

Enhancing Clinical Reasoning in Family Medicine Residents through a Comprehensive Asynchronous Problem-Based Learning Curriculum: A Proof-of-Concept Study

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Abstract

Introduction: Postgraduate medical education (PGME) faces the challenge of providing comprehensive clinical training that fosters deep learning and clinical reasoning skills. Traditional didactic methods often fail to promote active learning and knowledge application, especially given the time constraints of busy residency programs. Asynchronous Problem-Based Learning (PBL) offers a flexible, learner-led alternative that encourages self-directed learning and peer collaboration. Grounded in Constructivism and Self-Directed Learning Theory, this study presents a secondary data analysis of an existing asynchronous PBL curriculum implemented for second-year (PGY2) family medicine residents.

Hypothesis & Objectives: We hypothesized that a structured, asynchronous PBL curriculum would maintain high resident engagement and significantly improve clinical reasoning through collaborative case analysis. The primary objective was to evaluate a 35-week online PBL framework for PGY2 family medicine residents using retrospectively collected educational data, specifically targeting core competencies in basic knowledge (10%), clinical skills (60%), and data interpretation/synthesis (30%).

Methods: A secondary data analysis of a mixed-methods educational innovation was conducted using de-identified records from the 2021/2022 academic year (35 weeks). The curriculum encompassed 12 detailed modules, including Endocrinology, Cardiology, Respiratory Disease, and Psychiatry. Data were retrospectively extracted from the existing online learning platform, including engagement metrics and standardized In-Training Examination (ITE) scores for 12 PGY2 residents. Qualitative content analysis was performed on archived resident discussion posts to assess clinical reasoning and management strategy

synthesis. A descriptive correlation analysis was performed between the depth of PBL participation and ITE performance outcomes.

Results: The PBL curriculum demonstrated robust learner engagement across 35 weeks. Residents consistently applied sophisticated clinical reasoning, such as identifying Major Depressive Disorder (MDD) while managing comorbidities. Qualitative analysis revealed that residents with the most sophisticated evidence-based contributions also demonstrated strong quantitative performance on the ITE, with scores ranging from 320 to 670 (Mean = 456.3). High-engaging residents who consistently cited current literature and challenged peer assumptions achieved higher ITE scores (e.g., 610, 670), supporting a dose-response relationship between asynchronous PBL participation and standardized knowledge acquisition.

Discussion & Conclusions: This proof-of-concept study demonstrates that a comprehensive, asynchronous PBL curriculum is an effective method for enhancing clinical reasoning in family medicine residents. The format facilitated asynchronous “thinking time,” allowing residents to synthesize complex data and formulate management plans that address multimorbidity. The observed correlation between high-quality PBL engagement and superior ITE performance confirms that asynchronous collaborative learning effectively supports both clinical reasoning development and standardized knowledge retention. This model provides a replicable and scalable framework for residency programs seeking to modernize their curricula.

Keywords: asynchronous learning; problem-based learning; clinical reasoning; postgraduate medical education; In-Training Examination; family medicine; self-directed learning; competency-based medical education