Problem based learning with virtual patients improves the Diagnostic Thinking Ability: Students Memory Structure

Turk Neja¹, Sobočan Monika¹,², Pečovnik Balon Breda¹
¹Faculty of Medicine, University of Maribor, Taborska ulica 8, 2000 Maribor
²Centre for Medical Education, , Taborska ulica 8, 2000 Maribor, Slovenia
Correspondance: Neja Turk: neja.turk1@gmail.com

Theoretical background:
Problem based learning (PBL) is long established as a method of teaching in medical education. However, to link the theoretical nature of PBL designed for classroom education with clinical practice is still a challenge. A solution to this challenge could be education with virtual patients. This method replaces linear PBL cases (predetermined scenario) with virtual patients with the so-called “decision-PBL (D-PBL).” Using a method of D-PBL, virtual patients enable students to make decisions about the diagnostic procedures and treatment of their patient. Current studies indicate D-PBL positively impacts on learning outcomes and hypothesis have been made it improves clinical reasoning. We explore in this study the improvement of clinical reasoning when using virtual patients.

Methodology:
Thirty-four 3rd year medical students (with little prior clinical experience) participated in the study in 2 groups. One group used virtual patients during their PBL-classes and the other group used paper-based PBL cases to study cardiology and gastroenterology. At the beginning and end of their semester students were given the Diagnostic Thinking Inventory questionnaire (DTI). We measured the improvement of DTI measurement components, the “flexibility in thinking” and “memory structure”, which indicate an improvement in clinical reasoning.

Results:
Both groups improved during the semester in clinical thinking. The students using virtual patients had a mean score of 83.64 (prior) vs. 91.83 (after) in “Memory Structure” (Figure 3). In the control group, using paper based PBL, the mean improvement was lower: 81 (prior) vs. 86.125 (after) in “Flexibility of thinking” (Figure 2) and 79.05 (prior) vs. 84.18 (after) in “Memory Structure” (Figure 1).

Discussion: Our study shows a significant improvement in memory structure when using virtual patients compared to paper based PBL. While it is expected students advance in both fields, the more significant increase in “Memory Structure” when using virtual patients is a beneficial outcome for students. Therefore in order to increase clinical reasoning among medical students using virtual patients is a viable option.
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Neja Turk, Monika Sobocan, Breda P. Balon

Faculty of Medicine, University of Maribor, Slovenia
neja.turk1@gmail.com monika.sobocan@gmail.com breda.balon@guest.arnes.si

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Results: Both groups improved during the semester in clinical thinking. The students using virtual patients had a mean score of 83.64 (prior) vs. 90.41 (after) in “Flexibility of thinking” and 81.53 (prior) vs. 91.83 (after) in “Memory Structure”. In the control group, using paper based PBL, the mean improvement was lower: 81 (prior) vs. 86.125 (after) in “Flexibility of thinking” and 79.05 (prior) vs. 84.18 (after) in “Memory Structure”.

Discussion: Our study shows a significant improvement in memory structure when using virtual patients compared to paper based PBL. While it is expected students advance in both fields, the more significant increase in “Memory Structure” when using virtual patients is a beneficial outcome for students. Therefore in order to increase clinical reasoning among medical students using virtual patients is a viable option.