Scenario 1: Adult Cardiac Arrest Case Flow Sheet

Instructional Goal

The goal of our interprofessional patient simulation is to provide third-year medical students and fourth-year nursing students with an opportunity to develop and practice both technical and non-technical skills required for effective management of an adult ventricular fibrillation cardiac arrest in the Emergency Department. This simulation aims to align with Society for Simulation in Healthcare and INACSL best practices and standards by promoting interprofessional teamwork and communication, effective use of available resources, accurate recognition of cardiac arrest, timely initiation of high-quality CPR, appropriate administration of medications and defibrillation, and optimal ventilation management.

Through this simulation, students will have the opportunity to identify and address common challenges encountered in cardiac arrest situations, practice appropriate prioritization and delegation of tasks, and develop positive team behaviors that will enable them to work collaboratively in high-stress situations. Ultimately, our goal is to prepare students to provide safe, effective, and patient-centered care in real-world clinical settings.

Simulation Objectives

1. To promote interprofessional teamwork and communication in the management of an adult ventricular fibrillation cardiac arrest in the Emergency Department.
2. To recognize the signs and symptoms of a cardiac arrest and initiate the appropriate interventions based on the American Heart Association guidelines.
3. To provide high-quality cardiopulmonary resuscitation (CPR) and defibrillation within the recommended time frames.
4. To administer appropriate medications, including epinephrine and amiodarone, as per the American Heart Association guidelines.
5. To manage the patient's airway and ventilation effectively.

Equipment and Supply List

1. Simulation manikin capable of displaying ECG rhythms, pulse, blood pressure, and other vital signs
2. Monitor/defibrillator with ECG leads and defibrillation pads
3. Bag-valve mask device with oxygen reservoir and appropriate-sized masks
4. Endotracheal intubation equipment including laryngoscope, endotracheal tube, and stylet
5. Suction catheter and suction device
6. IV catheters and fluids for resuscitation
7. Medications for ACLS protocol including epinephrine, amiodarone, atropine, and lidocaine
8. Code cart with appropriate medications and equipment
9. Crash cart with additional supplies and medications
10. Personal protective equipment (PPE) including gloves, masks, and gowns
11. Timer or stopwatch for timing interventions
12. Stethoscope for monitoring breath sounds and heart sounds
13. Tourniquet for IV access in difficult patients
14. Scalpel and equipment for surgical airway access

It is important to note that the equipment and supply list may vary depending on the specific requirements of the scenario and the available resources. The team should ensure that all equipment and supplies are in good working order and readily available before beginning the simulation.

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Manikin/Simulator Selection

There are many different adult patient simulators available, each with their own strengths and limitations. Here are five adult patient simulators that may be suitable for the scenario described:

1. Laerdal SimMan ALS: This simulator is designed specifically for advanced life support training, and includes a wide range of realistic features such as airway management, ECG monitoring, and defibrillation capabilities
2. Gaumard HAL S3201: This simulator is a versatile high-fidelity manikin with realistic airway and vascular features, as well as the ability to simulate a wide range of cardiac rhythms.
3. CAE Healthcare METIman: This simulator is designed to be highly realistic, with a range of anatomical features including palpable pulses, realistic chest rise and fall, and the ability to simulate a variety of medical conditions.
4. Simulaids STAT Simulator: This simulator is designed specifically for emergency care training, and includes realistic features such as pulse points, breath sounds, and ECG monitoring.
5. 3B Scientific Emergency Care Manikin: This simulator is designed to be affordable and easy to use, while still offering realistic features such as realistic airway management, IV access, and ECG monitoring.

When selecting a simulator, it is important to consider factors such as the cost, the level of realism and functionality required, and the specific learning objectives of the simulation scenario.

Reference List

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Simulation Case and Flow (Part 1)

Mr. Johnson, a 62-year-old male with a history of hypertension and hyperlipidemia, presents to the Emergency Department with sudden onset chest pain, shortness of breath, and diaphoresis. While waiting in the triage area, Mr. Johnson experiences a sudden collapse, and his wife calls for help. The code team is activated, and the third-year medical students and fourth-year nursing students are assigned to manage the cardiac arrest together.

Simulation Scenario:
The simulation starts with a briefing on the patient's background and presenting symptoms. The code team is expected to work together to manage the cardiac arrest, with the medical students leading the resuscitation efforts, and the nursing students managing the patient's airway and ventilation.

As the team approaches the patient, they find Mr. Johnson unresponsive, pulseless, and not breathing. The team must quickly recognize the signs of cardiac arrest and initiate the appropriate interventions based on the American Heart Association guidelines. The medical students should lead the resuscitation efforts and provide high-quality CPR, while the nursing students manage the patient's airway and provide ventilations.

During the resuscitation, the team must administer appropriate medications, including epinephrine and amiodarone, as per the American Heart Association guidelines. The team should also be prepared to provide defibrillation within the recommended time frames.

Throughout the simulation, the team should focus on effective communication, teamwork, and task delegation. The nursing students should provide updates on the patient's vital signs and communicate any changes to the medical students. The medical students should delegate tasks and provide clear instructions to the nursing students.

The simulation ends once the patient is successfully resuscitated or declared dead.

Conclusion:
This simulation aims to provide an opportunity for third-year medical students and fourth-year nursing students to work together in the management of an adult ventricular fibrillation cardiac arrest in the Emergency Department. The simulation follows the American Heart Association guidelines and promotes interprofessional teamwork and communication, effective use of available resources, accurate recognition of cardiac arrest, timely initiation of high-quality CPR, appropriate administration of medications and defibrillation, and optimal ventilation management. Through this simulation, students will develop positive team behaviors and gain the necessary skills to provide safe, effective, and patient-centered care in real-world clinical settings.

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Simulation Case and Flow (Part 2)

Before the interventions:

- The manikin would be unresponsive, pulseless, and not breathing.
- The monitor would show ventricular fibrillation with a flat-line ECG trace.

After each intervention:

- After the first cycle of CPR and defibrillation, there may not be any significant change in the manikin state or vital signs.
- After the second cycle of CPR and defibrillation, the team may start to see some signs of ROSC, such as an increase in end-tidal carbon dioxide (ETCO2) levels and a palpable pulse.
- After the third cycle of CPR and defibrillation, the team should aim for ROSC. If successful, the manikin's pulse should be palpable, and the monitor would show a return of organized electrical activity on the ECG trace.
- After ROSC, the team should continue to monitor the patient's vital signs, manage their airway and ventilation, and administer appropriate medications as necessary.

After ROSC, the team should continue to monitor the patient's vital signs closely. Specific vital signs that should be assessed and documented include:

1. Pulse: The patient should have a palpable pulse, and the pulse rate should be within normal limits for an adult (60-100 beats per minute).
2. Blood pressure: The patient's blood pressure should be measured and recorded. The normal range for blood pressure in adults is typically 90/60 mmHg to 120/80 mmHg, but the target blood pressure after cardiac arrest may vary depending on the patient's condition.
3. Respiratory rate: The patient's respiratory rate should be monitored, and the team should ensure that the patient is breathing effectively and receiving adequate oxygenation.
4. Oxygen saturation: The patient's oxygen saturation levels should be monitored and maintained within the target range (usually > 94%).
5. End-tidal carbon dioxide (ETCO2) levels: ETCO2 levels should be monitored to assess the effectiveness of ventilation and to confirm the presence of adequate blood flow.
6. Level of consciousness: The patient's level of consciousness should be assessed regularly. The team should look for signs of neurological recovery, such as the return of purposeful movements or responsiveness to stimuli.

Overall, the goal is to maintain stable vital signs and ensure the patient is receiving appropriate supportive care while determining the underlying cause of the cardiac arrest and initiating any necessary interventions.

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Medication Administration

The doses for the medications used in this case according to American Heart Association guidelines are as follows:

1. Epinephrine: The recommended dose of epinephrine for the treatment of cardiac arrest is 1 mg IV/IO every 3-5 minutes. The dose can be repeated as needed.
2. Amiodarone: The recommended dose of amiodarone for the treatment of ventricular fibrillation is 300 mg IV/IO push, followed by a second dose of 150 mg IV/IO if necessary.
3. Atropine: Atropine is not routinely recommended for the treatment of cardiac arrest, but may be used in certain situations such as bradycardia or asystole. The recommended dose of atropine is 0.5 mg IV/IO every 3-5 minutes, with a maximum total dose of 3 mg.
4. Lidocaine: Lidocaine is an alternative medication to amiodarone for the treatment of ventricular fibrillation or pulseless ventricular tachycardia. The recommended dose of lidocaine is 1- 1.5 mg/kg IV/IO bolus, with additional doses of 0.5-0.75 mg/kg every 5-10 minutes, up to a maximum dose of 3 mg/kg.

It is important to note that medication doses may vary depending on the specific situation and patient characteristics, and should be administered according to the provider's clinical judgment and the specific guidelines of their institution.

Components of High-Quality CPR

Effective CPR (cardiopulmonary resuscitation) is crucial in managing adult ventricular fibrillation cardiac arrest. Here are the components of effective CPR for the patient in this case, based on the American Heart Association guidelines:

1. Early recognition of cardiac arrest: The first step in effective CPR is recognizing the signs of cardiac arrest, such as the absence of breathing, pulse, or consciousness.
2. Call for help: Activate the emergency response system and call for help to ensure that additional resources and support are available.
3. Chest compressions: Begin high-quality chest compressions by placing the heel of one hand on the center of the patient's chest and the other hand on top of the first hand. Compress the chest to a depth of at least 2 inches (5 cm) at a rate of 100-120 compressions per minute.
4. Airway management: Open the patient's airway by tilting the head back and lifting the chin. Use a bag-mask device or advanced airway, such as an endotracheal tube or supraglottic airway, to provide ventilation.
5. Defibrillation: Administer defibrillation using an automated external defibrillator (AED) or manual defibrillator as soon as possible. The initial shock should be delivered at 120-200 joules.
6. Medications: Administer medications, such as epinephrine and amiodarone, as indicated based on the patient's clinical condition.
7. Continuous monitoring and quality assurance: Monitor the patient's vital signs, including blood pressure, pulse, and oxygen saturation, continuously during CPR. Regularly assess the quality of chest compressions and adjust as needed.

By following these components of effective CPR, healthcare providers can improve the patient's chances of survival and successful return of spontaneous circulation (ROSC).

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Team Roles (Medical Student/Physician)

The physician's role in this simulation would be to provide medical oversight and guidance for the management of the cardiac arrest. They would be responsible for:

1. Assessing the patient's condition: The physician would be responsible for assessing the patient's condition and making treatment decisions based on their medical expertise and knowledge of best practices for managing cardiac arrest.
2. Directing the team: The physician would be responsible for directing the interprofessional team in the management of the cardiac arrest. This would involve assigning roles to team members, making decisions about interventions, and communicating with the team to ensure coordinated care.
3. Administering medications: The physician would be responsible for prescribing and administering medications as appropriate. They would need to be familiar with the appropriate doses, routes of administration, and potential side effects of each medication.
4. Performing interventions: The physician may be responsible for performing interventions such as intubation, advanced airway management, and other advanced procedures if required.
5. Documenting care: The physician would be responsible for accurately documenting the care provided to the patient, including medications administered, interventions performed, and the patient's response to treatment.

Overall, the physician's role would be to provide medical leadership and ensure that the patient is receiving appropriate care based on best practices and guidelines for managing cardiac arrest. They would need to work closely with the interprofessional team, demonstrating positive teamwork behaviors and effective communication to optimize the patient's chances of survival.

Team Roles (Nursing Student/Nurse)

The nurses in this simulation would play a crucial role in managing the cardiac arrest and providing high-quality care to the patient. The specific roles of the nurses may vary depending on the learning objectives and simulation design, but in general, the nurses would be responsible for:

1. Assessing the patient's condition: The nurses would be responsible for monitoring the patient's vital signs and assessing their response to interventions. They would also be responsible for recognizing changes in the patient's condition and communicating this information to the rest of the team.
2. Administering medications: The nurses would be responsible for preparing and administering medications as prescribed by the medical provider. They would need to be familiar with the appropriate doses, routes of administration, and potential side effects of each medication.
3. Assisting with interventions: The nurses would be responsible for assisting with interventions such as defibrillation, CPR, and airway management. They would need to be familiar with the proper techniques for these interventions and be able to perform them effectively.
4. Documenting care: The nurses would be responsible for accurately documenting the care provided to the patient, including medications administered, interventions performed, and the patient's response to treatment.
5. Communicating with the team: The nurses would be responsible for communicating with the rest of the interprofessional team, providing updates on the patient's condition, and coordinating care.

Overall, the nurses would play a critical role in ensuring the effective and efficient management of the cardiac arrest and optimizing the patient's chances of survival. They would need to work closely with the medical and other team members to provide coordinated care and demonstrate positive teamwork behaviors.

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Debriefing Guide (Part 1)

Debriefing is a critical component of simulation-based education as it allows learners to reflect on their performance, identify areas for improvement, and develop strategies for enhancing their skills and knowledge. Here is a debriefing guide that follows the best practices and standards of the Society for Simulation in Healthcare (SSH) and the International Nursing Association for Clinical Simulation and Learning (INACSL):

Debriefing Guide:

1. Introduction and orientation: a. Welcome the participants and provide an overview of the simulation session. b. Review the learning objectives and goals of the simulation. c. Explain the debriefing process and ground rules, including the need for confidentiality and non-judgmental feedback.
2. Participant reactions: a. Ask participants to reflect on their emotional reactions during the simulation. b. Discuss any challenges or surprises they encountered. c. Encourage participants to share their experiences with the group.
3. Description of events: a. Recap the events of the simulation, including the actions taken by each team member. b. Highlight the positive aspects of the team's performance. c. Identify areas for improvement.
4. Analysis of performance: a. Ask participants to reflect on their own performance and that of the team as a whole. b. Discuss the effectiveness of communication and teamwork. c. Identify factors that contributed to successes and challenges.
5. Identification of strengths and areas for improvement: a. Ask participants to identify their individual strengths and areas for improvement. b. Discuss strategies for enhancing individual and team performance. c. Identify specific actions that can be taken to address areas for improvement.
6. Generalization: a. Ask participants to reflect on how they can apply what they learned during the simulation to their clinical practice. b. Discuss the importance of interprofessional collaboration and communication in clinical practice. c. Encourage participants to share their thoughts and experiences with the group.
7. Conclusion: a. Summarize the key points discussed during the debriefing. b. Thank the participants for their participation and contributions. c. Encourage participants to continue learning and practicing the skills and knowledge gained during the simulation.

By following these debriefing points, learners can effectively reflect on their performance, identify areas for improvement, and develop strategies for enhancing their skills and knowledge.

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Debriefing Guide (Part 2)

Participants in this interprofessional simulation case may face several challenges, including:

1. Time pressure: In real-life cardiac arrest situations, time is critical, and the same pressure will be present in the simulation. Participants will need to act quickly and efficiently to manage the patient's care within the appropriate time frames for each intervention.
2. Communication: Communication is key in interprofessional healthcare teams, and effective communication is essential for successful resuscitation. Participants must communicate effectively to ensure that everyone is aware of the patient's condition and what interventions have been performed.
3. Technical skills: Technical skills, such as performing chest compressions, defibrillation, and medication administration, require practice and skill. Participants will need to perform these skills effectively and efficiently to provide the patient with the best chance of survival.
4. Emotional stress: Dealing with a cardiac arrest situation can be stressful and emotional for participants, particularly for those who have not experienced such a situation before. Participants must learn to manage their emotions and work as a team to provide the best care for the patient.
5. Interprofessional teamwork: Interprofessional teamwork requires participants to work together effectively, communicate openly, and respect each other's roles and expertise. Participants must understand and value each other's roles and work together to provide optimal patient care.

Overall, participants in this simulation case will need to navigate the challenges of time pressure, communication, technical skills, emotional stress, and interprofessional teamwork to provide optimal care for the patient.