MADISON
AREA | TECHNICAL
COLLEGE

Respiratory Therapy Program
Student Handbook

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Welcome

The Faculty welcomes you to the Madison College Respiratory Therapist 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 can't 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—which 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 and 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 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
- 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.

Understanding of program policies and procedures

In order to ensure effective education in the Respiratory Therapist 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 Therapist Program. This handbook is meant to be a guide to assist the student in attaining their goal to become a competent Respiratory Therapist. 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 his/her understanding of the program handbook. Any questions regarding the handbook should be directed to the program faculty.

Accreditation

The most important goal of the Madison College Respiratory Therapist program is the graduation of competent Respiratory Care Practitioners to include 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:
817-283-2835

http://www.coarc.com/
Information related to the program's success on NBRC exams, job placement as well as other outcomes can be found at the following link: http://www.coarc.com/47.html
You can scroll to the last page and look for Madison Area Technical College to facilitate your search for the program.

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 a 21-month program that results in graduates receiving an Associate of Applied Science (AAS) degree in Respiratory Therapy upon successful completion of the curriculum.

Program Goal

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)

Program outcomes

1. Apply Respiratory Therapy concepts to patient care situations
2. Demonstrate technical proficiency required to fulfill the role of a Respiratory Therapist
3. Practice Respiratory Therapy according to established professional and ethical standards

Program 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.

Program Philosophy

The Faculty of the Respiratory Care 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, handicap, or social status

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. Home care is another area where the respiratory therapist is employed. Therapists work in emergency rooms, intensive care units, participating 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.

Credentialing of Respiratory Therapists

Upon completion of this fully accredited advanced –level respiratory therapist program, graduates are required by the State of Wisconsin to become a licensed practitioner.
The credentialing exam, the therapist multiple-choice exam, is administered by the National Board for Respiratory Care. Graduates are eligible to take the exam immediately after graduation. Employers will require that you have this credential as a condition of employment. Successful completion of this exam will grant you the credential of CRT, Certified Respiratory Therapist. As a graduate of an advanced practitioner level program, you are also eligible to take the clinical simulation exam. Successful completion of this exam will award you the credential of RRT, Registered Respiratory Therapist. This is the highest level of credentialing that you can achieve and is often a requirement for employment. We, along with hospital employers, highly encourage you to take these exams.
In addition, the state of Wisconsin requires that you apply for and obtain a State of Wisconsin license to practice Respiratory Care. This can be done upon graduation and your instructors will assist you.

Curriculum

General Chemistry must be taken within 5 years of petitioning for the program or during the petitioning semester. The curriculum sheet for the Respiratory Therapist 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. The following science courses must be completed within 5 years of petitioning for the program or can be taken during the program curriculum; General A&P and Microbiology. See the program course information for prerequisite and corequisites

Continuous enrollment (semesters) in the program and a grade of "C" or better in all 515 courses and all required science courses are necessary for successful completion of the

Respiratory Therapist Program. A student who withdraws from 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. Advanced standing for respiratory therapy and science courses must have been completed within 5 years of admission to the respiratory therapy program. Exceptions to this will be made by joint consensus of the program faculty and the School of Health Education Dean.

Withdrawal and re-entry

A student who fails a respiratory therapy 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 only reenter the program 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 listed at: https://madisoncollege.edu/registration-guide)

Step 1: Meet with the Program Director to discuss student status and reenrollment-reentry options (extension agreement). 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 re-enter 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 re-entry 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 re-entering the program will continue in the course sequence but will be required to audit courses necessary to regain competency, keeping in mind fees for auditing courses will apply.
- A student that withdraws from the program and does not complete an extension agreement will not be able to reenter the program and must reapply to the program

submitting the required application. You will be given credit for the science courses and general electives that you successfully completed provided they fall within the 5-year window of your last withdrawal.
You should be assured that if you find the course work too challenging that you can make the program 3 years in length. If you need to extend the program, please realize that it is not failure and many times students have more time to learn by extending the program. We have many successful graduates who completed the program over 3 years. However, you MUST follow Steps, 1, 2, 3, 4 and 5 listed above in the Withdrawal/Reenter 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.

Castle Branch

Once admitted to the Respiratory Therapy Program all students must purchase an account from Castle Branch. This is where your criminal background check, immunization record, drug screening and related documents will be housed during the program. Cost of the account is a onetime fee. The account must be purchased before the programs 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 of 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.

Criminal 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

Tuberculosis Screening: One of the following is required:

1) 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.
2) Three consecutive annual test results; with no more than 12 months between tests and most recent test within the past 12 months*.
3) QuantiFERON or T-SPOT.TB test results reflecting negative TB status.
4) 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:

1) Two vaccination dates, a minimum of 28 days apart.
2) 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:

1) Two vaccination dates, a minimum of 4 weeks apart.
2) 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:

1) Documentation of three vaccinations.
2) 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.

All of the above information must be uploaded to Castle Branch Before Oct. 1st in order to remain in the program. Failure to complete any of the information will result in removal from the program.

Current CPR Card: All students must have a current healthcare provider CPR 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 CPR course and upload the card to Castle Branch before Oct 1st of the year in which you start the program.

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/health-education-student-insurance

Drug Screening:
Clinical sites may require students to provide evidence of recent drug screen results prior to attending clinical at the facility. Students will be notified prior to the start of the clinical 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 to complete a required drug screen or has a positive drug screen result without appropriate physician documentation will not be able to successfully complete the clinical nor progress in the Respiratory Therapist program. This may result in removal from the program. Repeat of a drug screen is determined by clinical facility requirements.

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 course of 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.

Faculty:

Program Director:
Amy Setchell, BS, RRT
Office 208 P
608-246-6527
setchel@madisoncollege.edu

Director of Clinical Education:

Chris Becker, MS, RRT
Office 202 L
608-246-6167
crbecker@madisoncollege.edu
Lauri Mill, AAS, RRT, CPFT
Office 202 D
608-243-4761
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Office 202 G
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Joe Punzel, BS, RRT
Office 208 K
608-246-6703
jmpunzel@madisoncollege.edu

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.

Program Policies

Equitable Application of Program Policies and Procedures

The Respiratory Therapy Program at Madison College is a traditional RT program. We can admit up to 26 students per year, based on CoARC recommendations and available resources. We can also accept two transfer or re-entry students per year to take our total to a maximum of 28 students per cohort. All didactic and laboratory work will take place at the Health Education building, Protective services building or main building on the Truax campus. Students will be rotated through clinical rotations at area clinical facilities. All College and program policies will apply to all students and faculty regardless of their location. In addition each clinical site will have its own policies that will be followed when students or faculty are practicing at that location.

Evaluation

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.

- 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 experiences difficulty 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. 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. Assignments that are turned in after the due date will be penalized by 50% of the total points earned with a maximum of 3 (three) late assignments accepted. More than 3 late assignments will result in a required meeting with the faculty member. 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.

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.

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 at the following link.
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 schools code of conduct, a student can be dismissed from the program with no chance of re-entry for
- Receiving a less than passing grade in 2 core Respiratory Courses in one semester
- Unethical behavior

- Failure to maintain compliance with the Essential Functions for the Respiratory Therapy Program
- HIPAA violation
- 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 Education, Director of Clinical Education and the Program Director.

Concerns and Complaints: Madison College's Dean of Students Office is committed to providing a mechanism for the college community to voice concerns and complaints. If you have a concern or complaint, you are encouraged to seek a resolution to the matter directly with the individual(s) involved. Most conflicts can be resolved in a timely and considerate manner by having an open and respectful conversation. You may contact Conflict Management Services for help resolving a conflict informally. If informal attempts to resolve the matter are not advisable or fail, follow the steps below.

STEP 1: SUBMIT THE ONLINE FORM. You may contact Conflict Management Services if you need assistance completing the form.
https://madisoncollege.microsoftcrmportals.com/ask-a-question/report-a-concern-or-complaint/

STEP 2: REVIEW OF CONCERN. Upon receipt of a completed form, the Dean of Students will review the nature of your concern and may take any of the following actions:

STEP 3: OUTCOME. The Dean of Students attempts to resolve issues and notify all parties within fourteen (14) calendar days of the date the concern is filed. A record of all concerns and outcomes will be documented and filed in the Dean of Students Office.

Electronic Devices

The use of cell phones is not acceptable during lecture, laboratory or clinical. All cellular phones must be turned off or put on vibrate in lecture and laboratory classes. You are not permitted to carry a personal cell phone during clinical. Messages can be checked during breaks or lunch. 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.

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.

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.

Respiratory Therapy Program Code of Ethics Regarding Social Media

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.

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

Guidelines:

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

Students must, at all times, abide by the Madison College Code of Ethics when using or participating in social media. All of the policies that apply to the respiratory therapy program apply here.

Students must, at all times, 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.

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.

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.

Study Area Availability

Group study is encouraged and is beneficial to each of you being successful in the program. Students are able to use rooms 270 and 272 in the Health building as study areas when available. Please see one of the program faculty to set up times for group study.

Office Hours and Open Lab

Program Faculty take pride in being available to help students outside of regularly scheduled class times. Faculty have scheduled office hours each day and are regularly available to assist students with practicing in the open lab setting. 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.

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. 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)

Academic Information Release 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 five years from the start date unless an earlier date is noted on the form.

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 you 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 of 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 of 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.

Essential Functions for the Respiratory Therapy Program

The Respiratory Therapist Program complies with the American with Disabilities Act (ADA), and consistent with the ADA, the attached Essential Functions list 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 Therapist Program to make decisions related to the ability of the respiratory therapist 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 Therapist Program, in consultation with Madison College's Disability Resource Services (DRS), room D1450 Truax campus, (608) 246-6716, will determine on an individual basis whether or not 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)

Pregnancy policy

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 her 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.

Advisory Board

Role and Responsibilities of the 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.

Clinical description and policies

The Respiratory Clinical Practice 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. You will begin with Respiratory Clinical 1, which will introduce you to many assessment skills and teach you how to apply several forms of routine oxygen and aerosol therapy. This will be followed by the fall semester clinical courses in your second year (Respiratory Clinical 2 & 3, lasting 8 weeks each), which will consist of clinical on Tuesdays and Thursdays for 8 hours each day. Respiratory Clinical 2 will continue with emphasis on the routine forms of oxygen and aerosol therapy and add hyperinflation therapies, mucous clearance techniques and non-invasive forms of ventilation. In the second quarter of the fall semester, you will begin Respiratory Clinical 3, which will focus on developing your knowledge and skills in intensive/critical care units. At the same time that you are entering into intensive respiratory care, you will be studying specific mechanical ventilators and will be able to apply learned concepts in the clinical arena. Finally, the spring semester clinical courses in your second year (Respiratory Clinical 4 & 5) will consist of 10 weeks of general intensive care rotations on Tuesdays and Thursdays (8 hours each day). Students must complete their entire clinical competency testing before the end of Respiratory Clinical 4. All of your R.T. didactic courses will finish by the 10th week also, so that after that point, you will have only the Internship phase of Respiratory Clinical 5 to complete. At the beginning of the Internship phase, you must complete all required advanced certifications and practice TMC/SAE per clinical course requirements.

The final six weeks of the semester will be the Clinical Internship. The student will spend 32-36 hours per week in a critical care unit. Typically, this is 3 weeks in an Adult Intensive Care area and 3 weeks in a Neonatal/Pediatric Intensive Care area. During this time, students will perfect their knowledge, technical skills and learn how to manage their time effectively so that upon completion of the program, students are well prepared to handle a typical workload for a new graduate. Student failure in the NRP (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.

During Respiratory Clinical 1, full or part time faculty will guide you. You may occasionally be assigned to other staff therapists to watch an interesting therapy that they may be performing. However, the faculty will do all of your clinical competency testing.

In Respiratory Clinical 2 through 4, you will rotate through the various hospitals in Madison. 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 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).

In the last six weeks of Respiratory Clinical 5, we use Madison (and sometimes Milwaukee) hospitals to provide clinical internships for each student, during which time you will be working under direct supervision of a hospital therapist. 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 respect this arrangement at all times. Some preceptors will not be as willing to let students do all therapies, as others 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 (with the exception of 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, in spite of the staff offering this as being permissible. This does not pertain to illness or prior arrangements.

Lastly, students may be required to undergo drug screening by our clinical affiliates. If a student refuses or fails the screening, there may be inability on the part of the faculty to place the student in clinical facilities, which 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.

Total Respiratory Clinical Practice 1-5 Credits: 14 Course Format: Face to face in the clinical environment, with human patient simulator adjuncts

Addition Requirements – It is strongly suggested that these requirements be completed before the start of the 1st semester of the program. They must be absolutely completed before October 1st. Failure to do so will result in the student being given a grade of F, resulting in the student being unable to continue in the program.

- Caregiver Background Check (CBC); refer to course catalog for this Health, Human and Protective Services Policy
- A current CPR "Professional Level" certification (aka BLS for the Healthcare Provider). Students must maintain current CPR certification while enrolled in the program
- TB test and all vaccinations, including the flu shot, must be completed and kept up to date as necessary
- Signed agreement and compliance with Essential Functions for the Respiratory Care Practitioner Program

Clinical Affiliates

We have affiliations with the following hospitals where you will do the majority of your clinical work.

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

In addition, some clinical experience may be provided at:

- Central Wisconsin Center (Madison)
- Multiple Rural Hospitals in the surrounding area
- Children's Hospital of Wisconsin (Milwaukee)
- Madison College Simulation Hospital (Madison)

Conference Attendance

You will be required to attend two conferences during your time in the program

- The first is a Pediatric conference at Children's Hospital of Wisconsin in Milwaukee. This conference is always on a Tuesday in early April and the exact date will be given to you early in the spring semester of your first year so you can make arrangements to attend
- The second is the North Regional Respiratory Care Conference. This is a three-day conference, which alternates between The Wisconsin Dells and Rochester MN, each year. During the second year of the program, you will be required to attend for at least one day but full attendance is encouraged. The conference is generally held in late April/Early May. Attendance as a first year student is encouraged but not required

Clinical Dress Code

- HUNTER GREEN scrub pants and top The top must also completely cover your 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 and One Card (Photo ID) are both required to 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.
- 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.
- You must be clean shaven to allow for proper fit of HEPA masks. 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.

Attendance

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.

- Attendance and punctuality are mandatory. 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!

- Unavoidable illness or tardiness must be called in to the clinical instructor AND hospital R.T. 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.

- Each student will be allowed one eight-hour clinical absence per semester. Clinical 1 is a 13 week rotation that meets every Thursday in a local Hospital. Respiratory Clinical 2, 3, 4 & 5 are all 8-week courses. Any absence(s) above the one eight-hour allowed absence will result in your grade dropping by 1 letter grade for each additional eight-hour absence. 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. 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.

- Tardiness will not be tolerated.
  Good work ethics begin by being on time to each and every clinical day and arriving in appropriate uniform (including display of One Card and ID badge), with stethoscope, calculator, clinical manual and review books. Any tardiness can affect your grade. Two "tardys" during any of the five Respiratory Clinical Practice courses will result in one absence of 8 hours being recorded. Tardy is arriving late for a clinical rotation, even 1 minute late, without prior notification to the clinical site and the instructor. 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. 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 supervisors/department directors that could be responsible for hiring or not hiring you in the future will recognize any tardiness. So treat every clinical day like you were going to a job interview. Again, they will be watching you! 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.

- Accommodations for absences due to disability
  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 Director of Clinical Education will make the arrangements. This type of clinical make up time is often done at the end of a

quarter or during the final exam week. Failure to make up the required time will result in an "Incomplete" in that Respiratory Clinical course.

- 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 http://matcmadison.edu/procedures. You MUST follow these procedures to assure fair treatment.

- Program organization related to clinical practice
  Students should follow this order of communication when dealing with clinically related concerns:
  a. Clinical instructor at affiliate at which complaint occurs.
  b. Director of Clinical Education – Chris Becker
  c. Program Director – Amy Setchell
  d. Dean of Center for Health and Safety Education – Mark Lausch

Use of Electronic Devices

- Cell phone use: you may not carry personal cell phones in the hospitals while you are in clinical. This insures patient privacy (you cannot take any photos of yourself or a patient). You may have your cell phone in your purse, backpack or in a locker, but it must be turned off. You will be allowed to retrieve messages during your break/lunch times only! 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.

- Audio recording: The use of audio recording devices is prohibited in the clinical setting. This is a violation of the HIPAA Privacy Rule.

Ethical Practices

- Smoking/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 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. 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.

Unethical Behavior/Gross Misconduct or other serious nonconformance may result in immediate termination from the program.
In summary, withdrawals from clinical ***may*** occur for any of the following reasons

- Endangering any patient's life
- HIPAA incident/violation
- Two performance evaluations with score less than passing (< 2.0 or < 75%).
- Final performance evaluation, in any clinical course, with score less than passing.
- Code of Conduct violation/Unethical behavior.
- Failure to meet clinical and Madison College attendance policies.
- Conviction of a Felony
- 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

- Receiving a less than passing grade (C) in 2 core courses in a given semester
- Code of Conduct violation/Unethical Behavior
- Failure of maintain compliance with Essential Functions
- HIPAA violation
- Endangering any patient's life

All terminations must be reviewed and approved by the Dean, Director of Clinical Education, and Program Director.

Grading Policy

There are three areas, which will determine a student's grade in clinical courses. These areas include the clinical procedures skills testing, the performance evaluations completed by your clinical instructor, and any quizzes, tests, worksheets or presentations given during the course. Following is the grading emphasis for these areas:

- Clinical Procedures Skills Testing Pass/Fail Performance
- Evaluations 50%
- Clinical Quizzes/Tests/Other 50%

To determine your clinical grade, we will compile your scores on evaluations and all of your quiz/test scores, apply the appropriate percentages to them, and then assign the letter grade utilizing the R.T. Program grading scale. A grade of C must be achieved in each of the clinical courses in order for a student to continue in the program.

Clinical 1-5 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 or around that time frame. Please check the Clinical Schedule for correct shift times.
Depending on class size, an evening shift may be used at any of these 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 10:30 p.m.).
The students are responsible for finding transportation and parking as necessary on their own. No exceptions will be made in these time schedules.
Policies are in place to drop a student's grade for excessive absences and/or tardiness. 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.

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 objectives must be retested and will set a date for completion. The student must obtain 100% on the retested objective 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 an objective. 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 Madison College instructors involved will meet with the Dean of the School of Health Education (SoHE) 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 safely and efficiently manage the defined patient care load 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 and 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 next page). 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.

AARC statement of Ethics and Professional Conduct

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

Respiratory Therapy Program 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 3 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

Madison College Respiratory Therapist Program Handbook Verification Form

I, _____, have received and read the ***Respiratory Therapy Program Student Handbook*.** I completely understand and agree to abide by all policies outlined in the Respiratory Therapist Program Student Handbook. I also understand that this document can and will be used as a reference when questions occur.
In addition, I have read the Rights, Responsibilities and Misconduct procedure sections on the Madison College website, http://madisoncollege.edu/student-rights-responsibilities, and agree to abide by the policies and procedures they contain. I also understand that additional Respiratory Therapy policies and procedures are contained in the Clinical Handbook and individual course of studies.

I also understand that:

- A Caregiver Background check using www.castlebranch.com be completed by the program orientation day.
- Have all vaccinations updated and loaded to castle branch by October 1st of the given year
- Maintain current Basic Life Support certification throughout the entire 2-year program
- Maintain annual tuberculosis screening throughout the entire 2-year program
- Have read and can comply with the Essential Functions for Respiratory Therapy found on pages 16-18 of this handbook

Statement of Understanding
The Americans with Disabilities Act of 1900, and the Rehabilitation Act of 1973, prohibits discrimination of persons because of his or her disability. In keeping with these laws, colleges of the Wisconsin Technical College System make every effort to ensure a quality education for students. The purpose of this document is to ensure that students acknowledge that they have been provided information on the essential functions required of a student in the Respiratory Therapist Program and are able to meet those essential functions.

This form is to be completed only after reviewing the:

- Respiratory Therapy Program Student Handbook
- Madison College Right and Responsibilities page
- Essential functions for Respiratory Therapy

Please initial in the space below:

_____ I have read and I understand the Essential Functions specific to a student in the Respiratory Therapist Program found on pages 16-18 of this handbook

_____ I am able to meet the Essential Functions as outlined in the Respiratory Therapist Student Handbook, or have been provided with information concerning accommodations or special services if needed.

Print Student name: _____

Student Signature: _____

Today's Date:_____

Return this form on the program orientation date.

RESPIRATORY THERAPY PROGRAM

CLINICAL PRACTICE MANUAL

2019-2020

Amy Setchell, BS, RRT – Program Director
Chris Becker, MSE, RRT – Director of Clinical Education
Lauri Mill, AAS, RRT, CPFT – Faculty
Patty Montgomery, BS, RRT – Faculty
Joe Punzel, BS, RRT – Faculty

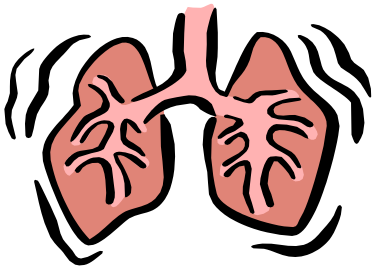

TABLE OF CONTENTS

Student-Physician Interaction Log

Please document ALL interactions with a Physician or other provider (Nurse Practitioner or Physician Assistant) during your clinical practice. This can include physician rounds as well as brief interactions.

DATE	HOSPITAL & UNIT	PROVIDER NAME	SPECIALTY	TOPIC	DURATION

Student-Physician Interaction Log, page 2

DATE	HOSPITAL & UNIT	PROVIDER NAME	SPECIALTY	TOPIC	DURATION

NAME:			RESPIRATORY CLINICAL SKILLS TESTING LOG			
*Statewide curriculum requires completion of:		Competency Check-off Requirements	SIMULATED in Lab	1st Attempt CLINICAL	2nd Attempt CLINICAL	100% Passing
PAGE #	6/7 skills in Respiratory Clinical 1					
	14/15 skills by end of Respiratory Clinical 2					
	23/24 skills by end of Respiratory Clinical 3					
	ALL 30 skills by end of Respiratory Clinical 4					
	All Required (**R**) & Simulated (**S**) skills require a 100% passing score using criteria listed in this Clinical Manual	R = Required in clinical setting				**Instructors:** Please Sign and Date this Page *and* Checklist Page
Respiratory Clinical 1 – 1st Year Spring Semester		S = may be Simulated in RT Lab				
30	Oxygen Therapy	**R**				
34	Aerosol Treatment	**R**				
38	Inhaler Instruction	**R**				
42	Pulse Oximetry	**R**				
45	Incentive Spirometry	**R**				
48	Perform a Pulmonary Exam	**R/S**				
53	Demonstrate Cylinder Safety	**R**				
Respiratory Clinical 2 – 1st 8 Weeks of Fall (2nd year)						
57	IPPB	**S**				
60	Bronchial Hygiene Adjuncts	**R**				
61	Continuous Aerosol Therapy (Large Vol Neb)	**R**				
65	Postural Drainage and Percussion (CPT)	**R**				
69	Non-Invasive Positive Presssure Ventilation (NIV/BIPAP®/CPAP)	**R/S**				
75	Arterial Blood Gas Sampling	**R/S**				
80	Daily Trach Care	**R**				
82	Cuff Pressure Measurement	**R**				
Respiratory Clinical 3 – 2nd 8 Weeks of Fall						
86	Manual Ventilation with Mask	**S**				
92	Manual Ventilation with Artificial Airway	**R**				
93	Open System Suctioning (Kit)	**R/S**				
98	Closed System Suctioning (Ventilated Patient)	**R**				
103	Assist with Intubation	**S**				
106	Spontaneous Breathing Trial	**R**				
109	Extubation	**R**				
111	Ventilator System Safety/Pre-use Check	**S**				
112	Initiating Mechanical Ventilation + vent check	**R/S**				
Respiratory Clinical 4 – 1st 8 Weeks of Spring						
117	Ventilator Circuit Change	**R/S**				
118	Mechanical Ventilation Neo/Pediatric Volume	**R**				
119	Mechanical Ventilation Neo/Pediatric Pressure	**R**				
124	Capnography	**R**				
125	Screening Spirometry	**S**				
126	12 Lead ECG	**S**				

Miscellaneous Skills Performed, Assisted and/or Observed (Instructors: please Date & Initial)	**Performed**	**Assisted**	**Observed**
Nasotracheal Suctioning			
Sputum Induction			
High Flow Nasal Cannula			
Liquid Oxygen			
Perform a trach change			
Tracheostomy (indicate surgical or percutaneous)			
Witnessed a Trach Change			
Bronchoscopy			
Intubation			
Labor and Delivery			
ECMO			
Sleep Study			
Transcutaneous Monitoring			
Assist with Thoracentesis			
Draw Arterial Blood Gas Sample via Arterial Line			
Administration of Nitric Oxide Therapy			
Administration of Heliox Therapy			
Hemodynamic Monitoring			
Insertion of Swan-Ganz or other Vascular Catheter			
Cardiac Catheterization			
Chest Tube Insertion and Monitoring of Drainage			
Pulmonary Rehab			
6 Minute Walk			
Swallow Study			
Surgery (specify type of surgery observed):			
Pulmonary function testing :			
Pre/post bronchodilator testing			
Methacholine challenge			
Body plethysmography			
Exercise stress testing			
Other (specify):			

MADISON AREA TECHNICAL COLLEGE
RESPIRATORY THERAPY PROGRAM

INSTRUCTOR CONTACT INFO, INCLUDING PHONE NUMBERS AT CLINICAL AFFILIATES:

Instructor & Email	Office Phone #	Hospital Affiliate	Hospital Phone #
Patty Montgomery pmontgomery@madisoncollege.edu	246-6698	Unity Point Health-Meriter	(608) 417-7467
Amy Setchell setchell@madisoncollege.edu	246-6527	VAH	(608) 256-1901 (Ext. 17549)
Joe Punzel jmpunzel@madisoncollege.edu	246-6703	UWHC & AFCH	(608) 576-8179
Lauri Mill lmill@madisoncollege.edu	243-4761	St. Mary's	(608) 258-5009 (608) 220-8028 charge therapist
Chris Becker crbecker@madisoncollege.edu	246-6167	Select Specialty	(608) 260-3245

RESPIRATORY CLINICAL 1 – 5 COURSE DESCRIPTIONS:

The Respiratory Clinical 1 - 5 courses will start with the second semester of the program. Respiratory Clinical 1, offered during the first spring semester, will introduce students to many assessment skills and teach how to apply several forms of routine oxygen and aerosol therapy. This clinical course meets 1 day per week, on either the Day or Evening shift, for 13 weeks. This will be followed by the fall semester clinical courses in the second year (Respiratory Clinical 2 & 3, lasting 8 weeks each), which will consist of clinical on Tuesdays and Thursdays for 8 hours each day. Respiratory Clinical 2 will continue with emphasis on the routine forms of oxygen and aerosol therapy and add hyperinflation therapies, mucous clearance techniques and non-invasive forms of ventilation. In the second half of the fall semester, students will progress to Respiratory Clinical 3, which will focus on developing knowledge and skills in intensive/critical care units. At the same time that students are entering into intensive respiratory care, they will be studying specific mechanical ventilators and will be able to apply learned concepts in the clinical arena. Finally, the spring semester clinical courses in the second year are Respiratory Clinical 4 and 5. Respiratory Clinical 4 will consist of 8 weeks of general intensive care rotations on Tuesdays and Thursdays for 8 hours each day. **Each student must complete their entire clinical competency testing requirements before the end of Respiratory Clinical 4 as a requirement to enter Respiratory Clinical 5.**

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, UP-Meriter Hospital and SSM Health St. Mary's Hospital-Madison. **This ensures that each student has received comparable experiences of clinical education as every other student 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:**
> 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.

All of the Program's didactic courses will finish by the 8th week also, so after that point, you will have only the Internship phase of Respiratory Clinical 5 to complete. **Before students can begin the Internship phase, they must also complete:**

- **Advanced Cardiac Life Support (ACLS) certification**
- **Neonatal Resuscitation Program (NRP) certification**
- **Pediatric Advanced Life Support (PALS) certification**
- **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)**

During the Respiratory Clinical 5 Internship, students will spend 32-36 hours per week in a critical care unit for six weeks. Typically, this is split between 3 weeks in an Adult Intensive Care area and 3 weeks in a Neonatal/Pediatric Intensive Care area. Students will also be working under hospital staff RT preceptors and not program faculty in Respiratory Clinical 5. 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.

Student failure in the NRP (Neonatal Resuscitation Program) course: This will result in a failure to earn the NRP credential, and 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.

Staffing of the clinical courses: During Respiratory Clinical 1, the program faculty will guide students almost exclusively. The student for the entire course will utilize the same hospital. Students occasionally will be assigned to other staff therapists to watch an interesting therapy that they may be performing, or to shadow the staff RT on another unit. However, the faculty will do all of your clinical skills testing. In Respiratory Clinical 2 through 4, students will rotate through the various hospitals in Madison. 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 1 - 4, 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).

In the last six weeks of Respiratory Clinical 5, all of the Madison hospitals are utilized to provide clinical internships for each student, during which time they will be working under the direct supervision of a hospital staff respiratory therapist. 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 respect this arrangement at all times.** Some preceptors will not be as willing to let students do as many therapies as others. This is understandable and reasonable given that students are working under each preceptor's license, and given that the staff RT may not have worked with a given student before, so they may need time to develop confidence and trust in the student.

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.

Total Respiratory Clinical 1 - 5 Credits: 14

Course Format: Face to face in the clinical environment. There will also be occasional use of human patient simulator adjuncts, such as during the school-wide Emergency Incident simulations that occur each fall and spring semester.

Additional Requirements: It is strongly suggested that these requirements be completed before the start of the 1st semester of the program. They must be entirely completed no later than October 1st. All of our clinical affiliates require these items to be done before you may step into their hospitals. Failure to complete these, as well as failure in keeping each up to date in Castle Branch, will result in the student not being allowed to attend all or part of the clinical courses, which could result in the student being given a grade of F due to lack of attendance. This, in turn, would prevent the student from being able to continue in the program.

1. **Caregiver Background Check** (CBC): refer to the course catalog for this Health, Human and Protective Services Policy.
2. **BLS for the Healthcare Provider** (CPR): Students must maintain current CPR certification while enrolled in the program, and update Castle Branch as necessary after recertification.
3. **Physical exam and completed Health History Form** on file in Castle Branch. The TB test and all vaccinations, including the annual flu shot, must be completed and kept up to date in Castle Branch.
4. Signed agreement and compliance with **Essential Functions** for the Respiratory Therapy Program. These can be found in the RT Program handbook.
5. Students must complete a new **BID (Background Information Disclosure) form** prior to Respiratory Clinical 2 if there have been any occurrences over the summer.
6. Lastly, students may be required to undergo **drug screening** by our clinical affiliates. This can be done through Castle Branch. If a student refuses or fails the screening, there may be inability on the part of the faculty to place the student in other clinical facilities, which 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.

Textbooks:

Madison College Respiratory Therapy Program Clinical Practice Manual
Egan's Fundamentals of Respiratory Care, 11th Edition (2017 Elsevier)

Clinical Dress Code:

1. HUNTER GREEN scrub pants and tops are required. The top must completely cover the abdomen and lower back, including undergarments, when you are reaching over the head or bending over.
2. White or solid-colored T-shirt (plain with no writing or images) with no longer than ¾ length sleeves can be worn underneath for warmth.
3. Full and comfortable rubber soled shoes (no sandals, clogs or open-toed shoes).
4. Madison College-issued name tag and One Card (Photo ID) are both required to be displayed on your uniform. Additional identification may be required by hospitals at your cost.
5. 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.

Notes on Personal Hygiene:

- Uniforms must be freshly laundered and wrinkle free.
- Long hair must be tied back. Long bangs must be secured with a clip so as to not interfere with vision.
- 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.
- You must be clean shaven to allow for proper fit of HEPA masks.

*** Students must be in full uniform (this includes OneCard and ID badge) and with acceptable hygiene at the time the clinical rotation is 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. ***

PROGRAM OUTCOMES:

As a student in the Respiratory Therapy program, you will learn to:

- Apply respiratory therapy concepts to patient care situations
- Demonstrate technical proficiency required to fulfill the role of a respiratory therapist
- Practice respiratory therapy according to established professional and ethical standards

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 core workforce skills:

A. SELF MANAGEMENT (manage time and stress, practice workplace etiquette, self-assess)

B. CRITICAL THINKING (evaluate, solve problems, make decisions)

C. SOCIAL INTERACTION (respond to feedback, respect diversity, work effectively on a team)

D. COMMUNICATION (listen and respond effectively)

E. COMMUNICATION (speak so others can understand, convey meaning)

F. COMMUNICATION (read, research, interpret and comprehend)

G. COMMUNICATION (write so others can understand, convey meaning)

H. ETHICS (demonstrate acceptable behavior and judgment)

STUDENT RESPONSIBILITIES AND PROGRAM POLICIES:

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

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.

Late or missing assignments: All assignments (including labs) must be turned in at the beginning of class on the day that the assignment is due. Assignments that are turned in after the 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 three late assignments allowed per course. More than 3 late assignments in a course will result in a required meeting with the faculty instructor for the course in question.

Withdrawal Policy: If a situation arises that prevents the successful completion of a program course, please note that it is each student's responsibility to formally withdraw from the course.

Attendance and Tardiness: Attendance at **every** clinical day is essential for the success of each student. 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. The program has very strict rules regarding attendance and tardiness that are outlined below:

1. **Attendance and punctuality are mandatory.** Our hospital affiliates are unpaid providers of your clinical experiences. Clinical instructors arrange their patient care workloads to provide you with an optimal clinical experience. Your absence or tardiness without notice places unnecessary strain on instructors, as this may force them to redistribute their workload to staff. Any "no call-no show" incidents are considered to be very unprofessional behavior that is sure to be noticed by hospital staff and requires a meeting with appropriate faculty and the Director of Clinical Education.

2. **Unavoidable illness or tardiness must be called in to the clinical instructor AND hospital RT personnel prior to the beginning of your clinical shift. TEXTING 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 8 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. Also, contact your clinical instructor personally.

3. **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 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 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. 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.

4. 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.

5. **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. **2 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 2 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, as in outlined in part 3. above. 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. So treat **every** clinical day like you were going to a job interview. Again, they **will** be watching you.

6. **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.

7. **Accommodations for Medical Absence.** If you are absent due to a documentable medical condition (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.

8. **Calling in for absence or tardiness.** Students are required to call the clinical instructor ***and*** the clinical hospital RT Department before the start of the shift. The RT Department phone numbers for our hospital affiliates may always be found on the Clinical Schedule. Calling after the start of the shift will be treated as if no call was made, unless there are extenuating circumstances. **Email and texting are not currently approved methods to call in sick or late to clinical.**

9. **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 SoHE 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 SoHE office staff in room 103 to open the door to the lab.

10. 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.

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://madisoncollege.edu/student-rights-responsibilities **.** You **must** follow these procedures to assure fair treatment.

Program organization related to clinical practice: Students should follow this order of communication when dealing with clinically-related concerns:

a. Clinical instructor at affiliate at which complaint occurs.
b. Director of Clinical Education – Chris Becker
c. Program Director – Amy Setchell
d. Dean of the School of Health Education

USE OF ELECTRONIC DEVICES:

1. **Cell phone use in patient care areas is prohibited.** Students **may not** carry personal cell phones in the hospitals while in clinical. This insures patient privacy (photos may **never** be take of a patient). Students may have a cell phone in a purse, backpack or in a locker, but it must be turned off. Students will be allowed to retrieve messages during break and lunch times only. 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.

2. **Audio recording is never acceptable in clinical situations.** The use of audio recording devices (including cell phones) is prohibited in all clinical settings. This is a violation of HIPAA Privacy Rules.

3. **Social Media and HIPAA.** 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.

ETHICAL PRACTICES:

1. **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.

2. 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.

CODE OF CONDUCT:

The following responsibilities represent the Student Code of Conduct for Madison Area Technical College (Madison College). Specific procedures should be followed to report an alleged Student Code of Conduct violation. Certain codes have specialized procedures as noted below.

1. Students are responsible to comply with all local, state, and federal policies, statutes, laws and ordinances.
2. Students are responsible to comply with all college policies and procedures.
3. Students are responsible to interact in ways that will not interfere with the educational process and/or any Madison College sponsored activity. Class disruptions are considered an interference with the educational process. See ***Classroom Disruptions*** procedures.
4. Students are responsible to treat others with respect and dignity.
5. Students are responsible to take no action that improperly utilizes or is damaging or disabling to safety equipment or systems such as alarms, exit signs, fire extinguishers, window screens, sprinklers, elevators, or escalators.
6. Students are responsible to make no threat, nor take any action, which could potentially cause physical harm to themselves or others including but not limited to physical or sexual assault, suicidal and/or homicidal ideation, self-mutilation, or conduct which intentionally or recklessly threatens the health or safety of themselves or any person.
7. Students are responsible to take no action that improperly utilizes, alters, damages, or disables property, systems or equipment owned or leased by the College or other Madison College community members. This includes theft or unauthorized possession of another person's property.
8. Students are responsible to refrain from unauthorized entry or use of Madison College property, facilities, or systems. This includes the unauthorized possession and/or use of keys and electronic access cards or codes or occupation of College facilities which are locked, closed to student activities or otherwise restricted as to use.
9. Students are responsible to refrain from the unauthorized or illegal use, possession, or distribution of controlled substances, associated paraphernalia and/or alcohol on property owned or leased by Madison College or at a Madison College sponsored activity. This includes presence under the influence of alcohol or other drugs.
10. Students are responsible to refrain from the unauthorized use, possession or distribution of weapons, dangerous firearms (or their facsimiles), explosives and/or hazardous objects or substances on Madison College property or at Madison College sponsored activities. . Students that are licensed under Wisconsin law to carry concealed weapons may carry such weapons only in places not

prohibited by the College.

11. Students are responsible to be honest and furnish accurate information to all members of the Madison College community. Honesty includes the absence of all forms of academic dishonesty. Academic dishonesty is defined as: any behavior which results in a student giving or receiving unauthorized assistance or receiving credit for work that is NOT his/her own. See ***Academic Integrity***. Honesty also includes the absence of all forms of forgery, fraud, alteration, or misuse of any Madison College document, record, or instrument of identification.
12. Students are responsible for the behavior of any guest they escort onto the Madison College campus or have accompanying them at a Madison College sponsored activity.
13. Students are responsible to ensure that gambling does not occur on Madison College property or at Madison College sponsored activities.
14. Students are responsible to comply with all reasonable verbal and written instructions and/or directives from authorized Madison College personnel.
15. Students are responsible to take no action, which could be defined as discrimination. Discrimination is defined as: an unfairness or prejudice based on a person's age, race, creed/religion, color, disability, marital status, sex, national origin, ancestry, sexual orientation, gender identity/expression, conviction record, parental status or pregnancy, or protected veteran status in its educational programs, admissions, activities or employment practices. See ***Harassment Discrimination complaint procedures***.
16. Students are responsible to take no action, which could be defined as harassment. Harassment is defined as: unwanted, deliberate, or repeated unsolicited comments, slurs, demeaning references, gestures, graphic materials, physical contacts, solicitation of favors, advances or other adverse treatment. See ***Harassment Discrimination complaint procedures*.**
17. Students who are members of formally recognized college clubs and organizations, which receive segregated funds through the Student Activities Board, are responsible to conduct themselves within the charters, constitutions, and guidelines of those organizations and of the Student Activities Board.
18. Students are responsible to be appropriately clothed and to wear shoes/sandals and shirts in/on Madison College facilities for safety and health reasons.
19. Students are responsible to ensure that smoking or the use of tobacco products or electronic tobacco product substitutes does not occur within any Madison College facility, or designated campus tobacco-free areas. Note all district facilities are designated as tobacco-free areas.
20. Students who wish to circulate petitions are responsible to obtain a facility permit from the Department of Facilities.

21. Students are responsible to refrain from using bicycles, skateboards, and rollerblades within Madison College facilities, or as posted on the grounds of district owned or leased property.
22. Students are responsible to conduct themselves appropriately when utilizing college-owned computer equipment and to follow the Student Computer Systems Acceptable Use Guidelines. See ***Student Computer Systems Guidelines*.**
23. Students are responsible to comply with copyright law, which protects written works, recorded works, computer programs and other forms of expression. Copyright law generally prohibits the duplication of copyrighted works without the permission of the copyright owner, but there are important exceptions that permit copying for some educational purposes. For more information about the rights and obligations of the Madison College community under copyright law, see additional ***Copyright Information*.**

*****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, which could result in removal from the course and/or program.*****

Unethical Behavior/Gross Misconduct or other serious nonconformance 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. Failure to meet clinical and Madison College attendance policies.
7. Conviction of a Felony

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. Failure to maintain compliance with Essential Functions
4. HIPAA violation
5. Endangering any patient's life

******All terminations must be reviewed and approved by the Dean, Director of Clinical Education, and Program Director.******

ADDITIONAL STUDENT INFORMATION:

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**.

Blackboard: Courses have been created in Blackboard for all program classes. You can access these courses by logging in to the following page: http://blackboard.madisoncollege.edu/

Blackboard Student Support information: http://madisoncollege.edu/blackboard-help . Consult your instructor for support with Blackboard problems.

Blackboard Outages: Madison College does its best to keep our Blackboard 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 (found in RT Handbook).

Class 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 sign up. Directions can be found here: https://madisoncollege.edu/public-safety Scroll down the page halfway for the link. If an instructor needs to cancel a clinical day, they will contact students ahead of time.

Learner 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

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.

Other 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/career-employment-resources
- 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

RT PROGRAM GRADING POLICY: There are three areas that determine a student's grade in clinical courses. These are clinical skills testing, clinical performance evaluations completed by clinical instructors, and any exams, quizzes, worksheets, labs or presentations given during the course. Following is the grading emphasis for these areas:

Clinical Procedures Skills Testing	**Pass/Fail**
Performance Evaluations	**50%**
Clinical Quizzes/Exams/Other	**50%**

To determine the clinical grade, faculty will compile your scores on evaluations and all of your quiz/test scores and apply the appropriate percentages to them and then assign the letter grade utilizing the RT Program grading scale:

Letter	Percent	4 Point Scale
A	94-100	3.55 – 4.0
AB	90-93	3.3 – 3.5
B	85-89	2.9 – 3.2
BC	80-84	2.5 – 2.8
C	75-79	2.0 – 2.4
D	**70-74**	**<2.0 Not a passing grade for clinical**
F	<70	0.0

In order to continue in the RT Program, students must achieve a grade of "C" or better in all clinical courses, as well as in all core RT courses and in all related science courses. Furthermore, students must pass each part of every clinical course with a "C" or better grade. The clinical evaluation scores must be passed with at least a "C" grade, and the Quizzes/Exams/Other scores must also be passed with at least a "C" grade. **So *both* portions of all clinical courses *must* be passed with at least a "C" grade in order to pass the course, and therefore to continue in the program.**

Clinical Skills Testing: Students will be required to perform a total of 30 clinical skills/competencies under the direct supervision of a Madison College RT Clinical Instructor, demonstrating 100% proficiency 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 on all 30 required clinical skills.**

Performance Evaluations: Students will be evaluated after each clinical day, as well as receiving a full evaluation at the completion of each hospital rotation. We will be using the evaluation tool entitled "Clinical Performance Evaluation," which evaluates communication skills, knowledge and technical skills, as well as affective skills and work ethics. This tool is available for student viewing on Blackboard in all 5 clinical courses. The evaluation tool uses a 4-point rating scale, which does not correlate exactly with the usual letter grades (see below). The final performance evaluation in each clinical course must be a passing grade and the faculty must recommend that your cumulative clinical skills are satisfactory for you to continue into the next clinical course. We will use these evaluations to arrive at the 50% of your overall clinical grade, with the other 50% coming from classroom testing.

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, writing comments on the back page concerning grading if deemed necessary, then **sign them** and return to faculty. 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 Lauri Mill's office, where each student's clinical files are stored, by first making an appointment with Lauri.

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 clinical grade.**

If you are ill or will be unable to attend clinical, it is imperative that you CALL (do not EMAIL or TEXT) the clinical instructor AND the RT staff at the hospital before the beginning of that shift. Hospital phone numbers can be found on the clinical schedule or in this manual. 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 ½ of the original points 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.

******YOU MUST ACHIEVE A PASSING GRADE OF C (≥ 75%) IN EACH OF THE 2 AREAS (CLINICAL AND CLASSROOM) OF EACH CLINICAL COURSE AS DESCRIBED ABOVE IN ORDER TO PASS EACH RT CLINICAL PRACTICE COURSE*** (This policy may be altered per faculty discretion).***

RESPIRATORY CLINICAL 1 – 5 SCHEDULING:

Any Respiratory Clinical course may contain rotations on both day shifts and evening shifts. Depending on class size, 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.). 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. **Students will be 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 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.**

PARKING:

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 parking lot. Turn right on Walnut 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 just off Fish Hatchery Rd. You may access it from South St. or Appleton St. just adjacent to the Dean Clinic. 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. Typically you are safe to park in 2 hour parking when on the PM shift.

Unity Point Meriter - The Meriter shuttle lot is on Plaenert St. The Meriter shuttle doesn't run through the end of the PM shift, but those students on the PM shift can buy a 3 week parking pass for the parking ramp at a reduced rate. 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 distance away.

Select Specialty Hospital - When at Select, there is all day parking available on W. Washington Ave. Students are ***not*** allowed to park in the Select lot, and may be ticketed and towed if they do.

*** **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 POLICY FOR POOR STUDENT PERFORMANCE:

If a student is performing in any clinical course 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 a score of 100% on the retested skill, as well as all other clinical skills in order to successfully complete any clinical course. **A student will only have 3 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 time period, the student and the Madison College instructors involved will meet with the Dean of the School of Health Education (SoHE) and discuss the situation. It will be decided at this meeting whether or not the student will be allowed to continue with the clinical course.

During each of the first 4 Respiratory Clinical courses, the student must complete all of the skills for each course as specified in this clinical manual on pg. 3 at 100% proficiency prior to moving on to the next clinical course. The student must also achieve an average passing score of C (≥ 75%) on clinical evaluations and a passing score of C in clinical discussion to move on. 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 internship evaluations and, most critically, must be able to efficiently manage the defined patient care load in their adult care rotation and their neonatal/pediatric care rotation (see Internship Clinical Objectives). **Furthermore, failure to be able to safely and efficiently manage the defined patient care load 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, the Director of Clinical Education and the SoHE 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 next page). 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.

AARC STATEMENT OF ETHICS AND PROFESSIONAL CONDUCT:

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

- Demonstrate behaviors that reflect integrity, support objectivity, and foster 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

MADISON AREA TECHNICAL COLLEGE
SCHOOL OF HEALTH EDUCATION

INFECTIOUS DISEASES:

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 Education 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:
      1. before performing invasive procedures;
      2. before taking care of particularly susceptible patients, such as those who are severely immunocompromised and newborns;
      3. before and after touching wounds, whether surgical, traumatic, or associated with an invasive device;
      4. 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;
      5. 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;
      6. 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;
      7. between contacts with different patients in high-risk units.
      8. 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:
      1. touching blood, open tissues, saliva, sputum, mucous membranes, feces, or semen.
      2. touching blood-soiled items, body fluids, secretions, or tissues as well as surfaces contaminated with them.
      3. 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.

TUBERCULOSIS STUDENT POLICY:

1. All students are required to have a TB skin test and/or chest x-ray as part of their admitting physical.
2. Many programs require a second TB skin test or chest x-ray during the course of the program.
3. Students who have positive skin tests must consult with their program director and the nurse regarding follow-up and/or treatment.
4. If you are diagnosed with active TB-You will NOT be allowed at clinical

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.

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
  - Other
- ✓ 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 ETHICS:

- ✓ 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")

Clinical Skills & 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 clinical competency.
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 that very day of the competency check off.
3. Instructors are not responsible for remembering if a student checked off on a competency or not if a student does not have their manual with them.
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 clinical skills check off sheet on page 3 of this manual for more details.

The following policies concerning timely competency check off will also be enforced by the faculty:

- If the objective still isn't completed by the end of the next clinical course, there will be a 1 letter grade drop in this course as well. This could result in a grade drop of 2 letters if a student fails to complete all objectives in this 2nd, following course.

* Exceptions to this policy may be made by faculty for certain objectives that may not be available to students, such as arterial puncture.

- **ALL objectives in this clinical manual Table of Contents (on page 3) MUST be completed 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.**

Madison College – Respiratory Therapy Program
Clinical Skills & Competency Checklist

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

OXYGEN 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 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 health 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 FIO_2's > 0.50
  - ✓ Oxygen toxicity when using FIO_2's > 0.50
  - ✓ In premature infants, PaO_2's > 80 mmHg may cause retinopathy of prematurity
  - ✓ In infants with congenital heart disease, high PaO_2's may cause closure of the ductus arteriosus
  - ✓ Increased fire hazard

- ***What type of equipment is used to administer oxygen therapy and specify approximate FIO_2's?***

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

    - Estimated FIO_2's in adults, from cannulas running at the following flowrates:
      1 L/min = 0.24
      2 L/min = 0.28
      3 L/min = 0.32
      4 L/min = 0.36
      5 L/min = 0.40
      6 L/min = 0.44
    - These FIO_2'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 CO_2 retention; usual flowrates are 5-12 L/min and approximate FIO_2's are 0.35 - 0.50; not used very often in adults due to the venti-mask having similar FIO_2 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 FIO_2, each pre-set FIO_2 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 FIO_2'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:

  $\frac{100\% - FIO_2}{FIO_2 - 21\%}$ 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 = 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 FIO_2's are 0.40 - 0.70; because this mask has no valves it is subject to considerable air entrainment which will dilute the FIO_2, thus the FIO_2 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 FIO_2's are 0.60 - 0.80, though it is theoretically possible to near 100% in patients breathing with a very shallow ventilatory pattern.

- ***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)

Reference:

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:

Oxygen Therapy for Adults in the Acute Care Facility – Revision & Update - 2012

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AEROSOL TREATMENT

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. 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 mls/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

    - 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)
- Reuseable 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 Pulmocort)

▪ 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

▪ 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
- Mouth piece or mask may be used
- 0.5 – 6.0 mL capacity

✓ 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 μm, 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 Ribaviri

➢ ***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 (FEV_1 or PEF)

For additional references on 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

Additional sources of reference on Aerosol Treatments include:

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

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INHALER INSTRUCTION

Rating Scale:
0 = Inappropriate, incorrect, or omitted
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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. 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 in proper breathing techniques (proper use of diaphragm and breath holds)					
12. Instructs patient on proper use of device (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 health 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 affects and have been prohibited
      - HFA's – hydrofluoroalkanes are more environmentally safe and did replace 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

✓ **<u>Dry Powder Inhalers (DPI's):</u>**

- 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 affect 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

➢ ***What essential assessments are needed to evaluate the appropriate response to metered dose inhaler treatments?***

✓ Comparison of pulmonary function indicators (PEF, FEV_1, 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

- ✓ **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

- 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 Capilliary 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.

For additional references on 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's 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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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 health 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.***

  - ✓ **What are the 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).

  - ✓ **What is the 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 (O_2Hb, 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 (O_2Hb + 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 SpO_2 measurements with an arterial blood gas to validate the accuracy of the SpO_2.

- ***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 SpO_2 and for high and low heart rates. The most important alarm is the low SpO_2 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 SpO_2 > _____%".

- ***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.**

For additional references on Pulse Oximetry, go to the AARC website @ www.aarc.org and click on Resources, then click on Clinical Practice Guidelines and finally scroll down to:

Pulse Oximetry

Additional sources of reference on Pulse Oximetry include:

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

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INCENTIVE SPIROMETRY

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 health 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

For additional references on 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

Additonal sources of reference on Incentive Spirometry and Coughing & Deep Breathing include:

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
____ 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 _____ ºF
____ 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)	Assymetrical (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:

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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 (>110ºF)
  - ✓ 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:

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

*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

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

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

- ✓ **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)

Sources of reference on Transport Oxygen Equipment include:

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

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IPPB - INTERMITTENT POSITIVE PRESSURE BREATHING

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 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 equipment, utilizes appropriate gas source, and dispenses appropriate medication or saline in nebulizer					
8. Pre-tests equipment for adequate nebulization, cycling, and sensitivity					
9. Assesses vital signs and listens to breath sounds anteriorly and posteriorly					
10. Positions patient appropriately for therapy					
11. Measures spontaneous VC or IC having patient use respiratory muscles most efficiently					
12. Initiates therapy using appropriate initial settings of pressure, flow, and sensitivity					
13. Instructs patient in proper relaxation and breathing techniques (proper use of diaphragm and breath holds)					
14. Modifies control settings during therapy to obtain optimal volumes and breathing pattern					
15. During therapy, reassesses patient's vital signs, breath sounds and VC or IC while breathing with IPPB					
16. Terminates treatment at appropriate time and repositions patient as necessary					
17. Solicits cough and assists as necessary					
18. Reassesses patient's vital signs and breath sounds					
19. Disassembles equipment and stores appropriately					
20. Documents therapy appropriately in medical record					
21. Reports to other members of the health care team regarding the therapy as necessary					
Total	__/42	__/42	__/42	__/42	__/42

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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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 health care team regarding the therapy as necessary					
Total	__/34	__/34	__/34	__/34	__/34

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CONTINUOUS AEROSOL THERAPY w/ LARGE VOLUME NEBULIZER

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 health 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 carini 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°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.)

For additional references on 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

Additional sources of reference on Continuous (Bland) Aerosol Therapy include:

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

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POSTURAL DRAINAGE & PERCUSSION

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 health 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

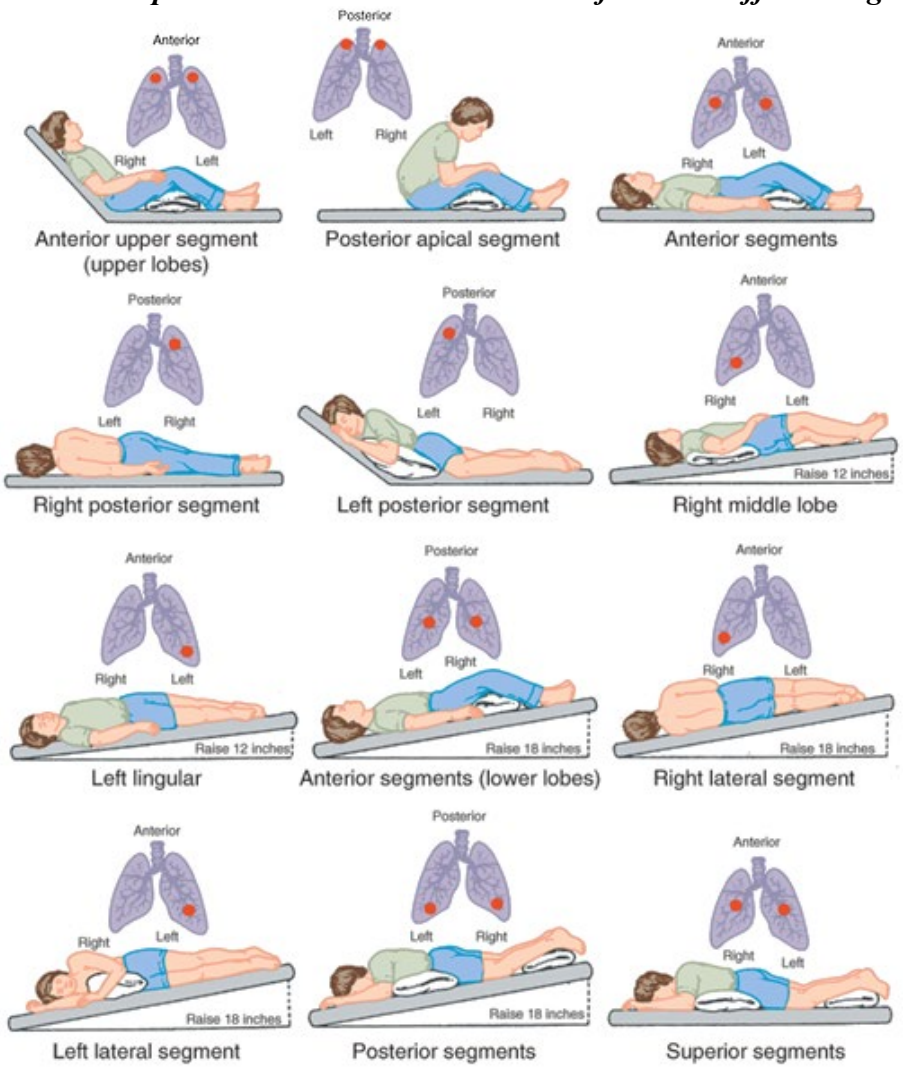
- ***What type of equipment might be used in performing postural drainage and percussion therapy?***

- ✓ **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 Trendelenberg 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)

For additional references on 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

Additional sources of reference on Postural Drainage and Percussion Therapy include:

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 Skills & Competency Checklist

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2 = Completed appropriately and correctly
N/A = Not applicable

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 health 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)

For additional references on 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

Additional sources of reference on NPPV therapy include:

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)

For additional references on 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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ARTERIAL BLOOD GAS SAMPLING
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 health 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 knicked 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 patients 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 diffusability 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

For additional references on 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

Additional sources of reference on Arterial Puncture include:

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

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DAILY TRACH 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 pad					
12. Remove old ties by cutting them with a scissor. *Be careful not to cut the pilot tube!*					
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					
Total	__/32	__/32	__/32	__/32	__/32

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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CUFF PRESSURE MEASUREMENT

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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. Reports to other members of the health 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?***

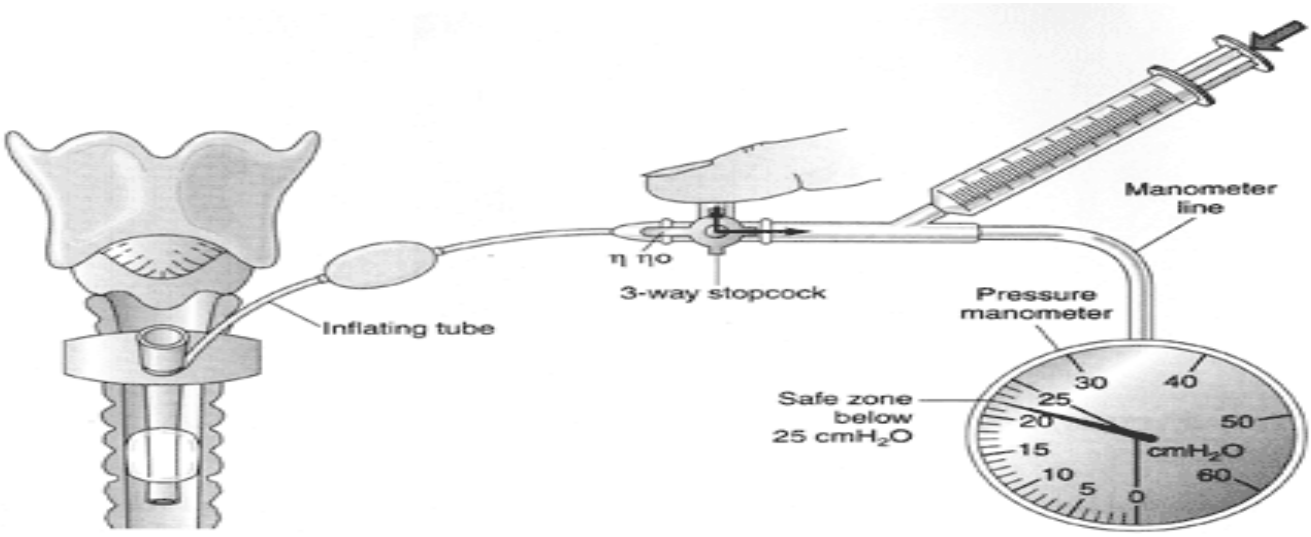
  - ✓ To assure a sealed airway for positive pressure ventilation
  - ✓ To prevent or minimize the potential for aspiration
  - ✓ To reduce the incidence of ventilator associated pneumonia (VAP)

- 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

Source of reference on Cuff Pressure Measurement include:

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

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2 = Completed appropriately and correctly
N/A = Not applicable

MANUAL RESUSCITATION W/ MASK

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 appropriate 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 health 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
  - ✓ Arrythmias/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 obturator airway/esophageal gastric tube airway (EOA/EGTA) – these are pre-hospital airways that insert blindly into the esophagus, but with an occluded tip and ventilation occurring through a mask, airflow is directed through holes and into the trachea. Many complications have occurred with this type of airway including intubation of the trachea resulting in a complete airway obstruction and gastric insufflation.

- ✓ 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

For additional references on 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

Additional sources of reference on Manual Resuscitation with Mask/Artificial Airway include:

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/ ARTIFICIAL AIRWAY

Procedural steps:	RATINGS Lab/Peer	Lab/Instr	Clinical	Clinical	Clinical
1. Reviews medical record and completes patient assessment form					
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					
8. Assesses vital signs and listens to breath sounds anteriorly and posteriorly					
9. Positions patient appropriately					
10. Attaches resuscitator to patient's 15mm adaptor of their artificial airway					
11. Inflates resuscitator using both hands to compress approximately 50-75% of the bag volume out with each breath watching for adequate chest rise					
12. If leaks occur and inadequate chest rise results, reassess depth of compression of bag, check for cuff leaks on artificial airway and repeat attempts to ventilate					
13. Continues to ventilate for 1-2 minutes and allows interruptions for suctioning of no longer than 15-20 seconds before resuming ventilations					
14. During interruptions for suctioning, secures the endotracheal tube for the individual suctioning and reassesses vital signs on the cardiac monitors (especially pulse & SpO_2)					
15. Terminates manual resuscitation appropriately and returns patient to prior source of oxygen					
16. Disassembles and stores equipment appropriately					
17. Documents therapy appropriately in medical record					
18. Reports to other members of the health care team regarding the therapy as necessary					
Total	__/36	__/36	__/36	__/36	__/36

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OPEN SYSTEM SUCTIONING w/ KIT

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 health 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:

NTS 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.

BIBLIOGRAPHIC SOURCE(S):

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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CLOSED SYSTEM SUCTIONING (in-line)

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 health 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)

For additional references on 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

Additional sources of reference on Closed Circuit Suctioning include:

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

Rating Scale:
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N/A = Not applicable

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					
Total	__/38	__/38	__/38	__/38	__/38

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

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 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 health 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 $\leq$ 5-8 cmH_2O
- ✓ PaO_2/FIO_2 ratio 150 - 200

Bedside pulmonary parameters meet the following criteria:

- ✓ VT $\geq$ 5 mL/kg (4-6 mL/kg)
- ✓ VC $\geq$ 10 mL/kg (2 x VT)
- ✓ f 8-20 breaths/minute
- ✓ $\dot{V}_E$ 10-15 L/min
- ✓ MIP/NIF $\geq$ -20 cmH_20
- ✓ RSBI $\leq$ 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 $\leq$ 140; BP $\geq$ 90/60 without pressors)
- ✓ Cardiac rhythm is normal/stable
- ✓ Afebrile (temperature $\leq 38^oC$)
- ✓ Patient is alert & oriented (GCS score $\geq$ 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 dysyncrhony with ventilator, desire for close monitoring of patient's ventilation with alarms, etc.):

  - ✓ T- piece trial; FIO_2 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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EXTUBATION

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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 health 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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INITIATING MECHANICAL VENTILATION
Patient Ventilator System Check- Adult
Ventilator brand - _____

Procedural steps:	**RATINGS** Lab/Peer	Lab/Instr	Clinical	Clinical	Clinical
1. Reviews medical record and verifies order for therapy: mode, $FI0_2$, 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 health 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.

For additional references on 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

Additional sources of reference on Adult Mechanical Ventilation include:

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

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VENTILATOR CIRCUIT CHANGE

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 - Infant (Volume)
Ventilator brand - _____

RATINGS

Procedural steps:	**Lab/Peer**	**Lab/Instr**	**Clinical**	**Clinical**	**Clinical**
1. Reviews medical record and verifies order for therapy: mode, $FI0_2$, volume, 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 - 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 health care team regarding the therapy as necessary					
Total	**__/28**	**__/28**	**__/28**	**__/28**	**__/28**

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Mechanical Ventilation - Infant (Pressure)
Ventilator brand - _____

Procedural steps:	RATINGS Lab/Peer	Lab/Instr	Clinical	Clinical	Clinical
1. Reviews medical record and verifies order for therapy: mode, $FI0_2$, 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 Pressure Control – Set/actual pressures - Timed parameters – Set/actual rates, IT, ET, I:E ratio, flowrate Pressures - 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 health 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.

For additional references on 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

Additional sources of reference on Infant Mechanical Ventilation include:

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

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PERFORM CAPNOGRAPHY

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

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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 electronic medical record and Reports to other members of the health care team regarding the therapy as necessary					
Total	__/30	__/30	__/30	__/30	__/30

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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