**Assessment of competency of Pharm D students on self-medication request: a patient simulation approach**

**1. Introduction**

Self-medication constitutes a worldwide public health challenge which affects developing nations like India especially. Pharm D students will become future healthcare experts who must provide counselling services and promote medication rationality for patients. However, the traditional educational system fails to offer sufficient opportunities for students to interact with patients in real time and address self-medication situations specifically.

The proposed research will use AI technology to develop and test an exceptional virtual patient simulation software that will evaluate Pharm D student capabilities in addressing self-medication requests. The simulation operates through the use of virtual patients created by AI which enables assessment of decision-making and communication together with ethical considerations and pharmacological reasoning.

**3. Rationale**

Pharmacists must increase their responsibilities for patient safety because self-medication has become more prevalent among patients. Pharm D students need to build their capability for effective clinical assessment and communication features to handle medicine requests from patients properly. Traditional education systems do not provide complete preparation for their future encounters with patients in real world settings. This investigation implements virtual patient simulations based on artificial intelligence to create authentic self-medication conditions which enable both assessment and competence development for students through an interactive system. The system functions to connect classroom learning with real-world pharmacy practice for educational purposes.

**2. Objectives**

**Primary Objective**

To assess the competency of Pharm D students in managing self-medication requests using an AI-powered virtual patient simulation

**Secondary Objectives**

1. To design realistic self-medication training materials and case scenarios.
2. To develop an AI-driven, interactive virtual patient simulation platform tailored to pharmacy education.
3. To analyse competency metrics such as clinical reasoning, patient safety, counselling effectiveness and communication skills.
4. To compare the effectiveness of AI-based virtual simulation versus traditional teaching methods in improving learning outcomes.

**4. Methodology**

**4.1 Phases of the Project**

**Phase I: Content Design & Scenario Development**

* Identification of common self-medication related consequences (via literature + surveys)
* Development of various training modules related to OTC medications
* Development of patient case scripts involving: analgesics, cough syrups, antipyretics, GI drugs, antihistamines, antibiotics
* Scripts reviewed by pharmacology, clinical pharmacy communication experts.

**Phase II: AI Virtual Patient Simulation Development**

**Key Components:**

1. Validated AI-powered virtual patient simulation tool which can train and assess the competency of the Pharm D students
2. Multiple language (customise)
3. AI-powered patient avatars
4. Voice-based interaction (virtual assistant)
5. Performance tracking for individual students and groups
6. Need Customization option for case scenarios for advance students
7. Monitoring student progress in real time
8. Simplified language
9. Empathetic communication
10. AI patient responses (based on real patient behaviour)
11. AI adjusting responses based on student questions and recommendations

**Content:**

Step -1

1. Training modules:
2. Introduction Module
3. Clinical Knowledge Foundation Module
4. Simulation Navigation & Practice Module
5. Feedback & Assessment Module
6. Advanced Skill Modules (Optional)
7. Case scenario-based training:

Adding multiple case scenarios for different class of OTC medications where the virtual patient will interact with the student pharmacist.

1. Competency Assessment:
2. Basic knowledge assessment
3. Case scenario-based assessment
4. Results

**Phase III: Pilot Testing**

* Small group of students test 3–5 scenarios.
* Metrics collected:
  + Accuracy of clinical decisions
  + Time to respond
  + Ethical consideration in responses
  + Satisfaction surveys (students + faculty)

**Phase IV: Intervention Study**

* Control Group: Traditional paper-based case scenarios
* Intervention Group: AI Virtual Patient Simulation
* Assessment Tools:
  + Pre- and post-intervention tests
  + OSCE-style stations with real and virtual cases
  + Standardized rubrics for performance

**Phase V: Evaluation & Data Analysis**

* Quantitative Analysis:
  + Student scores (t-tests, ANOVA, regression models)
  + Performance improvements across modules
  + Correlation between simulation usage and learning gains
* Qualitative Analysis:
  + Focus group discussions
  + Thematic analysis of student feedback
  + Faculty observations

**5. Expected Outcomes**

• A validated AI simulation tool tailored to Pharm D education

• Statistically significant improvement in student competencies

• Framework for future curriculum integration

• Peer-reviewed publications and presentations at pharmacy education conferences

• Potential for commercialization and licensing to universities

**6. Research Significance**

The research presents an educational reform for pharmacy education through advanced AI technologies. Interesting AI technologies from this study help students become competent and confident while preparing them for practical challenges especially against the growing problem of irrational self-medication.