Is there an SOP for this? Using Simulation to Assess the Implementation of a Laboratory Information System in Medical Laboratory Science Education

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Introduction
- Laboratory Information System (LIS) software is used to record, manage, and store clinical information.
- LIS competency is necessary for medical laboratory technologists as it is involved in nearly every step of the laboratory workflow.
- The Division of Medical Laboratory Science (MLS) at the University of Alberta developed and implemented several simulation scenarios for the first-year student curriculum that incorporated various functions of an LIS.

Research Question: How effective is simulation for practice and application of LIS and other transferrable skills?

Objectives
- Creation and implementation of several moderate-to-high fidelity simulation scenarios
- Development of rubrics to monitor student performance and simulation effectiveness

Simulation Scenarios
- Pre-brief
- Scenario
- Debrief

Learning Objectives:
- Practice and become familiar with basic LIS functions
- Follow instructions in SOP manuals efficiently and effectively
- Demonstrate effective communication skills
- Practice appropriate data and specimen handing and processing
- Manage and share workload with team members

Required Tasks:
- Data entry of laboratory testing orders
- Manual results entry and reporting

Potential Distractions:
- Case #1: Cancelling an insufficient sample
- Case #2: Cancelling a physician’s test order
- Case #3: Checking previous order for a unit phone-in

Evaluation Tools
- MLS-LIS Simulation Rubric
  - Facilitator evaluation of students’ specific skills, behaviors, and overall simulation performance
  - Included various LIS functionalities, SOP use, communication, safe work practices, professionalism, and critical-thinking
  - Based on LIS SOPs and general CSM/LS competencies
- MLS Simulation Thinking Category
  - Assigned based on student’s cognitive approach to the scenario
  - Four categories: sensorimotor, preoperational, concrete, and formal
- MLS Simulation Evaluation Survey
  - Student evaluation of the simulation design and process
  - Covered pre-brief, scenario, debrief, and overall simulation
  - Agreement based on a 5-point Likert scale

Student Performance
- LIS competency:
  - 74% successful data entry
  - 84% successful results entry
- Students struggled with accessing and documentation
- SOP Use:
  - 76% efficient use
  - 88% accurate use
  - First-time exposure to multiple SOPs without assistance

Communication and Teamwork:
- 94% effective communication with peers
- Lack of proper phone etiquette
- Professionalism and Safety:
  - 92% proper safety measures
- Students frequently and consistently performed clerical checks
- Need for further practice with task prioritization

Simulation Thinking Category
- Concrete
  - 24.0% (6/25 students)
- Preoperational
  - 55.6% (15/25 students)

Simulation Design
- Scenario Design:
  - 96% felt simulations were realistic and relevant to the clinical lab
- Skill Practice:
  - 99% were able to practice troubleshooting, technical, critical-thinking, and other transferrable skills
- Teamwork:
  - 88% perceived effective teamwork in their group
- Student comment:
  - “Understanding the laboratory workflow in terms of communication, efficiency, and work order”

Areas for Improvement:
- Adequacy of resources
- Length of scenario

Discussion
- Student performance reflected the limited prior clinical exposure of these early learners
- Findings justify the training the students are receiving in the program and opportunities for improvement
- Simulation provides an opportunity for practice technical and relevant transferrable skills
- Changes to timing of curriculum are needed to enhance students’ simulation experience

Limitations
- Minimal clinical experience of first-year MLS students limited complexity of scenarios
- Need for standardization and validation of simulation scenarios and evaluation tools to allow for comparison between simulations

Conclusion
- Simulation in an MLS program is an effective way for students to practice LIS and other transferrable skills
- Early use of evaluation tools can help monitor student progress in the program

Future Directions
- Continuous use and refinement of scenarios and evaluation tools
- Advanced LIS simulations for year two students
- Incorporation of LIS into existing MLS simulations
- Earlier professional communication sessions in the MLS curriculum

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