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Podcast Title:

Simulation in Undergraduate Medical Education: Why It Matters from the Preclinical Years

Department: PHYSIOLOGY AS MEU MEMBER

Category: (Select relevant category)
Continuing Medical Education

TRANSCRIPT

Hello everyone…. This is Dr. Nalini, from department of Physiology talking about Simulation in Undergraduate Medical Education: Why It Matters from the Preclinical Years

Opening
Hello everyone,
Welcome to this podcast on Simulation in Undergraduate Medical Education, with a special emphasis on the preclinical phase.
In today's medical education landscape, especially in India, we are facing a unique challenge—more students, fewer patients, and higher societal expectations of competency from young doctors. Traditional teaching methods alone may no longer be sufficient to bridge this gap. This is where simulation-based medical education, or SBME, emerges as a powerful and practical solution.
In the next ten minutes, we will explore why simulation is important, how it aligns with the competency-based curriculum, and its relevance to preclinical subjects like physiology.

Why Simulation Is Needed Today
Medical education has always relied heavily on learning from real patients. However, depending solely on hospital exposure has limitations. Case availability is unpredictable, patient safety is a concern, and opportunities for repeated practice are limited.
Simulation addresses these issues by offering a safe, controlled, learner-centered environment where students can practice skills, make mistakes, and learn from them—without harming patients.
Simulation-based training has been shown to improve procedural skills, reduce patient-related complications, and enhance clinical outcomes. Importantly, it allows standardized learning experiences for all students, regardless of patient load.

Simulation and Competency-Based Medical Education
From the academic year 2019–2020, India adopted Competency-Based Medical Education, or CBME, for undergraduate and postgraduate training.
CBME emphasizes:

- Early clinical exposure

- Outcome-based learning
- Skill acquisition over rote knowledge

Core competencies now include communication skills, history taking, physical examination, procedural and diagnostic skills, resuscitation, ethics, teamwork, critical thinking, and problem-solving.
Simulation fits naturally into CBME because it allows certifiable, observable, and repeatable skill training, even from the first professional year.

Educational Theories Behind Simulation
Simulation-based learning is grounded in two key educational theories.
The first is experiential learning theory, often described as "learning by doing." Studies suggest that learners retain up to 90% of what they actively do, compared to much lower retention with passive listening.
The second is deliberate practice theory, which emphasizes:

- Repetitive performance
- Clearly defined objectives
- Immediate, focused feedback

Simulation enables deliberate practice at adjustable difficulty levels, making it ideal not only for beginners but also for adult learners who may fear embarrassment in real clinical settings.

Role of Simulation in Preclinical Subjects
Simulation is often associated with clinical specialties like anaesthesia, intensive care, and obstetrics. However, its role in preclinical education, especially physiology, is equally significant.
Simulation is defined as a technique—not just technology—that recreates real-world processes to achieve educational goals through active learning.
Preclinical disciplines have long used forms of simulation:

- Cadavers in anatomy
- Animal laboratories for physiological responses

While animal labs demonstrated core physiological concepts, they posed ethical, financial, and logistical challenges.
Modern simulation tools now allow us to demonstrate cardiovascular, respiratory, renal, and neurological physiology by recreating both normal and pathological states in a simulated environment.

Evidence Supporting Simulation in Physiology Teaching

Several studies have shown that simulation enhances understanding and retention of physiological concepts.
Human patient simulators have been used to teach:

- Cardiovascular function curves
- Shock physiology
- Respiratory mechanics
- Renal failure

Students consistently report better conceptual clarity, especially when physiological principles are linked to clinical and pathological conditions.
Even simple, model-based simulations—such as balloons, bellows, or mechanical lung models—have proven effective in explaining complex topics like compliance and pressure–volume relationships.

Low-Cost Simulators: A Practical Solution
One major barrier to simulation in developing countries is cost.
However, innovation offers hope. Low-cost simulators, made using locally available

materials—such as gloves, thermocol, kitchen towels, or basic tubing—have been successfully used to teach skills like blood pressure measurement, arterial puncture, and even surgical procedures.
These frugal innovations make simulation accessible, scalable, and sustainable, especially in resource-limited settings.

Simulation as a Teaching and Assessment Tool
Simulation is not just a teaching tool—it is also a reliable method of assessment.
Simulation-based assessments, particularly OSCEs and OSPEs, are widely used to evaluate communication skills, procedural competence, and clinical reasoning.
In undergraduate education, simulation is more commonly used for formative assessment, helping students identify gaps and improve performance before high-stakes examinations.

Conclusions
To conclude, simulation-based medical education plays a crucial role in improving patient safety, enhancing skill acquisition, and aligning teaching with competency-based outcomes.
With thoughtful planning, trained faculty, and innovative use of resources, simulation can be effectively integrated not only into clinical training but also into preclinical subjects like physiology.

Simulation is not a replacement for real patients—but it is an essential bridge between theory and practice.
Thank you for listening.

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Signature of the Resource Person

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