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MedEst|2026 | Vol.6: e564| ISSN: 2789-7567 |RNPS: 2524| RESEARCH ARTICLE

System of actions to enhance clinical skills in medical procedures of Internal Medicine residents

Sistema de acciones para potenciar habilidades clínicas en procederes médicos de residentes de Medicina Interna

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RESUMEN

Introducción: La formación de residentes de Medicina Interna exige sólidas habilidades clínicas, pero la heterogeneidad docente y la insuficiente sistematización práctica limitan su competencia profesional, lo cual impacta en la seguridad del paciente. **Objetivo:** Elaborar un sistema de acciones para potenciar habilidades clínicas en los procederes médicos de los residentes de Medicina Interna del Hospital Provincial Clínico Quirúrgico Docente "Faustino Pérez". **Métodos:** Estudio observacional descriptivo y propositivo, con enfoque mixto, realizado entre enero de 2025 y enero de 2026. Participaron 14 profesores y 38 residentes. Se aplicaron revisión documental, guías de observación, encuesta a residentes y entrevista a profesores. Los instrumentos fueron validados por criterio de especialistas (coeficiente alfa de Cronbach: 0,958). El análisis estadístico fue descriptivo con frecuencias absolutas y relativas. Se declaró aprobación ética y consentimiento informado. **Resultados:** La dimensión cognitiva mostró nivel alto en profesores (90 %) y bajo en residentes (52 %); la dimensión ético-actitudinal fue alta en ambos (90 % y 85 %); la dimensión procedimental-metodológica fue media en profesores (60 %) y baja en residentes (52 %). Las principales debilidades fueron: insuficiente precisión de acciones formativas en el plan de estudio, escasa preparación metodológica docente, baja sistematicidad en la práctica de procederes y limitado dominio técnico de los residentes. El sistema de acciones propuesto fue validado por especialistas (75 % de valoraciones como "muy adecuado"). **Conclusiones:** El diagnóstico evidenció brechas significativas en el dominio procedimental de los residentes. El sistema de acciones elaborado, constituye una herramienta para fortalecer la formación clínica en el posgrado.

ABSTRACT

Introduction: Internal Medicine residency training requires solid clinical skills; however, heterogeneity in teaching and insufficient systematization of practice limit professional competence, thereby impacting patient safety. **Objective:** To develop a system of actions to enhance the clinical skills regarding medical procedures among Internal Medicine residents at the "Faustino Pérez" Provincial Clinical-Surgical Teaching Hospital. **Methods:** A descriptive, observational, and proposal-oriented study with a mixed-methods approach was conducted between January 2025 and January 2026. Participants included 14 faculty members and 38 residents. Data collection involved document review, observation guides, resident surveys, and faculty interviews. Instruments were validated using expert judgment (Cronbach's alpha coefficient: 0.958). Statistical analysis was descriptive, utilizing absolute and relative frequencies. Ethical approval and informed consent were obtained. **Results:** The cognitive dimension showed a high level among faculty (90%) and a low level among residents (52%); the ethical-attitudinal dimension was high for both groups (90% and 85%); the procedural-methodological dimension was moderate among faculty (60%) and low among residents (52%). Key weaknesses identified included: insufficient specification of training actions within the curriculum, limited methodological preparation among faculty, lack of systematic practice regarding procedures, and limited technical proficiency among residents. The proposed system of actions was validated by experts (75% rated it as "highly adequate"). **Conclusions:** The assessment revealed significant gaps in the residents' procedural proficiency. The developed system of actions serves as a tool to strengthen clinical training at the postgraduate level.

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INTRODUCTION

The training of Internal Medicine residents represents an essential pillar for the comprehensive care of adults in health systems. In this process, the acquisition of clinical skills—understood as the integration of cognitive, procedural, and relational competencies—and the safe mastery of medical procedures (thoracentesis, paracentesis, lumbar puncture, central venous access, among others) constitute critical elements to guarantee patient safety and quality of care [1,2].

However, global literature evidences a concerning heterogeneity in the teaching and accreditation methods for these competencies. While governing bodies such as the American Board of Internal Medicine (ABIM) and the Accreditation Council for Graduate Medical Education (ACGME) do not provide uniform training standards, programs have historically depended on volume minimums, an approach that has proven insufficient to guarantee competence [3,4].

Clinical reasoning, the cornerstone of medical practice, is based on complex cognitive processes that can be affected by biases and knowledge deficits [5,6], which is why its teaching requires a deliberate and structured approach, based on practical guidelines and probabilistic reasoning [7].

Recent studies confirm that the apprenticeship or "apprenticeship" learning model, based on opportunistic clinical exposure, does not consistently develop robust procedural skills [8]. From sociocultural theory, situated learning [9] explains why mere exposure to the clinical context, without didactic structuring and progressive supervision, limits the transfer of knowledge to autonomous practice.

The global response to this deficiency has been the widespread adoption of simulation with a mastery learning approach (Simulation Based Mastery Learning — SBML), which combines deliberate practice on simulators with the requirement of reaching a demonstrable minimum standard before proceeding with real patients. A systematic review and meta-analysis published in 2025 confirms that competency-based simulation is more effective than non-competency-based simulation for the development of procedural skills, with a larger effect size [10]. In turn, the incorporation of point-of-care ultrasound (POCUS) as a guide for procedures has been shown to reduce complications and increase the success rate [11].

In the Cuban context, the Internal Medicine specialty is governed by a study program structured in three academic years, with emphasis on workplace education and the clinical method as a fundamental diagnostic tool [12]. Current trends in medical education in Cuba

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advocate for competency-based training and the use of developmental didactic models [13,14].

However, preliminary observations at the "Faustino Pérez" Provincial Clinical Surgical Teaching Hospital reveal systematic insufficiencies in the implementation of the clinical method and in the technical execution of procedures, as well as scarce use of active and formative didactic strategies that favor the development of clinical competencies [15,16]. This gap between curricular design and its implementation constitutes a recurring challenge in the country's teaching-care settings.

This situation generates a contradiction between the demands of contemporary medical education—oriented toward the systematic development of skills through integrated strategies and objective performance evaluations—and the current limitations in the residents' training process, which hinder achieving the levels of professional performance required in care practice.

Therefore, the present research proposed as its objective: to elaborate a system of actions to enhance clinical skills and mastery of medical procedures in Internal Medicine residents at the "Faustino Pérez" Provincial Clinical Surgical Teaching Hospital.

METHODS

Study design

An observational, descriptive, and propositional study with a mixed approach (qualitative-quantitative) was conducted at the "Faustino Pérez" Provincial Clinical Surgical Teaching Hospital in Matanzas, Cuba, between January 2025 and January 2026. The research was framed within the Internal Medicine service, the teaching-care setting of the specialty.

Universe and sample

The universe consisted of 14 professors from the specialty faculty (total specialists who teach the program) and 42 Internal Medicine residents enrolled in the study period. A sample of 14 professors (total sample) and 38 residents (probabilistic sample stratified by academic year, with proportional allocation and random selection within each stratum, with a maximum admissible error of 5 % and 95 % reliability according to calculation with the Epidat package) was selected. The final distribution was: 13 first-year residents, 13 second-year, and 12 third-year. All professors actively teaching in the period were included. No exclusion criteria were applied.

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Variables and data collection instruments

The main variable was the system of actions to enhance clinical skills in medical procedures of the residents, operationalized into three dimensions with their respective indicators (Annex 1, available as supplementary material):

1-Cognitive dimension (7 indicators): level of theoretical knowledge, understanding of protocols, clinical reasoning, knowledge of steps and sequences, recognition of risks and complications, theory-practice integration, and scientific updating.

2-Ethical-attitudinal dimension (4 indicators): compliance with ethical principles, responsibility, patient data protection, and equitable care.

3-Procedural-methodological dimension (8 indicators): technical mastery, compliance with methodological sequence, application of safety norms, adequate selection of the procedure, efficient use of resources, management of complications, teamwork, and effectiveness.

The following instruments, designed and validated for the study, were used:

1-Documentary review guide (Annex 4): to analyze study plans, specialty program, action protocols, minutes of methodological meetings, and resident files.

2-Participant observation guides (Annex 5): five ward rounds, five diagnostic discussions, and observation of medical procedures, with adequacy scales (1: not adequate, 2: moderately adequate, 3: adequate). Teaching performance for skill orientation was also observed.

3-Resident survey (Annex 6): self-administered questionnaire of 9 questions with a Likert scale (1-3) on the perception of teaching orientation.

4-Semi-structured interview with professors (Annex 7): 11-question questionnaire on pedagogical preparation, skill orientation, and use of teaching aids, plus a numerical scale (1-10) on knowledge to design developmental actions.

Instrument validation

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The instruments were submitted to content evaluation by a panel of 8 specialists (4 Master of Science, 3 Second-Degree Specialists, and 1 Doctor of Educational Sciences), with an average experience of 23.5 years in teaching and research. The Moriyama criterion (1968) was applied to evaluate reasonableness, discrimination, justification, clarity, and feasibility of data collection, obtaining 100 % consensus in the "much" categories for most items. Reliability was estimated using Cronbach's alpha coefficient, which yielded a value of 0.958 for the global instrument, indicating excellent internal consistency.

Procedure and data analysis

An initial diagnosis was carried out that included:

1-Exhaustive documentary review of normative materials.

2-Non-participant observation of teaching-care activities.

3-Application of surveys and interviews in scheduled sessions.

Data were collected in Excel and SPSS 25 databases and processed using descriptive statistics: absolute and relative frequencies (percentages). For methodological triangulation, data from different sources (documents, observations, surveys, interviews) were cross-referenced to identify coincidences and discrepancies. The assessment of each indicator was established as:

High level (HL): ≥ 80 % adequate responses.

Medium level (ML): between 50 % and 79 %.

Low level (LL): < 50 %.

Based on the identified problems and potentialities, a system of actions was designed, structured in three stages (orientation-planning, execution, control-evaluation), grounded in the theoretical referents of advanced education and medical pedagogy. The proposal was submitted to theoretical validation by the same panel of specialists, with a guide of 13 criteria (Likert scale: Very Adequate, Adequate, Little Adequate, Not Adequate, Inadequate).

Ethical aspects

The research adhered to the principles of the Declaration of Helsinki and Cuban regulations on research ethics. Verbal informed consent was obtained from all participants, with a guarantee of data confidentiality and exclusive use for scientific purposes. No invasive procedures were

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used, nor were clinical variables of patients manipulated, so it was considered a minimal-risk investigation. The study was approved by the institution's Ethics Committee and Scientific Council (registration no. 13/2025). Generative artificial intelligence was not used in any phase of the research.

RESULTS

Characteristics of participants

The faculty of professors (n=14) was composed of: 1 full professor (7.1 %), 4 associate professors (28.6 %), 5 assistant professors (35.7 %), and 2 instructors (14.3 %); 8 were first-degree specialists (57.1 %) and 6 second-degree (42.8 %). 50% held a Master of Science degree and 1 (7.1 %) was a Doctor of Science. Regarding the residents (n=38), the distribution by year was balanced (13-13-12), with ages between 27 and 34 years (mean 29.5 years), and 60.5 % male.

Results of documentary review

The analysis of the specialty program and the minutes of methodological meetings revealed:

1-Existence of a study plan structured by modules with skills and procedures defined by year.

2-Insufficient precision of a system of concrete actions to enhance resident skills.

3-Scarce methodological preparation of professors to implement active methods (problem-based learning, problem-posing teaching); only one instructive methodological class was taught in the studied period.

4-Monthly evaluation cards recorded quantitative grades of procedures, but not qualitative aspects about execution or feedback on errors.

5-No systematic simulation plan was evidenced prior to practice on real patients.

Results of participant observations

Table 1 shows the behavior of the evaluated dimensions in residents according to academic year.

Table 1. Behavior of dimensions according to academic years of residents (N=38)

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Dimension	Not adequate (%)	Moderately adequate (%)	Adequate (%)
Cognitive	16%	79%	5%
R1	7%	33%	2%
R2	5%	25%	2%
R3	4%	21%	3%
Ethical-attitudinal	32%	3%	65%
R1	13%	2%	17%
R2	11%	1%	31%
R3	8%	0%	42%
Procedural-methodological	52%	18%	30%
R1	22%	8%	1%
R2	16%	4%	1%
R3	14%	6%	1%

Source: Prepared by the authors
Note: R1: first year; R2: second year; R3: third year.

In ward rounds, 40 % were evaluated as adequate and 60 % as moderately adequate. The main difficulties identified were: inaccuracies in obtaining primary data, lack of knowledge about aspects of the patient's and family's health situation, difficulties in presenting clinical history summaries, and deficiencies in the interpretation of complementary examinations.

In the observation of medical procedures, 52 % of residents showed inadequate mastery, especially in lumbar puncture, thoracentesis, and deep venous access. The lack of effective supervision and prior simulations were recurring factors.

Results of the resident survey

Table 2 summarizes the residents' perceptions about teaching orientation.

Table 2. Residents' perception of the orientation received (N=38)

Item	Not adequate (%)	Moderately adequate (%)	Adequate (%)
1. Professor's preparation to orient skills and procedures	7.89	-	-

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2. Integration of procedures with clinical method	21.05	42.10	-
3. Orientation to perform procedures	-	31.57	-
4. Favoring cognitive independence	15.78	-	-
5. Bibliographic orientation	-	-	60.52
6. Orientation in searching for problem-solving pathways	-	-	52.63
7. Stimulation of personal criteria	-	10.52	-
8. Relation of new/previous contents with practice	-	-	23.68
9. Use of teaching aids	63.15	-	-

Source: resident survey.
Note: Dashes indicate that there were no responses from participants in that category.

It is noteworthy that 63.15 % of residents considered the use of teaching aids to be inadequate, and 42.10 % rated the integration of procedures with the clinical method as moderately adequate.

Results of the professor interview

100 % of professors reported having received pedagogical preparation (60 % in postgraduate courses, 30 % during residency, 10 % in workshops). However, when asked about their level of knowledge to design developmental actions, only 7.14 % self-evaluated with a "high" level (scale of 10), 35.71 % declared scarce knowledge (2-4), and 14.28 % did not know (1). 92 % of professors recognized the use of teaching aids as inadequate and attributed it to the lack of didactic and technological resources.

Triangulation and diagnostic synthesis

The cross-referencing of sources allowed identifying the following strengths: existence of a formal study plan, continuous evaluation system, faculty with extensive teaching preparation, adequate mastery of the clinical method by professors, and high ethical principles. Among the weaknesses: insufficiency of concrete actions in the program, deficiencies in methodological teaching preparation, absence of

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developmental didactic methods, low systematicity in the performance of procedures by professors, and limited technical mastery of residents. The global assessment of the variable system of actions resulted in a medium level (ML), with the cognitive and procedural-methodological dimensions at low (residents) and medium (professors) levels, respectively (Table 3).

Table 3. Summary of dimension assessment

Dimension	Professors	Residents	Assessment
Cognitive	HL	LL	ML
Ethical-attitudinal	HL	HL	HL
Procedural-methodological	ML	LL	ML

Source: prepared by the authors.
HL: High Level, ML: Medium Level, LL: Low Level.

Proposed system of actions

Based on the diagnosis, a system of actions structured in three stages was designed:

1-Orientation and planning: aimed at professors and residents, with definition of objectives, contents, and active methods.

2-Execution: implementation of simulation workshops, reasoned clinical sessions, reverse tutoring, and structured supervision of procedures.

3-Control and evaluation: continuous feedback through checklists, electronic portfolios, and competency-based evaluation.

The system is based on the historical-cultural approaches (Vygotsky), activity theory, and developmental didactics. It includes specific actions for each year of residency, with increasing levels of complexity and linkage with the clinical-epidemiological-social method.

Theoretical validation of the system

The panel of specialists evaluated the system with the following results: of the 65 assessments issued (13 criteria × 5 specialists), 75 % (49) were in the "Very Adequate" category and 25 % (16) in "Adequate"; there were no assessments in the lower categories. The best-rated criteria were: importance of the topic (100 % VA), feasibility of application (50 % VA / 50 % A), methodological value (80 % VA), and capacity to develop skills during class work (80 % VA). Only improvements in the graphic structure and in the explicit statement of achievement indicators were suggested, which were incorporated before the final version.

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DISCUSSION

The present study started from a need confirmed in the training of Internal Medicine residents: the gap between theoretical knowledge and practical mastery of medical procedures. The results confirm that, although residents possess an acceptable cognitive base, procedural and methodological skills present serious deficiencies, especially in the initial years of residency. This difficulty in integrating theoretical knowledge with practical action is related to findings from cognitive psychology, which indicate that errors in clinical reasoning are usually due to cognitive biases and poorly structured knowledge, which is aggravated when learning scenarios lack supervision that promotes conscious reflection on errors.

These findings coincide with the global trend reported in the literature. Several authors [17-19] have documented that the opportunistic learning model based on the volume of procedures performed does not guarantee competence; in fact, a national survey of program directors in the United States revealed that 74 % use direct observation, but 64–88 % still depend on volume minimums without proven validity [4].

The results presented evidence that this dependence persists in the Cuban context, with the aggravating factor that structured supervision and feedback are insufficient. Effective teaching in the hospital environment requires, precisely, the implementation of active methods that transcend passive exposure and foster self-directed learning [20], an aspect that was deficient according to the perception of the surveyed residents.

The procedural-methodological dimension was the most affected, with 52 % of residents evaluated as inadequate in the execution of techniques such as lumbar puncture or thoracentesis. This underscores the urgency of implementing simulation strategies with a mastery learning approach (SBML), as recommended by McGaghie et al. [10] and Barsuk et al. [19], who demonstrated reductions of up to 65 % in major complications after systematic training. Although the specialty program contemplates the performance of procedures, it does not establish a formal simulation curriculum nor require demonstrated prior competence before contact with real patients, which constitutes a structural weakness.

Another relevant aspect is the integration of point-of-care ultrasound (POCUS) as a guide for procedures, a skill already considered essential for the modern internist [11]. In the presented study, no resident or professor reported formal training in POCUS applied to procedures, which represents an opportunity for improvement for future iterations

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of the system of actions. Furthermore, contemporary medical practice demands not only technical skill but also the ability to work in interprofessional teams [21] and to manage diagnostic and therapeutic uncertainty [22], competencies that were not adequately developed in the observed process and that must be explicitly incorporated into the training system.

The residents' perception of teaching orientation revealed critical aspects: 63 % considered the use of teaching aids inadequate, and only 23.68 % rated the linking of new contents with practice as adequate. This reflects a predominance of expository-reproductive methods, to the detriment of active approaches such as problem-based learning or experiential learning, which have proven more effective for the development of clinical competencies. The professors, although with solid base preparation, recognized their scarce knowledge to design developmental actions (only 7.14 % self-evaluated with a high level), which points to the need to reinforce the methodological preparation of the faculty. In this sense, Cuban developmental didactics offers solid foundations to redesign the teaching-learning process, prioritizing the zone of proximal development and the conscious activity of the resident [16,23,25].

The proposed system of actions gathers current recommendations of competency-based medical education: staged learning structures, progressive simulation, direct supervision with specific feedback, and multimodal evaluation (checklists, global scales, and portfolios) [24]. Likewise, it is based on clinical competency evaluation models developed in the Latin American context [26] and on the principles of quality management in health training processes [27]. Its theoretical validation by specialists with extensive experience (mean of 23.5 years) grants significant support to its pertinence and feasibility, in consonance with the good methodological practices described in Cuban educational literature [28,29].

Barriers to implementation and future perspectives

Despite the theoretical solidity of the system, its practical application in the setting of the "Faustino Pérez" Hospital faces real barriers that must be proactively addressed. The high care burden, the frequent rotation of residents between services, and the limited availability of technological resources (high-fidelity simulators, ultrasound machines for training) constitute the main identified obstacles. To overcome them, a gradual approach is proposed, beginning with low-fidelity simulation and low-cost workshops, as well as the creation of a bank of shared didactic resources among services. Likewise, a controlled pilot study is recommended to evaluate the effectiveness of the system through a pre-post design, with long-term follow-up to measure the

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real impact on the reduction of complications and patient safety, as well as on strengthening the physician-patient relationship, an essential component of humanized care [30]. Replication of the study in other university hospitals in the country would allow strengthening the evidence and adjusting the system to different institutional realities.

Limitations

The study presents limitations that must be considered: it was conducted in a single hospital, which limits the generalization of results; the sample size, although statistically calculated, is relatively small; surveys and interviews may be subject to social desirability bias; a complete practical implementation of the system was not carried out, but only theoretical validation; the lack of a control group prevents establishing causal relationships between the detected deficiencies and the observed results. Future studies should address pilot implementation with pre-post evaluation and long-term follow-up.

Implications for practice

Despite these limitations, the findings have direct implications for the management of the Internal Medicine residency: it is imperative to incorporate a formal procedural skills curriculum with mandatory simulation; the methodological preparation of tutors must be strengthened through active didactics workshops, taking advantage of national and international theoretical referents [15,16]; it is necessary to establish evaluation systems that are more qualitative than quantitative, with structured feedback and monitoring of competency evolution [26]; the incorporation of technologies such as POCUS ultrasound and high-fidelity simulators should be prioritized in institutional budgets.

CONCLUSIONS

The identified theoretical-methodological foundations—based on the historical-cultural approach, activity theory, and developmental didactics—support a system of actions that integrates the cognitive, ethical-attitudinal, and procedural-methodological dimensions, in consonance with contemporary trends in medical education. The diagnosis of the current state revealed a global assessment of medium level for the variable system of actions, with strengths in the ethical-attitudinal dimension and significant weaknesses in the procedural-methodological dimension, especially in first-year residents. The elaborated system of actions, structured in stages of orientation-planning, execution, and control-evaluation, provides a concrete and viable tool for the transformation of the training process. Validation by specialists confirmed the pertinence, feasibility, and methodological

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value of the system, with 75 % of assessments in the "Very Adequate" category, which supports its potential applicability in clinical-teaching practice.

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AUTHOR CONTRIBUTIONS

JLDM: Conceptualization, data curation, investigation, methodology, project administration, resources, software, supervision, validation, visualization, drafting of the manuscript, writing, review, and editing of the final work.

ESC: Conceptualization, investigation, methodology, validation, drafting of the original manuscript, review.

RRR: Conceptualization, methodology, validation, review.

EGP: Conceptualization, methodology, validation, review.

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CONFLICT OF INTERESTS

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