Clinical scenario model for evaluating telemedicine competencies based on entrusted professional activities (EPAs)

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Abstract

Objective: To develop a comprehensive model for the design, implementation, and evaluation of clinical telemedicine scenarios using the Entrusted Professional Activities (EPAs) approach. **Methods:** A literature review was conducted to identify key components of telehealth competency frameworks (AAMC, PAHO) and clinical case construction models (PBL, SNAPPS, Harvard), to develop a structured educational model based on Entrusted Professional Activities (EPAs); this model was subsequently validated using a modified Delphi method involving 15 experts. Twenty-two simulation scenarios created within a university setting were analyzed to identify gaps between current practice and the proposed model. **Results:** The literature review highlighted the need for a standardized model that integrates pedagogical design, clinical content, implementation logistics, and trust-based evaluation. The proposed model is structured around 15 key components. The analysis of the scenarios revealed inconsistencies in their integration, with specific evaluation rubrics present in only 59% of cases and an underrepresentation of the follow-up EPA (14%), validating the need for the proposed model. **Conclusions:** The implementation of a standardized model, grounded in educational evidence, will facilitate quality and consistency in the assessment of telemedicine competencies. The proposed model offers an evidence-based and adaptable framework that can be used by educational institutions to develop learning scenarios useful for the training of health professionals.

Key-words: Telemedicine; Professional Competence; Clinical Competence

Resumen

Modelo de escenarios clínicos para evaluar competencias en telemedicina basado en actividades profesionales a confiar (APCs)

Objetivo: Desarrollar un modelo integral para el diseño, implementación y evaluación de escenarios clínicos de telemedicina con el enfoque de Actividades Profesionales a Confiar (APCs).**Métodos:** Se realizó una revisión de la literatura para identificar los componentes clave de los marcos de competencias en telesalud (AAMC, OPS) y los modelos de construcción de casos clínicos (ABP, SNAPPS, Harvard), para desarrollar un modelo educativo estructurado de Actividades Profesionales a Confiar (APCs), que se validó con método Delphi modificado con 15 expertos. Se analizaron 22 escenarios de simulación creados en un contexto universitario para identificar brechas entre la práctica actual y el modelo propuesto.**Resultados:** La revisión de la literatura evidenció la necesidad de un modelo estandarizado que integre diseño pedagógico, contenido clínico, logística de implementación y evaluación basada en confiabilidad. El modelo propuesto se estructura en 15 componentes clave. El análisis de los escenarios reveló inconsistencias en su integración, con rúbricas de evaluación específicas presentes en 59% de los casos y una subrepresentación de la APC de seguimiento (14%), validando la necesidad del modelo.**Conclusiones:** La implementación de un modelo estandarizado, fundamentado en la evidencia educativa facilitará la calidad y consistencia en la evaluación de competencias en telemedicina. El modelo propuesto ofrece un marco fundamentado y adaptable que puede ser utilizado en instituciones educativas para el desarrollo de escenarios de aprendizaje útiles para la formación de profesionales de la salud.

Palabras clave: Telemedicina; Competencia Profesional; Competencia Clínica.

Resumo

Modelo de cenário clínico para avaliação de competências em telemedicina baseado em Atividades Profissionais Confiáveis (EPAs).

Objetivo: Desenvolver um modelo abrangente para o desenho, implementação e avaliação de cenários clínicos de telemedicina utilizando a abordagem das Atividades Profissionais Confiáveis (Entrustable Professional Activities – EPAs). **Métodos:** Foi realizada uma revisão da literatura para identificar os principais componentes dos referenciais de competências em telessaúde (AAMC, OPAS) e dos modelos de construção de casos clínicos (PBL, SNAPPS, Harvard), com o objetivo de desenvolver um modelo educacional estruturado baseado em Atividades Profissionais Confiáveis (EPAs). Esse modelo foi posteriormente validado por meio de um método Delphi modificado envolvendo 15 especialistas. Vinte e dois cenários de simulação criados em um ambiente universitário foram analisados para identificar lacunas entre a prática atual e o modelo proposto.**Resultados:** A revisão da literatura destacou a necessidade de um modelo padronizado que integrasse desenho pedagógico, conteúdo clínico, logística de implementação e avaliação baseada na confiança. O modelo proposto foi estruturado em torno de 15 componentes-chave. A análise dos cenários revelou inconsistências em sua integração, com rubricas específicas de avaliação presentes em apenas 59% dos casos e sub-representação da EPA de acompanhamento (14%), validando a necessidade do modelo proposto.**Conclusões**: A implementação de um modelo padronizado, fundamentado em evidências educacionais, facilitará a qualidade e a consistência da avaliação das competências em telemedicina. O modelo proposto oferece uma estrutura baseada em evidências e adaptável, que pode ser utilizada por instituições educacionais para desenvolver cenários de aprendizagem úteis na formação de profissionais da saúde.

Palabras-chave: Telemedicina; Competência Profissional; Competência Clínica.

INTRODUCTION

The COVID-19 pandemic enabled patients, healthcare professionals, and health managers to experience the benefits of telemedicine for healthcare services[1,2]. This situation facilitated the global adoption of telemedicine within health systems and exposed a gap in the training of healthcare professionals: the absence of specific competencies required for effective and safe technology-mediated clinical practice[3]. Medical education programs, traditionally centered on in-person interaction, faced the challenge of integrating a new set of skills, ranging from the mastery of digital platforms to the adaptation of communication and clinical semiology to the virtual environment[4].

The framework of Entrusted Professional Activities (EPAs)—described by Ten Cate in 2005-translates abstract medical competencies into observable and measurable professional tasks, enabling educators to make informed decisions regarding the level of supervision a student requires, while fostering growing self-confidence in the student during the development of these competencies[5,6]. In this context, the EPA approach is particularly pertinent to telemedicine, where competencies such as assessing the appropriateness of a virtual consultation, communicating empathetically through a screen, or guiding a remote physical examination must be systematically developed and evaluated[7].

However, despite the recognition of their importance, few standardized educational models exist for the design and evaluation of telemedicine simulation scenarios based on EPAs[8]. The literature on clinical case construction offers robust models, such as Barrows' Problem-Based Learning (PBL), the SNAPPS model for case presentation, or the Harvard framework [9,10] yet their direct application to telemedicine has not been systematized. Although telehealth competency frameworks have been proposed by organizations such as the Association of American Medical Colleges (AAMC) and the Pan American Health Organization (PAHO)[4,11], a methodological bridge is lacking to connect these competencies with practical, standardized assessment scenarios.

This lack of standardization leads to significant variability in the quality and effectiveness of

simulation experiences, compromising the reliability of assessments and the preparedness of future physicians. In 2024, the Digital Health Studies Group (GESaDi) at the UNAM School of Medicine developed and validated a competency framework for remote healthcare using a modified Delphi method involving 15 international experts in digital health, medical education, and telemedicine. This framework is grounded in the Entrusted Professional Activities (EPAs) approach and integrates eight EPAs focused on the clinical method and the process of delivering remote healthcare. Table 1.

Table 1. Medical Competency Framework Based on Entrusted Professional Activities (EPAs) for Remote Medical Care. Campos Castolo et al., 2024. Based on the Entrusted Professional Activities (EPA) model by Ten Cate, 2005.

- EPA 1: Identify the feasibility of teleconsultation.
- EPA 2: Conduct the patient's medical history via teleconsultation.
- EPA 3: Direct physical examination (assisted or autonomous) in telemedicine.
- EPA 4: Integrate the clinical diagnosis.
- EPA 5: Prescribe the initial treatment.
- EPA 6: Conduct a teleconsultation.
- EPA 7: Recommend remote promotion and prevention actions, and
- EPA 8: Conduct remote monitoring.

Source: Prepared by the author, 2026.

EPAs represent two “clinical moments” that reflect the temporal flow of care in telemedicine: the first moment is the initial clinical encounter (EPA1 through EPA5, and EPA7), which typically involves synchronous interaction; and the second moment encompasses management actions and continuity of care (EPC6 and EPC8), which may involve synchronous, asynchronous, or deferred interactions.

Each EPA assesses specific competencies designed to observe and measure progress in competency acquisition within a real-world context[12].This article proposes a comprehensive model for the design, implementation, and evaluation of clinical telemedicine scenarios based on the framework of EPA competencies validated by UNAM. The model is developed through a synthesis of existing literature on medical education, competency frameworks, and simulation models. Subsequently, its feasibility is contextualized and validated through an analysis of 22 simulation scenarios developed within a medical education program in Mexico, demonstrating how the proposed model can help standardize and enhance educational scenarios focused on the practical instruction of telemedicine.

METHODOLGY

This study encompassed the development and validation process of the Entrusted Professional Activities (EPAs) model of the project PAPIME PE203232, the evaluation of its applicability across two main phases of the project PAPIME PE207224, and the creation of the “TeleEPAs” (TeleAPCs) Model. These projects were supported by the Program for Support of Projects for Innovation and Improvement of Teaching, administered by the General Directorate of Academic Personnel Affairs at UNAM.

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Phase 1: Development of the Clinical Scenario Model for Evaluating EPA in Teleconsultation, Based on the Literature

This document proposes a prototype clinical scenario model for assessing Entrusted Professional Activities (EPAs) in teleconsultation. To ensure that the model is grounded in solid theoretical foundations and is practical and adaptable to various institutional contexts, a narrative literature review was conducted. The review focused on the PubMed, SciELO, and Google Scholar databases to identify relevant theoretical frameworks and models in three key areas: 1) telemedicine competency frameworks, 2) models for developing clinical cases and simulation scenarios, 3) the Remote Medical Care Model proposed by the General Directorate for the Modernization of the Health Sector (DGMoSS) of the Secretariat of Health in Mexico (formerly CENETEC), and 4) competency assessment frameworks that include the use of EPAs and rubrics.

The synthesis of this review was used to develop a didactic clinical scenario model for EPA-based teleconsultation. The components of the model were derived from integrating identified best practices, aiming to create a coherent structure spanning from pedagogical design to evaluation and feedback.

Phase 2: Case Study for Contextualization and Validation

To evaluate the relevance and applicability of the proposed model, a descriptive, cross-sectional case study was conducted, analyzing a convenience sample of 22 telemedicine simulation scenarios developed by instructors from the School of Medicine and FES Iztacala (UNAM) during the 2023–2024 period.

An analysis matrix was created to systematically gather information from each scenario, focusing on structural components, assessed EPAs, and the inclusion of evaluation elements such as rubrics and debriefing protocols. A descriptive statistical analysis (frequencies and percentages) was conducted to characterize current practice. The findings were compared with the components of the theoretical model developed in Phase 1. This analysis enabled the identification of gaps between local practice and the proposed standards, confirming the need for and usefulness of the model.

The study used exclusively simulated educational material and did not involve data from real patients. Therefore, it did not require approval from an ethics committee.

Content validation was conducted using a modified Delphi method, incorporating a panel of experts in telemedicine and medical education. The process included several rounds of standardized online questionnaires, virtual focus group sessions, and follow-up and query resolution via instant messaging (Telegram).

RESULTS

Part 1: "TeleAPCs" (TeleEPAs): The Proposed Model of Clinical Scenarios for EPAs in Telemedicine

Based on a synthesis of the literature, a comprehensive model was developed for the clinical telemedicine scenarios. Each clinical scenario is grounded in a matrix of the 15 elements that constitute an Entrusted Professional Activity (EPA), which are detailed in Table 2.

Table 2. Elements Constituting an Entrusted Professional Activity (EPA). Modified from Ten Cate (2005).

Element Name	Description
Title	A brief and concise summary of the activity, descriptive enough to provide a general idea of the activity, but concise enough to be easily remembered and referenced.
Description	A clear and detailed explanation of the activity or task that the student or apprentice is expected to be able to perform at the end of a specific training period.
Time of Achievement	Estimated time of achievement in the educational intervention field.

Specifications	Specific actions required to perform the EPA. Details regarding the specific methods or techniques to be used, the quality standards to be met, or any additional details relevant to the achievement of the EPA.
Requirements	The theoretical knowledge students need to possess to carry out the activity, the practical skills they need to demonstrate, and the attitudes or behaviors expected of their performance. • *Knowledge* may include concepts, theories, or specific information that students need to understand. • *Skills* may include technical skills, communication skills, problem-solving skills, etc. • *Attitudes* may include professional and ethical behaviors, as well as respect toward patients and colleagues.
Limitations	Restrictions, barriers, or circumstances that would impede or limit the assessment of student performance, such as patient characteristics, resource availability, or institutional regulations.
Reliability Level	Parameters for evaluating student performance and identifying the degree of supervision required to carry out the EPA.
Points to Evaluate	Evidence demonstrating the level of performance, directly related to the knowledge, skills, and attitudes of the EPA.
Feedback	Elements that the evaluator will consider to provide feedback to students regarding their performance and to help them improve their work.
Situations Requiring Immediate Intervention	A circumstance or event requiring immediate action by the supervisor, including the suspension of the assessment. These may include medical emergencies, technical issues, or any other event that disrupts the normal conduct of the EPA.
Resources	Bibliography and a learning and study ecosystem that facilitates feedback and study.
Related Technologies*	The use of digital tools (e.g., chatbots, gadgets) during remote medical care.
Link to Plan 2010*	Relationship between EPAs and the Competencies of the Physician-Surgeon under the 2010 Curriculum of the UNAM School of Medicine (2026).

Source: Prepared by the author, 2026.

The Clinical Scenario Model for the Assessment of Telemedicine Competencies Based on Entrusted Professional Activities, which we have abbreviated as “TeleAPCs”, is organized into five sections covering the complete cycle, from pedagogical design to feedback, ensuring that each scenario serves as a consistent learning and assessment tool; these sections are presented in Table 3.

Table 3. Clinical Scenario Model for the Assessment of Telemedicine Competencies Based on Entrustable Professional Activities— “TeleAPCs.” The model is organized into five sections that encompass the complete cycle of designing, implementing, and evaluating clinical scenarios in telemedicine

SECTION	N°	COMPONENT	DESCRIPCIÓN
I. FOUNDATIONS AND PEDAGOGICAL	1	Needs Analysis: Link to the 2010 Plan	Identification of training gaps and priority competencies to be developed within the specific institutional context. Alignment with the graduation competencies of the UNAM 2010 Plan for Surgeon-Physicians.

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DESIGN	2	Learning Objectives	Formulation of measurable educational goals aligned with the graduate profile and expected competencies.
	3	EPAs to be evaluated	Selection of the specific EPAs to be evaluated in the scenario.
II. CLINICAL CONTENT AND CONTEXT	4	Complete Medical History	Case construction, including background, present illness, review of systems, and relevant data.
	5	Patient Characterization	Definition of the demographic, psychosocial, and clinical profile of the standardized or simulated patient.
	6	Teleconsultation Context	Specification of the environment, modality (synchronous/asynchronous), technological platform, clinical processes (DGMoSS Remote Medical Care Model), and circumstances of the encounter.
III. IMPLEMENTATION AND LOGISTICS GUIDE	7	Description of the scene	Physical environment, equipment layout, participant roles, and initial conditions of the scenario.
	8	Material Resources	List of technological equipment, medical supplies, documents, and materials necessary for the simulation.
	9	Human Resources	Identification of facilitators, standardized patients, observers, and required support staff.
	10	Temporal Evolution	Sequence of events, estimated times per phase, and possible ramifications of the evaluated individual's decisions.
IV. EVALUATION FRAMEWORK	11	Key Points to Evaluate	Observable behaviors, critical decisions, and specific skills that determine performance.
	12	Reliability Levels	A supervision scale that determines the degree of autonomy that may be granted to the evaluated individual, based on their performance.
	13	Evaluation Rubric	An instrument with explicit criteria, competency dimensions, and performance descriptors by level.
V. FEEDBACK PROCESS	14	Debriefing Structure	A guide for post-activity reflection, including phases, generative questions, and facilitation techniques.
	15	Resources for Improvement	Supplementary materials, recommended readings, and opportunities for additional practice.

Source: Prepared by the author, 2026.

Section 1: Foundations and Pedagogical Design. This section begins with a needs analysis justifying the creation of the scenario, followed by the definition of 3 to 5 clear and measurable learning objectives. The clinical situations to be developed and their didactic components are identified; finally, the Entrusted Professional Activities (EPAs) that will serve as the focus of the assessment are specified. These EPAs are selected from the framework of eight telemedicine-specific competencies proposed by the GESaDi group at the UNAM School of Medicine: teleconsultation feasibility, remote medical history taking, remote physical examination, remote diagnosis, remote initial treatment, tele-interconsultation, remote prevention and health promotion, and remote follow-up.

Section 2: Clinical Content and Context. The scenario narrative is detailed to ensure its realism. It includes a medical history, comprising background information and a digital literacy

profile, a description of the current condition and its semiology, and a script for the standardized patient that provides guidance for their performance in terms of verbal, non-verbal, and behavioral cues. Scenarios may be classified according to the clinical phases and the level of complexity intended for assessment:

● Moment 1, the Initial Clinical Encounter - It represents the competencies necessary to resolve a health problem in a single synchronous encounter, as defined in EPAs 1 through 5: teleconsultation feasibility, and once the interaction has been established, medical history taking, physical examination, diagnosis, and remote treatment.

● Moment 2, Management and Continuity of Care - It outlines the competencies for longitudinal management and care coordination. These activities may take place days or weeks later, often asynchronously (via messaging, review of diagnostic studies, or coordination with other professionals) and, depending on the nature of the presenting complaint, may not be strictly indispensable. These competencies correspond to EPAs 6 through 8: tele-interconsultation, remote health prevention and promotion, and remote follow-up.

This classification is useful for designing progressive simulation scenarios, assessing competencies across different temporal contexts, and structuring telemedicine curricula by complexity.

Section 3: Implementation and Logistics Guide – It covers the operational aspects of the educational activity. This section details the description of the scenario and environment (for both the student and the patient), the necessary resources and materials (human, technological, and documentary), and the progression of the scenario through different phases: initiation, development (incorporating planned challenges), conclusion, and feedback.

Section 4: Evaluation Framework - This section defines the key points to be evaluated (observable performance indicators) following the EPA methodology, utilizing a four-level entrustment scale to determine the degree of supervision required by the student. The expected level for medical students is Level 2, at which they can perform the activity under active supervision. The evaluation is formalized through a detailed analytical rubric. Table 4 shows an example of a rubric for EPA 3: Remote Physical Examination.

Table 4. Rubric for EPA 3, Sample Case: Guiding a patient through a physical examination or the use of devices. The various assessment dimensions and the levels of reliability that students can achieve are displayed.

Competency Dimension	Level 1: Requires Direct Supervision	Level 2: Requires Reactive Supervision	Level 3: Acts Independently	Level 4: Capable of Supervising Others
Communication and Guidance	Confusing or technical instructions. They do not verify understanding or correct execution.	Clear instructions, but they do not adapt them to the patient. They verify execution inconsistently.	They use simple and precise language. They ask the patient to demonstrate what they do to confirm correct execution.	They are exceptionally skilled at guiding even patients with low digital literacy. They can create support materials.
Selection of Maneuvers	They request maneuvers that are irrelevant or unsafe to perform remotely.	They select generally appropriate maneuvers, but may omit an important one or hesitate if it is inconclusive.	They select a set of pertinent and safe maneuvers based on the medical history and differential diagnosis.	They justify the selection of each maneuver based on its diagnostic value in the context of telemedicine. They know and teach alternative maneuvers.

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Interpretation and Limitations	They interpret the findings as if they were from an in-person examination, without considering the limitations of the method.	They interpret the findings correctly, but do not explicitly verbalize the limitations or document this uncertainty.	They interpret the findings with caution, communicate the limitations of the remote examination to the patient, and document this uncertainty in the medical note.	They use their understanding of limitations to guide decision-making, such as deciding whether an in-person evaluation is necessary.

Source: Prepared by the author, 2026.

Section 5: Feedback Process (Debriefing) - The final section is dedicated to reflective learning. It proposes a feedback structure based on models such as “Feedback with Good Judgment,” along with various resources for study and improvement tailored to the individual student. This feedback model was published in 2006 by Jenny Rudolph at the Center for Medical Simulation at Harvard. The instructor, in addition to evaluating performance, assists the student in understanding the “mental frame” that guided their actions, as feedback consists not merely of correcting the action, but of understanding and, if necessary, modifying the mental frame that produced it[13].

Part 2: Analysis of Existing Scenarios (Case Study)

To contextualize the model and assess its relevance, 22 clinical simulation scenarios in telemedicine were analyzed using the Clinical Scenario Model for the Assessment of Telemedicine Competencies Based on Entrusted Professional Activities, which we propose in this work (Table 3). This analysis revealed significant heterogeneity among the previously developed scenarios, validating the need for a standardized framework.

Coverage of EPAs.

Uneven coverage of the eight fundamental EPAs was observed. EPA 1 (Identifying the feasibility of teleconsultation) was the most frequently evaluated, appearing in 82% of the scenarios (n=18); EPA 2 (Medical history taking via teleconsultation) was present in 73% (n=16); and EPA 3 (Remote physical examination) in 77% (n=17), reflecting a strong focus on skills related to teletriage, patient interviewing, and physical examination. EPA 4 (Clinical diagnosis) and EPA 5 (Initial treatment) were included in only 55% (n=12) and 64% (n=14) of the scenarios, respectively. EPA 6 (Tele-interconsultation) was addressed in only 3 scenarios (14%). No scenario included or evaluated EPA 7 (Remote health promotion and prevention) or EPA 8 (Follow-up).

Evaluation Components.

The analysis of the structural components of the scenarios revealed a significant inconsistency in the evaluation elements. While the narrative components of the clinical case, including the patient identification sheet (95%) and medical history (90%), were well-developed, the elements necessary for a robust evaluation were lacking. Only 68% of the scenarios (n=15) included explicit evaluation criteria, and only 59% (n=13) featured rubrics specific to each Entrustable Professional Activity (EPA). Furthermore, only 45% (n=10) of the scenarios included a structured feedback protocol. This lack of standardization in evaluation directly undermines the reliability of entrustment decisions and the ability to provide effective feedback to students.

Modification of a Clinical Scenario Using the Proposed Model: Before and After

The selected scenario has a solid clinical foundation, encompassing actions related to EPAs 1, 2, 3, 4, and 5, and requires the use of remote physical examination equipment. However, its original assessment structure is narrative and incomplete, demonstrating the added value of the EPA-based Clinical Scenario Model.

Scenario 1: “Gabriel PS” (fictitious name), 24 years old, presenting with left-sided otalgia following a swimming session.

- Compliance with Technical Criteria:
  - Representativeness: This is an unscheduled, synchronous teleconsultation, a key modality in digital primary care. It was selected because it represents a common pathology in primary care settings and because it presents a

critical decision point regarding remote physical examination.

○ Presence of Milestones (EPA 3): The explicit objective is “to instruct the patient to perform a remote physical examination of the ear,” which constitutes the critical decision point for granting professional entrustment and allows for the differentiation of performance across levels of reliability: Level 1 (Requires direct supervision), Level 2 (Requires reactive supervisión, the expected level of performance), or Level 3 (Acts independently).

○ Sufficiency of Data: The document already provides the patient identification sheet and detailed semiology, but leaves the physical examination and assessment section without a clear definition.

● Analysis of the original scenario: It was limited to describing thematic objectives and general learning outcomes. It did not specify how the healthcare professional should guide the patient through assisted examination or self-examination. The assessment guide did not detail specific criteria for analysis.

● APPLICATION OF THE REMOTE CLINICAL SCENARIO MODEL (15 COMPONENTS).

I. Foundations and Pedagogical Design

● Needs Analysis: This module addresses otitis externa, a highly prevalent condition in primary care that presents a critical challenge in telemedicine: the need to guide a physical examination of a difficult-to-visualize area (the ear canal) without being physically present.

●Learning Objectives: To facilitate clinical reasoning and decision-making for diagnosing and treating diffuse otitis externa through the effective use of teleconsultation technologies.

● EPAs to be Evaluated: Primarily EPA 3 (Guiding assisted or autonomous physical examination) and, secondarily, EPA 1 (Assessing the feasibility of a teleconsultation).

II. Content and Clinical Context

Knowledge Requirements: Students must master the semiology and physical examination of the external and middle ear, remote examination techniques, the use of devices for this purpose, and how to correlate visual findings with the chief complaint (otalgia).

● Complete Medical History: Gabriel PS, 24 years old, Civil Engineer. Chief Complaint: Moderate left-sided otalgia (6/10) and pain upon chewing following a swimming session. The evaluating instructor will place particular emphasis on the accuracy of the findings recorded in the Electronic Health Record (EHR), the appropriate interpretation of observations made via camera, and the selection of the strategy used to guide the patient in performing the auricular traction maneuver.

● Patient Profile: A young, cooperative patient with sufficient digital literacy (familiar with the functionality of video calls and electronic devices), thereby enabling a guided, autonomous physical examination.

●Teleconsultation Context: Unscheduled synchronous modality, conducted following a successful tele-triage process. Complies with the remote healthcare guidelines established by DCENETEC.

III. Implementation and Logistics Guide

●Scene Description: The physician is situated at a teleconsultation station with access to the Electronic Health Record (EHR); the patient is at home, in a well-lit environment, using a smartphone as a camera.

●Resources: A device equipped with a camera and microphone, a stable internet connection, a video-calling platform, and a specialized gadget (digital otoscope or high-resolution camera) for assessing the ear canal.

●Material Resources: A standardized patient (Gabriel PS), the student being evaluated, and a faculty facilitator/observer.

●Timeline: Total duration of 30 minutes: 5 minutes for consent and feasibility assessment, 10 minutes for history-taking, 10 minutes for a focused physical examination, and 5 minutes for diagnosis and closure.

IV. Evaluation Framework

● Key Points for Evaluation:

○Verification of the patient's digital literacy.

○Clear instructions for performing the auricular traction maneuver and visualizing erythema.

○Use of simple language and maintenance of empathy despite the physical distance.

○Immediate Intervention: If the student incorrectly explains the maneuver for examining the ear canal, since, in addition to the risk associated with inserting objects, this may cause pain to the patient, the procedure must be halted immediately if the instruction is inadequate.

●Reliability Levels:

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○ Level 1: Requires the instructor to verbally provide instructions to the patient.

○ Level 2: The student acts autonomously but requires the instructor to intervene intermittently to react if the student makes an error or shows hesitation (reactive supervision).

○ Level 3: The student guides the ear examination autonomously and receives feedback only at the end.

●Evaluation Rubric: An example of a multidimensional instrument for assessing student performance is included (Table 4).

V. Feedback Process

● Feedback Structure:

○Initial Phase: Highlight successes in establishing the digital therapeutic alliance.

○Intermediate Phase: Analyze areas for improvement in remote instruction techniques for clinical visualization.

○Final Phase: Suggest strategies for the accurate recording of findings in the electronic health record.

● Resources for Improvement: Consult the Manual of Entrusted Professional Activities in Telemedicine (created for the PAPIME PE207224 project) and the Clinical Practice Guidelines on External Ear Pathologies (created by CENETEC, Secretariat of Health, Mexico).

● Skill Requirements: Ability to distinguish between normal and abnormal findings in a video image (detecting erythema or stenosis of the ear canal), guide the patient step-by-step through a self-examination, and identify alternatives if the initial view is inadequate.

Attitudinal Requirements: Demonstrate patience when providing instructions, respect for patient privacy, empathy regarding young Gabriel's pain, and acknowledgment of the technical limitations of the video call.

Study Resources: Based on the Telemedicine Manual developed for the project, as well as clinical practice guidelines regarding external ear pathologies.

Link to Plan 2010: This scenario specifically strengthens Competency 5 (Clinical skills in diagnosis, prognosis, treatment, and rehabilitation) within the digital health environment.

The fundamental shift achieved with the “TeleAPCs” Model is that the scenario transforms from being merely a “chat with a patient” into a measurable unit of professional practice, in which students' accuracy and communication skills in guiding the patient through the use of technology are evaluated.

DISCUSSION

The findings from the case study reveal a significant gap between the best practices outlined in the literature, as reflected in the proposed model, and the actual implementation of simulation scenarios. The inconsistency in design and, more importantly, in evaluation highlights the urgent need to adopt a standardized model like the one proposed to ensure high-quality telemedicine training.

This study analyzes the lack of a standardized approach to the development and assessment of telemedicine competencies as a current educational need in medical education. The findings suggest that the pedagogical practices described in the literature have not been integrated into the actual implementation of simulation scenarios. The proposed comprehensive model, grounded in a synthesis of educational evidence, seeks to serve as a bridge to close this gap.

The results of the case study are revealing. While it is understandable that the predominant EPAs are those associated with the initial clinical encounter, the underrepresentation of EPAs related to the management and continuity of care, such as EPA 6 (tele-interconsultation), present in only 14% of scenarios, is concerning. Particularly troubling is the absence of elements from EPA 7 (health promotion and prevention) and EPA 8 (follow-up) in the analyzed cases, given that the management of chronic diseases is one of the most significant and rapidly growing applications of telemedicine[3,9]. This suggests that current training may be inadequately preparing students for the realities of remote clinical practice[13,14].Similarly, the inconsistency in assessment components, with fewer than 60% of scenarios including specific rubrics, undermines the reliability of competency assessment and entrustment decision-making, a cornerstone of the EPA model.[15,16]

This model of clinical scenarios for telemedicine offers a response to identified deficiencies, and the 15 proposed components are perceived as appropriate for assessing competencies in remote healthcare. By clearly distinguishing between the “base clinical case” and the “simulation scenario design,” the model provides educators with a logical structure to ensure that all critical elements, from learning objectives to debriefing, are present and aligned. The adoption of a standardized framework such as this carries various practical implications:

it facilitates faculty training, promotes consistency in assessment across different courses and rotations, and enables the creation of repositories of high-quality scenarios that can be shared and adapted among institutions[17].

This study has several limitations that should be acknowledged. First, the literature review was narrative rather than a comprehensive systematic review, though it focused on widely accepted theoretical frameworks. Also, the case study was limited to scenarios within a specific institutional context, which may affect the generalizability of the quantitative findings, although the identified gaps are consistent with concerns expressed in the international literature. Finally, the proposed model is theoretical and requires prospective validation to assess its impact on learning outcomes and its feasibility in resource-constrained settings.

CONCLUSION

The effective integration of telemedicine into clinical practice requires a corresponding adaptation in medical education. Training in telemedicine must transcend the use of technology to focus on the development of competencies for a new modality of care. This study demonstrates that, while valuable local efforts exist to create telemedicine learning experiences, they often lack the standardization necessary to ensure homogeneous training and reliable assessment.

The clinical scenario model for telemedicine presented in this article offers a structured, evidence-based solution, validated through an analysis of current practice. By providing a clear and comprehensive framework, this model can guide medical education institutions in developing high-quality simulation scenarios. This approach promotes a more objective assessment of telemedicine competencies and prepares healthcare professionals to meet the challenges of healthcare in the digital age. The next step is to implement and prospectively validate this model across diverse educational settings.

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