TEHRAN UNIVERSITY OF MEDICAL SCIENCES

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EMERGING TECHNOLOGIES IN MEDICAL EDUCATION

WEBINAR – 3: Simulation in Medical Education

Virtual Hospital/Virtual Pharmacy

Soroush Ahmadi

PharmD/MHPE Candidate

Tehran University of Medical Sciences, Tehran, Iran

editTec

Outline

- Virtual patient technique
- Why is it important?
- Virtual Hospital
- Learning process by using virtual patients
- Virtual patient applications
- Virtual Pharmacy
- Advantages and disadvantages

Virtual Patient Technique

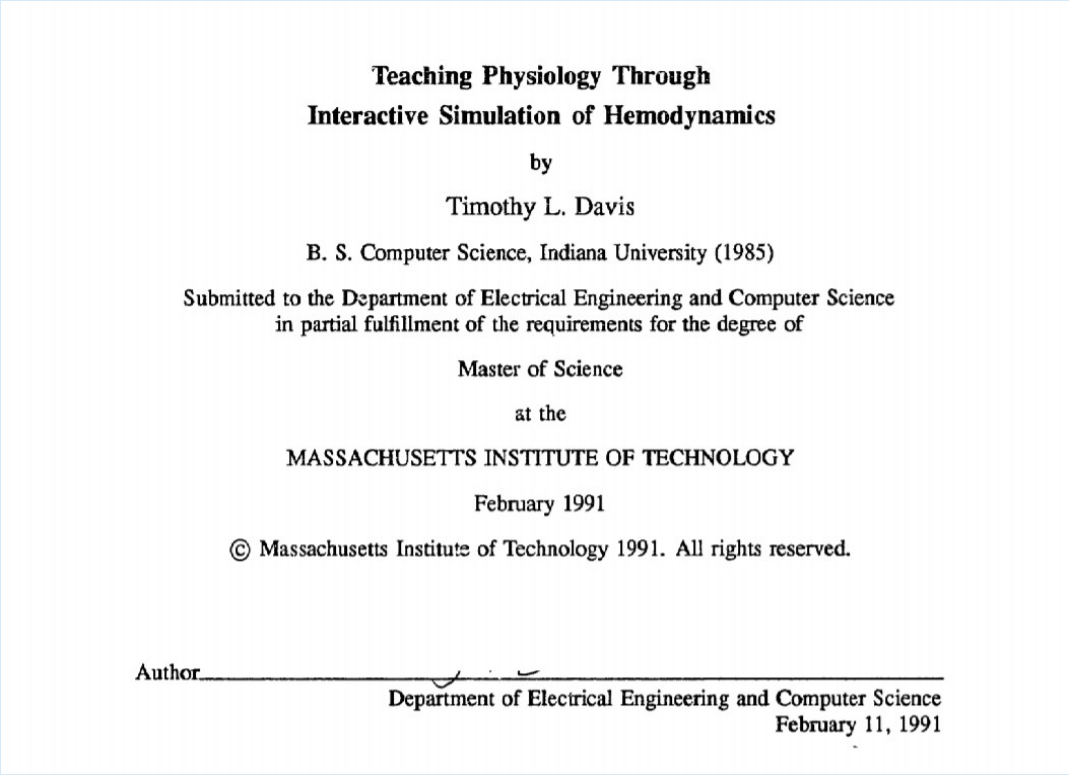
- Definition: Virtual patient can be defined as an interactive computer simulation based on a real-life clinical scenario for the purpose of medical training, education or assessment.[1]

- Our topic: Web-based virtual patients

1. Ellaway, R. H. (2014). Virtual patients as activities: exploring the research implications of an activity theoretical stance. *Perspectives on Medical Education*, *3*(4), 266–277. https://doi.org/10.1007/s40037-014-0134-z

Virtual Patient Technique

The term "virtual patients" appeared **for the first time** in the literature around 1990 to describe a simulation of hemodynamics used to teach physiology.



Teaching Physiology Through
Interactive Simulation of Hemodynamics

by

Timothy L. Davis

B. S. Computer Science, Indiana University (1985)

Submitted to the Department of Electrical Engineering and Computer Science
in partial fulfillment of the requirements for the degree of

Master of Science

at the

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

February 1991

Author_____
Department of Electrical Engineering and Computer Science
February 11, 1991

Virtual Patient Technique

why virtual patients are important? Why not going on to ONLY use the traditional direct student-patient contacts?

- the push towards shorter hospital stays (increasing number of patients are treated on an outpatient basis nowadays)
- specialization of hospitals
- increased focus on patient safety
- COVID19 pandemic.
- …

These could potentially diminish traditional opportunities for training of health professionals through direct patient contact. In such cases virtual patients are used to fill this gap and to help maintain a broad spectrum teaching that does not rely solely on textbook knowledge. [1]

1. Ramani, S., & Leinster, S. (2008). AMEE Guide no. 34: Teaching in the clinical environment. *Medical Teacher*, *30*(4), 347–364. https://doi.org/10.1080/01421590802061613

Virtual Patient Technique

According to medical education program accreditation standards in the United States and Canada:

"*if a medical student does not encounter patients with a particular clinical condition (e.g., because it is seasonal), the medical student should be able to remedy the gap by a simulated experience (e.g., a standardized patient experience, an online or paper case)*"[1]

LCME

LIAISON COMMITTEE ON MEDICAL EDUCATION

1. Liaison Committee for Medical Education. Functions and structure of a medical school. In: Standards for accreditation of medical education programs leading to the M.D. degree (for schools with full accreditation surveys in 2012-2013). Online. [Available at: http://www.lcme.org/standard.htm]2011.

Virtual Patient Technique

- The use of virtual patients is considered a type of **problem-based learning approach (PBL)**.

- Based on **Situated Learning theory**, learners can acquire knowledge through engaging in tasks that are in line with real-world activities. Such engagement can lead to a better motivation and deeper focus.[1]

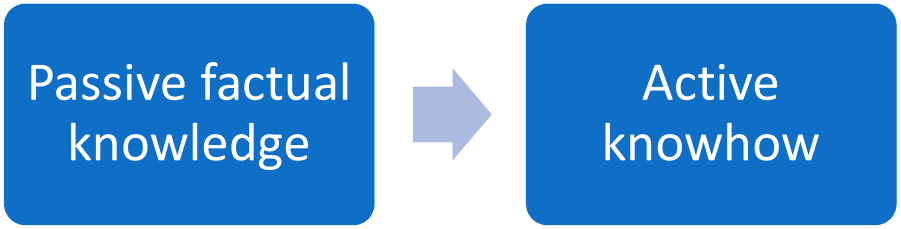
- In other words, it is important to ensure that the virtual patient scenario presents **a valid and coherent representation of the real world situations** to ensure that what is learnt is **directly transferable**.[2]

1. Quinn, C. N. (2005). *Engaging learning: Designing e-learning simulation games*. John Wiley & Sons.
2. Ellaway, R., Poulton, T., Fors, U., McGee, J., & Albright, S. (2008). Building a virtual patient commons. *Medical Teacher*, *30*(2), 170–174. https://doi.org/10.1080/01421590701874074

Example of Virtual Hospital

INMEDEA Simulator

- Virtual clinic
- Various faculties with typical patients
- Establishing diagnosis and therapy, making realistic clinical decisions
- Evaluation by an expert system



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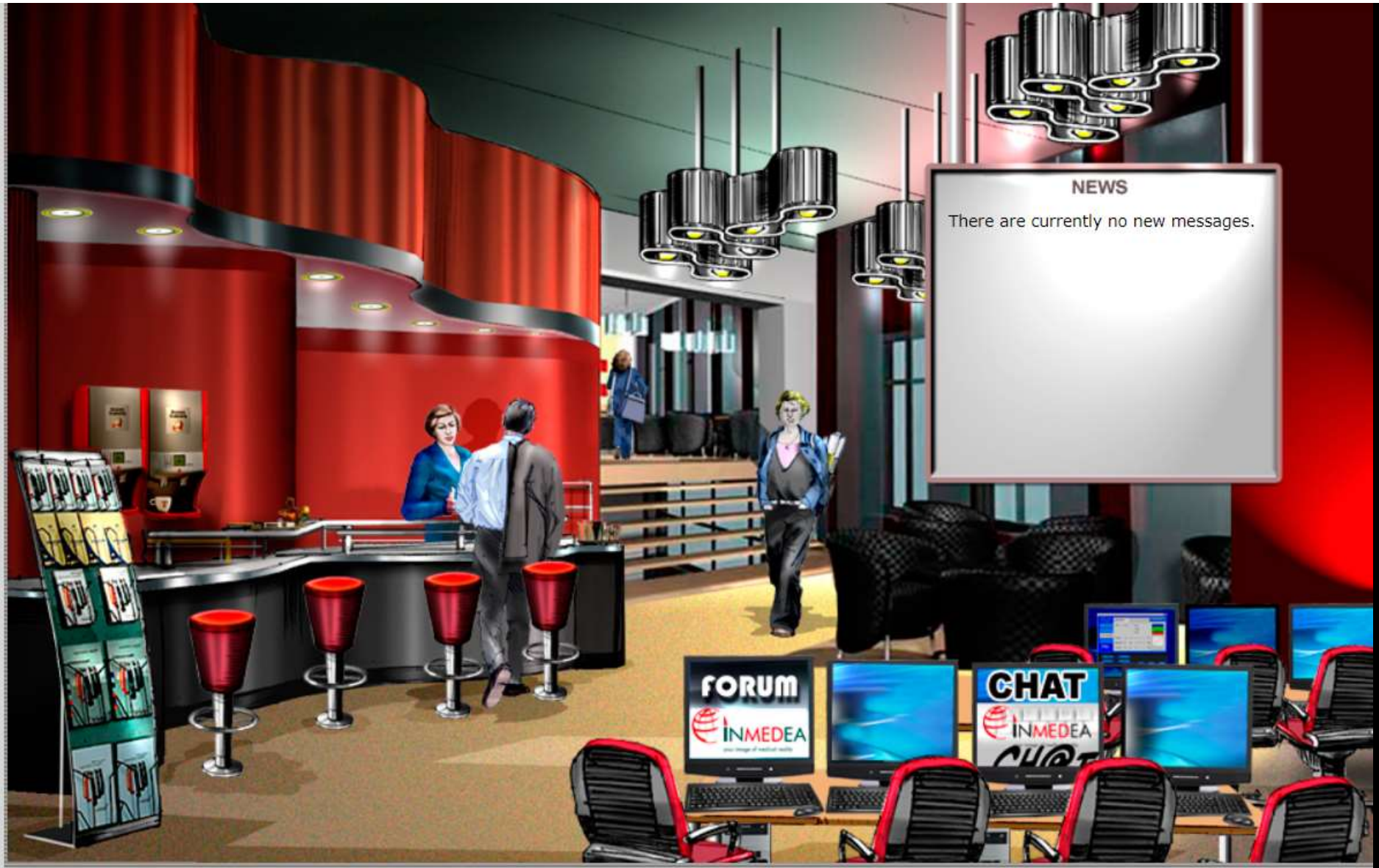
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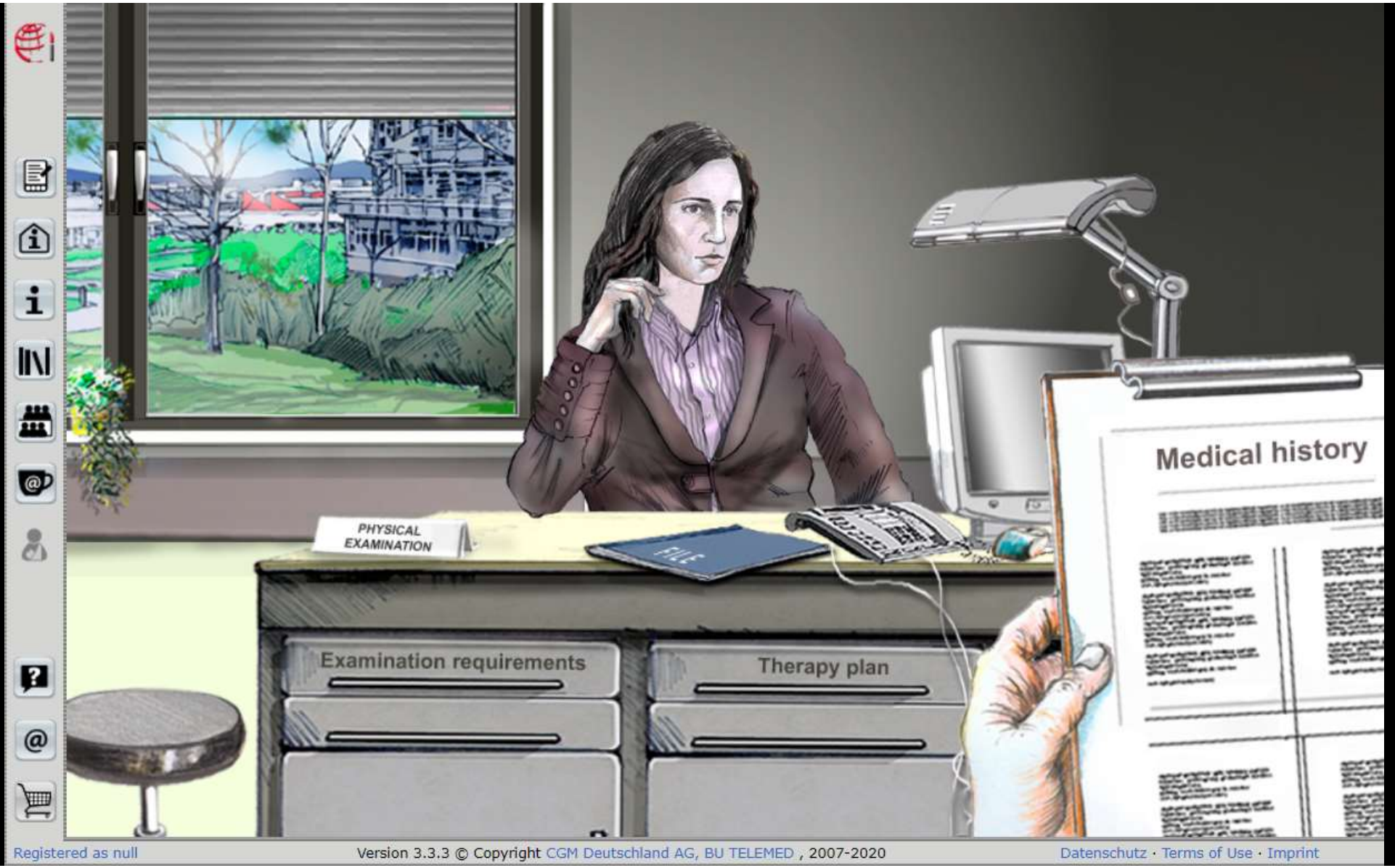
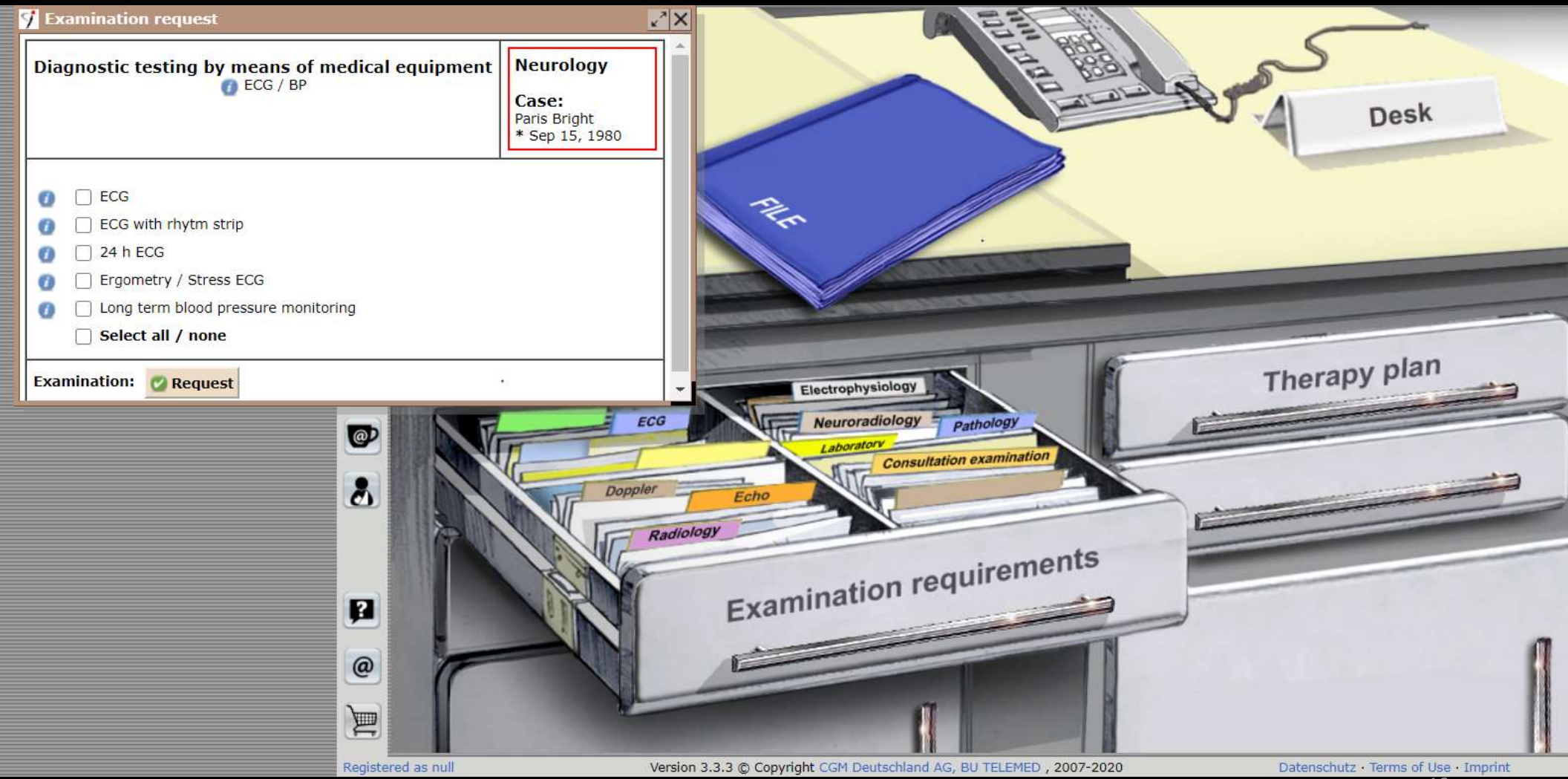
There are currently no new messages.
FORUM
INMEDEA
CHAT
INMEDEA




Examination request
Diagnostic testing by means of medical equipment
ECG / BP
Neurology
Case:
Paris Bright
* Sep 15, 1980
ECG
ECG with rhytm strip
24 h ECG
Ergometry / Stress ECG
Long term blood pressure monitoring
Select all / none
Examination:
Request
Desk
FILE
Therapy plan
Electrophysiology
ECG
Neuroradiology
Pathology
Laboratory
Consultation examination
Doppler
Echo
Radiology
Examination requirements
Registered as null
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Learning Process

- Virtual patients are typically presented as pre-existing cases that the students work through, typically on their own but they can also be collaborative.

- A virtual patient is processed on a computer screen and is based on an **authentic real-world clinical scenario**.

Learning Process

- The computer provides patient responses and requests information. The learner also communicates with the patient through writing, selecting and in some cases talking to the patient.

- The learner is cast into the **active role** of a practitioner, who must make decisions on what type and order of information to acquire, differential diagnosis, management and follow-up of the patient.

Virtual Patients Uses

- Clinical interviewing skills
- Clinical processes
- Bioethics
- Patient communication
- Patient history
- Clinical reasoning skills
- …

Virtual Patients Application in Medical Curricula

- Preclinical and clinical exercises
- Part of self-study scenario
- Small group activity in PBL sessions
- Post-graduate education
- Continuing education
- Student assessment
- …[1]

1. Kononowicz, A. A., Woodham, L., Georg, C., Edelbring, S., Stathakarou, N., Davies, D., Masiello, I., Saxena, N., Tudor Car, L., Car, J., & Zary, N. (2018). Virtual patient simulations for health professional education. In *The Cochrane Database of Systematic Reviews* (Vol. 2018, Issue 6). https://doi.org/10.1002/14651858.CD012194.pub2

Virtual Pharmacy

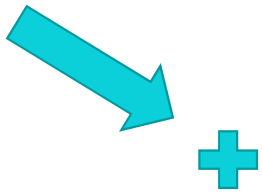
Medicine dispensing is a core skill and key competency for pharmacists.

It blends:

- Specialized knowledge
- Professional judgement
- Functional and behavioral competence
- Ethics and values
- …

Virtual Pharmacy

- This competence is often developed *in situ,* by **experiential learning** in professional placements.
- Placements sites are the first exposure to an actual practice setting and to become familiar with pharmaceutical products.
- Limited because of: increased demand and finite student support resources.



Virtual Pharmacy Placement

Virtual Pharmacy Example: MyDispense™

In 2011, the Faculty of Pharmacy and Pharmaceutical Sciences at **Monash University in Melbourne, Australia** introduced MyDispense, a web-based community pharmacy simulation program that promotes active, person-centered learning and allows students repetitive opportunities to achieve established learning objectives in their pharmacy curriculum.

MyDispense™

Web application supports total dispensing experience, from initial communication with the patient and prescriber to professional advice when handing medicines to the patient.

At the end of each exercise, students receive rich, contextual feedback on their dispensing performance.

Access to references

Benchtop basket including dispensed drugs and their labels

Phone to call the prescriber (if needed)

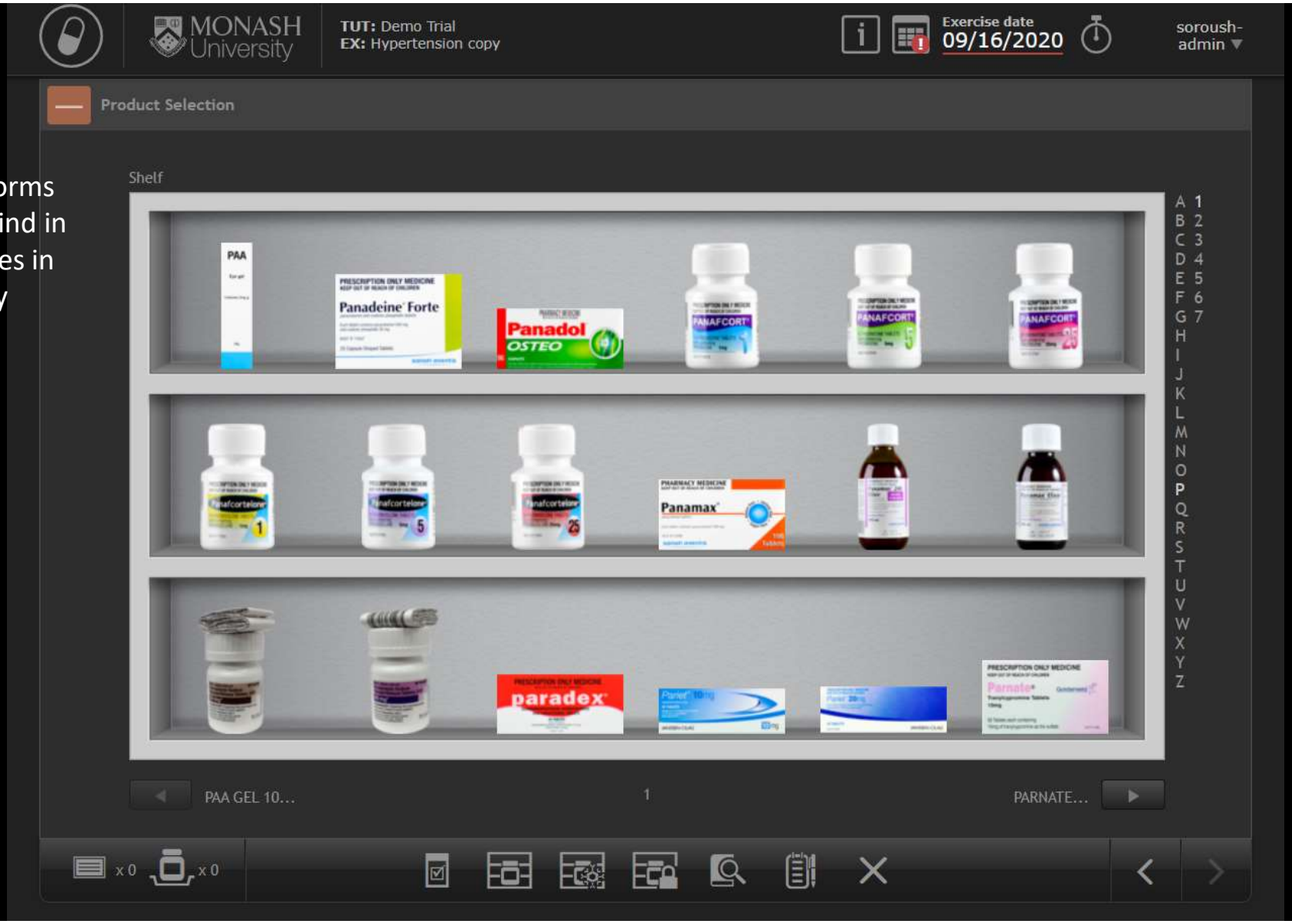
Computer to enter the data

Prescription fridge

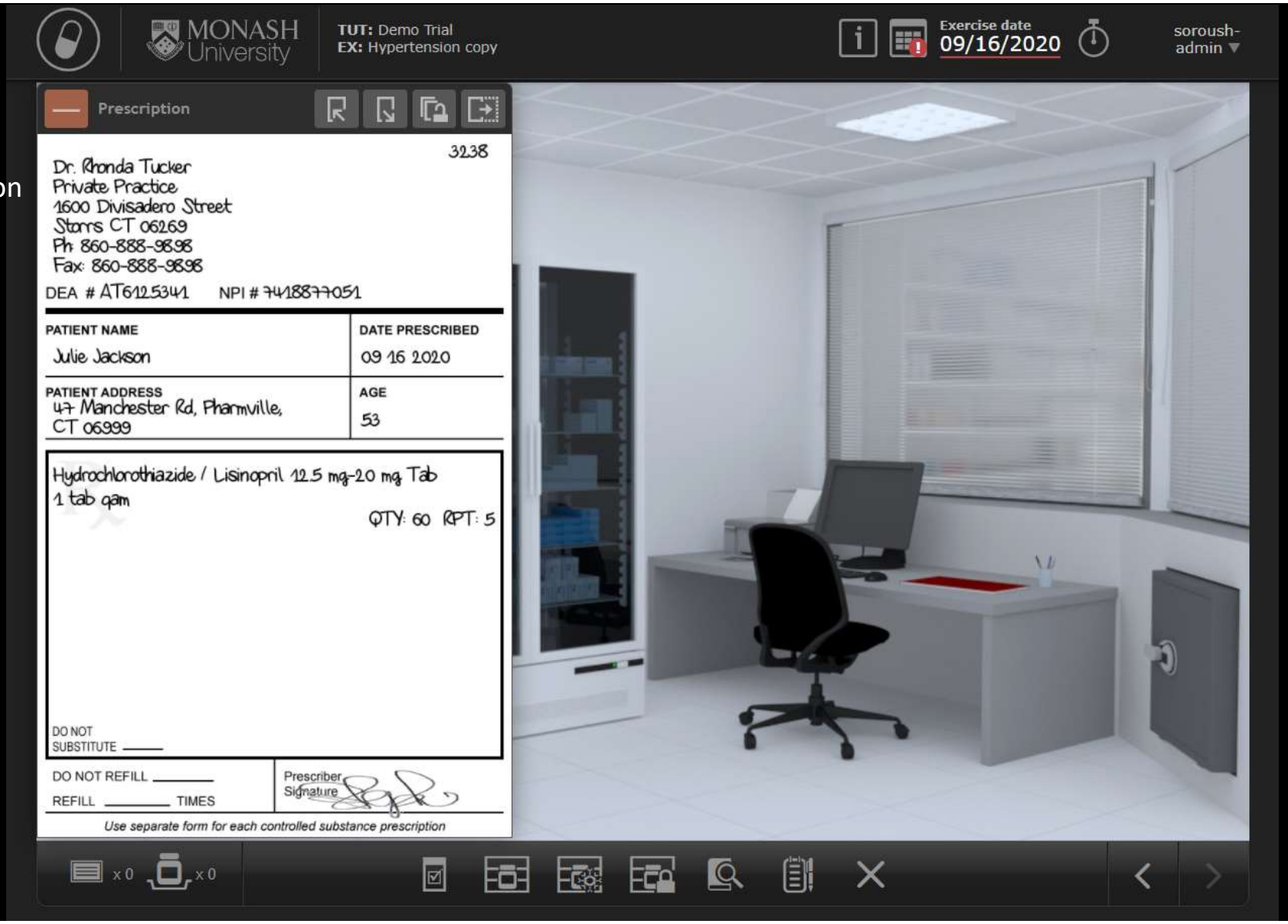
Prescription shelves

Safe

Dosage forms you can find in the shelves in pharmacy



Sample prescription



MyDispense™

Goals and objectives:

- **Assess a prescription** (completeness, legality, appropriate drug, dosage form, dose, drug-drug interactions)
- **Manage patient profile** (for medication use, comorbidities, allergies, adverse drug reactions, lab tests, …)
- **Select medications to dispense** (from inventory)
- **Develop patient label for the prescription** (verify content on the label and select auxiliary labels)
- **Counsel a patient**

Virtual Hospital/Pharmacy Pros and Cons

Advantages	Disadvantages
Interactivity	Difficulty of design and integrating into the curricula
Easy access	High costs of implementation and maintenance
Immediate feedback	Weakness in the assessment of complex cognitive skills
Safe zone	Emotional and human interactions cannot be simulated

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Thank You

For Your Attention.

Any questions?

sorooshamd@yahoo.com
www.linkedin.com/in/sorooshamd
+98-9336056006