



RRT Examination Matrix

Content Area	Cognitive Level Analysis			Number of Items
	Recall	Application	Analysis	
I. Clinical Data	3	3	11	17
A. Review patient records; recommend diagnostic procedures	1	1	3	5
B. Collect and evaluate clinical information	1	1	5	7
C. Perform procedures; interpret results; recommend modifications to care plan	1	1	3	5
II. Equipment	3	4	13	20
A. Select and obtain; assure cleanliness	1	2	5	8
B. Assemble and check; correct malfunctions; perform quality control	2	2	8	12
III. Therapeutic Procedures	6	8	49	63
A. Evaluate, monitor and record patient's response	2	3	13	18
B. Maintain airway; remove secretions; assure ventilation and oxygenation	1	1	10	12
C. Modify therapy	0	1	10	11
D. Perform emergency procedures	1	1	10	12
E. Assist physician in special procedures; conduct pulmonary rehabilitation and home care	2	2	6	10
Totals	12	15	73	100

Content Area	Cognitive Level Analysis		
	Recall	Application	Analysis
I. Select, Review, Obtain and Interpret Data			
SETTING: In any patient care setting, the advanced respiratory therapist reviews existing clinical data and collects or recommends obtaining additional pertinent clinical data. The therapist evaluates all data to determine the appropriateness of the prescribed respiratory care plan, and participates in the development of the respiratory care plan.	3	3	11
A. Review patient records and recommend diagnostic procedures.	1*	1	3
1. Review existing data in the patient record:			
a. patient history [e.g., present illness, admission notes, respiratory care orders, progress notes]	X**		
b. physical examination [e.g., vital signs, physical findings]	X		

* The number in each column is the number of items in that content area and cognitive level contained in each examination. For example, in category I.A., one item will be asked at the recall level, one item at the application level and three items at the analysis level. The items could be asked relative to any tasks listed (1-2) under category I.A.

** Note: An "x" denotes the examination does NOT contain items for the given task at the cognitive level indicated in the respective column (Recall, Application, Analysis).

	Application		
	Recall		
c. lab data [e.g., CBC, chemistries/electrolytes, coagulation studies, Gram stain, culture and sensitivities, urinalysis]	X	X	
d. pulmonary function and blood gas results	X	X	
e. radiologic studies [e.g., radiographs of chest/upper airway, CT, MRI]	X	X	
f. monitoring data			
(1) fluid balance (intake and output)			
(2) pulmonary mechanics [e.g., maximum inspiratory pressure (MIP), vital capacity]	X	X	
(3) respiratory monitoring [e.g., rate, tidal volume, minute volume, I:E, inspiratory and expiratory pressures; flow, volume and pressure waveforms]	X	X	
(4) lung compliance, airway resistance, work of breathing	X	X	
(5) noninvasive monitoring [e.g., capnography, pulse oximetry, transcutaneous O ₂ /CO ₂] . .	X	X	
g. results of cardiovascular monitoring			
(1) ECG, blood pressure, heart rate	X	X	
(2) hemodynamic monitoring [e.g., central venous pressure, cardiac output, pulmonary capillary wedge pressure, pulmonary artery pressures, mixed venous O ₂ , C(a-v)O ₂ , shunt studies (Qs/Qt)]	X	X	
h. maternal and perinatal/neonatal history and data [e.g., Apgar scores, gestational age, L/S ratio, pre/post-ductal oxygenation studies]	X		
i. other diagnostic studies [e.g., EEG, intracranial pressure monitoring, metabolic studies (VO ₂ , VCO ₂ , nutritional assessment), ventilation/perfusion scan, pulmonary angiography, sleep studies, other ultrasonography]			
2. Recommend the following procedures to obtain additional data:			
a. CBC, electrolytes, other blood chemistries			
b. radiograph of chest and upper airway, CT scan, bronchoscopy, ventilation/perfusion lung scan, barium swallow	X	X	
c. Gram stain, culture and sensitivities	X	X	
d. spirometry before and/or after bronchodilator, maximum voluntary ventilation, diffusing capacity, functional residual capacity, flow-volume loops, body plethysmography, nitrogen washout distribution test, total lung capacity, CO ₂ response curve, closing volume, airway resistance, bronchoprovocation, maximum inspiratory pressure (MIP), maximum expiratory pressure (MEP)	X	X	
e. blood gas analysis, insertion of arterial, umbilical and/or central venous, pulmonary artery monitoring lines	X	X	
f. lung compliance, airway resistance, lung mechanics, work of breathing	X	X	
g. ECG, echocardiography, pulse oximetry, transcutaneous O ₂ /CO ₂ monitoring	X	X	
h. V _D /V _T , Qs/Qt, cardiac output, cardiopulmonary stress testing			
B. Collect and evaluate clinical information.	1	1	5
1. Assess patient's overall cardiopulmonary status by <i>inspection</i> to determine:			
a. general appearance, muscle wasting, venous distention, peripheral edema, diaphoresis, digital clubbing, cyanosis, capillary refill	X	X	
b. chest configuration, evidence of diaphragmatic movement, breathing pattern, accessory muscle activity, asymmetrical chest movement, intercostal and/or sternal retractions, nasal flaring, character of cough, amount and character of sputum	X	X	
c. transillumination of chest, Apgar score, gestational age	X	X	
2. Assess patient's overall cardiopulmonary status by <i>palpation</i> to determine:			
a. heart rate, rhythm, force	X	X	
b. asymmetrical chest movements, tactile fremitus, crepitus, tenderness, secretions in the airway, tracheal deviation, endotracheal tube placement	X	X	
3. Assess patient's overall cardiopulmonary status by <i>percussion</i> to determine diaphragmatic excursion and areas of altered resonance	X	X	
4. Assess patient's overall cardiopulmonary status by <i>auscultation</i> to determine presence of:			
a. breath sounds [e.g., normal, bilateral, increased, decreased, absent, unequal, rhonchi or crackles (râles), wheezing, stridor, friction rub]	X	X	
b. heart sounds, dysrhythmias, murmurs, bruits	X	X	
c. blood pressure	X	X	
5. Assess patient's learning needs [e.g., age and language appropriateness, education level, prior disease and medication knowledge]	X	X	
6. Interview patient to determine:			
a. level of consciousness, orientation to time, place and person, emotional state, ability to cooperate	X	X	
b. presence of dyspnea and/or orthopnea, work of breathing, sputum production, exercise tolerance and activities of daily living	X	X	
c. physical environment, social support systems, nutritional status	X	X	

	Application		
	Recall		
7. Review chest radiograph to determine:			
a. presence of, or changes in, pneumothorax or subcutaneous emphysema, other extra-pulmonary air, consolidation and/or atelectasis, pulmonary infiltrates	X	X	
b. presence and position of foreign bodies	X	X	
c. position of endotracheal or tracheostomy tube, evidence of endotracheal or tracheostomy tube cuff hyperinflation.	X	X	
d. position of chest tube(s), nasogastric and/or feeding tube, pulmonary artery catheter, pacemaker, CVP, and other catheters	X		
e. position of, or changes in, hemidiaphragms, hyperinflation, pleural fluid, pulmonary edema, mediastinal shift, patency and size of major airways	X	X	
8. Review lateral neck radiograph to determine:			
a. presence of epiglottitis and subglottic edema	X	X	
b. presence or position of foreign bodies	X	X	
c. airway narrowing	X	X	
9. Perform bedside procedures to determine:			
a. ECG, pulse oximetry, transcutaneous O ₂ /CO ₂ monitoring, capnography, mass spectrometry	X	X	
b. tidal volume, minute volume, I:E.	X	X	
c. blood gas analysis, P(A-a)O ₂ , alveolar ventilation, V _D /V _T , Q _s /Q _t , mixed venous sampling. .	X	X	
d. peak flow, maximum inspiratory pressure, maximum expiratory pressure, forced vital capacity, timed forced expiratory volumes [e.g., FEV ₁], lung compliance, lung mechanics.	X	X	
e. cardiac output, pulmonary capillary wedge pressure, central venous pressure, pulmonary artery pressures, fluid balance (intake and output)			
f. pulmonary vascular resistance and systemic vascular resistance			
g. apnea monitoring, sleep studies, respiratory impedance plethysmography	X	X	
h. tracheal tube cuff pressure, volume	X	X	
10. Interpret results of bedside procedures to determine:			
a. ECG, pulse oximetry, transcutaneous O ₂ /CO ₂ monitoring, capnography, mass spectrometry	X	X	
b. tidal volume, minute volume, I:E.	X	X	
c. blood gas analysis, P(A-a)O ₂ , alveolar ventilation, V _D /V _T , Q _s /Q _t , mixed venous sampling. .	X	X	
d. peak flow, maximum inspiratory pressure, maximum expiratory pressure, forced vital capacity, timed forced expiratory volumes [e.g., FEV ₁], lung compliance, lung mechanics.	X	X	
e. cardiac output, pulmonary capillary wedge pressure, central venous pressure, pulmonary artery pressures, fluid balance (intake and output)			
f. pulmonary vascular resistance and systemic vascular resistance			
g. apnea monitoring, sleep studies, respiratory impedance plethysmography	X	X	
h. tracheal tube cuff pressure, volume	X	X	
C. Perform procedures and interpret results, determine appropriateness of and participate in developing and recommending modifications to respiratory care plan.	1	1	3
1. Perform and/or measure the following:			
a. spirometry before and/or after bronchodilator, maximum voluntary ventilation, diffusing capacity, functional residual capacity, flow-volume loops, body plethysmography, nitrogen washout distribution test, total lung capacity, CO ₂ response curve, closing volume, airway resistance	X	X	
b. ECG, pulse oximetry, transcutaneous O ₂ /CO ₂ monitoring	X	X	
c. V _D /V _T , Q _s /Q _t , mixed venous sampling, C(a- \bar{v})O ₂ , cardiac output, pulmonary capillary wedge pressure, central venous pressure, pulmonary artery pressures, cardiopulmonary stress testing			
d. fluid balance (intake and output)			
e. arterial sampling and blood gas analysis, co-oximetry, P(A-a)O ₂	X	X	
f. sleep studies, metabolic studies [e.g., indirect calorimetry]			
g. ventilator flow, volume, and pressure waveforms, lung compliance	X	X	
2. Interpret results of the following:			
a. spirometry before and/or after bronchodilator, maximum voluntary ventilation, diffusing capacity, functional residual capacity, flow-volume loops, body plethysmography, nitrogen washout distribution test, total lung capacity, CO ₂ response curve, closing volume, airway resistance, bronchoprovocation	X	X	
b. ECG, pulse oximetry, transcutaneous O ₂ /CO ₂ monitoring	X	X	
c. V _D /V _T , Q _s /Q _t , mixed venous sampling, C(a- \bar{v})O ₂ , cardiac output, pulmonary capillary wedge pressure, central venous pressure, pulmonary artery pressures, cardiopulmonary stress testing			
d. fluid balance (intake and output)			
e. arterial sampling and blood gas analysis, co-oximetry, P(A-a)O ₂	X	X	
f. peripheral venipuncture or insertion of intravenous line			
g. sleep studies, metabolic studies [e.g., indirect calorimetry]			
h. insertion of arterial and umbilical monitoring lines			
i. ventilator flow, volume, and pressure waveforms, lung compliance	X	X	

	Recall	Application
3. Determine the appropriateness of the prescribed respiratory care plan and recommend modifications where indicated:		
a. perform respiratory care quality assurance	X	X
b. develop quality improvement program	X	X
c. review interdisciplinary patient and family care plan	X	X
4. Participate in development of respiratory care plan [e.g., case management, develop and apply protocols, disease management education]	X	X

II. Select, Assemble and Check Equipment for Proper Function, Operation and Cleanliness

SETTING: In any patient care setting, the advanced respiratory therapist selects, assembles, and assures cleanliness of all equipment used in providing respiratory care. The therapist checks all equipment and corrects malfunctions. **3** **4** **13**

A. Select and obtain equipment, and assure equipment cleanliness. **1** **2** **5**

1. Select and obtain equipment appropriate to the respiratory care plan:			
a. oxygen administration devices			
(1) nasal cannula, mask, reservoir mask (partial rebreathing, nonrebreathing), face tents, transtracheal oxygen catheter, oxygen conserving cannulas	X	X	
(2) air-entrainment devices, tracheostomy collar and T-piece, oxygen hoods and tents	X	X	
(3) CPAP devices	X	X	
b. humidifiers [e.g., bubble, passover, cascade, wick, heat moisture exchanger]	X	X	
c. aerosol generators [e.g., pneumatic nebulizer, ultrasonic nebulizer]	X	X	
d. resuscitation devices [e.g., manual resuscitator (bag-valve), pneumatic (demand-valve), mouth-to-valve mask resuscitator]	X	X	
e. ventilators			
(1) pneumatic, electric, microprocessor, fluidic	X	X	
(2) high frequency			
(3) noninvasive positive pressure	X	X	
f. artificial airways			
(1) oro- and nasopharyngeal airways	X	X	
(2) oral, nasal and double-lumen endotracheal tubes	X	X	
(3) tracheostomy tubes and buttons	X	X	
(4) intubation equipment [e.g., laryngoscope and blades, exhaled CO ₂ detection devices]	X	X	
(5) other airways [e.g., laryngeal mask airway (LMA), Esophageal Tracheal Combitube® (ETC)]			
g. suctioning devices [e.g., suction catheters, specimen collectors, oropharyngeal suction devices]	X	X	
h. gas delivery, metering and clinical analyzing devices			
(1) regulators, reducing valves, connectors and flowmeters, air/oxygen blenders, pulse-dose systems	X	X	
(2) oxygen concentrators, air compressors, liquid oxygen systems	X	X	
(3) gas cylinders, bulk systems and manifolds	X	X	
(4) capnograph, blood gas analyzer and sampling devices, co-oximeter, transcutaneous O ₂ /CO ₂ monitor, pulse oximeter	X	X	
(5) CO, He, O ₂ and specialty gas analyzers	X	X	
i. patient breathing circuits			
(1) IPPB, continuous mechanical ventilation	X	X	
(2) CPAP, PEEP valve assembly	X	X	
(3) H-valve assembly			X
j. environmental devices			
(1) incubators, radiant warmers			
(2) aerosol (mist) tents	X	X	
(3) scavenging systems		X	X
k. positive expiratory pressure device (PEP)			
l. Flutter® mucous clearance device			X
m. other therapeutic gases [e.g., O ₂ /CO ₂ , He/O ₂]			
n. manometers and gauges			
(1) manometers – water, mercury and aneroid, inspiratory/expiratory pressure meters, cuff pressure manometers	X	X	
(2) pressure transducers	X	X	
o. respirometers [e.g., flow-sensing devices (pneumotachometer), volume displacement]	X	X	
p. electrocardiography devices [e.g., ECG oscilloscope monitors, ECG machines (12-lead), Holter monitors]	X	X	
q. hemodynamic monitoring devices			
(1) central venous catheters, pulmonary artery catheters [e.g., Swan-Ganz], cardiac output, continuous S \bar{V} O ₂ monitors			
(2) arterial catheters			
r. vacuum systems [e.g., pumps, regulators, collection bottles, pleural drainage devices]	X	X	

	Application		
	Recall		
s. metered dose inhalers (MDI), MDI spacers	X	X	
t. Small Particle Aerosol Generators (SPAG)	X	X	
u. bronchoscopes	X	X	
2. Assure selected equipment cleanliness [e.g., select or determine appropriate agent and technique for disinfection and/or sterilization, perform procedures for disinfection and/or sterilization, monitor effectiveness of sterilization procedures]	X	X	
B. Assemble and check equipment function, identify and correct equipment malfunctions, and perform quality control.	2	2	8
1. Assemble, check for proper function, and identify malfunctions of equipment:			
a. oxygen administration devices			
(1) nasal cannula, mask, reservoir mask (partial rebreathing, nonrebreathing), face tents, transtracheal oxygen catheter, oxygen conserving cannulas	X	X	
(2) air-entrainment devices, tracheostomy collar and T-piece, oxygen hoods and tents	X	X	
(3) CPAP devices	X	X	
b. humidifiers [e.g., bubble, passover, cascade, wick, heat moisture exchanger]	X	X	
c. aerosol generators [e.g., pneumatic nebulizer, ultrasonic nebulizer]	X	X	
d. resuscitation devices [e.g., manual resuscitator (bag-valve), pneumatic (demand-valve), mouth-to-valve mask resuscitator]	X	X	
e. ventilators			
(1) pneumatic, electric, microprocessor, fluidic	X	X	
(2) high frequency			
(3) noninvasive positive pressure	X	X	
f. artificial airways			
(1) oro- and nasopharyngeal airways	X	X	
(2) oral, nasal and double-lumen endotracheal tubes	X	X	
(3) tracheostomy tubes and buttons	X	X	
(4) intubation equipment [e.g., laryngoscope and blades, exhaled CO ₂ detection devices]	X	X	
g. suctioning devices [e.g., suction catheters, specimen collectors, oropharyngeal suction devices]	X	X	
h. gas delivery, metering and clinical analyzing devices			
(1) regulators, reducing valves, connectors and flowmeters, air/oxygen blenders, pulse-dose systems	X	X	
(2) oxygen concentrators, air compressors, liquid oxygen systems	X	X	
(3) gas cylinders, bulk systems and manifolds	X	X	
(4) capnograph, blood gas analyzer and sampling devices, co-oximeter, transcutaneous O ₂ /CO ₂ monitor, pulse oximeter	X	X	
(5) CO, He, O ₂ and specialty gas analyzers	X	X	
i. patient breathing circuits			
(1) IPPB, continuous mechanical ventilation	X	X	
(2) CPAP, PEEP valve assembly	X	X	
(3) H-valve assembly		X	X
j. environmental devices			
(1) incubators, radiant warmers			
(2) aerosol (mist) tents	X	X	
k. positive expiratory pressure device (PEP)			
l. Flutter [®] mucous clearance device			X
m. other therapeutic gases [e.g., O ₂ /CO ₂ , He/O ₂]			
n. manometers and gauges			
(1) manometers – water, mercury and aneroid, inspiratory/expiratory pressure meters, cuff pressure manometers	X	X	
(2) pressure transducers			
o. respirometers [e.g., flow-sensing devices (pneumotachometer), volume displacement]	X	X	
p. electrocardiography devices [e.g., ECG oscilloscope monitors, ECG machines (12-lead), Holter monitors]	X	X	
q. hemodynamic monitoring devices			
(1) central venous catheters, pulmonary artery catheters [e.g., Swan-Ganz], cardiac output, continuous SvO ₂ monitors			
(2) arterial catheters			
r. vacuum systems [e.g., pumps, regulators, collection bottles, pleural drainage devices]	X	X	
s. bronchoscopes			X
2. Take action to correct malfunctions of equipment:			
a. oxygen administration devices			
(1) nasal cannula, mask, reservoir mask (partial rebreathing, nonrebreathing), face tents, transtracheal oxygen catheter, oxygen conserving cannulas	X	X	
(2) air-entrainment devices, tracheostomy collar and T-piece, oxygen hoods and tents	X	X	
(3) CPAP devices	X	X	

	Application		
	Recall		
b. humidifiers [e.g., bubble, passover, cascade, wick, heat moisture exchanger]	X	X	
c. aerosol generators [e.g., pneumatic nebulizer, ultrasonic nebulizer]	X	X	
d. resuscitation devices [e.g., manual resuscitator (bag-valve), pneumatic (demand-valve), mouth-to-valve mask resuscitator]	X	X	
e. ventilators			
(1) pneumatic, electric, microprocessor, fluidic	X	X	
(2) high frequency			
(3) noninvasive positive pressure	X	X	
f. artificial airways			
(1) oro- and nasopharyngeal airways	X	X	
(2) oral, nasal and double-lumen endotracheal tubes	X	X	
(3) tracheostomy tubes and buttons	X	X	
(4) intubation equipment [e.g., laryngoscope and blades, exhaled CO ₂ detection devices]	X	X	
g. suctioning devices [e.g., suction catheters, specimen collectors, oropharyngeal suction devices]	X	X	
h. gas delivery, metering and clinical analyzing devices			
(1) regulators, reducing valves, connectors and flowmeters, air/oxygen blenders, pulse-dose systems	X	X	
(2) oxygen concentrators, air compressors, liquid oxygen systems	X	X	
(3) gas cylinders, bulk systems and manifolds	X	X	
(4) capnograph, blood gas analyzer and sampling devices, co-oximeter, transcutaneous O ₂ /CO ₂ monitor, pulse oximeter	X	X	
(5) CO, He, O ₂ and specialty gas analyzers			
i. patient breathing circuits			
(1) IPPB, continuous mechanical ventilation	X	X	
(2) CPAP, PEEP valve assembly	X	X	
(3) H-valve assembly			X
j. environmental devices			
(1) incubators, radiant warmers			X
(2) aerosol (mist) tents	X	X	
k. positive expiratory pressure device (PEP)			
l. Flutter [®] mucous clearance device			X
m. other therapeutic gases [e.g., O ₂ /CO ₂ , He/O ₂]			
n. manometers and gauges			
(1) manometers – water, mercury and aneroid, inspiratory/expiratory pressure meters, cuff pressure manometers	X	X	
(2) pressure transducers			
o. respirometers [e.g., flow-sensing devices (pneumotachometer), volume displacement]	X	X	
p. electrocardiography devices [e.g., ECG oscilloscope monitors, ECG machines (12-lead), Holter monitors]			
q. hemodynamic monitoring devices			
(1) central venous catheters, pulmonary artery catheters [e.g., Swan-Ganz], cardiac output, continuous SvO ₂ monitors			
(2) arterial catheters			
r. vacuum systems [e.g., pumps, regulators, collection bottles, pleural drainage devices]	X	X	
s. Small Particle Aerosol Generators (SPAG)			X
t. bronchoscopes			X
3. Perform quality control procedures for:			
a. blood gas analyzers and sampling devices, co-oximeters	X	X	
b. pulmonary function equipment, ventilator volume/flow/pressure calibration	X	X	
c. gas metering devices	X	X	
d. noninvasive monitors [e.g., transcutaneous]			

III. Initiate, Conduct, and Modify Prescribed Therapeutic Procedures

SETTING: In any patient care setting, the advanced respiratory therapist evaluates, monitors and records patient's response to care. The therapist maintains patient records and communicates with other healthcare team members. The therapist initiates, conducts, and modifies prescribed therapeutic procedures to achieve the desired objectives. The therapist provides care in emergency settings, assists the physician and conducts pulmonary rehabilitation and home care.

	6	8	49
A. Evaluate, monitor and record patient's response to respiratory care.	2	3	13
1. Evaluate and monitor patient's response to respiratory care:			
a. recommend and review chest radiograph	X	X	
b. perform arterial puncture, capillary blood gas sampling, and venipuncture; obtain blood from arterial or pulmonary artery lines; perform transcutaneous O ₂ /CO ₂ , pulse oximetry, co-oximetry, and capnography monitoring	X	X	

	Application		
	Recall		
c. observe changes in sputum production and consistency, note patient's subjective response to therapy and mechanical ventilation.	X	X	
d. measure and record vital signs, monitor cardiac rhythm, evaluate fluid balance (intake and output)	X	X	
e. perform spirometry/determine vital capacity, measure lung compliance and airway resistance, interpret ventilator flow, volume, and pressure waveforms, measure peak flow	X	X	
f. determine and record central venous pressure, pulmonary artery pressures, pulmonary capillary wedge pressure and/or cardiac output			
g. recommend measurement of electrolytes, hemoglobin, CBC and/or chemistries			
h. monitor mean airway pressure, adjust and check alarm systems, measure tidal volume, respiratory rate, airway pressures, I:E, and maximum inspiratory pressure (MIP)	X	X	
i. measure F_iO_2 and/or liter flow	X	X	
j. monitor endotracheal or tracheostomy tube cuff pressure	X	X	
k. auscultate chest and interpret changes in breath sounds.	X	X	
l. perform hemodynamic calculations [e.g., shunt studies \dot{Q}_s/\dot{Q}_t], cardiac output, cardiac index, pulmonary vascular resistance and systemic vascular resistance, stroke volume]			
m. interpret hemodynamic calculations:			
(1) calculate and interpret $P(A-a)O_2$, $C(a-\bar{v})O_2$, \dot{Q}_s/\dot{Q}_t			
(2) exhaled CO_2 monitoring, V_D/V_T			
(3) cardiac output, cardiac index, pulmonary vascular resistance and systemic vascular resistance, stroke volume			
2. Maintain records and communication:			
a. record therapy and results using conventional terminology as required in the healthcare setting and/or by regulatory agencies by noting and interpreting:			
(1) patient's response to therapy including the effects of therapy, adverse reactions, patient's subjective and attitudinal response to therapy.	X	X	
(2) auscultatory findings, cough and sputum production and characteristics	X	X	
(3) vital signs [e.g., heart rate, respiratory rate, blood pressure, body temperature]	X	X	
(4) pulse oximetry, heart rhythm, capnography.	X	X	
b. verify computations and note erroneous data.	X	X	
c. apply computer technology to patient management [e.g., ventilator waveform analysis, electronic charting, patient care algorithms].	X	X	
d. communicate results of therapy and alter therapy per protocol(s)	X	X	
B. Conduct therapeutic procedures to maintain a patent airway, achieve adequate ventilation and oxygenation, and remove bronchopulmonary secretions.	1	1	10
1. Maintain a patent airway including the care of artificial airways:			
a. insert oro- and nasopharyngeal airway, select endotracheal or tracheostomy tube, perform endotracheal intubation, change tracheostomy tube, maintain proper cuff inflation, position of endotracheal or tracheostomy tube.	X	X	
b. maintain adequate humidification.	X	X	
c. extubate the patient.	X	X	
d. properly position patient	X	X	
e. identify endotracheal tube placement by available means	X	X	
2. Achieve adequate spontaneous and artificial ventilation:			
a. initiate and adjust IPPB therapy	X	X	
b. initiate and select appropriate settings for high frequency ventilation			
c. initiate and adjust ventilator modes [e.g., A/C, SIMV, pressure support ventilation (PSV), pressure control ventilation (PCV)]	X	X	
d. initiate and adjust independent (differential) lung ventilation			
3. Remove bronchopulmonary secretions by instructing and encouraging bronchopulmonary hygiene techniques [e.g., coughing techniques, autogenic drainage, positive expiratory pressure device (PEP), intrapulmonary percussive ventilation (IPV), Flutter®, High Frequency Chest Wall Oscillation (HFCWO)].	X	X	
4. Achieve adequate arterial and tissue oxygenation:			
a. initiate and adjust CPAP, PEEP, and noninvasive positive pressure.	X	X	
b. initiate and adjust combinations of ventilatory techniques [e.g., SIMV, PEEP, PS, PCV].	X	X	
c. position patient to minimize hypoxemia, administer oxygen (on or off ventilator), prevent procedure-associated hypoxemia [e.g., oxygenate before and after suctioning and equipment changes]	X	X	
C. Make necessary modifications in therapeutic procedures based on patient response.	0	1	10
1. Modify IPPB:			
a. adjust sensitivity, flow, volume, pressure, F_iO_2	X	X	
b. adjust expiratory retard	X	X	
c. change patient – machine interface [e.g., mouthpiece, mask]	X	X	

	Application		
	Recall		
2. Modify patient breathing pattern during aerosol therapy	X	X	
3. Modify oxygen therapy:			
a. change mode of administration, adjust flow, and F _I O ₂	X	X	
b. set up an O ₂ concentrator or liquid O ₂ system	X	X	
4. Modify specialty gas [e.g., He/O ₂ , O ₂ /CO ₂] therapy [e.g., change mode of administration, adjust flow, adjust gas concentration]	X		
5. Modify bronchial hygiene therapy [e.g., alter position of patient, alter duration of treatment and techniques, coordinate sequence of therapies, alter equipment used and PEP therapy]	X	X	
6. Modify artificial airway management:			
a. alter endotracheal or tracheostomy tube position, change endotracheal or tracheostomy tube	X	X	
b. initiate suctioning	X	X	
c. inflate and deflate the cuff	X	X	
7. Modify suctioning:			
a. alter frequency and duration of suctioning	X	X	
b. change size and type of catheter	X	X	
c. alter negative pressure	X	X	
d. instill irrigating solutions	X	X	
8. Modify mechanical ventilation:			
a. change patient breathing circuitry, change type of ventilator	X	X	
b. measure volume loss through chest tube(s)	X		
c. change mechanical dead space	X	X	
D. Initiate, conduct, or modify respiratory care techniques in an emergency setting.	1	1	10
1. Treat cardiopulmonary collapse according to:			
a. BCLS	X	X	
b. ACLS	X	X	
c. PALS	X	X	
d. NRP	X	X	
2. Treat tension pneumothorax			
3. Participate in land/air patient transport			
E. Assist physician, initiate and conduct pulmonary rehabilitation.	2	2	6
1. Act as an assistant to the physician performing special procedures including:			
a. bronchoscopy	X	X	
b. thoracentesis	X	X	
c. transtracheal aspiration			
d. tracheostomy	X	X	
e. cardiopulmonary stress testing			
f. percutaneous needle biopsies of the lung			
g. sleep studies			
h. cardioversion	X	X	
i. intubation	X	X	
j. insertion of chest tubes			
k. insertion of lines for invasive monitoring [e.g., central venous pressure, pulmonary artery catheters, arterial lines]			
l. conscious sedation			
2. Initiate and conduct pulmonary rehabilitation and home care within the prescription:			
a. monitor and maintain home respiratory care equipment, maintain apnea monitors			
b. explain planned therapy and goals to patient in understandable terms to achieve optimal therapeutic outcome, counsel patient and family concerning smoking cessation, disease management	X	X	
c. assure safety and infection control	X	X	
d. modify respiratory care procedures for use in the home	X	X	
e. implement and monitor graded exercise program			
f. conduct patient education and disease management programs	X	X	
TOTALS	12	15	73

Examination Matrix

I. Data

- A. Review patient information
- B. Collect clinical information
- C. Perform diagnostic procedures

II. Equipment

- A. Select, obtain, assure cleanliness
- B. Assemble, check function, correct malfunctions

III. Therapeutic Procedures

- A. Explain therapy, protect patient
- B. Evaluate, monitor, record responses
- C. Conduct therapeutic procedures
- D. Modify procedures or care plan
- E. Modify care in emergency setting
- F. Assist physician, conduct rehabilitation, and home care

I. Select, Review, Obtain and Interpret Data

SETTING: In any patient care setting, the advanced respiratory therapist reviews existing clinical data and collects or recommends obtaining additional pertinent clinical data. The therapist evaluates all data to determine the appropriateness of the prescribed respiratory care plan, and participates in the development of the respiratory care plan.

A. Review patient records and recommend diagnostic procedures.

1. Review existing data in the patient record:
 - a. patient history [e.g., present illness, admission notes, respiratory care orders, progress notes]
 - b. physical examination [e.g., vital signs, physical findings]
 - c. lab data [e.g., CBC, chemistries/electrolytes, coagulation studies, Gram stain, culture and sensitivities, urinalysis]
 - d. pulmonary function and blood gas results
 - e. radiologic studies [e.g., radiographs of chest/upper airway, CT, MRI]
 - f. results of respiratory monitoring
 - (1) pulmonary mechanics [e.g., maximum inspiratory pressure (MIP), vital capacity]
 - (2) respiratory monitoring [e.g., rate, tidal volume, minute volume, I:E, inspiratory and expiratory pressures; flow, volume and pressure waveforms]
 - (3) lung compliance, airway resistance, work of breathing
 - (4) dead space to tidal volume ratio (V_D/V_T)
 - (5) noninvasive monitoring [e.g., capnography, pulse oximetry, transcutaneous O_2/CO_2]
 - g. results of cardiovascular monitoring
 - (1) ECG, blood pressure, heart rate
 - (2) fluid balance (intake and output)
 - (3) hemodynamic monitoring [e.g., central venous pressure, cardiac output, pulmonary capillary wedge pressure, pulmonary artery pressures, mixed venous O_2 , $C(a-\bar{v})O_2$, shunt studies (\dot{Q}_s/\dot{Q}_t)]
 - h. maternal and perinatal/neonatal history and data [e.g., Apgar scores, gestational age, L/S ratio, pre/post-ductal oxygenation studies]
 - i. other diagnostic studies [e.g., EEG, intracranial pressure monitoring, metabolic studies ($\dot{V}O_2$, $\dot{V}CO_2$, nutritional assessment), ventilation/perfusion scan, pulmonary angiography, sleep studies, other ultrasonography]
2. Recommend the following procedures to obtain additional data:
 - a. CBC, electrolytes, other blood chemistries
 - b. radiograph of chest and upper airway, CT scan, bronchoscopy, ventilation/perfusion lung scan, barium swallow
 - c. Gram stain, culture and sensitivities
 - d. spirometry before and/or after bronchodilator, maximum voluntary ventilation, diffusing capacity, functional residual capacity, flow-volume loops, body plethysmography, nitrogen washout distribution test, total lung capacity, CO_2 response curve, closing volume, airway resistance, bronchoprovocation, maximum inspiratory pressure (MIP), maximum expiratory pressure (MEP)
 - e. blood gas analysis, insertion of arterial, umbilical and/or central venous, pulmonary artery monitoring lines
 - f. lung mechanics [e.g., lung compliance, airway resistance, work of breathing]
 - g. ECG, echocardiography, pulse oximetry, transcutaneous O_2/CO_2 monitoring
 - h. V_D/V_T , \dot{Q}_s/\dot{Q}_t , cardiac output, cardiopulmonary stress testing

B. Collect and evaluate clinical information.

1. Assess patient's overall cardiopulmonary status by *inspection* to determine:
 - a. general appearance, muscle wasting, venous distention, peripheral edema, diaphoresis, digital clubbing, cyanosis, capillary refill
 - b. chest configuration, evidence of diaphragmatic movement, breathing pattern, accessory muscle activity, asymmetrical chest movement, intercostal and/or sternal retractions, nasal flaring, quality of cough, amount and characteristics of sputum
 - c. transillumination of chest, Apgar score, gestational age
2. Assess patient's overall cardiopulmonary status by *palpation* to determine:
 - a. heart rate, rhythm, force
 - b. asymmetrical chest movements, tactile fremitus, crepitus, tenderness, secretions in the airway, tracheal deviation
3. Assess patient's overall cardiopulmonary status by *percussion* to determine diaphragmatic excursion and areas of altered resonance
4. Assess patient's overall cardiopulmonary status by *auscultation* to determine presence of:
 - a. breath sounds [e.g., normal, bilateral, increased, decreased, absent, unequal, rhonchi or crackles (râles), wheezing, stridor, friction rub, endotracheal tube placement]
 - b. heart sounds, dysrhythmias, murmurs, bruits
 - c. blood pressure
5. Assess patient's learning needs [e.g., age and language appropriateness, education level, prior disease and medication knowledge]
6. Interview patient to determine:
 - a. level of consciousness, orientation to time, place and person, emotional state, ability to cooperate
 - b. presence of dyspnea and/or orthopnea, work of breathing, sputum production, exercise tolerance and activities of daily living
 - c. physical environment, social support systems, nutritional status
7. Review chest radiograph to determine:
 - a. presence of, or changes in, pneumothorax or subcutaneous emphysema, other extra-pulmonary air, consolidation and/or atelectasis, pulmonary infiltrates
 - b. presence and position of foreign bodies
 - c. position of endotracheal or tracheostomy tube, evidence of endotracheal or tracheostomy tube cuff hyperinflation
 - d. position of chest tube(s), nasogastric and/or feeding tube, pulmonary artery catheter, pacemaker, CVP, and other catheters
 - e. position of, or changes in, hemidiaphragms, hyperinflation, pleural fluid, pulmonary edema, mediastinal shift, patency and size of major airways
8. Review lateral neck radiograph to determine:
 - a. presence of epiglottitis and subglottic edema
 - b. presence or position of foreign bodies
 - c. airway narrowing

C. Perform procedures and interpret results, determine appropriateness of and participate in developing and recommending modifications to respiratory care plan.

1. Perform bedside procedures and interpret results to determine:
 - a. ECG, pulse oximetry, transcutaneous O₂/CO₂ monitoring, capnography, mass spectrometry
 - b. tidal volume, minute volume, I:E
 - c. blood gas analysis, P(A-a)O₂, alveolar ventilation, V_D/V_T, Q̇_s/Q̇_t, mixed venous sampling
 - d. peak flow, maximum inspiratory pressure, maximum expiratory pressure, forced vital capacity, timed forced expiratory volumes [e.g., FEV₁], lung compliance, lung mechanics
 - e. cardiac output, pulmonary capillary wedge pressure, central venous pressure, pulmonary artery pressures, fluid balance (intake and output)
 - f. pulmonary vascular resistance and systemic vascular resistance
 - g. apnea monitoring, sleep studies, respiratory impedance plethysmography
 - h. tracheal tube cuff pressure, volume
2. Perform, measure and interpret the following:
 - a. spirometry before and/or after bronchodilator, maximum voluntary ventilation, diffusing capacity, functional residual capacity, flow-volume loops, body plethysmography, nitrogen washout distribution test, total lung capacity, CO₂ response curve, closing volume, airway resistance
 - b. ECG, pulse oximetry, transcutaneous O₂/CO₂ monitoring
 - c. V_D/V_T, Q̇_s/Q̇_t, mixed venous sampling, C(a- \bar{v})O₂, cardiac output, pulmonary capillary wedge pressure, central venous pressure, pulmonary artery pressures
 - d. fluid balance (intake and output)
 - e. arterial sampling and blood gas analysis, co-oximetry, P(A-a)O₂
 - f. sleep studies, metabolic studies [e.g., indirect calorimetry], cardiopulmonary stress testing
 - g. ventilator flow, volume and pressure waveforms, lung compliance
3. Interpret results from insertion of the following:
 - a. arterial and umbilical monitoring lines
 - b. peripheral venipuncture or intravenous lines

4. Determine the appropriateness of the prescribed respiratory care plan and recommend modifications where indicated:
 - a. analyze available data to determine pathophysiological state
 - b. review planned therapy to establish therapeutic goals
 - c. determine appropriateness of prescribed therapy and goals for identified pathophysiological state
 - d. recommend changes in therapeutic plan if indicated (based on data)
 - e. perform respiratory care quality assurance
 - f. develop quality improvement program
 - g. review interdisciplinary patient and family care plan
5. Participate in development of respiratory care plans [e.g., case management, develop and apply protocols, disease management education]

II. Select, Assemble and Check Equipment for Proper Function, Operation and Cleanliness

SETTING: In any patient care setting, the advanced respiratory therapist selects, assembles, and assures cleanliness of all equipment used in providing respiratory care. The therapist checks all equipment and corrects malfunctions.

A. Select and obtain equipment, and assure equipment cleanliness.

1. Select and obtain equipment appropriate to the respiratory care plan:
 - a. oxygen administration devices
 - (1) nasal cannula, mask, reservoir mask (partial rebreathing, nonrebreathing), face tents, transtracheal oxygen catheter, oxygen conserving cannulas
 - (2) air-entrainment devices, tracheostomy collar and T-piece, oxygen hoods and tents
 - (3) CPAP devices
 - b. humidifiers [e.g., bubble, passover, cascade, wick, heat moisture exchanger]
 - c. aerosol generators [e.g., pneumatic nebulizer, ultrasonic nebulizer]
 - d. resuscitation devices [e.g., manual resuscitator (bag-valve), pneumatic (demand-valve), mouth-to-valve mask resuscitator]
 - e. ventilators
 - (1) pneumatic, electric, microprocessor, fluidic
 - (2) high frequency
 - (3) noninvasive positive pressure
 - f. artificial airways
 - (1) oro- and nasopharyngeal airways
 - (2) oral, nasal and double-lumen endotracheal tubes
 - (3) tracheostomy tubes and buttons
 - (4) intubation equipment [e.g., laryngoscope and blades, exhaled CO₂ detection devices]
 - (5) other airways [e.g., laryngeal mask airway (LMA), Esophageal Tracheal Combitube®(ETC)]
 - g. suctioning devices [e.g., suction catheters, specimen collectors, oropharyngeal suction devices]
 - h. gas delivery, metering and clinical analyzing devices
 - (1) regulators, reducing valves, connectors and flowmeters, air/oxygen blenders, pulse-dose systems
 - (2) oxygen concentrators, air compressors, liquid oxygen systems
 - (3) gas cylinders, bulk systems and manifolds
 - (4) capnograph, blood gas analyzer and sampling devices, co-oximeter, transcutaneous O₂/CO₂ monitor, pulse oximeter
 - (5) CO, He, O₂ and specialty gas analyzers
 - i. patient breathing circuits
 - (1) IPPB, continuous mechanical ventilation
 - (2) CPAP, PEEP valve assembly
 - (3) H-valve assembly
 - j. environmental devices
 - (1) incubators, radiant warmers
 - (2) aerosol (mist) tents
 - (3) gas scavenging systems
 - k. incentive breathing devices
 - l. percussors and vibrators
 - m. positive expiratory pressure device (PEP)
 - n. Flutter® mucous clearance device
 - o. other therapeutic gases [e.g., O₂/CO₂, He/O₂]
 - p. manometers and gauges
 - (1) manometers – water, mercury and aneroid, inspiratory/expiratory pressure meters, cuff pressure manometers
 - (2) pressure transducers
 - q. respirometers [e.g., flow-sensing devices (pneumotachometer), volume displacement]
 - r. electrocardiography devices [e.g., ECG oscilloscope monitors, ECG machines (12-lead), Holter monitors]
 - s. hemodynamic monitoring devices
 - (1) central venous catheters, pulmonary artery catheters [e.g., Swan-Ganz], cardiac output, continuous S \bar{V} O₂ monitors
 - (2) arterial catheters

- t. vacuum systems [e.g., pumps, regulators, collection bottles, pleural drainage devices]
 - u. metered dose inhalers (MDI), MDI spacers
 - v. Small Particle Aerosol Generators (SPAG)
 - w. bronchoscopes
2. Assure selected equipment cleanliness [e.g., select or determine appropriate agent and technique for disinfection and/or sterilization, perform procedures for disinfection and/or sterilization, monitor effectiveness of sterilization procedures]

B. Assemble and check equipment function, identify and correct equipment malfunctions, and perform quality control.

1. Assemble and check for proper equipment function, and identify and correct equipment malfunctions:
- a. oxygen administration devices
 - (1) nasal cannula, mask, reservoir mask (partial rebreathing, nonrebreathing), face tents, transtracheal oxygen catheter, oxygen conserving cannulas
 - (2) air-entrainment devices, tracheostomy collar and T-piece, oxygen hoods and tents
 - (3) CPAP devices
 - b. humidifiers [e.g., bubble, passover, cascade, wick, heat moisture exchanger]
 - c. aerosol generators [e.g., pneumatic nebulizer, ultrasonic nebulizer]
 - d. resuscitation devices [e.g., manual resuscitator (bag-valve), pneumatic (demand-valve), mouth-to-valve mask resuscitator]
 - e. ventilators
 - (1) pneumatic, electric, microprocessor, fluidic
 - (2) high frequency
 - (3) noninvasive positive pressure
 - f. artificial airways
 - (1) oro- and nasopharyngeal airways
 - (2) oral, nasal and double-lumen endotracheal tubes
 - (3) tracheostomy tubes and buttons
 - (4) intubation equipment [e.g., laryngoscope and blades, exhaled CO₂ detection devices]
 - g. suctioning devices [e.g., suction catheters, specimen collectors, oropharyngeal suction devices]
 - h. gas delivery, metering and clinical analyzing devices
 - (1) regulators, reducing valves, connectors and flowmeters, air/oxygen blenders, pulse-dose systems
 - (2) oxygen concentrators, air compressors, liquid oxygen systems
 - (3) gas cylinders, bulk systems and manifolds
 - (4) capnograph, blood gas analyzer and sampling devices, co-oximeter, transcutaneous O₂/CO₂ monitor, pulse oximeter
 - (5) CO, He, O₂ and specialty gas analyzers
 - i. patient breathing circuits
 - (1) IPPB, continuous mechanical ventilation
 - (2) CPAP, PEEP valve assembly
 - (3) H-valve assembly
 - j. environmental devices
 - (1) incubators, radiant warmers
 - (2) aerosol (mist) tents
 - k. incentive breathing devices
 - l. percussors and vibrators
 - m. positive expiratory pressure device (PEP)
 - n. Flutter[®] mucous clearance device
 - o. other therapeutic gases [e.g., O₂/CO₂, He/O₂]
 - p. manometers and gauges
 - (1) manometers – water, mercury and aneroid, inspiratory/expiratory pressure meters, cuff pressure manometers
 - (2) pressure transducers
 - q. respirometers [e.g., flow-sensing devices (pneumotachometer), volume displacement]
 - r. electrocardiography devices [e.g., ECG oscilloscope monitors, ECG machines (12-lead), Holter monitors]
 - s. hemodynamic monitoring devices
 - (1) central venous catheters, pulmonary artery catheters [e.g., Swan-Ganz], cardiac output, continuous S \bar{V} O₂ monitors
 - (2) arterial catheters
 - t. vacuum systems [e.g., pumps, regulators, collection bottles, pleural drainage devices]
 - u. metered dose inhalers (MDI), MDI spacers
 - v. Small Particle Aerosol Generators (SPAG)
 - w. bronchoscopes
2. Perform quality control procedures for:
- a. blood gas analyzers and sampling devices, co-oximeters
 - b. pulmonary function equipment, ventilator volume/flow/pressure calibration
 - c. gas metering devices
 - d. noninvasive monitors [e.g., transcutaneous]

III. Initiate, Conduct, and Modify Prescribed Therapeutic Procedures

SETTING: In any patient care setting, the advanced respiratory therapist evaluates, monitors and records patient's response to care. The therapist maintains patient records and communicates with other healthcare team members. The therapist initiates, conducts, and modifies prescribed therapeutic procedures to achieve the desired objectives. The therapist provides care in emergency settings, assists the physician and conducts pulmonary rehabilitation and home care.

A. Explain planned therapy and goals to patient in understandable terms to achieve optimal therapeutic outcome and protect patient from nosocomial infection.

1. Explain planned therapy and goals to patient in understandable terms to achieve optimal therapeutic outcome, counsel patient and family concerning smoking cessation, disease management education
2. Protect patient from nosocomial infection by adherence to infection control policies and procedures [e.g., universal/standard precautions, blood and body fluid precautions]

B. Evaluate, monitor and record patient's response to respiratory care.

1. Evaluate and monitor patient's response to respiratory care:
 - a. recommend and review a chest radiograph
 - b. interpret results of arterial, capillary, and mixed venous blood gas analysis
 - c. perform arterial puncture, capillary blood gas sampling, and venipuncture; obtain blood from arterial or pulmonary artery lines; perform transcutaneous O_2/CO_2 , pulse oximetry, co-oximetry, and capnography monitoring
 - d. observe changes in sputum production and consistency, note patient's subjective response to therapy and mechanical ventilation
 - e. measure and record vital signs, monitor cardiac rhythm, evaluate fluid balance (intake and output)
 - f. perform spirometry/determine vital capacity, measure lung compliance and airway resistance, interpret ventilator flow, volume and pressure waveforms, measure peak flow
 - g. determine and record central venous pressure, pulmonary artery pressures, pulmonary capillary wedge pressure and/or cardiac output
 - h. recommend measurement of electrolytes, hemoglobin, CBC and/or chemistries
 - i. monitor mean airway pressure, adjust and check alarm systems, measure tidal volume, respiratory rate, airway pressures, I:E, and maximum inspiratory pressure (MIP)
 - j. measure F_{IO_2} and/or liter flow
 - k. monitor endotracheal or tracheostomy tube cuff pressure
 - l. auscultate chest and interpret changes in breath sounds
 - m. perform hemodynamic calculations [e.g., shunt studies (\dot{Q}_s/\dot{Q}_t), cardiac output, cardiac index, pulmonary vascular resistance and systemic vascular resistance, stroke volume]
 - n. interpret hemodynamic calculations:
 - (1) calculate and interpret $P(A-a)O_2$, $C(a-\bar{v})O_2$, \dot{Q}_s/\dot{Q}_t
 - (2) cardiac output, cardiac index, pulmonary vascular resistance and systemic vascular resistance, stroke volume
 - o. interpret exhaled CO_2 monitoring, V_D/V_T
2. Maintain records and communication:
 - a. record therapy and results using conventional terminology as required in the healthcare setting and/or by regulatory agencies by noting and interpreting:
 - (1) specify therapy administered, date, time, frequency of therapy, medication, and ventilatory data
 - (2) patient's response to therapy including the effects of therapy, adverse reactions, patient's subjective and attitudinal response to therapy
 - (3) auscultatory findings, cough and sputum production and characteristics
 - (4) vital signs [e.g., heart rate and rhythm, respiratory rate, blood pressure, body temperature]
 - (5) pulse oximetry, capnography
 - b. verify computations and note erroneous data
 - c. communicate information regarding patient's clinical status to appropriate members of the healthcare team
 - d. communicate information relevant to coordinating patient care and discharge planning [e.g., scheduling, avoiding conflicts, sequencing of therapies]
 - e. apply computer technology to patient management [e.g., ventilator waveform analysis, electronic charting, patient care algorithms]
 - f. communicate results of therapy and alter therapy per protocol(s)

C. Conduct therapeutic procedures to maintain a patent airway, achieve adequate ventilation and oxygenation, and remove bronchopulmonary secretions.

1. Maintain a patent airway including the care of artificial airways:
 - a. insert oro- and nasopharyngeal airway, select endotracheal or tracheostomy tube, perform endotracheal intubation, change tracheostomy tube, maintain proper cuff inflation, position of endotracheal or tracheostomy tube
 - b. maintain adequate humidification
 - c. extubate the patient
 - d. properly position patient
 - e. identify endotracheal tube placement by available means

2. Remove bronchopulmonary secretions
 - a. perform postural drainage, perform percussion and/or vibration
 - b. suction endotracheal and tracheostomy tubes, perform nasotracheal or orotracheal suctioning, select closed system suction catheter
 - c. administer aerosol therapy, administer prescribed agents [e.g., bronchodilators, corticosteroids, saline, mucolytics]
 - d. instruct and encourage bronchopulmonary hygiene techniques [e.g., coughing techniques, autogenic drainage, positive expiratory pressure device (PEP), intrapulmonary percussive ventilation (IPV), Flutter®, High Frequency Chest Wall Oscillation (HFCWO)]
3. Achieve adequate spontaneous and artificial ventilation:
 - a. instruct in proper breathing techniques, instruct in inspiratory muscle training techniques, encourage deep breathing, instruct and monitor techniques of incentive spirometry
 - b. initiate and adjust IPPB therapy
 - c. select appropriate ventilator
 - d. initiate and adjust continuous mechanical ventilation when no settings are specified and when settings are specified [e.g., select appropriate tidal volume, rate, and/or minute ventilation]
 - e. initiate and select appropriate settings for high frequency ventilation
 - f. initiate nasal/mask ventilation, initiate and adjust external negative pressure ventilation [e.g., cuirass]
 - g. initiate and adjust ventilator modes [e.g., A/C, SIMV, pressure support ventilation (PSV), pressure control ventilation (PCV)]
 - h. initiate and adjust independent (differential) lung ventilation
 - i. administer prescribed bronchoactive agents [e.g., bronchodilators, corticosteroids, mucolytics]
 - j. institute and modify weaning procedures
4. Achieve adequate arterial and tissue oxygenation:
 - a. initiate and adjust CPAP, PEEP, and noninvasive positive pressure
 - b. initiate and adjust combinations of ventilatory techniques [e.g., SIMV, PEEP, PS, PCV]
 - c. position patient to minimize hypoxemia, administer oxygen (on or off ventilator), prevent procedure-associated hypoxemia [e.g., oxygenate before and after suctioning and equipment changes]

D. Make necessary modifications in therapeutic procedures based on patient response.

1. Terminate treatment based on patient's response to therapy being administered
2. Modify bronchial hygiene therapy [e.g., alter position of patient, alter duration of treatment and techniques, coordinate sequence of therapies, alter equipment used and PEP therapy]
3. Modify artificial airway management:
 - a. alter endotracheal or tracheostomy tube position, change endotracheal or tracheostomy tube
 - b. change type of humidification equipment
 - c. initiate suctioning
 - d. inflate and deflate the cuff
4. Modify incentive breathing devices [e.g., increase or decrease incentive goals]
5. Modify aerosol therapy:
 - a. modify patient breathing pattern
 - b. change type of equipment, change aerosol output
 - c. change dilution of medication, adjust temperature of the aerosol
6. Modify oxygen therapy:
 - a. change mode of administration, adjust flow, and $F_{I}O_2$
 - b. set up or change an O_2 blender
 - c. set up an O_2 concentrator or liquid O_2 system
7. Modify specialty gas [e.g., He/ O_2 , O_2 / CO_2] therapy [e.g., change mode of administration, adjust flow, adjust gas concentration]
8. Modify suctioning:
 - a. alter frequency and duration of suctioning
 - b. change size and type of catheter
 - c. alter negative pressure
 - d. instill irrigating solutions
9. Modify mechanical ventilation:
 - a. adjust ventilator settings [e.g., tidal volume, $F_{I}O_2$, inspiratory plateau, PEEP and CPAP levels, pressure support and pressure control levels, noninvasive positive pressure, alarm settings]
 - b. change patient breathing circuitry, change type of ventilator
 - c. measure volume loss through chest tube(s)
 - d. change mechanical dead space
10. Modify weaning procedures [e.g., SIMV, pressure support, T-piece trials]
11. Modify IPPB:
 - a. adjust sensitivity, flow, volume, pressure, $F_{I}O_2$
 - b. adjust expiratory retard
 - c. change patient – machine interface [e.g., mouthpiece, mask]

12. Recommend modifications in the respiratory care plan based on the patient response:
 - a. change F_iO_2 and O_2 flow
 - b. change mechanical dead space
 - c. use or change artificial airway [e.g., endotracheal tube, tracheostomy]
 - d. change ventilatory techniques [e.g., tidal volume, respiratory rate, ventilatory mode, inspiratory effort (sensitivity), PEEP/CPAP, mean airway pressure, pressure support, inverse ratio ventilation, noninvasive positive pressure]
 - e. wean or change weaning procedures and extubation
 - f. institute bronchopulmonary hygiene procedures [e.g., positive expiratory pressure (PEP), IS, intrapulmonary percussive ventilation (IPV), CPT]
 - g. modify treatments based on patient response [e.g., change duration of therapy, change position]
 - h. change aerosol drug dosage or concentration
 - i. insert chest tube
13. Recommend use of pharmacologic agents [e.g., antiinfectives, antiinflammatories, bronchodilators, cardiac agents, diuretics, mucolytics/proteolytics, narcotics, neuromuscular blockers, sedatives, surfactants, vasoactive agents]

E. Initiate, conduct, or modify respiratory care techniques in an emergency setting.

1. Treat cardiopulmonary collapse according to:
 - a. BCLS
 - b. ACLS
 - c. PALS
 - d. NRP
2. Treat tension pneumothorax
3. Participate in land/air patient transport

F. Assist physician, initiate and conduct pulmonary rehabilitation.

1. Act as an assistant to the physician performing special procedures including:
 - a. bronchoscopy
 - b. thoracentesis
 - c. transtracheal aspiration
 - d. tracheostomy
 - e. cardiopulmonary stress testing
 - f. percutaneous needle biopsies of the lung
 - g. sleep studies
 - h. cardioversion
 - i. intubation
 - j. insertion of chest tubes
 - k. insertion of lines for invasive monitoring [e.g., central venous pressure, pulmonary artery catheters, arterial lines]
 - l. conscious sedation
2. Initiate and conduct pulmonary rehabilitation and home care within the prescription:
 - a. monitor and maintain home respiratory care equipment, maintain apnea monitors
 - b. explain planned therapy and goals to patient in understandable terms to achieve optimal therapeutic outcome, counsel patient and family concerning smoking cessation, disease management
 - c. assure safety and infection control
 - d. modify respiratory care procedures for use in the home
 - e. implement and monitor graded exercise program
 - f. conduct patient education and disease management programs