VIRTUAL VENTILATOR

GAME 4: FACULTY GUIDE

Estimated Time: 30 minutes

Scan to Begin

Patient Name: Patrick Armstrong

SCENARIO OVERVIEW

In Game 4 of the **ARISE Virtual Ventilator Serious Game** series, students receive report about a 16-year-old asthmatic patient who was intubated yesterday during an exacerbation. He remains on mechanical ventilation and is in the ICU.

INSTRUCTIONS

There are four 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 4** for detailed instructions.

LEARNING OBJECTIVES

1. Interpret Arterial Blood Gas results and select the correct mechanical ventilator setting changes according to NBRC standards

2. Apply correct mechanical ventilator setting changes to the ARISE Virtual Ventilator according to NBRC standards

3. Modify mechanical ventilator alarms on the ARISE Virtual Ventilator according to NBRC standards

4. 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 standards

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 4 are as follows:

- Level 1: Students must interpret the patient's Arterial Blood Gas by answering a multiple-choice question. Then, they must choose ventilator setting changes according to NBRC standards. Given the available patient information, the correct answers are as follows:
  - Rate = 18 – 24 bpm (based on a desired PaCO2 of 35 – 45 mm Hg)

- o   Tidal Volume = 600 ml (This should not be changed as his max Vt = 625 ml.)
- o   O2 % = 40 – 55% (based on a desired PaO2 of 80 – 100 mm Hg)
- o   PEEP = 8 cmH2O (no change)

- Level 2: Students must correctly enter their chosen setting changes and adjust the alarms on the ARISE Virtual Ventilator. If they enter the setting changes within the ranges listed above AND change the alarm limits according to NBRC standards, they will be correct. New alarm limits are as follows:
  - o   Pressure alarm: Maximum = 34 – 40 cm H2O and Minimum = 15 – 25 cm H2O
  - o   Rate alarm: Maximum = 23 – 32 bpm and Minimum = 6 – 14 bpm
  - o   VE alarm: Maximum = 11 – 18 lpm and Minimum = 3 – 10 lpm
  - o   Apnea alarm: < or = to 20 seconds
  - o   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 3: Students must correctly calculate the Static Compliance, Dynamic Compliance, Airway Resistance, and I:E Ratio using a pre-filled ventilator flowsheet.
  - o   Static Compliance = 98.9 – 99.1 ml/cmH2O
  - o   Dynamic Compliance = 29.5 – 29.7 ml/cmH2O
  - o   Raw = 11.2 – 11.3 cmH2O/L/sec
  - o   I:E ratio of set rate = 1:5.6 to 1:5.8

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.

SURVEY

2. Copy and paste the following survey link into your browser.

    a. https://ircvtc.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.