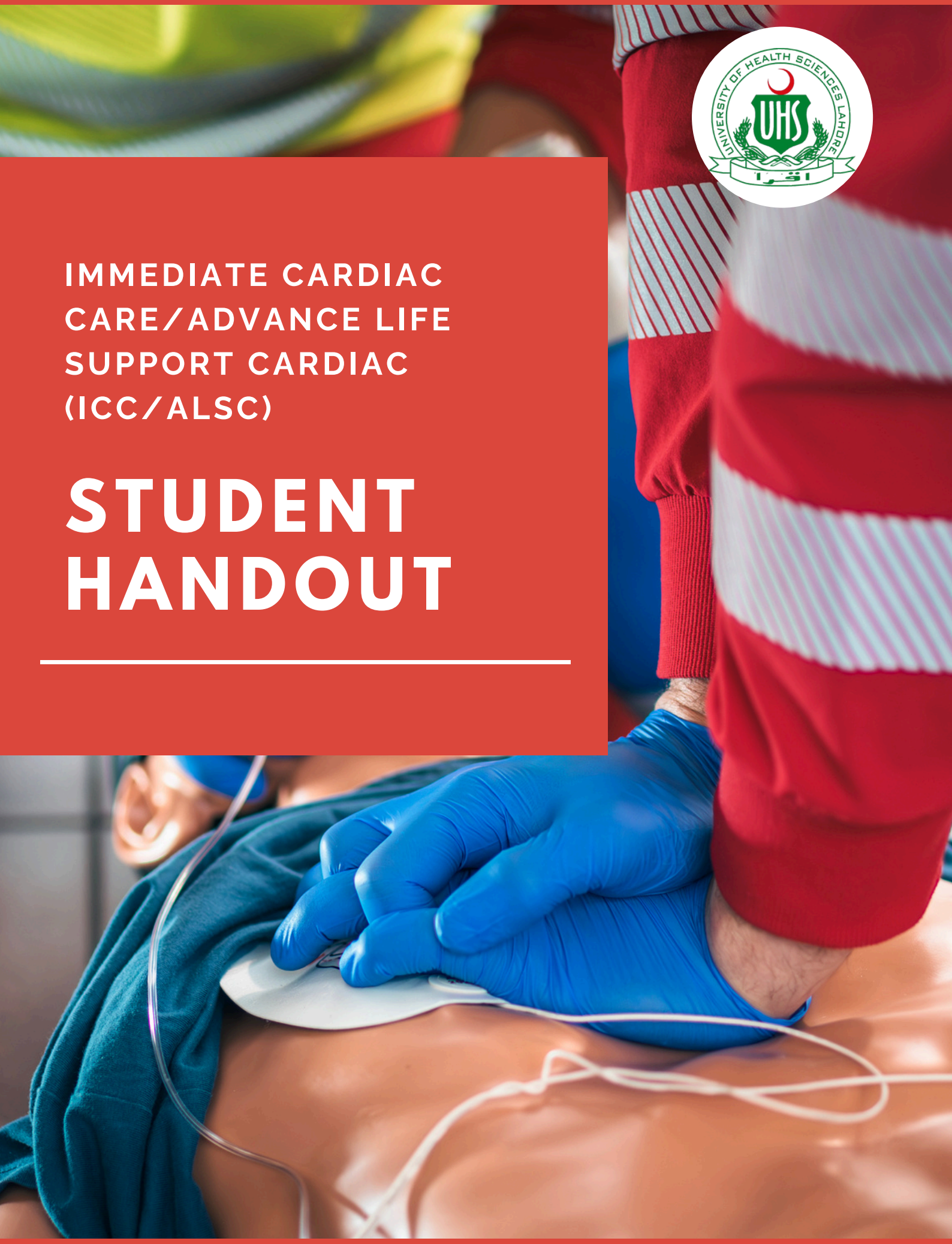

IMMEDIATE CARDIAC CARE/ADVANCE LIFE SUPPORT CARDIAC (ICC/ALSC)

STUDENT HANDOUT

PROFESSIONAL SKILL DEVELOPMENT CENTRE
UNIVERSITY OF HEALTH SCIENCES LAHORE

IMMEDIATE CARDIAC CARE/ADVANCE LIFE SUPPORT CARDIAC (ICC/ALSC) CURRICULUM

2025

STUDENTS HAND OUT

UNIVERSITY OF HEALTH SCIENCES LAHORE

Introduction:

Immediate Cardiac Care/ advance life support cardiac (ICC/ALSC) is a set of advanced, life-saving medical procedures and techniques used to treat life-threatening cardiovascular emergencies, such as cardiac arrest, stroke, and other conditions. It builds upon Cardiac First response/Basic Life Support training and involves interventions like defibrillation, advanced airway management, and medication administration. Training in ICC/ALSC aims to improve the chances of survival for patients experiencing these critical events.

Learning Outcomes of the Course

i. Recognize and manage cardiac arrest and peri-arrest conditions.
ii. Demonstrate high-quality CPR and effective team dynamics.
iii. Apply immediate cardiac care algorithms in simulated cardiac emergency scenarios.
iv. Manage **airways**, use **defibrillators**, and administer medications during high-pressure situations.
v. Function effectively as both team leader and team member during ICC events.

Learning Objectives

i. Identify signs and rhythms of cardiac arrest, bradycardia, and tachycardia.
ii. Execute ICC interventions, including defibrillation, pacing, and medication administration.
iii. Interpret ECG rhythms relevant to ICC protocols.
iv. Communicate clearly and perform under pressure in a team-based resuscitation scenario.

Module One: Introduction and Overview

i. Define ICC and its importance in managing cardiac arrest and other cardiovascular emergencies.
ICC (Immediate Cardiac Care/Advanced Life Support Cardiac) is a set of advanced interventions to treat life-threatening cardiovascular events like cardiac arrest and stroke. It improves survival rates by implementing defibrillation, airway management, and medications in critical situations.

ii. Identify the key components of ICC & Understand the ICC algorithm and its application in various clinical scenarios.
Key components of ICC include defibrillation, airway management, and medication administration, guided by an evidence-based algorithm. The ICC algorithm helps determine treatment based on the patient's rhythm (shockable vs. non-shockable) and response to resuscitation.

iii. Learn about the ICC treatment sequence and decision-making process.
The ICC treatment sequence includes activating emergency response, performing high-quality CPR, rhythm checks, defibrillation, and drug administration. Decision-making involves adjusting treatment based on patient response and clinical findings such as rhythm and vitals.

iv. Recognize the roles and responsibilities of team members during an ICC response.
The team leader oversees the response, while other members handle chest compressions, airway management, medication delivery, and defibrillation. Clear communication and coordination are vital for effective resuscitation and patient stabilization.

Airway Management

Airway Assessment and Management

- **Bag-Mask Ventilation:** Used for initial airway management, providing positive pressure ventilation to maintain oxygenation in unconscious patients.
- **Endotracheal Intubation:** Insertion of an endotracheal tube to secure the airway in unconscious patients, confirmed with capnography to ensure proper placement.
- **Supraglottic Airway Devices:** Used when intubation is not feasible, providing an alternative for airway control and ventilation.

Advanced Techniques

- **Oropharyngeal and Nasopharyngeal Airway Insertion:** These devices are inserted to provide a clear airway for ventilation, especially in unconscious patients.
- **Endotracheal Tube Placement and Verification:** Endotracheal tube placement is confirmed using capnography to verify correct positioning and ensure effective ventilation.

High-Quality CPR and CFR Review

High-Quality CPR

i. **Chest Compression Technique**
   - **Depth:** Compressions should be at least 2 inches deep in adults to ensure adequate circulation.
   - **Rate:** Perform 100-120 compressions per minute, maintaining an appropriate rhythm for effective circulation.
   - **Full Recoil:** Allow full chest recoil between compressions to enhance venous return and improve circulation.

ii. **Effective Ventilation**

Bag-Mask Technique: Use a bag-mask device to deliver adequate ventilation at a rate of 10-12 breaths per minute, ensuring oxygenation without interrupting compressions.

iii. **Minimize Interruptions**

Hands-Off Time: Aim to minimize interruptions in chest compressions, limiting hands-off time to no more than 10 seconds for optimal circulation.

iv. **Feedback Devices**

CPR Feedback: Use devices to monitor and provide feedback on compression depth, rate, and recoil, ensuring CPR is performed at optimal levels.

Advanced Resuscitation Techniques:

1. Recognizing Cardiac Arrest

- **Activate Emergency Response:** Immediately activate the emergency response system to alert medical personnel and initiate life-saving interventions for the patient.

2. Performing Advanced CPR

- **Advanced CPR:** Perform chest compressions, provide rescue breaths, and use an AED (Automated External Defibrillator) to deliver shocks when necessary to restore normal heart rhythm.

3. Foreign-Body Airway Obstruction

- **Relieving Obstruction:** Demonstrate techniques like the back blows or abdominal thrusts to remove foreign-body obstructions and restore airflow to the lungs.

Pharmacology and Detailed Drug Protocols

1. Pharmacological Agents

- **Vasopressors:** Medications like **Epinephrine** are used to increase heart rate and blood pressure during cardiac arrest, aiding in the restoration of circulation.
- **Antiarrhythmics: Amiodarone** and **Lidocaine** are used to treat life-threatening arrhythmias such as ventricular fibrillation (VF) and pulseless ventricular tachycardia (pVT).
- **Other Medications: Atropine** is used for bradycardia, and **Magnesium Sulfate** is used for conditions like Torsades de Pointes.

2. Indications and Contraindications

- **Indications and Contraindications:** Recognize when medications are appropriate, such as vasopressors for cardiac arrest, and when they are contraindicated, like using **Lidocaine** in patients with allergies.
- **Role in Algorithms:** Medications play a crucial role in ICC protocols, enhancing survival rates by managing arrhythmias and supporting circulation as part of the overall treatment sequence.

3. Drug Protocols and Dosages

- **VF/VT Management:**
    - **Epinephrine:** Administer 1 mg IV/IO every 3-5 minutes after the second shock.
    - **Amiodarone:** Initial dose of 300 mg IV/IO, followed by 150 mg if needed.
    - **Lidocaine:** Administer 1-1.5 mg/kg IV/IO as an alternative to Amiodarone.
- **Torsades de Pointes:** Magnesium Sulfate 2 g IV/IO for treatment.
- **Tricyclic Antidepressant Toxicity:** Sodium Bicarbonate 8.4% 50 mL IV for toxicity management.

Skills:

1. **Medication Administration**:
    a. Properly **calculate and administer** drug dosages and time of administration.
    b. Use **medications** based on **ACLS protocols** for treating **VF/VT**, **PEA**, **asystole**, and **Torsades de Pointes**.
    c. **Recognize** when certain medications should not be used (e.g., adverse reactions).

Emergency Conditions (H's and T's) and Management of Myocardial Infarction (MI)

1. Tension Pneumothorax

- **Definition:** Tension pneumothorax occurs when air enters the pleural space but cannot escape, leading to increased pressure on the lung and surrounding structures, causing respiratory distress, hypotension, and distended neck veins.
- **Treatment:** Immediate needle decompression is performed to relieve the pressure, typically using a 14-16 gauge needle inserted into the second intercostal space at the midclavicular line. If the condition persists, a chest tube is placed for continuous drainage of air.

2. Cardiac Tamponade

- **Definition:** Cardiac tamponade occurs when fluid accumulates in the pericardial sac, restricting the heart's ability to pump blood effectively, which results in symptoms like hypotension, jugular venous distension, and muffled heart sounds.
- **Treatment:** The primary treatment is **pericardiocentesis**, a procedure where a needle is inserted into the pericardial sac to drain the accumulated fluid, relieving pressure on the heart and restoring normal cardiac function.

3. Thrombosis (Pulmonary/Coronary)

- **Definition:** Thrombosis refers to the formation of blood clots (thrombi) that obstruct blood flow in vessels. Pulmonary thrombosis occurs in the lungs (e.g., pulmonary embolism), and coronary thrombosis affects the heart's blood vessels (e.g., myocardial infarction).
- **Treatment:** Treatment includes **thrombolytic agents** such as tissue plasminogen activator (tPA) or urokinase, which dissolve the clot. In some cases, **surgical interventions** like thrombectomy or catheter-directed therapy may be necessary for large or persistent clots.

4. Management of Myocardial Infarction (MI)

- **STEMI Protocol:**
    - **Definition:** STEMI (ST-segment Elevation Myocardial Infarction) is a severe form of heart attack caused by complete blockage of a coronary artery.
    - **Treatment:** Early administration of **aspirin** and **clopidogrel** helps to inhibit platelet aggregation. **Thrombolytics** like alteplase are used if PCI (percutaneous coronary intervention) is not immediately available. **PCI** (e.g., balloon angioplasty) is preferred when available to reopen the blocked artery and restore blood flow.
- **NSTEMI Protocol:**
    - **Definition:** NSTEMI (Non-ST-segment Elevation Myocardial Infarction) involves partial blockage of a coronary artery, leading to a less severe but still dangerous heart attack.
    - **Treatment: Heparin** is administered to prevent further clotting. **Anti-platelet agents** such as aspirin and clopidogrel are used, along with **urgent coronary angiography** to assess the blockage and decide on further interventions like stent placement or medical management.

Post-Resuscitation Care

1. Oxygen Therapy

- **Definition:** Oxygen therapy aims to maintain adequate oxygen levels in the blood to ensure sufficient oxygenation of tissues, particularly after a cardiac arrest or critical illness.
- **Target:** Oxygen saturation should be maintained between **94-98%** using supplemental oxygen to avoid hypoxia (low oxygen levels) or hyperoxia (excessive oxygen levels), both of which can cause harm to the tissues.

2. Patient Monitoring

- **Continuous Monitoring:** Continuous monitoring of vital signs, including **ECG** (for heart rhythms), **blood pressure**, **blood glucose**, and other vital signs (e.g., respiratory rate, oxygen saturation) is essential during post-cardiac arrest care.
- **Purpose:** It helps detect early changes in the patient's condition, ensuring prompt interventions to stabilize the patient and prevent further complications.

3. Temperature Management

- **Active Cooling:** To reduce the risk of neurological damage, **cold saline IV fluids** (500 mL at 4°C) or **cold packs** are used for **active cooling** to lower the body temperature.
- **Target Temperature: Normothermia** (36–37°C) or **mild hypothermia** (32–34°C) is targeted to reduce brain injury, especially in cases of **post-cardiac arrest syndrome**, by minimizing cerebral ischemia and inflammation.

4. Medication

- **Addressing Hypotension: Normal saline (NaCl) IV/IO** is used to treat hypotension (low blood pressure), ensuring adequate blood flow to vital organs.
- **Managing Symptomatic Bradycardia: Atropine** is administered to manage **symptomatic bradycardia** (slow heart rate), improving heart rate and cardiac output during resuscitation.

5. Neurological Protection

- **Cerebral Ischemia Minimization:** After a cardiac arrest, **neurological protection** focuses on reducing **cerebral ischemia** (lack of oxygen to the brain) by managing body temperature and maintaining optimal perfusion.
- **Early Neurological Assessment:** An early neurological assessment is essential to evaluate for **potential brain injury**, using tools like the Glasgow Coma Scale (GCS) and neuroimaging to guide further management.

Mega Code Simulation (Team Scenarios)

1. Team Dynamics and Communication

- **Effective Communication & Teamwork:** In high-pressure situations, communication must be clear and efficient, with team members understanding their roles and responsibilities to ensure smooth operations during ICC events.
- **Closed-Loop Communication:** Using closed-loop communication ensures that instructions are acknowledged and understood, improving coordination and reducing errors during resuscitation.

2. Clinical Decision-Making

- **Apply ICC Algorithms:** Clinical decision-making during emergencies involves applying ICC protocols and algorithms to diagnose and treat conditions, ensuring consistency in patient care.
- **Timely Decisions:** In high-stress situations, timely and effective decisions are crucial to managing critical conditions, including integrating ECG findings and clinical assessments to guide treatment.

3. Simulation-Based Learning

- **Apply Knowledge in Simulated Environments:** Simulated clinical scenarios allow learners to apply theoretical knowledge in practice, while feedback and debriefing help refine performance and improve skills for real-world situations.

4. Team Leadership and Followership

- **Demonstrating Leadership Skills:** Leadership in high-pressure situations involves clear communication, decisive action, and the ability to guide the team through complex scenarios while maintaining efficiency and focus.

5. Debriefing and Reflection

- **Debriefing Sessions:** Participating in debriefing sessions helps to identify strengths, weaknesses, and areas for improvement in both individual and team performance, contributing to continuous learning.
- **Reflection on Performance:** Reflecting on both individual and team performance after ICC scenarios allows for recognizing successful strategies and areas that require further practice or adjustment.

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