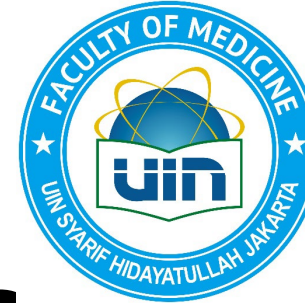




Virtual Patient (VP)

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About me



Fika Ekayanti

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Vice Dean for Academic Affairs (2023-2027) of Medical Faculty of State Islamic University Svarif Hidayatullah Jakarta.

General practitioner (Active practice licenses) in KPKM Buaran (2022-2027).

Chief for Council of Physician in Primary Care Indonesia Medical Association, 2025-2027.

Treasurer for Indonesia Medical Doctor Collegium 2024-2026.

Chief for International Division in IIMA, 2025-2027.



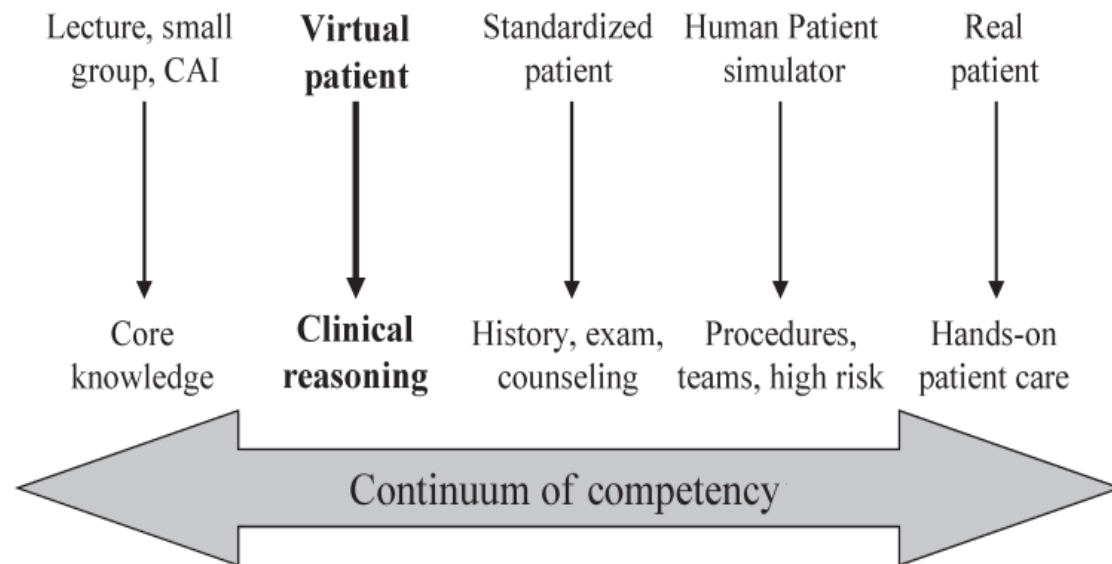
What is a Virtual Patients?



A virtual patient (VP) is "a specific type of computer-based program that simulates real-life clinical scenarios; learners emulate the roles of health care providers to obtain a history, conduct a physical exam, and make diagnostic and therapeutic decisions" (American Association of Medical Colleges).

Association of American Medical Colleges. Effective Use of Educational Technology in Medical Education. Summary Report of the 2006 AAMC Colloquium on Educational Technology. Washington, DC: Association of American Medical Colleges; 2006. p. 2007.

The aligning of instructional modalities with desired outcomes



- The arrow represents the continuum of competence (or performance) in medical education.
- The arrow's two heads imply that although these competencies build on one another, the relationships are often reciprocal and co-dependent.

CAI = computer assisted instruction

Cook DA, Triola MM. (2009). Virtual patients: a critical literature review and proposed next steps. *Medical Education*. Vol 43: 303–311

Types of Virtual Patients

Case Presentations (Talbot, 1997).

LABORATORY REPORT:

WBC	8.88
RBC	3.50
HGB	10.1
MCV	82
PLATELETS	175,000
B-HCG	NEGATIVE
RPR	NEGATIVE

Bleeding Times

You see a 14 year old girl for a school physical. No abnormalities are noted. A review of systems yields menorrhagia, menarche was at age 12.

AVAILABLE TESTS:

LABS SMEAR



ATTENDING MD's RESPONSE:

Oral contraceptives can effectively treat menorrhagia. The problem is that you didn't bother to rule other things out first.

1. What is the next step in patient management.

- a. [Oral Contraceptives](#)
- b. [Additional history](#)
- c. [CBC for assess of anemia](#)
- d. [Endometrial biopsy](#)

2. Given this life long history, you suspect an inherited disorder. What is most likely in this patient.

- a. [Hemophilia A](#)
- b. [Hemophilia B](#)
- c. [von Willebrand's disease](#)
- d. [Factor VIII or IX inhibitor](#)

3. What treatment is indicated.

- a. [Reassurance](#)
- b. [Recombinant Factor VIII](#)
- c. [DDAVP nasal spray](#)
- d. [Porcine Factor VIII](#)

Virtual Patient Games



Interactive Patient Scenarios



Talbot, T. B., Sagae, K., John, B., & Rizzo, A. A. (2012). Sorting out the virtual patient: how to exploit artificial intelligence, game technology and sound educational practices to create engaging role-playing simulations. *International Journal of Gaming and Computer-Mediated Simulations (IJGCMS)*, 4(3), 1-19.

Types of Virtual Patients

High Fidelity Manikins



Virtual Reality (VR) Scenarios



Virtual Standardized Patients



Gudadapannavar, A. M., Hombal, P., Benni, J. M., Patel, S., & Tubaki, B. R. (2023). Evaluation of Virtual Reality High-Fidelity Adult Mannequin-based Simulation of Real-Life Clinical Scenarios in Teaching Clinical Pharmacology to Medical Students. *Journal of Pharmacology and Pharmacotherapeutics*, 14(1), 25-34.

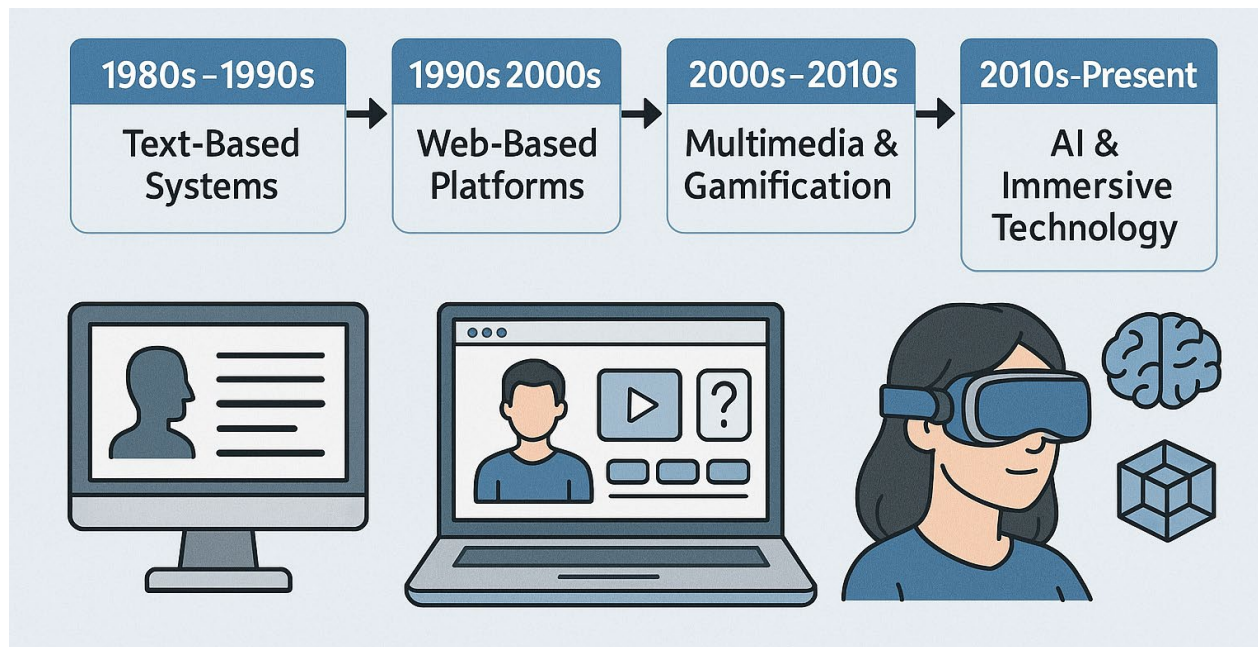
Current Challenges of Medical Education and Virtual Patient (VP)-Based Strategies^a

Challenge	VP educational strategy	VP educational activity	Potential educational outcome
Expansion of medical knowledge	Interactive learning activities	VP assigned prior to seminar (i.e., the flipped classroom)	Deep learning
Negative impact of medical education on student mental health	Capture student's intrinsic motivation to learn	VPs recommended by system, based on assessment of performance	Mastery and lifelong learning
Diagnostic error	Focus on application of foundational knowledge	VPs incorporating learner-constructed summary statements and prioritization of differential diagnosis	Clinical reasoning expertise
High prevalence of medical error	Competency-based education and assessment	VP-based assessment aligned with VP cases for learning	Reduced medical error
Difficulty identifying improved outcomes from educational strategies	Analyze educational data	VPs incorporating learning analytics to earlier identify and support learners at risk	Improved learning outcomes

^aThe authors define VP as a multimedia, screen-based interactive patient scenario.

Berman NB, Durning SJ, Fischer MR, et al. (2016). The Role for Virtual Patients in the Future of Medical Education. *Academic Medicine*. Vol. 91 (9): 1217-1222.

Development of Virtual Patients

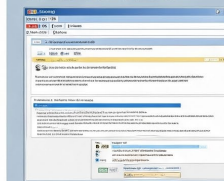


1980s-1990s



1990s-2000s

Web-Based



Text-Based

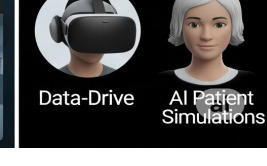


2000s-2010s

Multimedia



2010s-Present



Kononowicz, A. A., Woodham, L. A., Georg, C., et al. (2019). Virtual patient simulations in health professions education: Systematic review and meta-analysis. *Journal of Medical Internet Research*, 21(7), e14676.

Miller, R. A., Pople, H. E., & Myers, J. D. (1982). Internist-1, an experimental computer-based diagnostic consultant for general internal medicine. *New England Journal of Medicine*, 307(8), 468-476.

Radtke, J., Majchrzak, A., Fromm, J., & Wohlgenannt, T. (2020). A systematic review of immersive virtual reality applications for higher education. *Computers & Education*, 147, 103719.

Culture and Health System Adaptation of Virtual Patients as Collaborative Learning eResources South East Asia



Co-funded by the European Union

Virtual Patients with Augmented Reality (AR)



- Virtual patients with augmented reality are computer-generated patient simulations that overlay digital 3D holographic representations onto real-world environments, enabling medical learners to interact with lifelike patient scenarios through AR devices
- Interactive Medical Simulations: Digital patient cases enhanced with AR technology that allow students to examine, diagnose, and treat virtual patients in immersive mixed-reality environments
- Educational Tool Integration: Combination of traditional virtual patient case-based learning with cutting-edge AR visualization technology for enhanced medical education

Bruno, R. R., Wolff, G., Wernly, B., Masyuk, M., Piayda, K., Leaver, S., Gellisch, J., Baldus, S., Rudolph, V., Cornelissen, C., Müller-Newen, G., Marx, N., Carev, M., Kelm, M., Horn, P., Jung, C., & Westenfeld, R. (2024). Virtual reality and augmented reality in medical education: An umbrella review. *Frontiers in Digital Health*, 6, 1365345.

Kavanagh, S., Luxton-Reilly, A., Wuensche, B., & Plimmer, B. (2021). Augmented reality in medical education: Students' experiences and learning outcomes. *BMC Medical Education*, 21, 404.

Al-Khalili, D., Coppola, W., Craft, J., Reynolds, J., & Cater, S. W. (2023). Advancing medical education using virtual and augmented reality in low- and middle-income countries: A systematic and critical review. *Digital*, 3(3), 295-320.

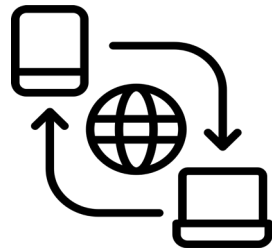
Hermant. (2023). Augmented reality bringing doctors' eyes and ears to remote medical exams in aged care. <https://www.abc.net.au/news/2023-05-19/regional-victoria-aged-care-trial-vr-remote-doctor-exams-visits/102356004>

Use of VP in Medical Education



Safe Learning Environment

Allows students to make clinical decisions without endangering real patients.



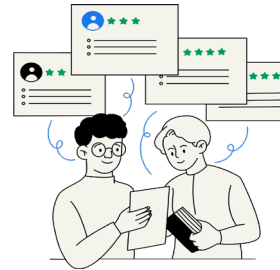
Flexible and Accessible

Can be accessed remotely, enabling self-paced or distance learning.



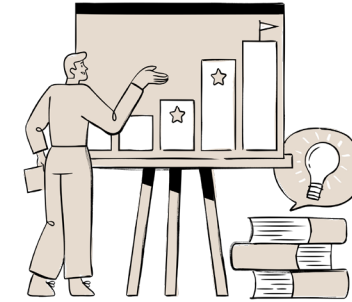
Standardized and Repeatable Practice

Every student encounters the same clinical case, promoting fairness and consistency.



Feedback and Reflection

Immediate feedback enhances critical thinking and self-assessment.



Skill Development

Supports training in diagnostic reasoning, communication, ethics, and procedural skills.



Integration into Curricula

Widely used in pre-clinical education, clinical rotations, and continuing professional development (CPD).

Cook, D. A., & Triola, M. M. (2009). Virtual patients: a critical literature review and proposed next steps. *Medical education*, 43(4), 303-311.

CHAPTER SEA Project

- Aim to implement and evaluate the use of collaborative learning using virtual patient cases in Malaysian and Indonesian partner medical programs with 1000 undergraduate students (120-400 students per institution)
- It will be implemented using:
 - The VP cases for SEA settings adapted from the CASUS application
 - Embedded into existing curricula
 - Target about 30 cases (4-8 cases in each institution)

An exemplary VP and a learner's map embedded in the VP system CASUS.

- The switches on top allow to show/hide all connections and the expert's map.
- A help page and a short introductory video are available.
- The clinical reasoning tool specifically aims to support the clinical reasoning process
- Diagnoses can be marked as final or working diagnoses and as must-not-miss (exclamation mark) diagnosis.

Hege I, Kononowicz, AA, Adler M. (2017). A Clinical Reasoning Tool for Virtual Patients: Design-Based Research Study. *JMIR Med Educ*. Vol 3(2); p:1-11.

Culture and Health System Adaptation of Virtual Patients as Collaborative Learning eResources South East Asia

Understanding of Virtual Patients

Five institutions of health professions in SEA

Educators	Admin	Students
● No experience on Virtual Patient in T&L activities but are aware of VP ● Experience of VR - visualises the level of respiratory distress of the patient and its management. ● Involved in a research of VP on history taking	● Technology-mediated patient interaction ● Virtual-reality understanding ● Patient representation concepts (i.e. 'avatar') ● Remote standardized patient integration (i.e. SP but through Zoom) ● Virtual environment perception	● No experience on VP in T&L activities but accepted on the use of VP in T&L Perceived Definition: ● Usage of Virtual Reality ● Simulated self explanatory website / platform ● Creating safe environment to prevent harm to real patient (e.g. doing procedures, correct communication skill, train management algorithm)

Challenges of using virtual patients

- Cost and time of building of VP
- Not suitable for short cases
- Physical interaction limitations
- Existing models does not suit local setting
- Resistance of use by educators
- Wifi connection
- Non-verbal assessment challenges/ communication barriers
- Limitation in clinical skills performance → no skills performance, and lack of real feelings and empathy in training



Thank You

FK UIN SYARIF HIDAYATULLAH JAKARTA

Culture and Health System Adaptation of Virtual Patients as Collaborative Learning
eResources South East Asia