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Immersive Virtual Reality Simulation Development with a Nursing Workflow Approach: Optimizing Experiential Learning for Respiratory Distress Management

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Abstract

Background: Fragmental learning in nursing immersive virtual reality (IVR) simulations may lack context and distort accurate presentation of the real-life nursing practice. This can make it challenging for the nursing students to fully understand how a combination of skills fit together to optimize patient care. Developing IVR simulations that mimic real-life nursing workflow rather than a single-skill oriented simulation scenario could augment IVR nursing education and provide a more realistic and optimized experiential learning experience.This presentation described how Kolb's Experiential Learning Theory model was used to develop IVR simulation scenario on managing COVID-19-induced respiratory distress.

Hypothesis: It was hypothesized that this IVR simulation will increase nursing students' learning, knowledge scores, and confidence in managing patients in respiratory distress induced by COVID-19

Methods: This IVR simulation comprised three IVR modules developed by a Canadian immersive learning platform Lumeto to reflect Kolb's four modes of learning: 1) concrete experience; 2) reflective observation; 3) abstract conceptualization, and 4) active experimentation. The three modules included: 1) donning and doffing of the personal protective equipment; 2) focused respiratory assessment and 3) stabilizing COVID-19-induced respiratory distress. Upon stabilizing their virtual patient, nursing students were asked to relay the incident to a Nurse Practitioner using the SBAR format. Knowledge, confidence, and learning related to managing COVID-19-induced respiratory distress among nursing students were analyzed using descriptive and inferential statistics.

Results: Data (n=30) revealed a statistically significant change in knowledge scores from pre-test to post-test (t-test: $t(30) = -3.56$, $p = 0.01$) and a moderate effect size (Cohen's $d = -0.65$) of the intervention. The study also showed a high mean score in confidence ($\bar{x} = 9.9/12$, SD = 2.35) and learning ($\bar{x} = 10.6/12$, SD = 1.79).

Conclusion : Nursing educators can utilize a nursing flow approach to developing IVR simulations that combine versatile IVR modules into a comprehensive IVR simulation scenario. This would urge students to practice and demonstrate nursing extensive skills, clinical reasoning abilities, and professional communication. Such a strategy can be helpful for providing a more realistic and effective learning experience and improve retention of information and skills. In addition, such an approach may facilitate a smoother transition from nursing student to a new graduate nurse role.