

# Anesthesiology Module for Competency Based, Integrated Modular Undergraduate Medical Curriculum in Ethiopia

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## 1. Background and Aim

Anesthesiology has gradually become one of the largest specialty in medicine [1]. The specialty of anaesthesiology has grown, and separate branches of critical care and pain management have flourished; and perioperative medicine has defined itself as a new focus for anaesthesia in many areas of the world [1,2]. Times have changed in medical education too. Curricula are focusing less on acquisition of knowledge and instead on achieving competencies to equip students for work in complex clinical settings. Couple of years ago, Competency-based medical education (CBME) has been adopted as an evidence-guided alternative to the traditional/conventional medical education in Ethiopia [3]. The need to change the existing medical education curriculum has been felt due to the current complex systems of patient care. The aim of CBME is to build physicians having capability to cope with the evolving health-care needs, and to enhance patient care. The concept of integrated curriculum has been introduced with a vision to integrate clinical training into knowledge skeleton from the inception among medical students. This involves linking theoretical teaching in basic sciences with early training in basic clinical skills such as communication, case history taking, and physical examination. The most important aspects of anesthesiology rotation will be learning and practicing basic life saving skills like airway and circulation managements. Anesthesiology forms part of the undergraduate curriculum in many countries. However, the extent to which the various clinical topics will be covered, and the duration of attachments were not specified are left to individual medical schools to determine. Therefore Anesthesiology rotation is quite variable and inconsistent. A Canadian study investigated the contributions made by the specialty to pre-clinical medical education and found that, although it had increased in the previous 15 years, this was not in proportion to the growth in anaesthesia faculty [4].

In the module of Anaesthesiology, fourteen topics including 14 competencies are to be taught over a total period of four weeks in

the form of nine interactive lectures with clinical attachments and five self-directed skill lab sessions. These include introduction to anesthesia and anaesthesiology as a speciality, acute and chronic pain management, preoperative evaluation and optimization of surgical patients, fluid and electrolyte disturbances, general anaesthesia, regional anaesthesia, post-anaesthesia recovery and common post anesthesia complications, intensive care management and mechanical ventilation, fluids, transfusion and patient safety and procedural sedation and from skill lab sessions includes cardiopulmonary resuscitation, airway managements, peripheral IV cannulation, ECG/EKG and ABG interpretation.

The author conducted telephone interviews with anaesthesiology educators at medical schools in Ethiopia. The respondents were largely Anaesthesiologists. They perceived problems with 'ownership' of course content with other discipline (possible overlap with surgery and emergency medicine), lack of formal structured anaesthesiology module at national level like other departments. They also feel that Anaesthesiology as a medical speciality was ignored as a subject in under graduate medical education in Ethiopia.

Therefore the general aim of this study was to design and implement a structured and formal anesthesiology, critical care and pain medicine module for undergraduate medical curriculum in Ethiopia. To do so, review of the published literature and standard text books and educational experiences via telephone interviews from different anesthesia educators at medical schools in Ethiopia were conducted. The author strongly believes this document as a curriculum framework is intended as a guide for students for learning and teachers for teaching. In this literature review, the first two section is devoted to (1) general and educational anesthesiology module objectives for under graduate medical students, There follows (2) outlines of course syllabus, study and teaching guide, finally (3) Anesthesiology skills lab sessions.

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## 2. General Module Objectives

As part of the training of medicine in anesthesiology, critical care and pain medicine, essential non-technical skills could be identified including leadership, teamwork, effective communication, professionalism and decision-making. To integrate basic, clinical sciences and non-technical skills, four to six weeks rotation is needed for clerkship medical students. Uses simulation sessions, problem based learnings, lectures, interactive small groups, seminars, and clinical attachments in operating room, pain clinics, ICU and PACU to introduce anesthesiology and critical care medicine to medical students as they relate to their routine practices for doctors of the future.

### 2.1. Goals

Upon completion of this Anesthesiology clinical Clerkship Rotation, medical students will understand how to assess surgical patients prior to anesthesia and try optimize and approach critically ill patients. They will demonstrate competencies in basic airway management, resuscitations, venous cannulation, ECG/ABG interpretation and will be able to discuss pain management, procedural sedation and basic ventilator management.

### 2.2. General Competencies

Clerkship medical student will be able to:

1. Develop an approach to acute and chronic pain management.
2. Develop an approach to acute resuscitation, including appropriate fluid therapy and blood transfusion.
3. Demonstrate cardio-pulmonary resuscitation.
4. Understand and explain the risks and benefits associated with regional versus general anesthesia.
5. Develop a plan for Common Post Anesthesia complications.
6. Demonstrate competency in basic airway management.
7. Gain clinical skills and deeper understanding about procedural sedation
8. Demonstrate peripheral IV line cannulation.
9. Demonstrate ECG/EKG and ABG interpretations
10. Describe and practice indication for mechanical ventilation and frequently used ventilator settings and monitoring for alarms, waveforms and troubleshooting during mechanical ventilation.
11. Approach and manage critically ill patients.
12. Demonstrate the ability to assess surgical patients prior to anesthesia and try to initiate appropriate optimization strategies.
13. Interpret and utilize data obtained from patient monitoring modalities.
14. Describe documentation and medico-legal aspects of anesthesia.

### 2.3. Communicator/Doctor-Patient Relationship

Clerkship medical student will be able to: Communicate effectively and empathetically with patients and their families, and recognize their level of anxiety.

1. Communicate their level of training and involvement in patient care.
2. Communicate risk with high risk patients and their families.
2. Use appropriate verbal, nonverbal, and written communications

in health care delivery.

3. Communicate effectively with the perioperative, ICU, pain clinic, PACU teams.
4. Present a complete preoperative assessment in a clear and concise manner.

### 2.4. Collaborator

Clerkship medical student will be able to:

1. Establish and maintain effective working relationships with colleagues and health care professionals.
2. Consult effectively with physicians and other health care professionals.
3. Participate effectively on health care teams, like anesthesiologists, ward & OPD teams, and Cardiac Arrest and/or ICU Teams.
4. Understand the high level of collaboration (Anesthesiology, surgery, nursing, pharmacy) required for the effective management of the patient in the perioperative period.

### 2.5. Leader

Clerkship medical student will be able to:

1. Demonstrate appropriate and cost-effective use of investigations in an evidence-based manner.
2. Understand the prioritization of the surgical emergency patient to minimize the risk of negative outcome.
3. Develop an understanding of the factors contributing to resource issues in the perioperative period.
4. Understand the role of anesthesiologists and other physicians in developing the health care system and promoting access to care.

### 2.6. Scholar

Clerkship medical student will be able to:

1. Retrieve information from appropriate sources related to the anesthesia curriculum.
2. Assess the quality of information found, using principles of critical appraisal
3. Develop an approach to self-directed learning.

### 2.7. Professional

Clerkship medical student will be able to:

1. Interact with patients in a compassionate, empathetic, and altruistic manner.
2. Recognize his or her limitations and seek appropriate help when necessary.
3. Maintain patient confidentiality and adhere to ethical principles.
4. Understand the current legal and ethical aspects of consent for surgery, anesthesia and blood transfusion.
5. Understand full and honest disclosure of error or adverse events.
6. Understand initiatives, such as the different Checklist, which have been undertaken to ensure patient safety and to minimize medical error in the perioperative period.
7. Fulfill all obligations undertaken, including educational obligations.
8. Improve and maintain competency and a pursuit of lifelong learning and scientific knowledge.

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9. Sensitivity and responsiveness to the patient's culture, age, gender and disabilities.

### 3. Educational Core Objectives

#### 3.1. Skills

At the completion of the Anesthesiology Clerkship rotation, clerkship medical student will be able to demonstrate basic proficiency in the following skills. These skills may be acquired during the clinical rotation, seminars or simulation day.

##### 3.1.1. Technical Skills

One of each of the following must be attempted or completed:

1. Adult and pediatrics Cardio-pulmonary resuscitation.
2. Airway management: oral airway/Naso-pharyngeal airway insertion, Laryngeal mask airway insertion and Mask ventilation
3. Peripheral IV insertion

##### 3.1.2 Interpretive Skills

1. ECG/EKG interpretation
2. ABG interpretation
3. Pulse Oximetry
4. Capnography

##### 3.1.3. Other Encounters

1. Anaphylaxis
2. Transfusion
3. Intubation
4. Complex regional pain syndrome
5. Delirium
6. Spinal and epidural anesthesia/analgesia
7. Post-operative nausea-vomiting
8. Mechanical ventilator waveforms and trouble -shootings.

### 4. Course Syllabus, Study and Teaching Guide

Anaesthesiologists can provide a unique and practical clinical perspective on basic life saving skills like airway and circulation managements. Many anaesthesiologist, pain management, and intensive care physicians throughout the whole world are successfully engaged with training students in practical procedures. Clearly setting out learning objectives for factual knowledge is important, but also a carefully structured skill lab session can help students understand the totality of professional work in anaesthesiology and Critical care Medicine.

Critical care has much to offer students to integrate between theoretical and ward experience; and it gives access to procedural and patient management aspects of the acutely ill which are not often encountered elsewhere.

In terms of pain management, Several research showed that pain is often ignored, under-reported, and mismanaged by health Care providers in Ethiopia [5,6].

Enhancing undergraduate education in this clinical field can be beneficial to address this problem.

Perioperative medicine is a logical extension of anaesthesia and critical care [1]. dealing with the assessment and optimisation of the patient's condition before surgery, and providing enhanced rehabilitation after operation. optimising chronic clinical conditions such as chronic obstructive pulmonary disease, tends to improve postoperative outcomes. There is the potential for longer-term public health benefit to the perioperative encounter, over and above the better surgical outcome. For instance, diagnosing and treating arterial hypertension before surgery should stand such patients in better stead for the rest of their lives [1].

<b>Department:</b> Anesthesiology, Critical care and Pain Medicine		Year: Clerkship medical students	pre-requisite : None	
<b>Module Title:</b> Anesthesiology		<b>Module Code:</b> -----	<b>Cr. Hr./ECTS:</b> -----	
<b>Topic : acute and chronic pain management</b>				
<b>General Learning Outcomes:</b>		By the end of this course students will be able to assess patients with pain and suggest appropriate pain management modalities		
<b>Specific Learning Outcomes:</b>		<ul style="list-style-type: none"> <li>✎ define pain</li> <li>☞ Describe Classification of pain <ul style="list-style-type: none"> <li>☞ explain Mechanism of pain</li> </ul> </li> <li>☞ assess and determine severity of pain for patients with acute and chronic pain</li> <li>☞ List the physiological consequences of poor pain control. <ul style="list-style-type: none"> <li>☞ differentiate different types of pain</li> </ul> </li> <li>☞ apply pharmacologic principles of pain control</li> <li>☞ explain non-pharmacological methods of pain management</li> <li>☞ Recognize the importance of multidisciplinary management for patients with chronic pain and list the various modalities for therapy</li> <li>☞ Recognize and understand the ways in which acute and persistent pain in children differ from pain in adults.</li> <li>☞ List the pharmacological and non-pharmacological methods of pain relief available for labour pain .</li> <li>☞ Describe the management of Chronic Regional Pain Syndrome (CRPS) .</li> </ul>		
<b>Teacher Activity</b>	<b>duration</b>	<b>Student Activity</b>	<b>Assessment Methods</b>	<b>Resource</b>
<ul style="list-style-type: none"> <li>✎ interactive lecture</li> <li>✎ leading and moderating Clinical practicum and seminars</li> </ul>	3 lectures & seminars lasting for 2 hrs. each,	<ul style="list-style-type: none"> <li>✎ group discussion.</li> <li>✎ seminar ( assessment of pain)</li> <li>✎ practical pain clinic &amp; labour ward attachment</li> </ul>	<ul style="list-style-type: none"> <li>🔔 <b>Summative :</b> very interactive class room discussion, Anesthesiology log book , CBD , DOPS, class room quizzes and final <ul style="list-style-type: none"> <li>☞ <b>formative assessment :</b> quizzes, peer and self assessment</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>🔗 References: Miller's text book of anesthesia , 9<sup>th</sup> edition. Longnecker anesthesiology 3rd ed. Morgan &amp; Mikhail's clinical anesthesiology, 5<sup>th</sup> edition.</li> <li>🔗 Web Resources: <a href="http://www.uptodate.com">http://www.uptodate.com</a>&gt;login</li> <li>☞ <b>Teaching materials</b> <ul style="list-style-type: none"> <li>✓ LCD projector &amp; Laptop</li> </ul> </li> </ul>

**Table 4.1. Course syllabus for acute and chronic pain management, 2023.**

<b>Department:</b> Anesthesiology, Critical care and Pain Medicine		Year: Clerkship medical students		pre-requisite : Pharmacology of general and local anesthesia	
<b>Module Title:</b> Anesthesiology		<b>Module Code :</b> -----		<b>Cr. Hr./ECTS :</b> -----	
<b>Topic : introduction to Anesthesiology</b>					
<b>General Learning Outcomes:</b>		By the end of this course students will gain basic knowledge about anesthesia, history of anesthesia, types of anesthesia & pharmacology of anesthesia.			
<b>Specific Learning Outcomes:</b>		<ul style="list-style-type: none"> <li>✍ define Anesthesia</li> <li>✍ discuss history of anesthesia</li> <li>✍ explain types of anesthesia</li> <li>✍ review on clinical pharmacology of anesthesia ( sedatives, muscle relaxants and local Anesthetics agents)</li> <li>✍ Distinguish between epidural and spinal anesthesia.</li> </ul> <p>And Describe the contraindications and complications of both</p> <ul style="list-style-type: none"> <li>✍ List the common peripheral nerve blocks, the indications for their use, and potential complications</li> </ul>			
<b>Teacher Activity</b>	<b>duration</b>	<b>Student Activity</b>	<b>Assessment Methods</b>	<b>Resource</b>	
<ul style="list-style-type: none"> <li>👉 Interactive lecture</li> <li>👉 Clinical practicum at skill (epidural &amp; spinal anesthesia)</li> </ul>	2 Interactive lecture & skill Lab demonstration lasting for 2 hours each	<ul style="list-style-type: none"> <li>✓ Group discussions</li> <li>✓ Active participation in Interactive lecture and PBL sessions</li> </ul>	<ul style="list-style-type: none"> <li>🔔 Progressive ( Anesthesiology log book, quizzes, PBL, global rating )</li> <li>🔔 End -course assessment ( written, OSCE/OSPE)</li> <li>🔔 formative assessment</li> </ul>	<ul style="list-style-type: none"> <li>🔔 Miller’s text book of anesthesia , 9th ed.</li> <li>🔔 Longnecker anesthesiology 3rd ed.</li> <li>🔔 Morgan &amp; Mikhail’s clinical anesthesiology/ 5<sup>th</sup> ed.</li> <li>🔔 Paul G. Barash clinical Anesthesia , 6<sup>th</sup> edition</li> <li>🔔 <b>Teaching msterials</b> <ul style="list-style-type: none"> <li>✓ LCD projector &amp; Laptop</li> </ul> </li> <li><b>Other Learning manuals</b></li> </ul>	

**Table 4.2 Course syllabus for introduction to Anesthesiology, 2023.**

<b>Department:</b> Anesthesiology, Critical care and Pain Medicine		Year: Clerkship medical students		pre-requisite : None
<b>Module Title:</b> Anesthesiology		<b>Module Code :</b> -----		<b>Cr. Hr./ECTS :</b> -----
<b>Topic : Pre-Anesthesia evaluation and optimization of surgical patients</b>				
<b>General Learning Outcomes:</b>		At the end of this course students will be able to assess surgical patients prior to anesthesia and try to initiate appropriate optimization strategies.		
<b>Specific Learning Outcomes:</b>		<ul style="list-style-type: none"> <li>🔔 evaluate the patient's condition prior to anesthesia</li> <li>🔔 optimize the patient's clinical condition</li> <li>🔔 determine and minimize risks for anesthesia</li> <li>🔔 Describe the rationale for pre-operative fasting, NPO guidelines, and pharmacological prophylaxis for aspiration.</li> <li>🔔 Summarize the indications for laboratory testing and special investigations during preop-evaluation.</li> <li>🔔 inform &amp; educate the patient</li> <li>🔔 obtain informed written consent</li> </ul>		
<b>Teacher Activity</b>	<b>duration</b>	<b>Student Activity</b>	<b>Assessment Methods</b>	<b>Resource</b>
<ul style="list-style-type: none"> <li>👉 Interactive lecture</li> <li>👉 Clinical practicum</li> </ul>	2 Interactive lecture & clinical practical attachment lasting for 2 hours each	<ul style="list-style-type: none"> <li>✍ PBL /case study</li> <li>✍ clinical practical attachment at preanesthesia clinic</li> <li>✍</li> </ul>	<p><b>Formative</b></p> <ul style="list-style-type: none"> <li>✓ Anesthesiology log book</li> <li>✓ global rating</li> </ul> <p><b>Summative</b></p> <ul style="list-style-type: none"> <li>✓ written</li> <li>✓ OSCE/OSPE</li> </ul>	<ul style="list-style-type: none"> <li>📖 Preanesthesia checklists</li> <li>📖 Miller's text book of anesthesia, 9th ed.</li> <li>📖 Morgan &amp; Mikhail's clinical anesthesiology/ 5th ed.</li> <li>📖 Paul G. Barash clinical Anesthesia, 6th edition.</li> <li>📖 <b>Teaching materials</b> <ul style="list-style-type: none"> <li>✓ LCD projector &amp; Laptop</li> </ul> </li> <li><b>Other Learning manuals</b></li> </ul>

**Table 4.3 Course syllabus for Pre-Anesthesia evaluation and optimization of surgical patients, 2023.**

<b>Department:</b> Anesthesiology, Critical care and Pain Medicine		Year: Clerkship medical students		pre-requisite : None	
<b>Module Title:</b> Anesthesiology		<b>Module Code :</b> -----		<b>Cr. Hr./ECTS :</b> -----	
<b>Topic: Fluid &amp; electrolyte disturbances</b>					
<b>General Learning Outcomes:</b>		By the end of this course students will be able to assess patients with Fluid & electrolyte disturbances and try to formulate appropriate plan of management			
<b>Specific Learning Outcomes:</b>		<ul style="list-style-type: none"> <li>↳ describe the mechanisms of fluid and electrolyte homeostasis</li> <li>↳ Summarize the principles of fluid management.</li> <li>↳ differentiate between crystalloids and colloids.</li> <li>↳ Calculate, initiate and manage fluid therapy</li> <li>↳ Make definition, etiology, clinical presentation and management of electrolyte disturbances ( Na<sup>+</sup>, K<sup>+</sup>, Ca<sup>2+</sup>, Mg<sup>2+</sup> disturbances)</li> </ul>			
<b>Teacher Activity</b>	<b>duration</b>	<b>Student Activity</b>	<b>Assessment Methods</b>	<b>Resource</b>	
<ul style="list-style-type: none"> <li>↳ Interactive lectures</li> <li>↳ Tutoring and moderating PBL sessions and seminars</li> </ul>	2 Interactive lectures each lasting for 2 hours A seminars ( approach to Na <sup>+</sup> disturbances ) lasting 2 hours	<ul style="list-style-type: none"> <li>↳ Group discussion</li> <li>↳ PBL</li> <li>↳ Active participation in Interactive lectures</li> <li>↳ seminars</li> <li>↳ self study</li> </ul>	<ul style="list-style-type: none"> <li>↳ Written exam ( MCQ. essay, Quizes, short answers)</li> </ul>	<ul style="list-style-type: none"> <li>↳ Marino's the little ICU book, 2<sup>nd</sup> edition.</li> <li>↳ Oxford Handbook of Critical Care third edition</li> <li>↳ Oh's Intensive Care Manual eighth edition</li> <li>↳ clinical evaluation &amp; management of fluid, electrolyte, acid-base disorder, second edition</li> <li>↳ <b>Teaching materials</b></li> <li>√ LCD projector &amp; Laptop</li> </ul>	

**Table 4.4 Course syllabus for Fluid & electrolyte disturbances, 2023.**

<b>Department:</b> Anesthesiology, Critical care and Pain Medicine		Year: Clerkship medical students		pre-requisite : None
<b>Module Title:</b> Anesthesiology		<b>Module Code :</b> -----		<b>Cr. Hr./ECTS :</b> -----
<b>Topic: Approach to critically ill patients</b>				
<b>General Learning Outcomes:</b>		By the end of this course student will be able to approach and manage critically ill patients .		
<b>Specific Learning Outcomes:</b>		<ul style="list-style-type: none"> <li>✓ To Define critically ill illness</li> <li>✓ Explain ICU set up and organization</li> <li>✓ To elaborate admission and discharge policy in ICU</li> <li>✓ To know ABCDE approach assessment of critically ill patients</li> <li>✓ To enumerate different severity of illness scoring system</li> <li>✓ Monitoring of critically ill patients</li> <li>✓ To discuss Sedation, stress ulcer prophylaxis, analgesia and nutrition &amp; glycemic control in critically ill patients ( FAST HUGS BIDS strategy)</li> </ul>		
<b>Teacher Activity</b>	<b>duration</b>	<b>Student Activity</b>	<b>Assessment Methods</b>	<b>Resource</b>
<ul style="list-style-type: none"> <li>👉 Interactive lectures</li> <li>👉 ICU rotation</li> </ul>	2 Interactive lectures each lasting for 2 hours	<ul style="list-style-type: none"> <li>👉 Group discussion</li> <li>👉 Active participation in Interactive lectures</li> <li>👉 self study</li> <li>👉 clinical practical attachment to ICU</li> </ul>	<ul style="list-style-type: none"> <li>📖 portfolio/Ane sthesiology log book</li> <li>📖 written</li> <li>📖 OSCE/OSPE</li> </ul>	<ul style="list-style-type: none"> <li>📖 Marino's the little ICU book , 2<sup>nd</sup> edition.</li> <li>📖 Oxford Handbook of Critical Care third edition</li> <li>📖 Oh's Intensive Care Manual eighth edition</li> <li>👉 <b>Teaching materials</b></li> <li>✓ LCD projector &amp; Laptop</li> </ul>

**Table 4.5 Course syllabus for Approach to critically ill patients, 2023.**



<b>Department:</b> Anesthesiology, Critical care and Pain Medicine		Year: Clerkship medical students	pre-requisite : None	
<b>Module Title:</b> Anesthesiology		<b>Module Code :</b> -----	<b>Cr. Hr./ECTS :</b> -----	
<b>Topic : Basics of Mechanical ventilation</b>				
<b>General Learning Outcomes:</b>		By the end of this course student will be able to describe and practice indication for mechanical ventilation, common modes of MV, frequently used ventilator settings and monitoring for alarms , wave forms and troubleshootings during mechanical ventilation and process of ventilator weaning and eventual liberation of patients from ventilator.		
<b>Specific Learning Outcomes:</b>		<ul style="list-style-type: none"> <li>❖ Describe the general principles of mechanical ventilation</li> <li>❖ Define indication for mechanical ventilation</li> <li>❖ Provide appropriate mechanical ventilation</li> <li>❖ Provide monitoring and weaning of mechanical ventilation</li> <li>❖ Describe extubation criteria from mechanical ventilation</li> <li>❖ Summarize the requirements for safe extubation</li> <li>❖ Handle alarms , wave forms and troubleshootings in MV.</li> <li>❖ Recognize complications of mechanical ventilation</li> </ul>		
<b>Teacher Activity</b>	<b>duration</b>	<b>Student Activity</b>	<b>Assessment Methods</b>	<b>Resource</b>
<ul style="list-style-type: none"> <li>➤ Interactive lectures and discussions</li> <li>➤ Demonstration In clinical simulation</li> </ul>	2 Interactive lecture & clinical practical attachment lasting for 2 hours each	<ul style="list-style-type: none"> <li>↪ Group discussion</li> <li>↪ Active participation in Interactive lecturers</li> <li>↪ self study</li> <li>↪ clinical practical attachment to ICU</li> </ul>	<ul style="list-style-type: none"> <li>↪ Written exam ( MCQ. essay, Quizes, short answers</li> </ul>	<ul style="list-style-type: none"> <li>↪ Marino's the little ICU book , 2<sup>nd</sup> edition.</li> <li>↪ Oxford Handbook of Critical Care third edition</li> <li>↪ Oh's Intensive Care Manual eighth edition</li> <li>↪ Pilbeam's mechanical ventilation sixth edition</li> <li>↪ <b>Teaching materials</b></li> <li>✓ LCD projector &amp; Laptop</li> </ul>

**Table 4.6 Course syllabus for Basics of Mechanical ventilation, 2023.**

<b>Department:</b> Anesthesiology, Critical care and Pain Medicine		Year: Clerkship medical students	pre-requisite : None	
<b>Module Title:</b> Anesthesiology		<b>Module Code:</b> -----	<b>Cr. Hr./ECTS :</b> -----	
<b>Topic : Introduction to Common Post Anesthesia complications</b>				
<b>General Learning Outcomes:</b>		By the end of this course student will be able to approach and manage common post operative complication related to Anesthesia.		
<b>Specific Learning Outcomes:</b>				
<ul style="list-style-type: none"> <li>📖 List the common causes and describe the management of the following post-anesthetic complications <ul style="list-style-type: none"> <li>🕒 Respiratory: airway obstruction, hypoventilation, and hypoxemia.</li> <li>🕒 Cardiovascular: hypotension, hypertension, tachycardia.</li> <li>🕒 Neuro-muscular: weakness, delayed recovery, delirium and malignant hyperthermia .</li> </ul> </li> <li>📖 List the common causes and describe the management of the following minor post-anesthetic complications : Sore throat, Paresthesia, Back pain, Post-operative Pyrexia , Hypothermia and shivering</li> <li>📖 List the risk factors for postoperative nausea and vomiting and describe its management.</li> <li>📖 Discuss managements and standard precautions for Anaphylaxis</li> <li>📖 explain the components of enhanced recovery after surgery strategies</li> </ul>				
<b>Teacher Activity</b>	<b>duration</b>	<b>Student Activity</b>	<b>Assessment Methods</b>	<b>Resource</b>
<ul style="list-style-type: none"> <li>🔔 Interactive lecture</li> <li>🔔 Case Scenarios</li> <li>🔔 Demonstration in Clinical practicum at PACU</li> </ul>	03 Interactive lecture & Clinical practicum each lasting for 2 hours	<ul style="list-style-type: none"> <li>👤 Actively involved in Assign tasks</li> <li>👤 Interactivity in lectures</li> <li>👤 self study</li> </ul>	<ul style="list-style-type: none"> <li>✍ <b>summative</b> : very interactive class room discussion, portfolios , CBD , class room quizzes and final exams.</li> <li>✍ <b>formative</b> : peer and self assessments.</li> </ul>	<ul style="list-style-type: none"> <li>✓ Miller'S Text Book Of Anesthesia , 9<sup>th</sup> Editin</li> <li>✓ paul G. Barash clinical Anesthesia , 6<sup>th</sup> edition</li> <li>✓ Morgan &amp; Mikhail'S Clinical Anesthesiology 6<sup>th</sup> Edition</li> </ul>

**Table 4.7 Course syllabus for Introduction to Common Post Anesthesia complications, 2023.**

<b>Department:</b> Anesthesiology, Critical care and Pain Medicine		Year: Clerkship medical students	pre-requisite : None	
<b>Module Title:</b> Anesthesiology		<b>Module Code:</b> : -----	<b>Cr. Hr./ECTS:</b> : -----	
<b>Topic : Procedural sedation</b>				
General Learning Outcomes:		By the end of this course student will be able to gain clinical skills and a deeper understanding regarding issues related to procedural sedation , development of a sedation plan, recognition and management of adverse events in sedation practice and sedation pharmacology.		
Specific Learning Outcomes:		<ul style="list-style-type: none"> <li>✓ Define Procedural sedation</li> <li>✓ Categorize the different levels /Spectrum of sedation</li> <li>✓ Establish Potential Indications and contra- Indications for Procedural sedation</li> <li>✓ Perform pre-sedation risk assessment</li> <li>✓ Describe pharmacologic options for procedural sedations and analgesia</li> <li>✓ Describe special Considerations in Pregnancy and pediatric patients for Procedural sedation</li> <li>✓ List the necessary preparations, equipments and monitoring for Procedural sedation</li> <li>✓ Recognise common Complications of Procedural sedation</li> </ul>		
<b>Teacher Activity</b>	<b>duration</b>	<b>Student Activity</b>	<b>Assessment Methods</b>	<b>Resource</b>
<ul style="list-style-type: none"> <li>🔔 Interactive lecture</li> <li>🔔 Case Scenarios</li> <li>🔔 Demonstration in Clinical practicum at minor OR</li> </ul>	02 Interactive lecture & Clinical practicum each lasting for 2 hours	<ul style="list-style-type: none"> <li>👤 Actively involved in Assign tasks</li> <li>👤 Interactivity in lectures</li> <li>👤 self study</li> </ul>	<ul style="list-style-type: none"> <li>📝 Written examination</li> <li>📝 Simulation testing stations of specific sedation scenarios/ OSCE/Anesthesiology log book</li> </ul>	<ul style="list-style-type: none"> <li>📖 ASA, Practice Guidelines for sedation and analgesia by Non-Anesthesiologists</li> <li>✓ Miller'S Text Book Of Anesthesia , 9<sup>th</sup> Editin</li> <li>✓ paul G. Barash clinical Anesthesia , 6<sup>th</sup> edition</li> </ul>

**Table 4.8 Course syllabus for Procedural sedation, 2023.**

<b>Department:</b> Anesthesiology, Critical care and Pain Medicine		Year: Clerkship medical students		pre-requisite : None	
<b>Module Title:</b> Anesthesiology		<b>Module Code :</b> -----		<b>Cr. Hr./ECTS :</b> -----	
<b>Topic: Transfusion medicine</b>					
<b>General Learning Outcomes:</b>		By the end of this course students will be able to assess patients with blood component disturbances and try to formulate appropriate plan of management			
<b>Specific Learning Outcomes:</b>		<ul style="list-style-type: none"> <li>☞ discuss historical perspectives of transfusion</li> <li>☞ Summarize the basics of blood groups and antibodies.</li> <li>☞ explain Safe transfusion protocol</li> <li>☞ describe Blood components -indications and contraindications</li> <li>☞ Calculate, initiate and manage blood component therapy</li> <li>☞ Describe indications for Massive transfusion</li> <li>☞ Recognise effective transfusion in pediatric patients.</li> <li>☞ Recognise Management of patients who do not accept transfusion.</li> <li>☞ Discuss transfusion reactions</li> </ul>			
<b>Teacher Activity</b>	<b>duration</b>	<b>Student Activity</b>	<b>Assessment Methods</b>	<b>Resource</b>	
<ul style="list-style-type: none"> <li>☞ Interactive lectures</li> <li>☞ Tutoring and moderating PBL sessions and seminars</li> </ul>	2 Interactive lectures each lasting for 2 hours A seminars ( massive transfusion ) lasting 2 hours	<ul style="list-style-type: none"> <li>☞ Group discussion</li> <li>☞ PBL</li> <li>☞ Active participation in Interactive lectures</li> <li>☞ seminars</li> <li>☞ self study</li> </ul>	<ul style="list-style-type: none"> <li>☞ Written exam ( MCQ. essay, Quizes, short answers)</li> <li>☞ Anesthesiology log book</li> </ul>	<ul style="list-style-type: none"> <li>☞ Hand book of transfusion medicine 5<sup>th</sup> edition</li> <li>☞ Oxford Handbook of Critical Care third edition</li> <li>☞ Oh's Intensive Care Manual eighth edition</li> <li>☞ clinical evaluation &amp; management of fluid , electrolyte, acid-base disorder, second edition</li> <li>☞ <b>Teaching materials</b></li> <li>✓ LCD projector &amp; Laptop</li> </ul>	

**Table 4.9 Course syllabus for Transfusion medicine, 2023.**

### 5. Anesthesiology Skill Lab Sessions

Simulation is a widely used training method, especially in the area of anesthesiology. The term “skills labs”, an abbreviation of skills laboratories, refers to specifically equipped practice rooms functioning as training facilities offering medical students, in training for the practice of clinical skills prior to their real life application. Skills lab training provides medical students with the necessary basic skills for later clinical activity by the means of models, phantoms, and fellow students or with the help of standardized patients [7]. Anaesthesiologists are the leaders in the establishment and maintenance of the skill laboratories and in imparting simula-

tion-based training for teaching such as airway management and other lifesaving skills.

For Example, Teaching cardiopulmonary resuscitation, IV cannulation, airway management and ECG interpretation to medical students gives them the real feel of the practice of medicine and a high motivation to learn the lifesaving skill that is necessary to be possessed by any medical graduate. The knowledge and awareness of cardiopulmonary resuscitation among medical students is very poor as per the results of several studies and surveys conducted [8,9-23].

Ser. NO	Items	0 x	1 ✓	Case Scenario , objectives, duration Resources required
1	Ensure Scene safety			<p><b>General Objectives of this session</b></p> <ul style="list-style-type: none"> <li>✎ To recognise that the patient has ardiac arrest.</li> <li>✎ To perform high quality CPR</li> </ul> <p><b>Duration of this session</b> : 2 hours.</p> <p><b>Scenario: cardiac arrest</b></p> <p>45-Year-Old Female patient was admitted to medical ward. Few hours after admission , while she was eating with her families, she suddenly collapsed. A bystander nurse attempted to palpate pulse and her pulse not felt.</p> <p><b>Instruction</b> : Demonstrate why this patient has cardiac arrest and perform high quality cardio- pulmonary resuscitation on the given mannikin.</p> <p style="text-align: center;"><b>Resources required</b></p> <ul style="list-style-type: none"> <li>✧ Gloves</li> <li>✧ Manikin for CPR</li> <li>✧ Manual Defibrillators/Automated External Defibrillator (AED) with electrodes</li> <li>✧ Patient monitor with capnometry</li> <li>✧ K-Y jelly</li> <li>✧ Oxygen/Oxygen cylinder</li> <li>✧ Oxygen mask with Self-inflating bag (BVM) - Adult</li> <li>✧ Suction Apparatus with catheter</li> <li>✧ Syringe and needles ( 5 &amp; 10 cc)</li> <li>✧ Epinephrine/Adrenaline</li> <li>✧ Oropharyngeal (Guedel) airways</li> <li>✧ IV Amiodarone/IV lidocaine</li> <li>✧ Emergency arway cart havng at least Adult sized ETT , laryngoscope, LMA</li> <li>✧ <b>Other components of this simulation session</b> : Demonstration for Neonatal and Obstetrics resuscitation ( CPR).</li> </ul>
2	Wear gloves and use a barrier devices ( if needed)			
3	Check the response of the patients			
4	Check for breathing ( look, listen and feel) and check pulse simultaneously ( for 5-10 seconds).			
5	If The Victim Is Unresponsive or no breathing/ only gasping <ul style="list-style-type: none"> <li>✎ Shout for nearby help/call EMS</li> <li>✎ <b>Start high quality CPR</b> <ul style="list-style-type: none"> <li>✎ Perform chest compressions at a rate of 100-120/min</li> <li>✎ Compress to a depth of at least 2 in. (5 cm)</li> <li>✎ Allow full recoil after each compression</li> <li>✎ Minimize pauses in compressions/minimizing interruptions (less than 10 s)</li> <li>✎ Compression ventilation ratio 30:2</li> <li>✎ Avoid excessive ventilation</li> </ul> </li> </ul>			
6	Administer 1 mg. Of adrenaline ( via IV, IO or ETT access) ASAP, Repeat Q3-5min.			
7	assess the rhythm wether shokable or not shokable. <ul style="list-style-type: none"> <li>✓ if shockable, apply shocks</li> </ul>			
8	Consider advanced airway & capnography			
9	For every 2 minutes <ul style="list-style-type: none"> <li>✎ assess for pulse,including rhythm for shokable</li> <li>✎ Rotate team dynamics</li> <li>✎ Check for 5H's and 5T's and try to treat</li> </ul>			
10	If shock refractory VF/PVT ,try to use miodarone or lidocaine <ul style="list-style-type: none"> <li>♣ <b>amiodarone IV/IO</b> = First dose 300 mg. , second dose=150 mg.</li> <li>♣ <b>lidocaine IV/IO</b> = First dose 1-1.5 mg/kg , second dose=0.5-0.75 mg/kg.</li> </ul>			
11	If sign of ROSC ( Pulse, BP , ETCO <sub>2</sub> , Intra arterial wave form) continue post cardiac arrest care---admit to ICU			
12	If <b>NO</b> sign of ROSC after several cycles of CPR ---- Break bad news for families			

Table 5.1 Checklist for adult CPR, 2023.

Ser. NO	part 1 : Items	0 x	1 √	Resources required and objective of skill lab
1	Check ABC of life and base line vital signs			<b>General Objectives this skill lab.</b> 🛎 To be familiar with airway equipments 🛎 To demonstrate basic and advanced airways management <b>Resources required</b> ✧ Gloves ✧ Manikin for airway management ✧ Patient monitor ✧ K-Y jelly ✧ Oxygen/Oxygen cylinder ✧ Stethoscope ✧ Oxygen mask with Self-inflating bag (BVM) - Adult ✧ Syringe and needles ( 5 , 10 , 30 cc) ✧ Oropharyngeal (Guedel) airways ✧ Nasopharyngeal airways ✧ Emergency arway cart havng at least Adult sized ETT , laryngoscope, LMA ✧ Emergency drugs Adrenaline, atropine ✧ Sedatives : ketamine, propofol & diazepam ✧ Muscle relaxants Suxamethonium, vecuronium ✧ Suction ✧ Stylet, bougie ✧ tape or a securing device.
2	Wear gloves and use a barrier devices ( if needed)			
	Check & Chooses functionality and appropraite size of : 🛎 Self-inflating bag (BVM): mask, bag 🛎 naso-pharyngeal 🛎 oropharyngeal airway			
3	Demonstrat airway management manuevers ✧ Head tilt ✧ Chin lift ✧ Jaw trust			
4	Maintain airway patency after any manuever			
5	Maintain cervical alignment ( known or suspected crvical spine injury)			
6	Lubricat naso-pharyngeal airway ( verbally ask contra-indication for insertion of naso-pharyngeal airway )			
7	Demonstrate approprait insertion of nasal airways			
	Demonstrate approprait insertion of oral airways (curved up toward hard palate first, then rotated or inserted with tongue blade directly, check for Fully insertions)			
8	Demonstrate correct ventilation process using bag-valve mask on manikin (proper rate , prepare volume to make bilateral chest rise , avoid stomach insufflation)			
9	Assess for one hand/two hand techniques			
10	Re-assess patient vital signs.			
<b>Part 2 : Endotracheal intubation &amp; LMA insertion</b>				
1	state equipments needed for intubation & LMA insertion			
	Selec approprait size LMA & ETT			
2	Demonstrate Sniffing position			
3	Preoxygenate the patient with BVM			
4	<b>intubation</b>	Opened mouth with right hand while using scissor technique, inserted laryngoscope using the left hand, swept tongue from right to left.		
5		Lifted handle up and away from operator		
6		Right hand placed the ET tube through vocal cords		
7	<b>LMA</b>	Lubricat LMA		
8		insert LMA correctly ( Demonstrate )		
9	Inflated cuff with appropriate volume ( LMA , ETT )			
10	Checked that ambu bag was connected to O2 source & ventilate			
11	Assess proper placemt (auscultation & chest rise)			
12	Fix the tube in place			

Table 5.2. Check List for airway Management, 2023. A case of apneic patient

Ser NO	Items	Achieved	Not Achieved	Objectives and Resources required
1	Introduce yourself to the patient and take proper oral consent(a clear explanation of the procedure including potential adverse effects )			<u><b>Objectives</b></u> ↳ Perform a successful IV cannulation on the training arm (manikin) ↳ Demonstrate awareness of national Infection Control protocols. ↳ Other Points of discussion : Tips for difficult IV cannulation, Setting up IV infusion and calculating drip rate . <u><b>Resources required</b></u> ❖ Nonsterile gloves. ❖ Tourniquet. ❖ Antiseptic solution ( 70% isopropyl alcohol) ❖ 2 × 2 in. gauze ❖ Local anesthetic solution. ❖ 1-mL syringe with a 30-gauge needle ❖ 1 liter of NS/RL ❖ 10 ml ampoule of 0.9% NaCl. ❖ Transparent semi permeable dressing ❖ Cannula (18, 20, 22G) . ❖ Paper tape
2	Review patient Hx & PE ( E.g. Allergy)			
	Checked that all necessary equipment is available and prepared to use			
3	Washed hands			
4	Put on gloves			
5	Assess the dominant/non-dominant side and check the veins for status and suitability (If possible use the non dominant arm)			
6	clean site with appropriate solution(e.g. 70% alcohol) using a circular outward movement			
7	Use intradermal injection of a topical anesthetic agent at IV insertion site just prior to insertion or topical application of a local anesthetic cream about 30 minutes prior to IV insertion to decrease associated pain.			
8	Applied tourniquet : should not be left > 2-3 min.			
9	Apply skin traction to immobilise the vein			
10	Ensure cannula has bevel side UP and insert at approximately 30 degree angle			
11	You will see a flashback of blood in the chamber once you have pierced the vein			
12	Then advance the cannula a few more millimetres and then flatten the cannula, stabilise the device and advance the cannula until at skin level			
13	Remove the stylet and apply pressure just beyond the catheter tip			
14	Gently stabilise the cannula hub			
15	Release the tourniquet			
16	Flush cannula with 5-10ml 0.9% sodium chloride to ensure patency			
17	Apply dressing and secure cannula			
18	Attached IV tubing to hub of catheter and Opened IV line to ensure proper flow of fluids			
19	Dispose of sharps and waste			
20	Document in patient chart (Site of insertion-vein and arm/hand, Type & gauge of cannula , Date & time of insertion , Type & amount of IV solution ).			

Table 5.3 Checklist for peripheral IV cannulation, 2023.

N O	Items	0 x	1 √	Resources required and objectives
1	<b>Check and Confirm Patient details</b> : name , MRN, age/sex, The time of strip tracing, relevant clinical findings and indication for ECG.			<b>General Objectives of this skill lab</b>
2	<b>Check ECG strip Standardisation:</b> speed (25mm/sec), Voltage (10mm/mV)			At the end of this skill
3	<b>Heart rhythm : Use “paper test”</b> (Map P-P and R-R intervals in lead II) ↳ Is the rhythm regular or irregular? If it is irregular is it regularly irregularly or irregularly irregular ?			Lab. session students will be systematic interpret normal and abnormal ECG with different pathologies
4	<b>Measuring heart rate on ECG</b> ↳ <b>Assess atrial rate (PP-intervals ) &amp; ventricular rate (RR-interval )</b>  🔔 <b>Regular rhythm and HR is &gt;50</b> ✓ 300/No <sub>of</sub> large boxes b /n R to R waves  🔔 <b>Regular rhythm and HR is &lt;50</b> ✓ 1500/No <sub>of</sub> small boxes between R-R Waves  🔔 <b>Irregular rhythm</b> ✓ The 6 seconds method : : Number of QRS complexes in 6 s × 10. ✓ The 3 seconds method (HR<50) : Number of QRS complexes in 3 s × 20.			<b>Resources required</b> ✓ Real patient ECG strips at least with the following ECG findings : 👉 normal ECG = # 01 👉 Multifocal atrial tachycardia= # 01 👉 Atrial fibrillation/ Atrial Flutter = # 01 👉 premature atrial/junctional/ventricular beats= # 01
5	<b>Assess Cardiac axis</b> ↳ Examine positive and negative deflection of QRS-Complex in Lead I, aVF .			👉 RBBB= # 01 👉 LBBB = # 01
6	<b>Assess P waves</b> ↳ is distinct P-waves seen ? Assess P-wave morphology, amplitude, ( notched, inverted P-wave, tall/peaked P-wave) , Followed by QRS-complex ( in 1:1 fashion )			👉 LVH= # 01 👉 RVH = # 01 👉 Right axis deviation = # 01
7	<b>Assess PR interval</b> (Measure from the start of the P wave to the start of the QRS complex) ↳ is PR interval prolonged, Shortened ,Irregular or depressed ?			👉 P-Mitrale = # 01 👉 P-Pulmonale = # 01
8	<b>Assessing Q-waves &amp; QRS complex</b> (in each of 12/15 leads) ↳ determine size of Q-wave ( look for “pathologic Q-wave”), ↳ determine width (duration) , shape & height (voltage) of QRS-complex .			👉 ? Ventricular tachycardia= # 01
9	<b>ST segment</b> (Measure from the end of the QRS to the start of the T wave) ↳ locate J-point then Look whether ST-segment is normal or deviated (elevated or depressed)			👉 Different degrees of AV-Block = # 01 each 👉 ST-segment elevation/depressions= # 01 each
10	<b>QT interval</b> ( measured from the beginning of Q-wave to the end of T-wave) ↳ determine length of QT interval & QTc ( QTc = QT/ √ R-R)			👉 T-wave changes = # 01
11	<b>T-wave</b> ( determine whether T-wave is flattened, inverted or peaked) .			
12	<b>U-Wave</b> (Check whether U-wave is present , if seen , determine it's amplitude).			
13	Compare the current findings with earlier ECG recordings (if any)			
14	Overall description , interpretation & possible diagnosis in clinical settings			

Table 5.4 Checklist for ECG/EKG interpretation, 2023.



No	Items	0	1	Resources required and objectives
1	step 1 : State that this is an arterial blood gas sample (rather than venous).	x	√	<p><b>Objectives</b></p> <p>At the end of this skill Lab. session students will be Assess changes in acid- base homeostasis and clinically correlate acid-base disorders.</p> <p><b>Resources required</b></p> <p>√ clinical case Scenarios at least with the following acid-base disturbances.</p> <ul style="list-style-type: none"> <li>⊕ Metabolic alkalosis</li> <li>⊕ metabolic acidosis with hypoalbuminemia</li> <li>⊕ high anion gap metabolic acidosis with respiratory alkalosis (mixed)</li> <li>⊕ partially compensated respiratory acidosis</li> </ul>
2	step 2: State the patients name and outline history/pertinent examination findings : any interpretation of blood gases must be made in the appropriate clinical context.			
	step 3 : check for validity : use Henderson-Hasselbach equation			
3	Step 4: Identify the primary disorder by looking at the pH.  Is the pH normal, acidotic or alkalotic?  { 7.4 (7.35-7.45) is the optimal blood pH, <7.4 is acidic, > 7.4 is alkalotic }			
4	Step 5 : Analyze the PCO <sub>2</sub> and HCO <sub>3</sub> <sup>-</sup> (Normal PaCO <sub>2</sub> : 35-45. Use 40 as absolute normal and Normal HCO <sub>3</sub> <sup>-</sup> ; 22-26 Use 24 as absolute normal .  🔔 When the pH and paCO <sub>2</sub> change in the same direction (which normally should not), the primary problem is <b>metabolic</b> .  √ pH ↓ PCO <sub>2</sub> ↓ =Metabolic acidosis  √ pH ↑ PCO <sub>2</sub> ↑ =Metabolic alkalosis  🔔 when pH and paCO <sub>2</sub> move in opposite directions and paCO <sub>2</sub> is normal, then the primary problem is <b>respiratory</b> .  √ pH ↓ PCO <sub>2</sub> ↑ = Respiratory acidosis  √ pH ↑ PCO <sub>2</sub> ↓ = Respiratory Alkalosis  🔔 if HCO <sub>3</sub> <sup>-</sup> and paCO <sub>2</sub> change in opposite direction (which they normally should not), then it is a mixed disorder: pH may be normal with abnormal paCO <sub>2</sub> or abnormal pH and normal paCO <sub>2</sub> )			
5	Step 5 : Calculation of the Expected Compensation  🔔 Either CO <sub>2</sub> or HCO <sub>3</sub> go to the opposite direction of pH, that means compensation in progress.  √ compensation for Metabolic Acidosis pCO <sub>2</sub> = 1.5 (HCO <sub>3</sub> ) + 8±2  √ compensation metabolic alkalosis pCO <sub>2</sub> = 0.7 [HCO <sub>3</sub> ] + 20 ( ±5)  √ compensation for Respiratory Acidosis and Respiratory Alkalosis : use 1, 2,3, and 4!acid -base rule .			
6	Step 6 : determine Anion gap and delta-delta  🔔 Anion Gap = Na - (Cl + HCO <sub>3</sub> ) , Corrected AG=actual AG-[2.5(4.5-albumin). 🔔 delta-delta = ΔAG / ΔHCO <sub>3</sub> <sup>-</sup>			
7	Step 7 : Analysis pO <sub>2</sub> and O <sub>2</sub> saturation : for evidence & possible cause of hypoxemia  🔔 Determine A-a Gradient .  🔔 determine PaO <sub>2</sub> /FiO <sub>2</sub> .  🔔 try to interprete the results.			
8	Step 8 : Summarize the final interpretations and correlated with clinical findins			

**Table 5.5 Checklist for ABG interpretation, 2023.**

## References

1. Brennan L. 2016. Our Strategic Plan. Royal College of Anaesthetists.
2. Carlisle, J. B., White, S. M., & Tobin, A. E. (2016). The anaesthetist and peri-operative medicine: migration and evolution. *Anaesthesia*, 71, 1-2.
3. Ethiopian ministry of Health and MOSHE ,Competency based integrated modular medical curriculum; 2021.
4. Hamlin, C., Bhangu, K., Villafranca, A., Bhangu, M., Brown, R., Tenenbein, M., ... & Association of Canadian University Departments of Anesthesia Undergraduate Education Study Group\*. (2017). Participation des départements canadiens d'anesthésiologie dans la formation médicale de premier cycle. *Canadian Journal of Anesthesia/Journal canadien d'anesthésie*, 64, 16-28.
5. Eshete, M. T., Baeumler, P. I., Siebeck, M., Tesfaye, M., Haileamlak, A., Michael, G. G., ... & Irnich, D. (2019). Quality of postoperative pain management in Ethiopia: A prospective longitudinal study. *Plos one*, 14(5), e0215563.
6. Ethiopian Public Health Association. (2011). Baseline evaluation of pain management practices and teaching in health facilities and health training schools in Ethiopia.
7. Barrows, H. S. (1993). An overview of the uses of standardized patients for teaching and evaluating clinical skills. *AAMC. Academic Medicine*, 68(6), 443-51.
8. MULUNEH SOLOMON, ASSESSMENT OF KNOWLEDGE, ATTITUDE AND PRACTICE AND ASSOCIATED FACTORS IN PERFORMING CPR AMONG MEDICAL INTERNS OF TIKUR ANBESSA SPECIALIZED HOSPITAL AND YEKETIT 12 HOSPITAL MEDICAL COLLEGE, ADDIS ABABA, ETHIOPIA, ADDIS ABABA UNIVERSITY, 2020.
9. Euliano, T. Y., Robicsek, S. A., & Banner, M. J. (2010). The value of anesthesiology in undergraduate medical education as assessed by medical school faculty. *The Journal of Education in Perioperative Medicine: JEPM*, 12(2).
10. Smith, A. F., Sadler, J., & Carey, C. (2018). Anaesthesia and the undergraduate medical curriculum. *British Journal of Anaesthesia*, 121(5), 993-996.
11. Anesthesia university of Toronto, Anesthesia for Medical Students, A concise clerkship manual for medical students.
12. Competency -based undergraduate curriculum implementation in Anesthesiology -A survey -based comparison of two models of training.
13. ASA, a guide to Anesthesiology for medical students, 2018.
14. Rohan, D., Ahern, S., & Walsh, K. (2009). Defining an anaesthetic curriculum for medical undergraduates. A Delphi study. *Medical teacher*, 31(1), e1-e5.
15. Setlur, R., Jahan, N., Gupta, N., & Sheshadri, K. (2021). Competency-based undergraduate curriculum implementation in anesthesiology—A survey-based comparison of two models of training. *Journal of Anaesthesiology, Clinical Pharmacology*, 37(2), 196.
16. Overton, M. J., & Smith, N. A. (2015). Anaesthesia priorities for Australian and New Zealand medical school curricula: a Delphi consensus of academic anaesthetists. *Anaesthesia and Intensive Care*, 43(1), 51-58.
17. Ebert, T. J., & Fox, C. A. (2014). Competency-based education in anesthesiology: history and challenges. *Anesthesiology*, 120(1), 24-31.
18. Ly, E. I., Catalani, B. S., Boggs, S. D., McGreevey, K. E., Updegraff, A. B., & Steadman, J. L. (2020). The anesthesiology clerkship: a requisite experience in medical education. *The Ochsner Journal*, 20(3), 250.
19. Smith, A., Carey, C., Sadler, J., Smith, H., Stephens, R., & Frith, C. (2019). Undergraduate education in anaesthesia, intensive care, pain, and perioperative medicine: The development of a national curriculum framework. *Medical Teacher*, 41(3), 340-346.
20. O'Connor, E., & Doyle, E. (2022). A scoping review of assessment methods following undergraduate clinical placements in anaesthesia and intensive care medicine. *Frontiers in Medicine*, 867.
21. Hunter, I., Ramanathan, V., Balasubramanian, P., Evans, D. A., Hardman, J. G., & McCahon, R. A. (2016). Retention of laryngoscopy skills in medical students: a randomised, crossover study of the Macintosh, AP Advance™, C-MAC® and Airtraq® laryngoscopes. *Anaesthesia*, 71(10), 1191-1197.
22. Sakawi, Y., & Vetter, T. R. (2011). Airway management and vascular access simulation during a medical student rotation. *The Clinical Teacher*, 8(1), 48-51.
23. Briggs, E. V., Battelli, D., Gordon, D., Kopf, A., Ribeiro, S., Puig, M. M., & Kress, H. G. (2015). Current pain education within undergraduate medical studies across Europe: Advancing the Provision of Pain Education and Learning (APPEAL) study. *BMJ open*, 5(8), e006984.

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