

  Uvular edema
- Hypoxia/hypoxemia
- Cardiac dysrhythmias/arrest
- Bradycardia
- Increase in blood pressure
- Hypotension
- Respiratory arrest
- Uncontrolled coughing
- Gagging/vomiting
- Laryngospasm
- Bronchoconstriction/bronchospasm
- Discomfort and pain
- Nosocomial infection

- Atelectasis
- Misdirection of catheter
- Increased intracranial pressure (ICP)
    - ✓ Intraventricular hemorrhage
    - ✓ Exacerbation of cerebral edema
- Pneumothorax
    - ✓ Skin color and perfusion
    - ✓ Personnel should assess effectiveness of cough.
- Prepare the patient for the procedure by providing an appropriate explanation along with adequate sedation and pain relief as needed.

***Reference*:**

American Association for Respiratory Care Clinical Practice Guideline. Nasotracheal Suctioning - 2014 Revision & Update. Respiratory Care, Sept 2014; 49(9):1080-4.

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PERFORM CLOSED SYSTEM SUCTION (VENTILATED PATIENT)

Procedural steps:	RATINGS Lab/Peer	Lab/Instr	Clinical	Clinical	Clinical
1. Reviews medical record, verifies order for therapy, and completes patient assessment form					
2. States indications for suctioning and identifies any potential side effects					
3. Locates and selects appropriate equipment					
4. Disinfects hands before and after therapy, following standard precautions					
5. Identifies patient by wristband and/or electronic identification					
6. Introduces self/instructor to patient and explains procedure					
7. Assesses vital signs and listens to breath sounds anteriorly and posteriorly					
8. Adjusts vacuum of suction pressure regulator appropriately by compressing the thumb port briefly and observe regulator: Adult 120-150 mmHg Pediatrics 100-120 mmHg Neonates 80-100 mmHg *Some closed circuit suction catheter systems require a vacuum setting of 160-180 mmHg in order to obtain 120 mmHg at the airway due to resistance across the thumb port one way valve					
9. Hyperoxygenates patient with a manual resuscitator or with the mechanical ventilator for at least 6-10 breaths (30-60 seconds) with maximum obtainable FIO_2. Assure patient's baseline SpO_2 is acceptable (usually >92%) *Some patients may tolerate closed circuit (in-line) suctioning without elevating the FIO_2					
10. Attaches vial of normal saline to side port of suction catheter					
11. Advances catheter without the use of saline on first attempt, advancing full length of catheter into airway with suction off until significant resistance is met					
12. Compresses thumb port valve to apply suction and slowly withdraws catheter out of the airway. Notes color and consistency of secretions aspirated.					
13. After the catheter is removed, assures that the patient is hyperoxygenated again for 1-2 minutes or until vital signs and SpO_2 return to baseline before suctioning again					

Procedural steps:	RATINGS Lab/Peer	Lab/Instr	Clinical	Clinical	Clinical
14. Clears secretions from catheter by squeezing vial of saline quickly while depressing thumb port					
15. Based on assessments, repeats steps 11-14 as tolerated by patient. If secretions are tenacious, instill 3-5 mls of normal saline through the side port at the beginning of the next suction attempt					
16. Reassesses patient's vital signs and SpO_2 during and after each suction attempt					
17. Terminates suctioning attempts at appropriate time based on secretions or hemodynamic instability and hyperoxygenates patient assuring vital signs and SpO_2 return to baseline					
18. Checks bedside to be sure that all supplies are adequate for future suctioning procedures and that the thumb port is locked					
19. Documents suctioning procedure appropriately in medical record including color, amount and consistency of aspirated secretions					
20. Reports to other members of the interdisciplinary care team regarding the procedure as necessary					
Total:	**__/40**	**__/40**	**__/40**	**__/40**	**__/40**

Closed System Suctioning (Ventilated Patient in-line) FAQ's

Knowledge and Technical Skills Expectations:

- ***What are the common indications for closed circuit suctioning of the ventilated patient?***
  - ✓ To remove accumulated pulmonary secretions
  - ✓ To reduce work of breathing
  - ✓ To reduce airway resistance
  - ✓ To obtain sputum specimen for culture and/or sensitivity
  - ✓ To treat deteriorations in oxygenation
  - ✓ To suction patients with high ventilatory requirements (PEEP > 10 cmH_2O, MAP > 20 cmH_2O, or FIO_2 > 0.60)
  - ✓ To suction patients who are hemodynamically unstable
  - ✓ To suction patients with serious and easily communicable pulmonary infections (i.e. TB, MRSA, SARS, etc.)
  - ✓ To suction patients receiving inhaled agents through their ventilator that cannot be interrupted (i.e. ribavirin, heliox, nitric oxide, etc.)
    - These should be assessed by observing or evaluating breath sounds, vital signs, SpO_2's, elevated peak inspiratory pressures and/or mean airway pressures and auto PEEP on ventilator, asynchrony with ventilator, atelectasis on CXR, etc.
- What are some of the precautions/hazards of closed circuit suctioning of the ventilated patient?
  - ✓ ***Tachycardia or bradycardia***
  - ✓ ***Hypoxemia/hypoxia***
  - ✓ ***Hypoventilation***
  - ✓ ***Trauma to airway tissues (pulmonary hemorrhage)***
  - ✓ ***Cardiac arrhythmias***

- ✓ ***Pulmonary atelectasis***
- ✓ ***Bronchospasm***
- ✓ ***Infection***
- ✓ ***Elevated intracranial pressures***
- ✓ ***Hypertension or hypotension***

➢ What types of equipment are used to suction a ventilated patient with a closed circuit suction system?

✓ *Suction Regulators* ***– should be set to continuous suction (NOT intermittent or full) and the pressure should be set appropriately for the age of the patient as follows:***

Age range	**Vacuum setting mmHg**
Adult	-120 to -150
Child	-100 to -120
Infant	-80 to -100
Premature infants	-80 to -60

*Specific closed circuit suction devices have significant resistance across the thumb port one-way valves****, requiring suction regulators to be set sometimes 40 mmHg higher to get*** *the desired negative pressure at the catheter tip when the valve is opened.* Practitioners should always test this before suctioning the patient by depressing the thumb port briefly before the catheter is advanced into the airway to observe that the pressure is set appropriately.

✓ **Closed Circuit Suction Catheters** – these are suction catheters contained in a protective sleeve that can be used in conjunction with any form of positive pressure ventilation.

Size Selection -They are available in various French Gauge sizes (only available in even numbered sizes) and are generally available in two lengths for adults (one for intubated patients and one for trached patients). The French Gauge size refers to the catheter's diameter, which should generally not exceed one half to two thirds the inner diameter of the ET tube or trach tube. French Gauge is calculated as a circumference ($C = \pi d$) or 3.14 x inner diameter in mm. This would calculate the equivalent size; the catheter should be ½ of that. Another common rule of thumb in the literature is to take the inner diameter of the tube in mm and multiply by 3 and divide by 2. If not a whole number, then round down to the closest whole number.

Side Port for Saline Instillation – Many brands of closed circuit suction catheters have a capped side port for instillation of saline or other medications that can be instilled into an artificial airway. The use of normal saline administration routinely with every suction attempt is highly controversial and it is suggested in the literature that it increases desaturations. Normal saline lavage should be reserved for those patients who have tenacious secretions that are difficult to aspirate through the catheter

Resting Position of Catheter – When the catheter is not be used to suction the patient, the practitioner should observe the position of the catheter and make sure that it is not obstructing or impeding the flow from the mechanical ventilator by not being retracted back fully

Use of Sputum Trap (Lukens Trap) – When suctioning to obtain a sputum specimen, a new, sterile closed circuit suction catheter should be installed prior to obtaining the sputum specimen to avoid prior contamination of the specimen

Change Frequency – Follow manufacturer's recommendations or individual hospital's Infectious Disease Department's recommendations related to how to minimize Ventilator Associated Pneumonias (VAP) – refer to the CDC website. It is generally recommended to change the catheters every 72 hours or when significant soiling or plugging has occurred

- ***What essential assessments are needed to evaluate the appropriate response to closed circuit suctioning of the ventilated patient?***
  - ✓ Improved breath sounds (clearing or decreased rhonchi, wheezing, crackles, etc.)
  - ✓ Decreased peak inspiratory pressures or mean airway pressures
  - ✓ Reduced auto PEEP
  - ✓ Improved oxygenation
  - ✓ Removal of pulmonary secretions
  - ✓ Improved patient synchrony with mechanical ventilator
  - ✓ Decreased work of breathing
  - ✓ Comparison of vital signs before and after suctioning
  - ✓ Stabilization of cardiac rhythm and hemodynamic status (normalizing of BP)
  - ✓ Improvement of CXR (long-term result)

References:

Closed Circuit Suctioning of Ventilated Patients go to the AARC website, www.aarc.org and click on Resources, then click on Clinical Practice Guidelines and finally scroll down to the following CPG for review:

Endotracheal Suctioning of Mechanically Ventilated Adults and Children with Artificial Airways

Kacmarek, Stoller, Heuer (2017). *Egan's Fundamentals of Respiratory Care,* 11th Edition. St. Louis, MO: Elsevier. Pages 1-1372.

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ASSIST WITH INTUBATION

Procedural steps:	RATINGS Lab/Peer	Lab/Instr	Clinical	Clinical	Clinical
1. Reviews medical record and verifies order for intubation, discussing plan with instructor					
2. States indicators that predict this patient's need for intubation					
3. Disinfects hands and applies standard precautions and transmission-based isolation procedures. The use of goggles or a face shield is recommended in an actual clinical situation.					
4. Gather and prepare all equipment and checks function of any equipment necessary to include: MR bag and masks, ETT's, stylet, capnometer, syringe, laryngoscope and blades, Magill forceps (if nasal) and suction equipment.					
5. Identifies patient by wristband and/or electronic identification					
6. Assesses vital signs, hemodynamic data, breath sounds and assesses intubation difficulty					
7. Ensure that all equipment is functioning and readily available					
8. Using a manual resuscitator with bag-mask-mask, preoxygenate the patient and/or assists with ventilation					
9. Pre-checks cuff with 5-15 ml of air and leaves attached to pilot balloon					
10. Inserts stylet into ETT assuring tip does not protrude from end and shapes the tube so that a curve is maintained (if oral)					
11. Assists in optimal head positioning, cricoid pressure, and suctioning during intubation attempt					
12. Reassesses vital signs, SpO_2 and ensures that intubation attempt doesn't exceed 30 seconds					
13. When intubation is successful, removes stylet and inflates the cuff with 5-10 ml of air					
14. Attaches end-tidal capnometer between 15-mm adapter on ETT and resuscitator bag connection					
15. Auscultate for bilateral breath sounds and check for bilateral expansion					
16. Confirm proper placement at level of teeth (19-21 female, 21-23 male)					
17. Secure the tube with tape or commercial ETT holding device					
18. Continue to ventilate or attach patient to a ventilation device					
19. Dispose of waste and remove gloves and PPE and wash hands					
20. Reports to other members of the interdisciplinary care team regarding the procedure as necessary					
Total:	__/40	__/40	__/40	__/40	__/40

Assist With Intubation- FAQ'S:

Knowledge and Technical Skills Expectations:

Intubation is the insertion of an endotracheal tube into the trachea.

What are the indications for intubation?

- ✓ Respiratory failure
- ✓ Impending respiratory failure
- ✓ Relief of airway obstruction
- ✓ Airway protection

What are the Complications?

- ✓ Vomiting and aspiration
- ✓ Hypoxemia with resulting dysrhythmias and/or hypotension
- ✓ Esophageal intubation
- ✓ Chipped or dislodged teeth
- ✓ Trauma to upper airway, tracheal mucosa, or vocal cords
- ✓ Vagal nerve stimulation with secondary bradycardia or hypotension
- ✓ Laryngospasm

What are the Relative Contraindications?

- ✓ The presence of stomach contents
- ✓ Inadequate sedation

What EQUIPMENT and MATERIALS are necessary?

- ✓ Endotracheal tubes of the estimated size needed, one-half size larger, and one-half size smaller:
- ✓ ETT of appropriate size= 7.0-7.5 Adult female and 8.0-8.5 Adult male.
- ✓ Manual resuscitator and appropriate sized mask
- ✓ Tonsil tip suction
- ✓ Laryngoscope and blades with functional bulbs
- ✓ Stylet
- ✓ 12 cc syringe
- ✓ Xylocaine jelly
- ✓ Cetacaine spray
- ✓ Endotracheal tube fixation device or tape
- ✓ Oral airways
- ✓ Pulse oximeter
- ✓ Cardiac monitor

What is the PROCEDURE that should be followed?

- ➢ Gather and prepare/test equipment
- ➢ Initiate cardiac monitoring, pulse oximetry.
- ➢ Connect the manual resuscitator and mask to oxygen.
- ➢ Test the pilot balloon on the endotracheal tube, insert the stylet, and lubricate the tube.
- ➢ Test and tighten the laryngoscope blades' bulbs.
- ➢ Don the appropriate universal precautions apparel.
- ➢ Position the patient appropriately.
- ➢ Hyperoxygenate the patient with resuscitation bag, mask and100% oxygen.

- Assist the physician as needed during the intubation with suctioning, patient repositioning, supplies, cricoid pressure, and bag/mask ventilation.
- Monitor the oxygen saturation using the pulse oximeter and notify the physician if saturation falls below 90%. Assist with reoxygenation.
- Once endotracheal tube is inserted through the glottis, remove stylet, and place $ETCO_2$ adapter (capnometer) between the endotracheal tube and the resuscitation bag.
- Assure proper placement of the endotracheal tube by observation of chest expansion and auscultation with manual breaths and presence of adequate color change of capnometer.
- After good placement has been confirmed, note the "cm" marking on the tube at the position of the lip or teeth, and secure the tube. Verify position of the endotracheal tube on the chest radiograph.

What are my responsibilities post procedure?

- Administer the appropriate post-intubation therapy, e.g., mechanical ventilation, CPAP therapy, or high flow oxygen therapy.
- Clean the soiled intubation supplies:
- Wipe the handle with alcohol.
- Scrub the blade(s) with soap and water and then soak them in alcohol or peroxide for several hours. Allow to air dry, place in sterilization pouch and send to CHS for gas sterilization.
- Restock the bedside intubation kit and reseal.

References:

Kacmarek, Stoller, Heuer (2017). *Egan's Fundamentals of Respiratory Care,* 11th Edition. St. Louis, MO: Elsevier. Pages 1-1372.

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SPONTANEOUS BREATHING TRIAL
Assessment & Implementation of Weaning Trial

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Procedural steps:	RATINGS Lab/Peer	Lab/Instr	Clinical	Clinical	Clinical
1. Reviews medical record, verifies order for SBT (weaning), noting method of weaning, and discusses SBT plan with nurse					
2. States indicators that predict this patient's readiness to wean and states criteria that should exclude a patient from performing an SBT (hemodynamic stability, sedation, etc.)					
3. Locates, selects, checks function of any equipment necessary					
4. Disinfects hands before and after therapy, following standard precautions					
5. Identifies patient by wristband and/or electronic identification					
6. Introduces self/instructor to I.C.U. staff and/or family and explains the weaning plan.					
7. Assesses vital signs, hemodynamic data, laboratory data and listens to breath sounds anteriorly and posteriorly, suctioning if necessary					
8. Positions patient optimally to aid with spontaneous breathing					
9. Changes modes and places patient in a spontaneous breathing mode and within the first 5 minutes, assesses the adequacy of the following: VC (within first minute) Vital signs (including SpO_2) & cardiac rhythm Work of breathing RSBI (RR/Vt Ratio)					
10. Determines if patient is stable enough to continue with SBT and discusses the plan with the nurse					
11. Assures appropriate alarm settings and proper alarm function					
12. Obtains an arterial blood gas (as necessary) to evaluate the effectiveness of the weaning trial. This will include making the decision whether to continue the trial or resume mechanical ventilatory support.					
13. Assure patient's comfort and safety (restraints, bed rails up) before leaving room					
14. Documents details of SBT appropriately in medical record					
15. Reports to other members of the interdisciplinary care team regarding the status of the SBT as necessary					
Total:	**__/30**	**__/30**	**__/30**	**__/30**	**__/30**

Spontaneous Breathing Trial FAQ's

Knowledge and Technical Skills Expectations:

Although mechanical ventilation is a lifesaving procedure, it carries numerous life threatening complications. Therefore it is important to discontinue mechanical ventilation at the earliest possible time. Clinical decision to discontinue mechanical ventilation is often arbitrary, and relies heavily on the practitioner experience. Recent published literature has shown that daily screening of respiratory function of patients receiving mechanical ventilation, followed by spontaneous breathing trials, resulted in reduction in the duration of mechanical ventilation and lower cost of intensive care in addition to fewer complications.

- **Assessment of readiness for weaning must be done first:**

  *Arterial Blood gases should show adequate ventilation and oxygenation (pH, $PaCO_2$, PaO_2 and SaO_2):

  - ✓ $PaO_2 \geq 60$ on an $FIO_2 \leq 0.50$
  - ✓ PEEP ≤ 5-8 cmH_2O
  - ✓ PaO_2/FIO_2 ratio 150 - 200

  *Bedside pulmonary parameters meet the following criteria:

  - ✓ VT ≥ 5 mL/kg (4-6 mL/kg)
  - ✓ VC ≥ 10 mL/kg (2 x VT)
  - ✓ f 8-20 breaths/minute
  - ✓ $\dot{V}_E$ 10-15 L/min
  - ✓ MIP/NIF ≥ -20 cmH_20
  - ✓ RSBI ≤ 105 {RR / VT (L)}

  *Clinical measurements of Hemodynamic Stability

  - ✓ A-a DO_2 < 300 mmHg
  - ✓ Qs/Qt < 20%
  - ✓ Vd/Vt < 60%
  - ✓ Pulse and Blood Pressure normal (HR ≤ 140; BP ≥ 90/60 without pressors)
  - ✓ Cardiac rhythm is normal/stable
  - ✓ Afebrile (temperature ≤ 38°C)
  - ✓ Patient is alert & oriented (GCS score ≥ 13 with minimal or no sedation)

  *Verify that underlying disease process has been reversed:

  - ✓ Review medical record
  - ✓ Evaluate CXR
  - ✓ Evaluate labs & cultures

- **Decreasing Ventilator Settings:**
  - ✓ If the assessment of the patient indicates that the patient can begin weaning, then the first step is to decrease the ventilator settings(f, FIO_2, PEEP).
  - ✓ Once the $FIO_2 \leq 0.50$, then the PEEP can be reduced by 2-5 cmH_2O increments. Once PEEP ≤ 8 cmH_2O and the controlled minute ventilation ≤ 10 L/min and the patient meets all other criteria above, then weaning can proceed.
  - ✓ Common weaning modes are: SIMV, PS, CPAP, or a T-piece.

- **Weaning Methods (if above criteria are met):**

Choose one of the following methods based on hospital protocol or on specific patient needs (i.e. increased WOB due to small ET tube size, patient dyssynchrony with ventilator, desire for close monitoring of patient's ventilation with alarms, etc.):

- ✓ T- piece trial; FIO2 of ___%
- ✓ Pressure Support PS ___ cm H_2O (5-8 cmH_2O); PEEP 5 cmH_2O; FIO_2 ___%
- ✓ CPAP ___ (0-5 cm H_2O)

***** ***Continue SBT for 30 - 120 minutes or as tolerated***

- ➢ **Assessment of Tolerance to include:**
  - ✓ Respiratory Rate < 35 breaths/min
  - ✓ SaO_2 > 90% on FIO_2 < 0.4-0.5
  - ✓ Heart Rate < 120
  - ✓ Systolic Blood Pressure ≥ 90 – 140 mmHg
  - ✓ Absence of respiratory distress (use of accessory muscles)
  - ✓ Arterial blood gas as necessary
  - ✓ ET tube leak test (cuff occlusion test) – deflation of cuff to determine if patient can breathe around ET tube verifying absence of excessive subglottic edema. **Leak ≥ 15%.**

***IF* above criteria are met, call md for extubation!** If above criteria are **not** met, resume previous ventilator orders and inform RN and MD of results of SBT.

References:

Kacmarek, Stoller, Heuer (2017). *Egan's Fundamentals of Respiratory Care,* 11th Edition. St. Louis, MO: Elsevier. Pages 1-1372.

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PERFORM EXTUBATION

RATING SCALE:
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N/A = Not applicable

Procedural steps:	RATINGS Lab/Peer	Lab/Instr	Clinical	Clinical	Clinical
1. Reviews medical record and verifies order for extubation, discussing plan with the nurse.					
2. States indicators that predict this patient's readiness for extubation					
3. Disinfects hands before and after therapy, following standard precautions					
4. Locates, selects, checks function of any equipment necessary (oxygen device, syringe, oral suction, etc.)					
5. Identifies patient by wristband and/or electronic identification					
6. Introduces self/instructor to I.C.U. staff, patient, and family members and explains procedure					
7. Positions patient optimally					
8. Assesses vital signs, hemodynamic data, laboratory data and listens to breath sounds anteriorly and posteriorly,					
9. Places patient on 100% oxygen and suctions ETT and oropharynx, assuring the patient has active gag and cough reflexes					
10. Detaches ETT securing device, instructs patient to inhale maximally, deflates cuffs, and instructs patient to cough while removing ETT					
11. Administers appropriate oxygen therapy device post extubation					
12. Instructs patient to deep breathe and cough, suctions and performs oral care as necessary					
13. Reassesses vital signs, SpO_2 and evaluates patient's airway for signs of obstruction, stridor, or increased WOB					
14. Assure patient's comfort and safety (restraints, bed rails up)before leaving room					
15. Evaluates post extubation ABG's when appropriate					
16. Documents extubation appropriately in medical record					
17. Reports to other members of the interdisciplinary care team regarding the patient's post extubation status					
Total:	__/34	__/34	__/34	__/34	__/34

Extubation FAQ's

Knowledge and Technical Skills Expectations:

Once mechanical ventilation is no longer required, the therapist must address the separate question of whether or not the patient can tolerate extubation. It is primarily the therapist's responsibility to access readiness and remove the endotracheal tube in most institutions. Keep in mind that a RSBI of less than 100 is the most important predictor of successful extubation. You also may be asked to perform a cuff occlusion/leak test per hospital guidelines. Assure that proper contact isolation procedures are followed upon entering the patient's room.

After confirming a patient's order for Extubation, the following equipment must be made available:

- ✓ Intubation equipment
- ✓ Manual resuscitator with mask
- ✓ 10-20 mL syringe
- ✓ Towel or pad to place on chest
- ✓ O_2 device with humidity as indicated
- ✓ Oral and ETT suction devices
- ✓ Mouth care supplies

Once these supplies are readily available, you will perform these steps:

- ✓ Place patient in upright position
- ✓ Hyperoxygenate patient
- ✓ Suction ETT and oropharynx
- ✓ Unsecure ETT holding device
- ✓ Deflate cuff
- ✓ Ask patient to cough
- ✓ Remove ET tube
- ✓ Suction oropharynx
- ✓ Apply appropriate O_2 and humidity
- ✓ Perform oral care and wash face (Nurse or **RT preferred**)
- ✓ Assess/Reassess the patient (vital signs, breath sounds, SpO_2, ABG)

Resources:

Kacmarek, Stoller, Heuer (2017). *Egan's Fundamentals of Respiratory Care,* 11th Edition. St. Louis, MO: Elsevier. Pages 1-1372.

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VENTILATOR SYSTEM SAFETY

PRE-USE CHECK

Ventilator Brand - _____

Procedural steps:	RATINGS Lab/Peer	Lab/Instr	Clinical	Clinical	Clinical
1. Wash hands and apply standard precautions and transmission-based isolation procedures as appropriate					
2. Performs proper ventilator cleaning and disinfection per manufacture's guidelines					
3. Gathers necessary equipment to include circuit, inspiratory filter, expiratory filter, HME, humidifier, expiratory valve, filter, flow sensor, test lung, etc.					
4. Re-assembles ventilator using appropriate equipment and assembly criteria					
5. Performs ventilator system safety check per manufacturer's instructions					
6. If unable to successfully complete safety check, recognizes the cause of the problem and repeats test successfully					
7. Labels ventilator with appropriate information of successful safety check to include date, initials, and time					
8. Covers equipment and/or assures that circuit is capped off to prevent contamination					
9. Places ventilator in proper area designated for clean and assembly ready devices					
Total:	__/18	__/18	__/18	__/18	__/18

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INITIATE MECHANICAL VENTILATION
With Patient Ventilator Assessment

Procedural steps:	RATINGS Lab/Peer	Lab/Instr	Clinical	Clinical	Clinical
1. Reviews medical record and verifies order for therapy: mode, FIO_2, volumes/pressures, rate, PEEP					
2. States indications for mechanical ventilation in this patient					
3. Locates and selects appropriate equipment and verifies that it has been checked based on manufacturers recommended Pre-Use Check					
4. Wash hands and apply standard precautions and transmission-based isolation procedures as appropriate					
5. Identifies patient by wristband and/or electronic identification					
6. Introduces self/instructor to ICU staff and/or family and explains purpose of ventilator assessment.					
7. Assesses vital signs, hemodynamic data, laboratory data and listens to breath sounds anteriorly and posteriorly, suctioning if necessary					
8. Checks mechanical ventilator for: Humidifier water level/HME Proper heating function/Circuit temperature Tubing free from obstruction No circuit leaks Filters are clean and clear of excessive water					
9. Determines the following parameters and record appropriately. (According to hospital policy): Mode and FIO_2 Volumes - Set/actual volumes - V_E, V_t, PS Timed parameters – Set/actual rates, IT, I:E ratio, inflation hold/pause time, flowrate Pressures - peak, static (plateau), PS , PEEP/auto PEEP Compliance					
10. Assures appropriate alarm settings and alarm function					
11. Re-evaluates most recent blood gases and suggests modification of ventilator settings as necessary					
12. Assure patient's comfort before leaving room					
13. Documents therapy appropriately in medical record					
14. Reports to other members of the interdisciplinary care team regarding the therapy as necessary					
Total:	__/28	__/28	__/28	__/28	__/28

Adult Mechanical Ventilation FAQ's

Knowledge and Technical Skills Expectations:

- ***What are the common indications for mechanical ventilation?***
  - ✓ To treat respiratory failure
  - ✓ To prevent impending respiratory failure
  - ✓ To treat hypoxemic respiratory failure [$P_{(A-a)}O_2$ value of 350 or more on FIO_2 of 1.0 or a PaO_2/FIO_2 value of < 200]
  - ✓ To provide long-term ventilatory support for chronic pulmonary insufficiency
- ***What are some of the precautions/hazards associated with mechanical ventilation?***
  - ✓ Hyperventilation or hypoventilation
  - ✓ Barotrauma
  - ✓ Increased intracranial pressure
  - ✓ Dynamic hyperinflation and auto-PEEP
  - ✓ Hypotension and reduced cardiac output
  - ✓ Infection (VAP)
  - ✓ Cardiac arrhythmias
- ***What types of equipment are used to administer adult mechanical ventilation?***
  - ✓ **Classifications of Mechanical Ventilators:**
    - **Method of Triggering (Patient or Time)**
      - Patient triggering can occur one of two ways – by generating a negative pressure sufficient to begin inspiration or by removing enough gas from the ventilatory circuit to trigger the ventilator into inspiration by flow
      - Time triggering occurs when the patient fails to make an inspiratory effort that would be detected by the ventilator, so the ventilator initiates inspiration due to a time setting (typically a control rate)
    - **Method of Cycling into Expiration (Time, Pressure or Flow)**
      - Time cycling occurs in many adult ventilators (i.e. Volume Control, Pressure Control, Pressure Support, SIMV or PRVC modes), when the breath terminates due to an inspiratory time control setting. However, a ventilator may deliver the breath at a flowrate over a given inspiratory time, so that a specific tidal volume is delivered within that time frame. Thus, the breath is terminated at the end of a preset inspiratory time, but *simultaneously* when a desired tidal volume is delivered.
      - Pressure cycling is rarely the *preset* parameter used to terminate inspiration in adult mechanical ventilation. IPPB devices use this form of cycling, where you set a peak inspiratory pressure and as soon as that pressure is reached, inspiration ends.
      - Flow cycling is commonly used in support modes of ventilation such as Pressure Support or Volume Support when inspiration is terminated at a fixed percentage of the measured peak inspiratory flow
    - **Methods of Limiting the Inspiratory Cycle**
      - Pressure limiting is the most common form of limiting we see in adult mechanical ventilators. This occurs when the pressure used to deliver the breath meets a preset maximum inspiratory pressure alarm limit. Most ventilators will abort the breath, sacrifice the delivered tidal volume and trigger the audible/visual alarm associated with this preset maximum inspiratory pressure limit. Pressure limiting also occurs in Pressure Support as the inspiratory pressure will not exceed the inspiratory pressure level, it simply holds at that pressure until flow cycling terminates the breath.

- **Modes of Ventilation**
  - **Volume Control (Assist-Control)** – All breaths are delivered at a preset tidal volume (unless pressure limited or leaks exist) and at a minimum preset rate. Inspiratory pressures will vary with changes in airway resistance and compliance. Inspiration may be patient or time triggered.
  - **Pressure Control** – All breaths are delivered with a preset pressure and at a minimum preset rate. Tidal volumes will vary with changes in airway resistance and compliance. Inspiration may be patient or time triggered.
  - **Pressure-Regulated Volume Control** – All breaths are delivered to reach a preset target tidal volume (unless pressure limited or leaks exist) using the lowest possible inspiratory pressure at a minimum preset rate. Inspiratory pressures are regulated breath to breath to reach the target tidal volume. Inspiratory pressures will not change more than 3 cmH_2O from breath to breath, resulting in some variability in reaching the target tidal volume. Inspiratory pressures will vary with changes in airway resistance and compliance. Inspiration may be patient or time triggered.
  - **SIMV (Volume Control + Pressure Support)** – This is usually used as a weaning mode of ventilation in which a preset number of mandatory volume breaths are delivered as in Volume Control. Then, if a patient triggers outside of the synchronous period, they receive spontaneous pressure supported breaths at the preset inspiratory pressure level above their PEEP with tidal volumes that vary in response to changes in airway resistance, compliance and patient effort.
  - **SIMV (Pressure Control + Pressure Support)** – This is also usually used as a weaning mode of ventilation in which a preset number of mandatory pressure breaths are delivered as in Pressure Control. Then, if a patient triggers outside of the synchronous period, they received spontaneous pressure supported breaths as described above.
  - **Pressure Support** – This is usually used as a weaning mode of ventilation in which a patient triggers all breaths. The breaths are delivered using a preset inspiratory pressure level above the patient's PEEP to assist in delivery of a larger spontaneous tidal volume. Tidal volumes will vary with changes in airway resistance, compliance and patient effort. Failure by the patient to initiate a breath will generally result in low volume and apnea alarms.
  - **Volume Support** – This is also usually used as a weaning mode of ventilation in which a patient triggers all breaths. The breaths are delivered using pressures necessary to administer the target tidal volume. The initial inspiratory pressure used is generally 5-10 cmH_2O and then the ventilator changes that pressure by as much as 3 cmH_2O to deliver the target tidal volume.
- **Flow Waveforms**
  - **Square wave flow pattern** – breaths are delivered with a constant flow throughout the entire inspiratory cycle. Frequently used with volume control/assist-control modes of ventilation. In face of low lung compliance or high airway resistance, square wave flow patterns will generate higher peak inspiratory pressures**.**
  - **Descending wave flow pattern** – breaths are delivered with a variable flow. Frequently seen in PRVC, PC, and PS modes of ventilation. Some ventilators provide a control to select the flow waveform desired. Flow begins with a high initial inspiratory flowrate and as resistance is met, flow decelerates. In face of low lung

compliance or high airway resistance, decelerating flow patterns will result in lower peak inspiratory pressures.

- **Alarms**
  - **High Pressure alarm** – designed to abort the inspiratory cycle when the preset pressure is reached and trigger audible/visual alarms. Recommended to be set at 10-15 cmH_2O > the patient's peak inspiratory pressures (PIP's), and should not exceed 50 cmH_2O.
  - **High and Low Minute Volume Alarms** – designed to alert practitioners of conditions that exceed an acceptable minute volume. Recommended to be set at 50-80% of the patient's actual minute ventilation for the low $\dot{V}_E$ alarm and 150% of the patient's actual minute ventilation for the high $\dot{V}_E$ alarm. These alarms should alert practitioners of leaks, disconnects, as well as periods of apnea, bradypnea or tachypnea.
  - **High and Low Respiratory Rate Alarms –** designed to alert practitioners of apnea, bradypnea, or tachypnea. Recommended to be set at 50-80% of the patient's actual R.R. and 150% of their actual R.R.
  - **High and Low FIO_2 Alarm** – these alarms can be either set by the practitioner or in some ventilators are automatic presets. If controls are available for the practitioner to set, it is recommended to set them 5% above and below the desired FIO_2.
  - **Apnea Alarm** – These alarms may vary between brands of ventilators. Adult apnea alarms are usually preset at 20 seconds and signal when no inspiratory cycle has been initiated in a 20 second window. Most frequent encounter of this alarm is in the support modes of ventilation.

➢ **Common Calculations used in assessing a patient on a mechanical ventilator:**

- Minute volume from tidal volume and respiratory rate (or vice versa)
- Static compliance
- Inspiratory time from control rate and percent inspiratory time
- Inspiratory flowrate (with square wave flow patterns only) from control rate and minute volume

✓ **Common Troubleshooting:**

With all ventilator alarms, begin by assessing the patient for adequate ventilation and oxygenation and when in doubt, remove the patient from the ventilator and provide ventilation with a manual resuscitator until the problem can be resolved!

- High Pressure limiting – listen to breath sounds, assess for need for suctioning, assess vital signs, assess pulse oximetry, determine if patient is biting on tube, assess for decreasing lung compliance or increasing airway resistance, evaluate appropriateness of inspiratory time/flowrate, determine need for administration of bronchodilator
- High Minute Volume or High Rate alarm – listen to breath sounds, assess for need for suctioning, assess vital signs, observe pulse oximetry, determine if there is a need to obtain an arterial blood gas, consult with nurse regarding level of sedation
- Low Minute Volume or Low Rate alarm – listen to breath sounds, assess for need for suctioning, assess vital signs, observe pulse oximetry, watch patient for excessive WOB and/or fatigue, determine if there is a need to obtain an arterial blood gas, evaluate patient for cuff leak and check ventilator for possible circuit leaks/disconnections

- High/Low FIO_2 alarms – observe patient for adequate oxygenation (pulse oximetry), determine if the FIO_2 control is appropriately set, observe the analyzed FIO_2, and then observe the alarm settings
- Apnea alarms – assess patient for adequacy of ventilation, observe patient's pattern of breathing, determine if patient needs additional support (i.e. termination of weaning mode), consult with nurse regarding level of sedation

➢ ***What essential assessments are needed to evaluate the effectiveness of mechanical ventilation for a specific patient:***

- ✓ Assess vital signs
- ✓ Assess oxygenation (pulse oximetry)
- ✓ Auscultation of breath sounds
- ✓ Observe pattern of breathing (use of accessory muscles, synchrony with ventilator, R.R. and tidal volume)
- ✓ Determine need for suctioning
- ✓ Determine need for administration of bronchodilators
- ✓ Evaluate ABG for appropriate acid-base balance and adequate oxygenation
- ✓ Complete ventilator assessment (evaluating pressures, volumes, compliance, etc.)
- ✓ Review chest x-rays for changes in tube position, changes in adequacy of ventilation, etc.

References:

For Adult Mechanical Ventilation, go to the AARC website, www.aarc.org and click on Resources, then click on Clinical Practice Guidelines and finally scroll down to the following CPG for review:

Patient-Ventilator System Checks, Humidification during Mechanical Ventilation, AHA—Adjuncts for Airway Control and Ventilation

Kacmarek, Stoller, Heuer (2017). *Egan's Fundamentals of Respiratory Care,* 11th Edition. St. Louis, MO: Elsevier. Pages 1-1372

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CHANGE VENTILATOR CIRCUIT

Procedural steps:	RATINGS				
	Lab/Peer	Lab/Instr	Clinical	Clinical	Clinical
1. Disinfects hands before procedure, applies gloves and follows standard precautions					
2. Assesses vital signs and determines appropriateness of ventilator circuit change					
3. Gather the necessary equipment to perform a complete ventilator circuit change					
4. Assemble equipment as completely as possible					
5. Place the assembled circuit on the bed with the wye placed aseptically proximal to the patient. Place the other ends proximal to their corresponding connections on the ventilator					
6. Adjust the Fio_2 on the ventilator to hyperoxygenate the patient before disconnection and silence the ventilator alarms					
7. Quickly disconnect the circuit from the patient wye and disconnect the other circuit connections from the ventilator					
8. Quickly attach the ends of the new circuit to the corresponding connections to the ventilator					
9. Reconnect the patient to the ventilator circuit					
10. Rapidly assess the circuit for leaks and ensure ventilator function					
11. Reassess vital signs					
12. Perform a complete patient ventilator system check to assure ventilator and circuit function					
13. Dispose of all equipment and soiled material in the proper waste container					
14. Removes gloves and PPE and washes hands					
Total:	**__/28**	**__/28**	**__/28**	**__/28**	**__/28**

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MECHANICAL VENTILATION OF THE NEONATAL/PEDIATRIC PATIENT

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Procedural steps:	RATINGS Lab/Peer	Lab/Instr	Clinical	Clinical	Clinical
1. Reviews medical record and verifies order for therapy: mode, FIO_2, volume/pressure, rate, I:E ratio, PEEP					
2. States indications for mechanical ventilation in this patient					
3. Locates and selects appropriate equipment and verify that it has been checked based on manufactures recommended Pre-Use Check					
4. Disinfects hands before and after therapy, following standard precautions					
5. Identifies patient by wristband and/or electronic identification					
6. Introduces self/instructor to ICU staff and/or family and explains purpose of ventilator assessment.					
7. Assesses vital signs, hemodynamic data, laboratory data and listens to breath sounds anteriorly and posteriorly, suctioning if necessary					
8. Checks mechanical ventilator for: Humidifier water level/HME Proper heating function/Circuit temperature Tubing free from obstruction (water traps) No circuit leaks Filters are clean and clear of excessive water					
9. Determines the following parameters and record appropriately. (According to hospital policy): Mode and FIO_2 Volumes – Set/actual volumes - V_E, V_t, PS Timed parameters – Set/actual rates, IT, ET, I:E ratio, flowrate Pressures – Set, peak, static (plateau), PS, PEEP, Auto-PEEP Compliance					
10. Assures appropriate alarm settings and proper alarm function					
11. Re-evaluates most recent blood gases and suggests modification of ventilator settings as necessary.					
12. Assure patient's comfort before leaving room					
13. Documents therapy appropriately in medical record					
14. Reports to other members of the interdisciplinary care team regarding the therapy as necessary					
Total:	**__/28**	**__/28**	**__/28**	**__/28**	**__/28**

INFANT Mechanical Ventilation FAQ's

Knowledge and Technical Skills Expectations:

- ***What are the common indications for mechanical ventilation?***
  - ✓ To treat respiratory failure
  - ✓ To prevent impending respiratory failure
  - ✓ To treat hypoxemic respiratory failure [$P_{(A-a)}O_2$ value of 350 or more on FIO_2 of 1.0 or a PaO_2/FIO_2 value of < 200]
  - ✓ To provide long-term ventilatory support for chronic pulmonary insufficiency
- ***What are some of the precautions/hazards associated with mechanical ventilation?***
  - ✓ Hyperventilation or hypoventilation
  - ✓ Barotrauma
  - ✓ Increased intracranial pressure
  - ✓ Dynamic hyperinflation and auto-PEEP
  - ✓ Hypotension and reduced cardiac output
  - ✓ Infection (VAP)
  - ✓ Cardiac arrhythmias
  - ✓ Respiratory Distress Syndrome (RDS)
- ***What types of equipment are used to administer infant mechanical ventilation?***
  - ✓ **Classifications of Mechanical Ventilators:**
    - **Method of Triggering (Patient or Time)**
      - Patient triggering can occur one of two ways – by generating a negative pressure sufficient to begin inspiration or by removing enough gas from the ventilatory circuit to trigger the ventilator into inspiration by flow
      - Time triggering occurs when the patient fails to make an inspiratory effort that would be detected by the ventilator, so the ventilator initiates inspiration due to a time setting (typically a control rate)
    - **Method of Cycling into Expiration (Time, Pressure or Flow)**
      - Time cycling occurs in many infant ventilators (i.e. Volume Control, Pressure Control, Pressure Support, SIMV or PRVC modes), when the breath terminates due to an inspiratory time control setting. However, a ventilator may deliver the breath at a flowrate over a given inspiratory time, so that a specific tidal volume is delivered within that time frame. Thus, the breath is terminated at the end of a preset inspiratory time, but *simultaneously* when a desired tidal volume is delivered. The other way in which ventilators time cycle is when there is a back-up inspiratory time which terminates inspiration when flow cycling fails
      - Pressure cycling is rarely the *preset* parameter used to terminate inspiration in infant mechanical ventilation. IPPB devices use this form of cycling, where you set a peak inspiratory pressure and as soon as that pressure is reached, inspiration ends
      - Flow cycling is commonly used in support modes of ventilation such as Pressure Support or Volume Support when inspiration is terminated at a fixed percentage of the measured peak inspiratory flow
    - **Methods of Limiting the Inspiratory Cycle**
      - Pressure limiting is the most common form of limiting we see in infant mechanical ventilators. This occurs when the pressure used to deliver the breath meets a preset maximum inspiratory pressure alarm limit. Most ventilators will abort the breath, sacrifice the delivered tidal volume and trigger the audible/visual alarm associated with

this preset maximum inspiratory pressure limit. Pressure limiting also occurs in Pressure Support as the inspiratory pressure will not exceed the inspiratory pressure level, it simply holds at that pressure until flow cycling terminates the breath.

- **Modes of Ventilation**
  - **Volume Control (Assist-Control)** – All breaths are delivered at a preset tidal volume (unless pressure limited or leaks exist) and at a minimum preset rate. Inspiratory pressures will vary with changes in airway resistance and compliance. Inspiration may be patient or time triggered.
  - **Pressure Control** – All breaths are delivered with a preset pressure and at a minimum preset rate. Tidal volumes will vary with changes in airway resistance and compliance. Inspiration may be patient or time triggered.
  - **Pressure-Regulated Volume Control** – All breaths are delivered to reach a preset target tidal volume (unless pressure limited or leaks exist) using the lowest possible inspiratory pressure at a minimum preset rate. Inspiratory pressures are regulated breath to breath to reach the target tidal volume. Inspiratory pressures will not change more than 3 cmH_2O from breath to breath, resulting in some variability in reaching the target tidal volume. Inspiratory pressures will vary with changes in airway resistance and compliance. Inspiration may be patient or time triggered.
  - **SIMV (Volume Control + Pressure Support)** – This is usually used as a weaning mode of ventilation in which a preset number of mandatory volume breaths are delivered as in Volume Control. Then, if a patient triggers outside of the synchronous period, they receive spontaneous pressure supported breaths at the preset inspiratory pressure level above their PEEP with tidal volumes that vary in response to changes in airway resistance, compliance and patient effort.
  - **SIMV (Pressure Control + Pressure Support)** – This is also usually used as a weaning mode of ventilation in which a preset number of mandatory pressure breaths are delivered as in Pressure Control. Then, if a patient triggers outside of the synchronous period, they received spontaneous pressure supported breaths as described above.
  - **Pressure Support** – This is usually used as a weaning mode of ventilation in which a patient triggers all breaths. The breaths are delivered using a preset inspiratory pressure level above the patient's PEEP to assist in delivery of a larger spontaneous tidal volume. Tidal volumes will vary with changes in airway resistance, compliance and patient effort. Failure by the patient to initiate a breath will generally result in low volume and apnea alarms.
  - **Volume Support** – This is also usually used as a weaning mode of ventilation in which a patient triggers all breaths. The breaths are delivered using pressures necessary to administer the target tidal volume. The initial inspiratory pressure used is generally 5-10 cmH_2O and then the ventilator changes that pressure by as much as 3 cmH_2O to deliver the target tidal volume.
- **Flow Waveforms**
  - **Square wave flow pattern** – breaths are delivered with a constant flow throughout the entire inspiratory cycle. Frequently used with volume control/assist-control modes of ventilation. In face of low lung compliance or high airway resistance, square wave flow patterns will generate higher peak inspiratory pressures**.**
  - **Descending wave flow pattern** – breaths are delivered with a variable flow. Frequently seen in PRVC, PC, and PS modes of ventilation. Some ventilators provide a control to select the flow waveform desired. Flow begins with a high initial inspiratory flowrate

and as resistance is met, flow decelerates. In face of low lung compliance or high airway resistance, decelerating flow patterns will result in lower peak inspiratory pressures

- **Alarms**
  - **High Pressure alarm** – designed to abort the inspiratory cycle when the preset pressure is reached and trigger audible/visual alarms. Recommended to be set at 10-15 cmH_2O > the patient's peak inspiratory pressures in older pediatric patients, but 5 – 10 cmH_2O > the patient's peak inspiratory pressures in infants and small children
  - **High and Low Minute Volume Alarms** – designed to alert practitioners of conditions that exceed an acceptable minute volume. Recommended to be set at 50-80% of the patient's actual minute ventilation for the low $\dot{V}_E$ alarm and 150% of the patient's actual minute ventilation for the high $\dot{V}_E$ alarm. These alarms should alert practitioners of leaks, disconnects, as well as periods of apnea, bradypnea or tachypnea
  - **High and Low Respiratory Rate Alarms –** designed to alert practitioners of apnea, bradypnea, or tachypnea. Recommended to be set at 50-80% of the patient's actual R.R. and 150% of their actual R.R. This alarm can be more liberal for neonatal because of erratic respiratory patterns
  - **High and Low FIO_2 Alarm** – these alarms can be either set by the practitioner or in some ventilators are automatic presets. If controls are available for the practitioner to set, it is recommended to set them 5-10% above and below the desired FIO_2
  - **Apnea Alarm** – These alarms may vary between brands of ventilators. Adult apnea alarms are usually preset at 10 - 15 seconds and signal when no inspiratory cycle has been initiated in a 20 second window. Most frequent encounter of this alarm is in the support modes of ventilation

✓ **Common Calculations used in assessing a patient on a mechanical ventilator:**
(Refer to Ventilator Calculations provided in class)

- Minute volume $\dot{V}_E$ from tidal volume and respiratory rate (or vice versa)
- Static compliance
- Inspiratory time from control rate and percent inspiratory time
- Inspiratory flowrate (with square wave flow patterns only) from control rate and minute volume

✓ **Common Troubleshooting:**

- With all ventilator alarms, begin by assessing the patient for adequate ventilation and oxygenation and when in doubt, remove the patient from the ventilator and provide ventilation with a manual resuscitator until the problem can be resolved.
- **High Pressure limiting** – listen to breath sounds, assess for need for suctioning, assess vital signs, assess pulse oximetry, determine if patient is biting on tube, assess for decreasing lung compliance or increasing airway resistance, evaluate appropriateness of inspiratory time/flowrate, determine need for administration of bronchodilator
- **High Minute Volume or High Rate alarm** – listen to breath sounds, assess for need for suctioning, assess vital signs, observe pulse oximetry, determine if there is a need to obtain an arterial blood gas, consult with nurse regarding level of sedation
- **Low Minute Volume or Low Rate alarm** – listen to breath sounds, assess for need for suctioning, assess vital signs, observe pulse oximetry, watch patient for excessive WOB and/or fatigue, determine if there is a need to obtain an arterial blood gas, evaluate patient for cuff leak and check ventilator for possible circuit leaks/disconnections

- **High/Low FIO_2 alarms** – observe patient for adequate oxygenation (pulse oximetry), determine if the FIO_2 control is appropriately set, observe the analyzed FIO_2, and then observe the alarm settings
- **Apnea alarms** – assess patient for adequacy of ventilation, observe patient's pattern of breathing, determine if patient needs additional support (i.e. termination of weaning mode), consult with nurse regarding level of sedation

➢ ***What essential assessments are needed to evaluate the effectiveness of mechanical ventilation for a specific patient:***

- ✓ Assess vital signs
- ✓ Assess oxygenation (pulse oximetry, transcutaneous $TCPO_2$)
- ✓ Auscultation of breath sounds
- ✓ Observe pattern of breathing (use of accessory muscles, synchrony with ventilator, R.R. and tidal volume)
- ✓ Determine need for suctioning
- ✓ Determine need for administration of bronchodilators
- ✓ Evaluate CBG, VBG, ABG for appropriate acid-base balance and adequate oxygenation
- ✓ Complete ventilator assessment (evaluating pressures, volumes, compliance, etc.)
- ✓ Review chest x-rays for changes in tube position, changes in adequacy of ventilation, etc.

References:

For Infant Mechanical Ventilation, go to the AARC website, www.aarc.org and click on Resources, then click on Clinical Practice Guidelines and finally scroll down to the following CPG for review:

> *Neonatal Time-Triggered, Pressure-Limited, Timed-Cycle Mechanical Ventilation, Patient-Ventilator System Checks, Humidification during Mechanical Ventilation, Capillary Blood Gas Sampling for Neonatal and Pediatric Patients*

Kacmarek, Stoller, Heuer (2017). *Egan's Fundamentals of Respiratory Care,* 11th Edition. St. Louis, MO: Elsevier. Pages 1-1372.

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Clinical Skills & Competency Checklist

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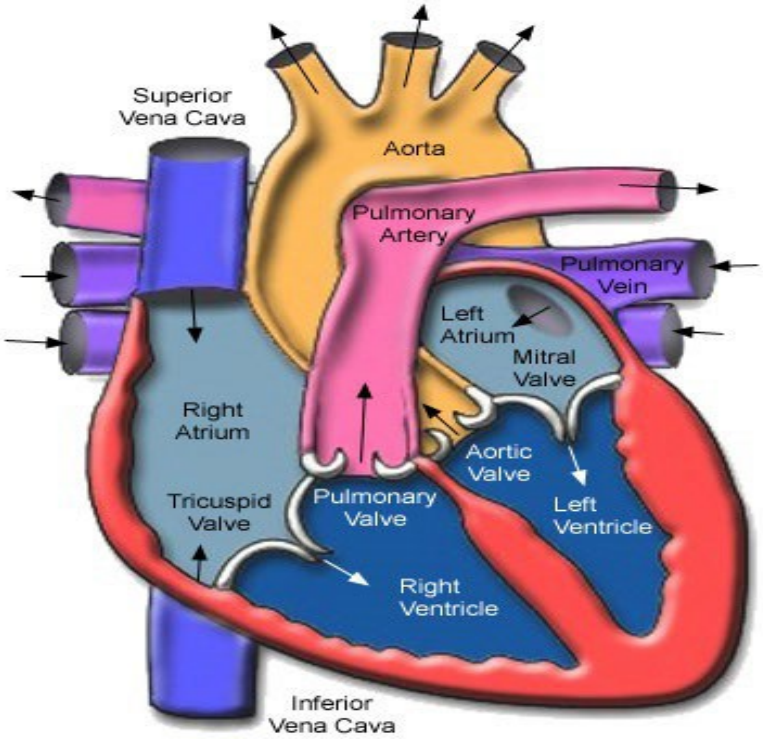
EVALUATE HEMODYNAMIC DATA

Procedural steps:	RATINGS Lab/Peer	Lab/Instr	Clinical	Clinical	Clinical
1. Lists indications for hemodynamic monitoring while correlating patient condition.					
2. Diagrams and identifies normal heart anatomy and blood flow through the heart.					
3. Identify waveforms and pressures within the heart to include normal values for: CVP:2-6 mmHg, RV: 25/0 mmHg, PAP 25/10 mmHg, PCWP: 5-10 mmHg, Cardiac Output: 4-8 LPM					
4. Identifies and evaluates the importance of the phlebostatic axis.					
5. Locates and identifies a variety of catheters to include: Swan Ganz PA, Double lumen, triple lumen, PICC line, arterial line					
6. Identifies equipment needed for hemodynamic monitoring including fluid source, pressure bag, transducer, cable and monitor.					
7. Documents current hemodynamic data from monitor					
8. Able to recognize effects of hypervolemia on hemodynamic data					
9. Able to recognize effects of hypervolemia on hemodynamic data					
10. Able to recognize effects of other pathologies on hemodynamic data. Refer to chart and FAQ's on following page.					
11. Identifies typical insertion sites (placement) of various lines both venous and arterial (art. Line).					
Total:	__/22	__/22	__/22	__/22	__/22

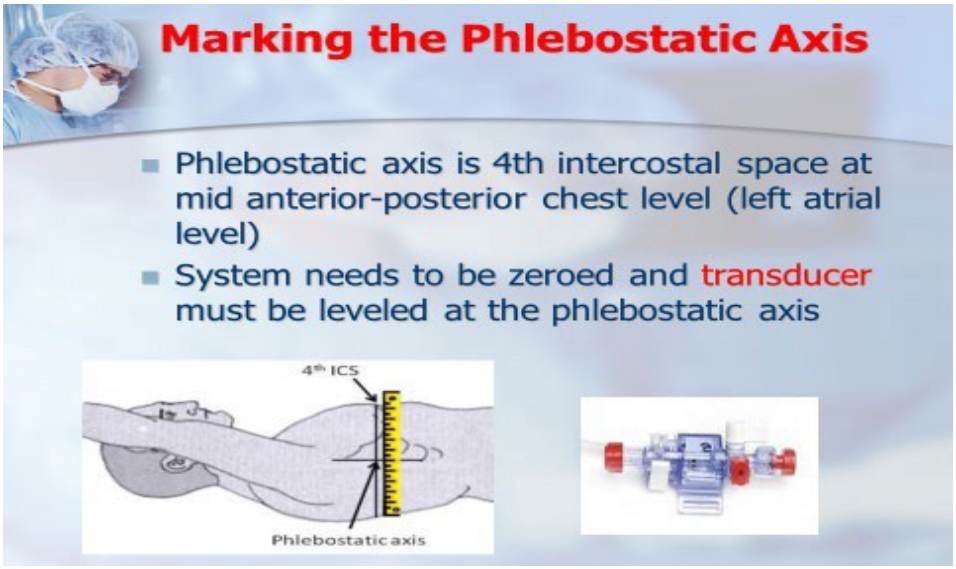
Hemodynamic Monitoring FAQ's:

Knowledge and Technical Skills Expectations:

Application of physiologic principles and the interpretation of the data obtained from hemodynamic monitoring aid the care of the critically ill, enhance patient-ventilator management, and improve clinical outcomes. Although the involvement is varied at different facilities, the NBRC recognizes that practitioners must demonstrate a basic competency in the area of hemodynamic monitoring.



mmHg	2-6	25/10	5-10	4-8 LPM
Pathology	**CVP**	**PAP**	**PCWP**	**CO**
Right heart failure	↑↑	N/↓	N/↓	N
Cor pulmonale	↑↑	N/↓	N/↓	N
Lung disorders	↑	↑↑	N/↓	N
Pulmonary embolism	↑	↑↑	N/↓	N
Pulmonary hypertension	↑	↑↑	N/↓	N
Air Embolism	↑	↑↑	N/↓	N
Left heart failure	N	↑	↑↑	↓
Mitral valve stenosis	N	↑	↑↑	↓
CHF/pulmonary edema	N	↑	↑↑	↓
High PEEP effects	N	↑	↑↑	↓
Hypervolemia	↑↑	↑	↑	↑
Hypovolemia	↓↓	↓	↓	↓



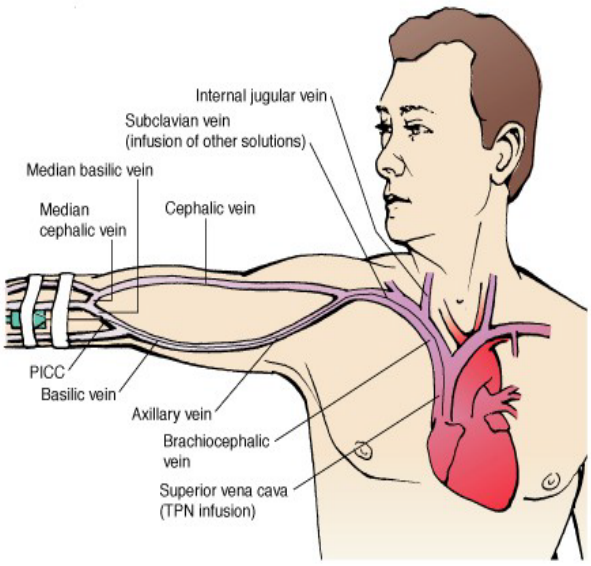


Figure 46-9 Placement of peripherally inserted central catheter (PICC).

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INTERPRET CAPNOGRAPHY RESULTS

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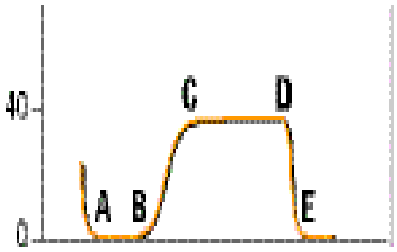
Procedural steps:	RATINGS Lab/Peer	Lab/Instr	Clinical	Clinical	Clinical
1. Reviews medical record and verifies order for Capnography					
2. Disinfects hands before and after therapy, following standard precautions					
3. Introduces self/instructor to staff, patient, and family members and explains procedure					
4. Determines and verifies FiO_2, device or current ventilator settings					
5. Calibrates capnography following device procedure manual and allows sufficient warm up time (if spot check)					
6. Identifies whether or not it is a mainstream or sidestream device					
7. Connects clean sampling sensor to patient's O_2 delivery device or in line with a ventilator					
8. Records highest $PECO_2$ after 3 minutes and compares to recent $PaCO_2$					
9. Interprets results and determines ventilator status					
10. If continuous monitoring is performed, checks sensor or sampling line for moisture or debris and replaces if necessary					
11. Documents findings in medical record					
12. Reports to other members of the health care team regarding the patient's status					
13. Discards or disinfects all soiled equipment as indicated					
14. Removes gloves and PPE and washes hands					
Total:	**__/28**	**__/28**	**__/28**	**__/28**	**__/28**

Capnography FAQ's:

Knowledge and Technical Skills Expectations:



Normal Capnogram: The diagram below shows the shape of a normal capnogram.

A-B: A near zero baseline—Exhalation of CO2-free gas contained in dead space.
B-C: Rapid, sharp rise—Exhalation of mixed dead space and alveolar gas.
C-D: Alveolar plateau—Exhalation of mostly alveolar gas.
D: End-tidal value— Peak CO2 concentration—normally at the end of exhalation.
D-E: Rapid, sharp downstroke—Inhalation

Ventilation (V)/Perfusion(Q) Relationship

During each breath, the alveoli exchange carbon dioxide and oxygen. At inhalation the alveoli receive O2, which diffuses into the pulmonary capillaries. Then, at exhalation, CO2 diffuses into the alveoli and is eliminated via ventilation.

The difference between EtCO2 (alveolar) and PaCO2 (arterial) is referred to as the a-ADCO2. This difference is normally 2 to 5 mmHg. However, conditions that alter the ventilation-perfusion ratio also affect the a-ADCO2. Clinicians can use the a-ADCO2 value to make treatment decisions and then track resulting changes in a-ADCO2 to assess the effectiveness of their interventions.

Abnormal Capnograms:

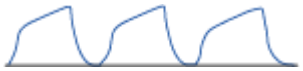
Sudden loss of $EtCO_2$ to zero or near zero

Possible causes:
Airway disconnection
Dislodged ET tube/esophageal intubation
Totally obstructed/kinked ET tube
Complete ventilator malfunction

Sustained low $EtCO_2$ with good alveolar plateau

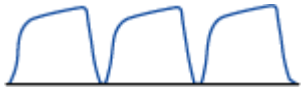
Possible causes: Hyperventilation
Hypothermia Sedation, anesthesia
Dead space ventilation

Sustained low $EtCO_2$ without alveolar plateau



Possible causes:
Incomplete exhalation
Partially kinked ET tube
Bronchospasm
Mucous plugging
Poor sampling techniques

Elevated $EtCO_2$ with good alveolar plateau



Possible causes:
Inadequate minute ventilation/hypoventilation
Respiratory-depressant drugs
Hyperthermia, pain, shivering

Gradually increasing $EtCO_2$

Possible causes:
Hypoventilation
Rising body temperature/malignant hyperthermia
Increased metabolism
Partial airway obstruction
Absorption of CO_2 from exogenous source

Exponential decrease in EtCO2

Possible causes:
Cardiopulmonary arrest
Pulmonary embolism
Sudden hypotension; massive blood loss
Cardiopulmonary bypass

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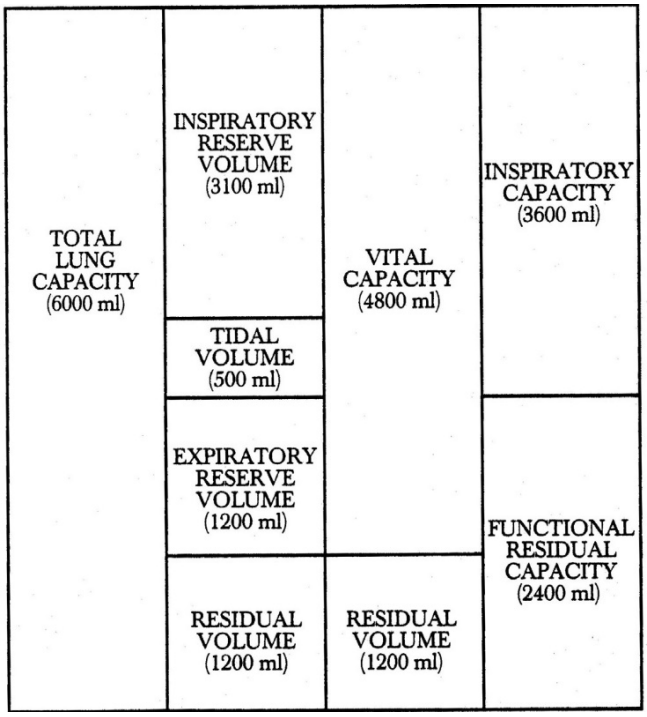
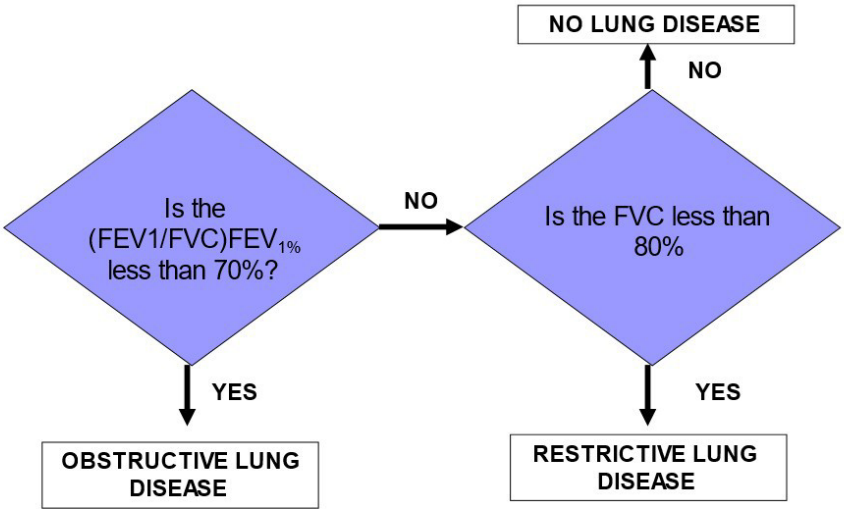
PERFORM SCREENING SPIROMETRY

Procedural steps:	RATINGS Lab/Peer	Lab/Instr	Clinical	Clinical	Clinical
1. Verifies physician order					
2. Wash hands and apply standard precautions and transmission-based isolation procedures as appropriate					
3. Gathers the necessary equipment to include; spirometer, disposable mouthpiece and filter, disposable nose clip, 3-liter calibration syringe					
4. Turn on machine and enter the calibration mode. Attach the syringe and follow calibration instructions					
5. Pull and push back the plunger of the syringe at least 3 times at variable speeds (slow, moderate, fast). According to ATS standards, the spirometer must be accurate to 3% of the calibrating volume or ± 50 ml, whichever is greater					
6. Introduce self and identifies patient by wristband and/or electronic identification					
7. Explain procedure and ensure patient understanding					
8. Enter in all demographic patient data and attach clean disposable mouthpiece. Instruct patient to place the mouthpiece between teeth and keep lips sealed tightly. Place disposable nose clips on patient.					
9. Instruct patient to breathe calmly for a few breaths and then take as deep of a breath as possible completely filling their lungs. Without hesitation, the patient should blow the air out as hard, fast, and completely as possible.					
10. Replace the nose clips and repeat maneuver until 3 acceptable maneuvers are obtained. Allow for adequate recover in between attempts					
11. Verify that the results meet ATS standards for reproducibility. The FVC tracings should be free from the following; cough or glottis closure, variable effort, early termination, hesitation at start of test, or baseline error or leak					
12. Identify need for bronchodilator if appropriate (FEV1% of ≤ 70%). If needed, administer a fast acting bronchodilator and repeat spirometry after 20 minutes					
13. After administering a bronchodilator, identifies whether or not there was reversibility noted (12% or 200 ml change in FEV1)					
14. Discard any disposable nose clips, mouthpieces, or flow sensors in an infectious waste container when testing is completed. Remove gloves and wash your hands					
15. Documents findings in EMR and reports to other members of the health care team regarding the therapy as necessary					
Total:	**__/30**	**__/30**	**__/30**	**__/30**	**__/30**

Lung Volumes



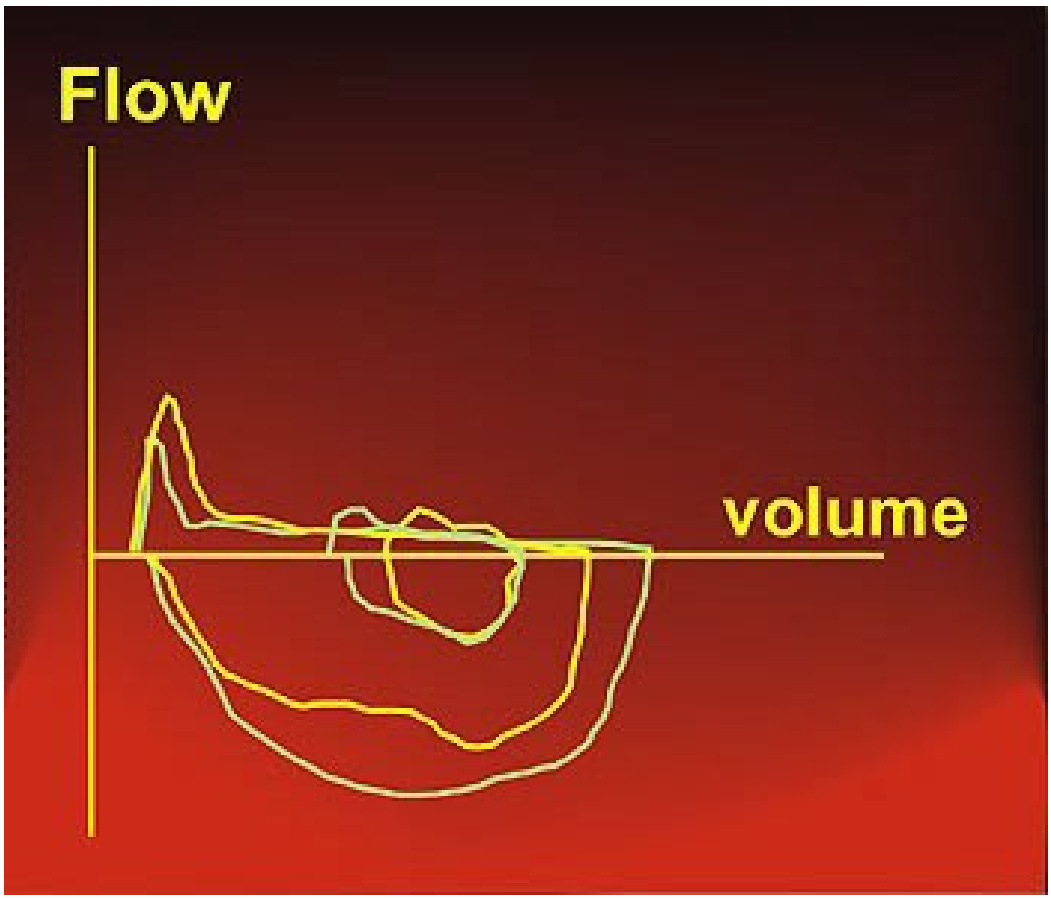
Interpretative Strategy



PFT'S IN A NUTSHELL

Obstructive Pattern — Evaluation

- **Spirometry**
  - **FEV1/FVC: decreased <70%)**
  - **Decreased flowrates**
- **FV Loop** "scooped" "witches hat"
- ***Lung Volumes***
  - TLC, RV: increased
- Bronchodilator responsiveness



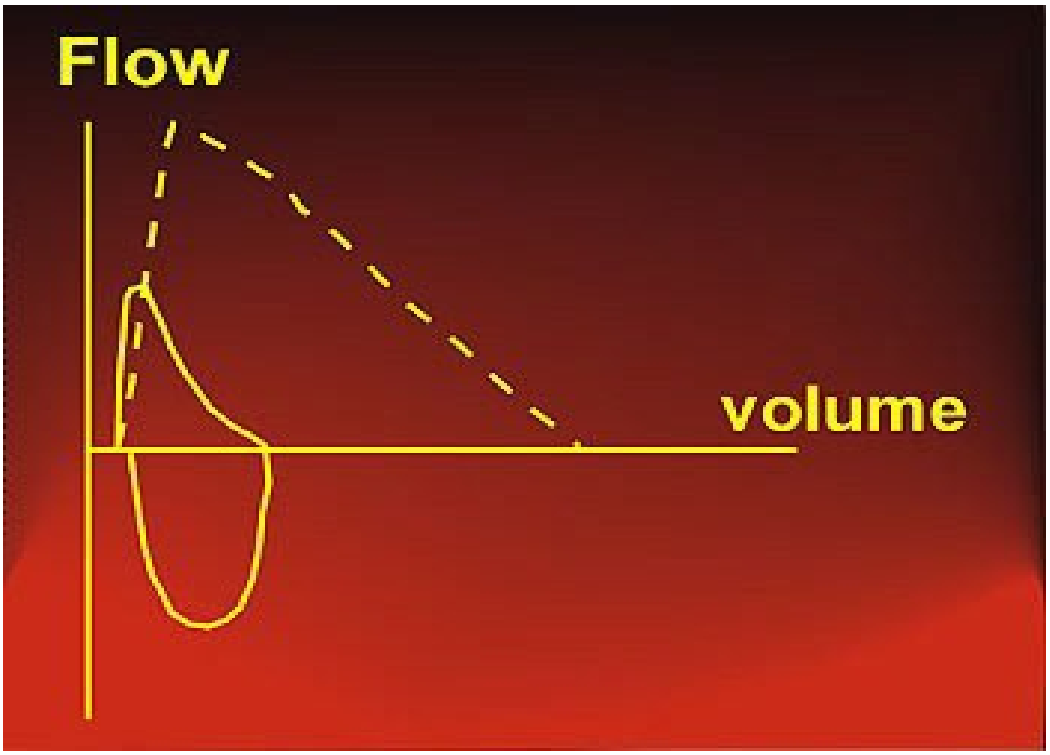
- Decreased flows indicate **OBSTRUCTIVE** disease
  1) **C**ystic Fibrosis
  2) **B**ronchitis
  3) **A**sthma
  4) **B**ronchiectasis
  5) **E**mphysema

Restrictive Pattern – Evaluation

- **Spirometry**
  - **FVC** **decreased < 80%**
  - FEV1/FVC: normal or increased
  - Normal flow rates

- **FV Loop** small and usually tall

  - ***Lung Volumes***
  - TLC, RV: decreased



* Decreased volumes indicate **RESTRICTIVE** disease

1) fibrotic disease
2) thoracic deformities
3) post-surgical patients
4) pleural disease
5) neuromuscular disease
6) cardiac disease
7) inflammatory disease

As a reminder: **Patients can be any of the following:**

Restrictive only (Decreased volumes, VC or FVC)

Obstructive only (Decreased flows, FEV1/FVC)

Both Restrictive and Obstructive (Decreased Volumes and Flows)

Neither- all normal

*****Determining BEST TEST*****

Greatest Sum of FEV1 and FVC:

FEV1		FVC
2.0	3.00	= 5.0 L
1.8	2.80	= 4.6 L
1.9	3.30	= 5.2 L

The third attempt is your best test because it has the greatest sum of your FEV1 and FVC !!!

Reversibility

12% or 200 ml increase in FEV1 post bronchodilator

*****This tells you that the bronchodilator worked!!!**

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PERFORM 12 LEAD ECG

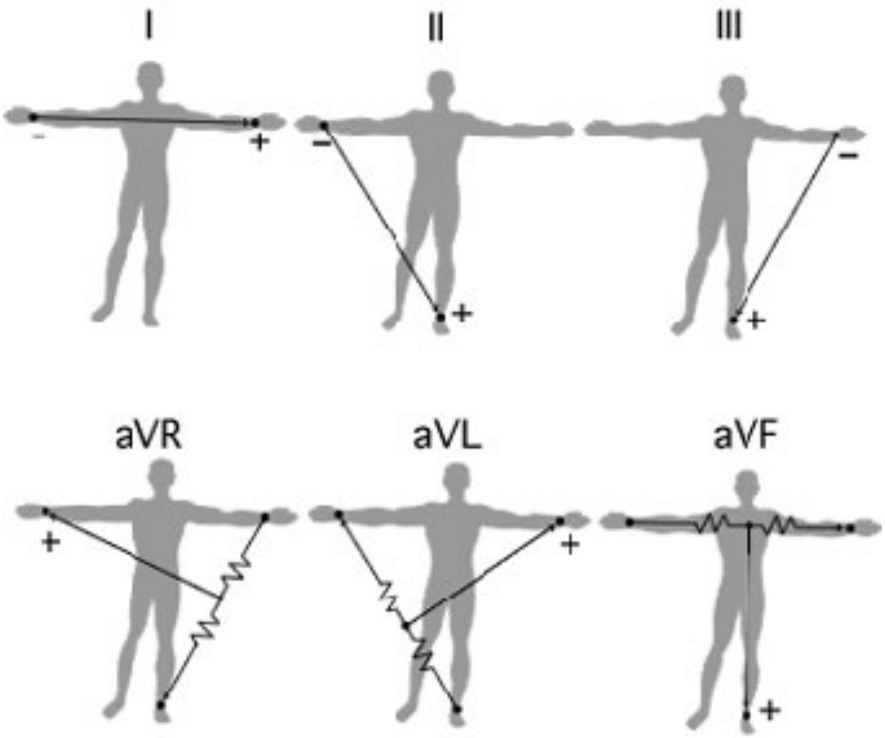
Procedural steps:	RATINGS Lab/Peer	Lab/Instr	Clinical	Clinical	Clinical
1. Verifies physician order					
2. Gathers the necessary equipment to include; electrocardiograph machine (ECG), disposable electrode pads, ECG recording paper, limb and chest leads, alcohol prep pads, razor, and clean towels					
3. Wash hands and apply standard precautions and transmission-based isolation procedures as appropriate					
4. Introduce self and identifies patient by wristband and/or electronic identification					
5. Explains procedure to patient					
6. Have the subject remove all jewelry or metal. Place patient in supine position with arms and legs uncrossed					
7. Plug in the ECG machine. Ensure there is an adequate supply of paper. Turn machine on and enter patient data per instructions					
8. Apply clean electrodes for the limb leads to the muscular areas of the arms and legs. Avoid placing electrodes on bony prominences. The leads may be color coded or alphabetical coded as follows: right arm-(RA)-white, left arm (LA)-black, left leg (LL)-red, chest-brown. You may need to prepare the skin by using an alcohol prep or by shaving hair as necessary					
9. Apply clean electrodes for chest placement. Place the electrodes in the proper position to include V1: fourth intercostal space, right sternal margin, V2: fourth intercostal space, left sternal margin, V3: Midway between V2 and V4, V4: Fifth intercostal space, left midclavicular line, V5: Fifth intercostal space, left anterior axillary line, V6: Sixth intercostal space, left midaxillary line					
10. Record 12 lead ECG tracing ensuring all leads are recording correctly					
11. Turn off machine, disconnect and remove leads from the patient and discard disposable electrodes and waste in an infectious waste container when testing is completed. Remove gloves and wash your hands					
12. Documents findings in electronic medical record and reports to other members of the health care team regarding the report as necessary					
Total:	**__/24**	**__/24**	**__/24**	**__/24**	**__/24**

Perform 12 Lead ECG FAQ's:

Knowledge and Technical Skills Expectations:

- ✓ **Twelve Leads of an ECG (But 10 electrodes! 4 limb and 6 chest leads)**
  - A 12-lead ECG must contain more than one "view" to adequately describe the electrical activity of the heart.
  - Twelve standard leads are used to obtain these views.

- ✓ **Einthoven's Triangle**
  - Einthoven's triangle is named for an earlier pioneer of electrocardiography, Willem Einthoven. He connected positive and negative electrodes to the limbs of the body in 3



specific patterns – leads I through III to generate standard ECG tracings. For lead I, the left arm is positive, and the right arm is negative. For lead II, the right arm is negative, and the left leg is positive. For lead III, the left arm is negative, and the left leg is positive. The electrical current measured and recorded represents a vector, having a length (voltage) and a direction (orientation). These vector orientations then represent a given view, or electrical "snapshot" of the heart. These three leads and augmented leads are bipolar (containing both a positive and a negative electrode).

✓ **Lead Placement**

- **Correct lead placement for an ECG is essential to obtain constant results. An error on only a quarter of an inch may affect the ECG tracing.**
  - The ***limb leads*** are placed on the right and left arms and the right and left feet.
  - The ***precordial leads*** are positioned at precise locations around the anterior chest.
  - Place the ***precordial leads*** as shown in the diagram.
    - V1 and V2 are placed at the fourth intercostal space adjacent to the sternum.
    - V1 is to the right of the sternum and V2 is at the left sternal border.
    - V4 is placed at the fifth intercostal space along with midclavicular line.
    - V3 is placed directly between V2 and V4.
    - V5 is placed at the anterior auxiliary line even with V4.
    - V6 is placed at the mid axillary line in line with V4 and V5.