

VIRTUAL VENTILATOR

GAME 7: FACULTY GUIDE

Estimated Time: 45 minutes



Scan to Begin



Patient Name: Collin P. Davis

SCENARIO OVERVIEW

In Game 7 of the **ARISE Virtual Ventilator Serious Game** series, students are guided through a “capstone” mechanical ventilator initiation and management experience. At the beginning of the game, students receive report about a COPD patient who needs BiPAP. After the patient is placed on BiPAP, ABG’s indicate the need to intubation and mechanical ventilation. Students choose settings and initiate the ARISE Virtual Ventilator. The next morning new ABG’s indicate the need for setting changes.

INSTRUCTIONS

There are six levels for students to complete in this serious game. See the **ARISE Virtual Ventilator Serious Game: Overview** and the **ARISE Virtual Ventilator Serious Game: Student Handout – Game 7** for detailed instructions.

LEARNING OBJECTIVES

1. Select correct mechanical ventilator settings for an adult patient according to NBRC standards.
2. Apply correct mechanical ventilator settings to the ARISE Virtual Ventilator according to NBRC standards.
3. Set patient specific mechanical ventilator alarms on the ARISE Virtual Ventilator according to NBRC standards.
4. Interpret Arterial Blood Gas results and select the correct mechanical ventilator setting changes according to NBRC standards
5. Apply correct mechanical ventilator setting changes to the ARISE Virtual Ventilator according to NBRC standards
6. Modify mechanical ventilator alarms on the ARISE Virtual Ventilator according to NBRC standards
7. Given patient ventilator parameters, calculate static compliance, dynamic compliance, airway resistance, and I:E ratio

CURRICULUM MAPPING

WTCS RESPIRATORY THERAPY PROGRAM OUTCOMES

- 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 standards³

RESPIRATORY LIFE SUPPORT

- Explain the general principles of mechanical ventilation
- Apply invasive mechanical ventilation
- Operate various ventilators
- Evaluate patient response to mechanical ventilation
- Correlate mechanical ventilation strategies to various disease states

RESPIRATORY DISEASE

- Interpret blood gas data

ANSWER KEY

The answers for each level of Game 7 are as follows:

- Level 1: Students must interpret the patient's Arterial Blood Gas by answering a multiple-choice question. Then, they must choose mechanical ventilator settings according to NBRC standards. Given the available patient information, the correct ranges are as follows:
 - Rate = 10 - 16 bpm
 - Tidal Volume = 450 – 605 ml
 - O₂ % = 50%
 - PEEP = 8 cmH₂O
 - (O₂ and PEEP are based on previous BiPAP settings)

- Level 2: Students must correctly enter their chosen settings on the ARISE Virtual Ventilator. If they enter settings within the ranges listed above, they will be correct.
 - Students may adjust Flow and I Time settings, but they are not connected to programming or checked against any parameters during the game.

- Level 3: Students must correctly enter patient appropriate ventilator alarms on the ARISE Virtual Ventilator according to NBRC standards. Given the ARISE Virtual Ventilator patient outputs, alarms should be set as follows:
 - Pressure alarm: Maximum = 29 – 36 cm H₂O and Minimum = 13 – 21 cm H₂O
 - Rate alarm: Maximum = 20 – 30 bpm and Minimum = 5 – 8 bpm
 - VE alarm: Maximum = 10– 15 lpm and Minimum = 2 – 7 lpm
 - Apnea alarm: < or = to 20 seconds
 - Note: Students may adjust Flow and I Time settings, but they are not connected to programming or checked against any parameters during the game.

In addition, students will interpret the patient's morning Arterial Blood Gas by answering a multiple-choice question.

- Level 4: Students must correctly choose mechanical ventilator setting changes by answering a multiple-choice question.

- Level 5: The Provider has ordered mechanical ventilator settings. Students must enter the ordered settings and adjust the alarms on the ARISE Virtual Ventilator. They must enter the EXACT settings as ordered. If they enter the exact setting changes AND change the alarm limits according to NBRC standards, they will be correct. New alarm limits are as follows:
 - Pressure alarm: Maximum = 32 – 40 cm H₂O and Minimum = 19 – 23 cm H₂O

- Rate alarm: Maximum = 30 – 38 bpm and Minimum = 16 – 22 bpm
 - VE alarm: Maximum = 17 – 21 lpm and Minimum = 4 – 10 lpm
 - Apnea alarm: < or = to 20 seconds
 - Note: Students may adjust Flow and I Time settings, but they are not connected to programming or checked against any parameters during the game.
- Level 6: Students must correctly calculate the Static Compliance, Dynamic Compliance, Airway Resistance, and I:E Ratio using a pre-filled ventilator flowsheet.
 - Static Compliance = 96.8 – 97.2 ml/cmH₂O
 - Dynamic Compliance = 35.7 – 36.2 ml/cmH₂O
 - Raw = 8.5 – 8.9 cmH₂O/L/sec
 - I:E ratio of set rate = 1:4.6 to 1:4.8

SCORING

The **ARISE Virtual Ventilator Serious Games** programming keeps track of how many attempts it takes a student to pass each level. The programming scores students based on the ratio of the number of remaining attempts to the total available attempts. If a student achieves 75% or greater, they have passed that serious game. However, a student can complete the game and not pass it. Thus, at the end of each serious game, a screen is displayed on the iPad with those results, a timestamp, and instructions on how to take a screenshot. Students can submit this screenshot to their instructor as “evidence” of completion. In addition, since this screenshot includes the number of failed attempts for each level, faculty can evaluate the data to determine if and where further instruction and/or practice is required. An example table is as follows:

Scorable Serious Game Levels	Failed Attempts
Level 1: Suggested Ventilator Settings	1
Level 2: Enter Ventilator Settings	0
Level 3: Set Ventilator Settings	2
Level 4: Perform Calculations	0
Total Score	9/12

SURVEY

Print this page and provide to students.

Students, please complete a brief (2-3 minute) survey regarding your experience with this ARISE simulation. There are two options:

1. Use QR Code: Survey
 - a. Note: You will need to download a QR Code reader/scanner onto your own device (smartphone or tablet). There are multiple free scanner apps available for both Android and Apple devices from the app store.
 - b. This QR Code will not work in the ARIS app.



2. Copy and paste the following survey link into your browser.
 - a. https://irevte.co1.qualtrics.com/SE/?SID=SV_6Mwfv98ShBfRnBX

CREDITS

Images purchased from Shutterstock.

REFERENCES

Persing, G. (2016). Respiratory Care Exam Review (4th ed.). St, Louis, Missouri: Elsevier.



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