

Enhancing Team-Based Learning Application Exercises with AI- Powered Patient Personas

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TBLC Conference, May 2026 - Vancouver, Canada

AI Powered Patient Personas

“Imagine giving the students a clinical case... and instead of reading it, they can talk to the patient.”

AI Powered Patient Personas

The current AE “limitations” for clinical cases

Limitations

- Static cases
- Passive reading
- Limited interaction
- Weak feedback loops

The Gap in TBL Application Exercises

- TBL is designed for active, team-based problem solving
- But case delivery is still static and limited interaction and feedback in practice

AI Powered Patient Personas

The research project: Two AI Personas

1. Patient Mr. Lim

Mr. Lim is a pragmatic and stoic man, shaped by decades of self-reliance and observing city life from his driver's seat. He's fiercely independent and views his current health crisis not just as a medical problem, but as a frustrating loss of control. He is proud and dislikes appearing weak or being a burden to others.



AI Powered Patient Personas

The research project: Two AI Personas

2. Dr Tan

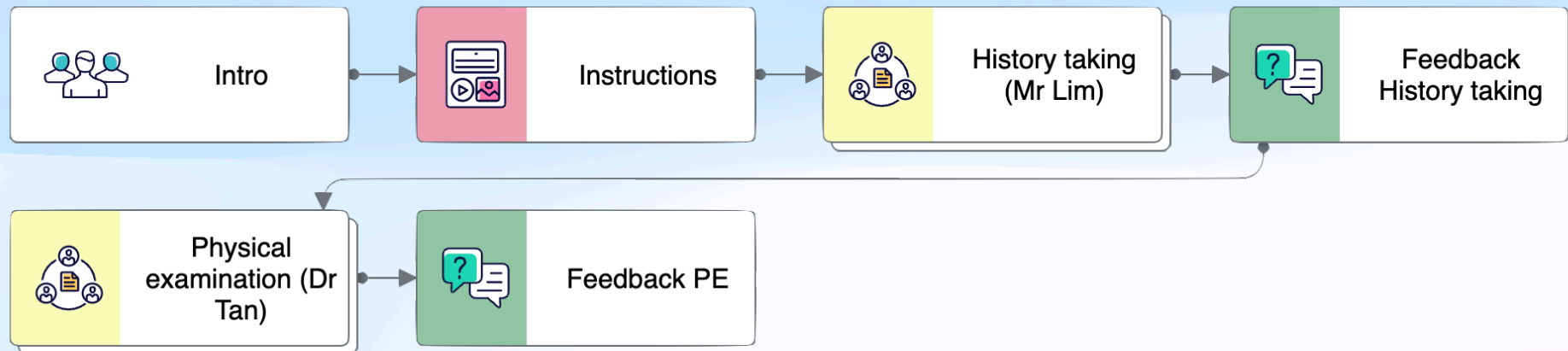
Dr Tan is an energetic and confident clinician who leads interactions with enthusiasm, keeping others engaged through frequent questions and active discussion. He is intellectually curious and encouraging, often pushing learners to think deeper and understand the reasoning behind clinical findings. While supportive and generally calm under pressure, he can be slightly less structured at times, favouring flow and engagement over strict precision.



The TBL AE Clinical Case with AI Personas

Course: Clinical Health Assessment and Reasoning

NUS Nursing School - 88 Students



Creating Mr Lim

AI Persona Template

Mr Lim

- Persona details
- BFI Traits
- Medical & Social History
- Personality & Demeanour
- Behaviour During the Medical Interview & Assessment

The TBL AE Clinical Case with AI Personas

Students' Instructions

In these AEs, you practise **clinical skills by interacting with two AI roles:**

- 1. First an AI patient for history-taking and triage, then**
- 2. AI doctor to present findings, explain your reasoning, and carry out a structured examination.**

You'll also pause between stages to reflect on your performance and give feedback. The goal is to strengthen your communication, clinical reasoning, and confidence in a safe learning environment.



Dr Tan

Hello, I am Dr. Tan, here to assist you with the physical examination of Mr. Lim. What would you like to do first?



Team Code Blue

I would like to assess mr lim's generally. Any presentation of laboured breathing or ect



Dr Tan

Good. During the inspection, Mr. Lim appears anxious and slightly pale. He is using accessory muscles subtly during breathing. There is no central cyanosis or obvious chest deformity. Do you have any questions for me about the inspection findings?



Team Code Blue

Does he have any scars that indicates past surgery?



Dr Tan

No, there are no visible scars or deformities over the chest.



Team Code Blue

Any raccoon eyes?



Dr Tan

No, there are no signs of raccoon eyes present on Mr. Lim.



Team Code Blue



medication

- lisinopril 10 mg daily
- metformin 500 mg twice a day
- Salbutamol PRN

General Inspection

Mr. Lim appears anxious and slightly pale.

He is using accessory muscles subtly during breathing.

There is no central cyanosis or obvious chest deformity.

no visible scars or deformities over the chest.

Mr. Lim are warm to the touch with a normal color.

There are no signs of clubbing present in the fingers.

Capillary refill time is within normal limits, and there are no flapping tremors observed.

- +ve JVP raised
- nil oedema

Palpitation

The palpation findings are: no tenderness or masses, equal chest expansion, and reduced tactile fremitus in the left lower zones of the lung

All Pulses: regular, strong, normal rate

no thrills felt in the area of the aorta, pulmonary valve, tricuspid valve, or mitral valve.

no right ventricle heave

Percussion,

- dullness noted at the left lower lung zone, posteriorly.

The auscultation findings are as follows:

- Decreased breath sounds at the left lower base
- Fine inspiratory crackles present bilaterally, worse at the bases
- Heart sounds are soft, with no murmurs and a regular rhythm

AI Simulated Personas Evaluation

Mr Lim and Dr Tan

Student Experience with AI Simulated Patient (Mr Lim)

Overall Impression

The overall student experience was positive, with many describing the interaction as:

- *“good”, “great”, or “very nice”*
- *“interesting” and “interactive”*
- *“a fun way to learn”*



Student Experience with AI Simulated Patient (Mr Lim)

Strengths of the Experience

Realistic and Detailed Responses

A dominant theme was that the AI patient:

- Provided clear, precise, and detailed answers
- Responded realistically, similar to real patients
- Could recall symptoms and context well

Examples from the feedback:

- *“gave detailed and realistic answers like how a patient normally would”*
- *“patient is able to give clear and precise answers”*
- *“he was detailed in answering my questions”*

This suggests the simulation was **effective in mimicking authentic patient interactions.**

Student Experience with AI Simulated Patient (Mr Lim)

Supports Learning and Clinical Reasoning

Students highlighted that the experience:

- Encouraged **critical thinking**
- Helped them **structure clinical questions**
- Supported **diagnostic reasoning**

Examples from the feedback:

- *“good for critical thinking”*
- *“help us narrow down to possible tests and diagnosis”*
- *“combine medical knowledge, observation, and interpersonal skills”*

Many students recognised the exercise as valuable for **developing clinical judgement and reasoning pathways**

Student Experience with AI Simulated Patient (Mr Lim)

Interactive and Engaging Learning

Students appreciated the interactive nature of the experience:

- *“fun and interactive way to learn”*
- *“amazing to talk with AI patient”*
- *“makes me feel that I know more about my patient”*

Many students recognised the exercise as valuable for **developing clinical judgement and reasoning pathways**

Student Experience with AI Simulated Patient (Mr Lim)

Encourages Active Questioning

Students highlighted that the experience:

- Asking better questions led to better answers
- The experience reinforced the importance of **structured history-taking**

Examples from the feedback:

- *“need to be well detailed in asking”*
- *“construct question so that patient provide sufficient information”*

Student Experience with AI Simulated Patient (Mr Lim)

Challenges and Limitations - Difficulty in Formulating Questions

A significant number of students reported:

- Uncertainty about **what to ask next**
- Difficulty **structuring questions logically**

Examples from the feedback:

- *“unsure on what else to ask”*
- *“cracking my brain to think of questions”*
- *“challenging to ask focused questions”*

This suggests students may need **more scaffolding or guidance** during the activity.

Student Experience with AI Simulated Patient (Mr Lim)

Challenges and Limitations - Limitations in Realism

A few students noted differences from real-life patients:

- AI patient may be **less expressive**
- Answers can sometimes be **too concise unless probed**

Examples from the feedback:

- *“usually in real life patient would be more expressive”*

Student Experience with AI Simulated Patient (Mr Lim)

Key Learning Outcomes Observed

From the feedback, students demonstrated:

- Improved awareness of **structured history-taking**
- Recognition of the importance of:
 - Asking **targeted questions**
 - Following **logical clinical flow**
- Development of **clinical reasoning and differential diagnosis thinking**

Student Experience with AI Simulated Patient (Mr Lim)

Summary of Students' Experience

The AI simulated patient experience was **well-received and educationally valuable**, particularly for developing **history-taking and clinical reasoning skills**. While most students found it engaging and realistic, improvements in **guidance, clarity, and simulation depth** would further enhance its effectiveness.

Positive Aspects:

- Realistic, responsive AI patient
- Engaging and interactive learning experience
- Strong support for clinical reasoning and questioning skills

Areas for Improvement:

- Provide guidance for question structuring
- Reduce ambiguity in instructions
- Enhance realism (e.g., emotional expression)

Student Experience with AI Simulated Doctor (Dr Tan)

Overall Impression

The overall **experience was positive**, with students describing it as::

- *“good”, “great”, and “okay”*
- *“informative” and “structured”*
- *a valuable **practice opportunity***



Student Experience with AI Simulated Doctor (Dr Tan)

Strengths of the Experience - Clear, Detailed, and Informative Explanations

Realistic and Detailed Explanations

A key strength highlighted was that Dr Tan:

- Provided detailed explanations
- Delivered clear and understandable information
- Was able to answer all student questions effectively

Examples from the feedback:

- *“very detailed”*
- *“very detailed and clear explanation”*
- *“Dr Tan is very informative, learned a lot from him”*
- *“AI able to answer all my questions and explained”*

The simulation was particularly **strong in teaching and explanation**, more so than just interaction.

Student Experience with AI Simulated Doctor (Dr Tan)

Supports Learning and Knowledge Building

Students consistently reported:

- Gaining **new knowledge**
- Improved understanding of **physical examination concepts**

Examples from the feedback:

- *“learned a lot from him”*
- *“provide opportunity to learn more about physical assessment”*
- *“able to further my understanding”*

The experience appears effective for **reinforcing theoretical knowledge with applied learning.**

Student Experience with AI Simulated Doctor (Dr Tan)

Structured and Guided Learning

Students noted that:

- The process was well-structured
- It followed expected clinical frameworks (e.g., IPPA)

Examples from the feedback:

- *“very structured.. must IPPA”*

This indicates the experience helps students internalise systematic examination approaches.

Student Experience with AI Simulated Doctor (Dr Tan)

Interactive and Practical Learning Experience

Students valued the simulation as:

- More engaging than passive learning
- A **hands-on alternative** to lectures

Examples from the feedback:

- *“more practical than sitting in and watch video lecture”*
- *“good practice to take physical examination”*

This highlights the experience role in **active, experiential learning**.

Student Experience with AI Simulated Doctor (Dr Tan)

Challenges and Limitations - Difficulty in Knowing What to Ask

A recurring issue was:

- Uncertainty in formulating appropriate questions

Examples from the feedback:

- *“challenge to come up with the right questions to ask”*
- *“unsure of what to ask”*

This mirrors findings from the previous simulation and suggests a **need for better scaffolding or prompts**

Student Experience with AI Simulated Doctor (Dr Tan)

Challenges and Limitations - Limited Depth in Some Responses

While generally positive, a few brief responses (e.g., “good”, “okay”) suggest:

- Some students may have had a neutral or less engaged experience

Student Experience with AI Simulated Doctor (Dr Tan)

Key Learning Outcomes Observed

Students demonstrated:

- Improved understanding of physical examination techniques
- Familiarity with structured examination frameworks (e.g., IPPA)
- Enhanced ability to:
 - Ask clinical questions
 - Interpret findings
 - Apply theoretical knowledge in practice

Student Experience with AI Simulated Doctor (Dr Tan)

Summary of Students' Experience

The AI simulated doctor (Dr Tan) experience was **well-received and highly educational**, particularly for **learning physical examination concepts and structure**. Its strength lies in **clear explanations and guided learning**, making it an effective supplement to traditional teaching methods. Enhancing **question guidance and interaction flow** would further improve its effectiveness.

Student Experience with AI Simulated Doctor (Dr Tan)

Summary of Students' Experience

Positive Aspects:

- Clear, detailed, and educational explanations
- Strong support for knowledge acquisition
- Structured and systematic learning approach
- Interactive and practical compared to lectures

Areas for Improvement:

- Provide guidance on what questions to ask
- Adjust timing of diagnostic feedback
- Support learners with less clinical exposure
- Increase engagement depth for all users

Student Experience with AI Simulated Doctor (Dr Tan)

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Want to do research on Simulated Personas in TBL?

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Thank you!

2026 TBLC Conference Vancouver, Canada



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