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# How do medical students communicate? An approach to communication profiles in third-year medical students .

# ¿Cómo se comunican los estudiantes de medicina? Un abordaje de los perfiles de comunicación en estudiantes del tercer año de medicina.

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**Summary**

**Introduction:** The assessment of effective communication during clinical rotations has been prioritized by medical schools. A rubric was developed to assess communication profiles based on the physician-patient relationship. These profiles were examined and self-learning strategies were suggested. **Objective:** To explore the predominant communication profiles in third-year LMC students and to promote self-regulated learning strategies. **Methods:** An exploratory mixed-methods study was designed to analyze data obtained from the Academic Progress Evaluation II, designed with constructed-response items, administered to third-year medical students. Four items were designed to assess effective communication and a category tree based on physician-patient communication styles. A correspondence analysis was performed to evaluate the association between response style categories, expert classifications, and scores obtained. **Results:** Three profiles were identified: disease-centered profile (DCP) [n=152, 66.7%], dissonant profile (DP) [n=40, 17.5%], and patient-centered profile (PCP) [n=36, 15.8%]. The PCP was associated with excellent/sufficient performance, while the PD was associated with poor/insufficient performance. The items assessing effective communication competency were shown to be associated with the identified communication profiles. **Conclusions:** The majority of medical students were classified as having PCE, indicating that their patient-centered communication skills need to be strengthened. A lack of focus on effective communication was identified, as well as an urgent need to implement appropriate assessment strategies and provide feedback to students regarding their communication skills.

**Keywords:** effective communication, disease-centered communication, patient-centered communication, medical education, formative assessment.

**Abstract.**
**Introduction:** Effective communication assessment during clinical clerkships has been prioritized by medical schools. Consequently, we developed a rubric to assess the communication profile based on the physician-patient relationship, examined communication profiles and promoted self-directed learning strategies. **Objective:** To explore the predominant profile of third-year medical students and to foster the development of self-directed learning. **Methods:** We conducted an exploratory mixed-methods study using data from the Academic Advance Assessment II delivered to third year medical students, based on constructed-response items. We included four items designed to assess effective communication. A category tree was developed based on physician-patient communication styles

and models. Correspondence analysis was performed to examine the association between response style categories, expert classifications, and the scores obtained. **Results:** We identified three profiles among the students: disease-centered profile (DCP) [n=152, 66.7%], dissonant profile (DP) [n=40, 17.5%], and patient-centered profile (PCP) [n=36, 15.8%]. We found that PCP was associated with excellent/sufficient performance levels based on the rubrics, while DP was associated with deficient/insufficient levels. Therefore, the items that assessed effective communication competence, demonstrated an association with the communication profiles identified. **Conclusions:** Most medical students exhibited a DCP, highlighting the need to strengthen their patient-centered communication skills. Furthermore, we identified that there is a lack of focus on effective communication, the urgent need to implement adequate assessment strategies and provide feedback to students on communication skills.

**Keywords:** effective communication, disease centered communication, patient centered communication, medical education, formative assessment.

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## 1. Introduction

In medical education, the importance of teaching and assessing communication skills in medical schools has gained increasing relevance in recent years. The teaching of these skills, along with the development of clinical competencies, must be balanced and strengthened together to encourage students to acquire patient-centered communication. Effective teaching and assessment of these skills in clinical settings requires a systematic conceptual framework. However, there are still areas of opportunity in academic programs and assessment mechanisms that must be addressed comprehensively (1).

Effective communication in medical practice encompasses a set of acquired skills that contribute to improving patient care. To achieve effective communication, medical personnel must develop specific skills beyond a general understanding of communication principles (2). It is essential to emphasize that this type of communication is essential in the physician-patient relationship, as it fosters appropriate interaction, which is manifested, among other things, in improved patient education. Consequently, health is promoted, disease is prevented, and treatment adherence is enhanced (3).

For the development of communication skills, experience alone is often insufficient teaching. Although experience can reinforce certain effective habits, it does not necessarily distinguish between appropriate and inappropriate practices. For example, during medical training, many skills are acquired through modeling; however, in the absence of structured educational interventions, communication skills can deteriorate throughout this teaching-learning process (4-5).

Since 2016, the Faculty of Medicine (FM) of the National Autonomous University of Mexico (UNAM) has implemented diagnostic-formative assessments called Academic Progress Assessments (APE) in the Bachelor of Medicine and Surgery (LMC) program, with the purpose of evaluating student performance throughout their training. APEs allow for a comprehensive assessment of academic performance and provide feedback to promote self-regulated learning.

Although effective communication during clinical rotations is not specifically assessed, a rubric was developed to assess communication profiles based on the physician-patient relationship. This was done to explore the predominant communication profiles among third-year LMC students and to foster self-regulated learning strategies. Finally, we assessed whether these communication profiles were associated with student performance in one of the AASs.

## 2. Methods

A mixed-method study design was used with data obtained from the EAA II practical phase, administered in November 2021 to third-year FM students. This group had already completed most of their clinical rotations, mainly in the area of Internal Medicine, which provided them with a year and a half of clinical experience (6).

*Diagnostic-formative evaluation: Evaluation of Academic Progress II*

The EAA are diagnostic-formative assessments whose purpose is to explore the performance of LMC students, based on the development of core competencies defined in the intermediate profiles I (preclinical) and II (clinical) established in the 2010 Curriculum (PE-2010) (6). These assessments provide meaningful feedback to students and guide effective learning strategies to improve their performance. They also allow the identification of areas of opportunity in academic programs that require strengthening. These types of assessments, although not mandatory, can have an impact on the process of assigning groups and hospital sites, since failure to do so could affect students' choice of these options.

Each of these assessments consists of two distinct phases: theoretical and practical. The theoretical phase is administered through a written exam consisting of clinical cases in a multiple-choice format, with a total of 120 items. In contrast, the practical phase varies depending on the assessment and includes different modalities, such as the Multi-Format Integrative Examination, the Constructed-Response Examination, and the Objective Structured Clinical Examination (OSCE).

In the particular case of the EAA II 2021, the Constructed Response Exam was used during the practical phase. This instrument is developed from items that demand the activation of complex cognitive processes, characteristic of medical practice (7). Its design promotes assessment for learning, since students must construct their responses based on the knowledge, skills, and attitudes acquired throughout the degree. In addition, it allows them to express themselves in their own words, favoring the development of skills such as synthesis, effective communication, and critical thinking (8).

The EAA II consisted of three clinical cases or stations (E): 1. Type 2 diabetes; 2. Community-acquired pneumonia; 3. Ischemic heart disease. Each one consisted of 11 items that evaluated six competencies defined in the PE-2010: critical thinking, decision-making and clinical judgment; effective communication; application of biomedical, clinical and sociomedical sciences; clinical skills; ethical aspects and legal responsibilities; population health. The exam was assembled on the Moodle platform and each item was graded using a rubric with four performance levels: excellent = 3 points, sufficient = 2 points, insufficient = 1 point and deficient = 0 points (Table 1). The maximum duration of the evaluation was two hours.

**Table 1.** Example of the EAA II rubric for item E1.8

| Qualification | Performance level | Answer |
|---|---|---|
| Excellent = 3 points | Explain the current condition, based on the findings of the physical examination, laboratory studies, and integrated diagnoses, using 13 to 17 of the highlighted terms. (Percentage = 75% or more correct answers). | Explain to the patient what she is suffering from using 13 to 17 of the terms marked in bold (the counting of the terms (T) appears as follows: ( *T1)* …( *T2)* …( *T3)* …and so on): "I regret to inform you that you suffer from *(T1)* **diabetes,** since your *(T2)* blood **sugar marks a level** *(T3)* **tall** . According to his weight and the measurements we took, he has *(T4)* **obesity.** Likewise, according to his labs, he has *(T5)* **high fats** *(T6)* and this is called *(T7)* **high cholesterol.** Also, you have *(T8)* High **blood pressure** *(T9)* **.** The conditions you have come together in a single disease called *(T10).* **metabolic syndrome.** It is important to be aware of these conditions, since they, in conjunction with *(T11)* **cigarette use** , *(T12)* **increase** their *(T13)* **propensity** to have *(T14)* **diseases** of the *(T15)* **heart,** *(T16)* **kidney** or its *(T17)* **glasses** ." |
| Enough = 2 points | Explain the current condition, based on the findings of the physical examination, laboratory | Explain to the patient what she is suffering from using 9 to 12 of the terms marked in bold. |

| | | |
|---|---|---|
| | studies, and integrated diagnoses, using 9 to 12 of the highlighted terms.<br>(Percentage = 50% or more correct answers). | |
| Insufficient = 1 point | Explain the current condition, based on the findings of the physical examination, laboratory studies, and integrated diagnoses, using 5 to 8 of the highlighted terms.<br>(Percentage = less than 50% correct). | Explain to the patient what she is suffering from using 5 to 8 of the terms marked in bold. |
| Poor = 0 points | Explain the current condition, based on the findings of the physical examination, laboratory studies, and integrated diagnoses, using four or fewer of the marked terms.<br>(Percentage = 25% or less correct). | Explain to the patient what she is suffering from using 4 or fewer of the terms marked in bold. |

Consequently, the EAA II consisted of a total of 33 items, with a maximum score of 99 points. To grade student responses, a group of 97 evaluators, all FM teachers, were trained. They evaluated each of the 33 items once the exam was completed. This group of evaluators was assigned a maximum of 15 students and had a period of seven days to grade each item.

For this study, a total of four items were included to assess the effectiveness of communication competency development. The selected items were as follows:

- E1.8 Based on the findings of the physical examination, laboratory studies, and integrated diagnoses, describe to the professor/resident how you would communicate to the patient in colloquial terms the risks associated with the current condition.
- E1.11 Based on the preventive measures (health education) you indicated, describe to the professor/resident how you would communicate them to the patient in this case.
- E2.4 You are about to perform a physical examination, describe how you would communicate to the patient the procedures you will perform.
- E3.8 Based on the current condition and the findings of the imaging study, describe to the professor/resident what you would communicate, in colloquial terms, to the patient about the pathophysiology of his/her condition.

*Definition of communication styles*

A multidisciplinary group of researchers, including four physicians and two psychologists with expertise in communication, health sciences education, and assessment, collaborated to define categories to classify student responses. A category tree was developed based on a review of the literature on communication styles and models between physicians and patients, as well as on the attributes of effective communication competency described in the PE-2010.

For the analysis of the student responses, each one was classified based on a priori categories to determine whether it was oriented towards a disease-centered/paternalistic or informative/patient-centered communication style. In order to evaluate the consistency of the classification, four consensus sessions were held in which the responses were reviewed and discussed to reach agreement. Subsequently, a set of responses (n = 10) was classified individually and in a fifth session, discrepancies were reviewed to achieve consistency in the categorization. Based on the results of the concordance analysis, pairs of researchers were formed: those who obtained significant concordance

(Kappa ≥ 0.6) worked together with those who presented slight or poor concordance (Kappa ≤ 0.3) to classify the remaining responses.

*Statistical analysis*

Qualitative variables were described using frequencies and percentages, while quantitative variables were presented as mean and standard deviation or median and interquartile range, according to the data distribution. Qualitative variables were compared using the Chi-square test, and quantitative variables were compared using the Mann-Whitney U test, according to the corresponding distribution.

*Consensus on classification*

To assess the agreement between the experts' classifications, two rounds of review were conducted, analyzing the responses of ten students in each round. Cohen's Kappa coefficient was calculated, with a value greater than or equal to 0.60 indicating significant agreement between the experts' classifications.

*Correspondence analysis*

Response profiles were classified into three categories: illness-focused (when three or more responses were classified as illness-focused), patient-focused (when three or more responses were classified as this style), and dissonant (when the same number of responses were classified in both categories). A correspondence analysis was performed to assess the association between response styles, expert classifications, and the results obtained for each of the items evaluated. To evaluate model fit, the percentage of explained variance (inertia), the chi-square statistic, the contribution of each item, the mass, and the total quality of representation (QLT) were calculated. A p-value < 0.05 was considered statistically significant. All analyses were performed using R software, version 4.1.0.

*Sample size*

The sample size was calculated to evaluate the correlation between student response profiles and the results obtained on the EAA II. An expected correlation of 0.2 was assumed, with a significance level (alpha) of 0.05 and a statistical power of 0.80. Under these parameters, a sample size of 228 students was estimated. To minimize selection bias, systematic sampling was used from a total population of 1,430 students, ensuring a balanced selection of participants based on their performance on the EAA II.

*Ethical aspects*

Access to the database was restricted to preserve the confidentiality of participant information. Data were anonymized by assigning consecutive numbers.

## 3. Results

*Aprioriistic tree of categories*

The expert group of researchers developed a category tree consisting of two general categories, each with three subcategories, based on the review of the literature on doctor-patient communication styles and models, as well as on the attributes of the effective communication competency described in the PE-2010 (6) (Table 2).

**Table 2.** A priori categories for coding student responses.

| Competence | 1. Paternalistic / Disease-Centered | 2. Informative / Patient-Centered |
|---|---|---|
| Effective communication | 1.1 Passive-aggressive communication | 2.1 Assertive communication, openness to patient questioning. |
| | 1.2 Use medical terms in explanations to the patient | 2.2 Use colloquial terminology for better patient understanding. |

| | | |
|---|---|---|
| | 1.3 Gives an opinion and/or value judgments on the causes of the patient's consultation | 2.3 No judgments or opinions are made regarding the reasons for the patient's consultation. |

*Concordance analysis to unify the classification criteria of the responses*

The first exercise consisted of classifying the response profile and communication style expressed by a subset of ten students. To assess agreement among experts, Cohen's Kappa coefficient was calculated at two levels: by individual response and by clinical case, as presented in Table 3.

**Table 3.** Cohen's Kappa coefficient matrix to evaluate the agreement between experts in the clinical cases included in the EAA II. * p<0.05.

| | **Clinical case 1** | | | | | |
|---|---|---|---|---|---|---|
| | **Expert 1** | **Expert 2** | **Expert 3** | **Expert 4** | **Expert 5** | **Expert 6** |
| **Expert 1** | - | | | | | |
| **Expert 2** | 0.798* | - | | | | |
| **Expert 3** | 0.083 | 0.083 | - | | | |
| **Expert 4** | 0.798* | 0.596* | 0.083 | - | | |
| **Expert 5** | 0.355* | 0.355* | 0.018 | 0.355* | - | |
| **Expert 6** | 0.400* | 0.200* | 0.010 | 0.400* | 0.470* | - |
| | **Clinical case 2** | | | | | |
| **Expert 1** | - | | | | | |
| **Expert 2** | 0.479* | - | | | | |
| **Expert 3** | 0.306* | 0.355* | - | | | |
| **Expert 4** | 0.625* | 0.589* | 0.077 | - | | |
| **Expert 5** | 0.474* | 0.255 | -0.207 | 0.571* | - | |
| **Expert 6** | 0.475* | 0.230* | 0.020 | 0.310* | 0.480* | - |
| | **Clinical case 3** | | | | | |
| **Expert 1** | - | | | | | |
| **Expert 2** | 0.894* | - | | | | |
| **Expert 3** | 0.078* | 0.095 | - | | | |
| **Expert 4** | 0.596* | 0.689* | 0.179 | - | | |
| **Expert 5** | 0.412* | 0.486* | 269* | 0.759* | - | |
| **Expert 6** | 0.410* | 0.398* | 0.156 | 0.510* | 0.670* | - |

In the case-by-case analysis, Expert 1 showed moderate to significant agreement with Experts 2, 4, and 5, but only weak agreement with Experts 3 and 6. Expert 2 showed reasonable to moderate agreement with Experts 3, 4, and 5. Experts 4 and 5 also showed agreement in the case-by-case assessment. The detailed results of the agreement analysis are shown in Table 4.

**Table 4.** Cohen's Kappa coefficient matrix to assess the agreement between experts in student responses to the different items. * p<0.05.

| | **E1.8** | | | | | |
|---|---|---|---|---|---|---|
| | **Expert 1** | **Expert 2** | **Expert 3** | **Expert 4** | **Expert 5** | **Expert 6** |
| **Expert 1** | - | | | | | |
| **Expert 2** | 0.219* | - | | | | |
| **Expert 3** | 0.079 | 0.069 | - | | | |
| **Expert 4** | 0.432* | 0.178 | 0.340* | - | | |
| **Expert 5** | 0.583* | 0.459* | 0.035 | 0.494* | - | |
| **Expert 6** | 0.222* | 0.210* | 0.100 | 0.400* | 0.310* | - |
| | **E1.11** | | | | | |
| **Expert 1** | - | | | | | |
| **Expert 2** | 0.500* | - | | | | |
| **Expert 3** | 0.200* | 0.342* | - | | | |
| **Expert 4** | 1,000* | 0.500* | 0.200* | - | | |
| **Expert 5** | 0.200* | 0.113 | 0.014 | 0.200* | - | |
| **Expert 6** | 0.450* | 0.410* | 0.210* | 0.220* | 0.245* | - |
| | **E2.4** | | | | | |
| **Expert 1** | - | | | | | |
| **Expert 2** | 0.300* | - | | | | |
| **Expert 3** | 0.001 | 0.002 | - | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Expert 4** | 0.286* | 0.200* | 0.001 | - | | |
| **Expert 5** | 0.589* | 0.100 | 0.003 | 0.694* | - | |
| **Expert 6** | 0.250* | 0.310* | 0.010 | 0.420* | 0.230* | - |
| **E3.8** | | | | | | |
| **Expert 1** | - | | | | | |
| **Expert 2** | 0.571* | - | | | | |
| **Expert 3** | 0.000 | -0.030 | - | | | |
| **Expert 4** | 0.769* | 0.400* | -0.200 | - | | |
| **Expert 5** | 0.206* | 0.452* | -0.198 | 0.131 | - | |
| **Expert 6** | 0.389* | 0.266* | 0.110 | 0.231* | 0.123 | - |

Due to the heterogeneous agreement among the experts, a Zoom session was organized in which the responses of another subset of ten students were collectively analyzed and classified. As a result of this discussion, it was decided to continue the analysis in pairs of experts, organized based on the previously obtained levels of agreement. Experts with high levels of agreement collaborated with those with low levels of agreement. In cases where consensus was not reached, the responses were reviewed and discussed by the rest of the expert group.

A third subset of responses, corresponding to ten more students, was analyzed and classified according to the communication style used. After performing a new agreement analysis, it was observed that the agreement among the expert group was almost perfect for items E1.8 and E1.11 (Kappa 0.81–1.00, $p < 0.05$). However, for items E2.4, E4.5, and the overall evaluation, the level of agreement was significant (Kappa 0.60–0.80, $p < 0.05$). The detailed results are presented in Table 5.

**Table 5.** Cohen's Kappa Coefficient Matrix to assess the agreement between expert groups in the clinical cases included in the EAA II. * $p<0.05$.

| | **Clinical case 1** | | |
|---|---|---|---|
| | **Group 1** | **Group 2** | **Group 3** |
| **Group 1** | - | | |
| **Group 2** | 1,000* | - | |
| **Group 3** | 0.890* | 0.789* | - |
| **Clinical case 2** | | | |
| **Group 1** | - | | |
| **Group 2** | 0.400* | - | |
| **Group 3** | 0.456* | 0.510* | - |
| **Clinical case 3** | | | |
| **Group 1** | - | | |
| **Group 2** | 0.609 | - | |
| **Group 3** | 0.580* | 0.710* | - |

*Association of communication profiles with the results of the EAA II*

The results of 228 students who participated in the EAA II were analyzed. Each member of the expert group classified the responses of 76 students, as shown in Table 6. For items E1.8, E1.11, and E2.4, the patient-centered communication (PCP) profile was identified in a range of 28.1% to 35.5% of the students. In contrast, for item E4.4, only 15.4% of students were classified as having a PCP profile.

**Table 6.** Proportion of responses classified as having the patient-centered communication profile according to the expert group (data are expressed in frequencies and percentages).

| Item | n= 228 | Group 1 n=76 | Group 2 n=77 | Group 3 n=75 | p |
|---|---|---|---|---|---|
| E1.8 | 64 (28.1) | 22 (28.9) | 33 (42.9) | 9 (12.0) | <0.001 |
| E1.11 | 75 (32.9) | 16 (21.1) | 44 (57.1) | 15 (20.0) | <0.001 |
| E2.4 | 81 (35.5) | 38 (50.0) | 28 (36.4) | 15 (20.0) | <0.001 |
| E3.8 | 35 (15.4) | 12 (15.8) | 10 (13.0) | 13 (17.3) | 0.42 |

When assessing peer group communication style classifications for items E1.8 and E1.11, Group 2 classified a higher proportion of students as having a PCP profile than the other groups, $p < 0.001$. For item E2.4, Group 1 identified a higher number of students with a PCP profile (50%) than Group 2 (36.2%) and Group 3 (20.0%), $p < 0.001$. However, no significant differences were observed between peer groups for item E4.4 ($p = 0.415$).

Based on the number of responses classified into each style, students were grouped into three communication profiles: illness-centered (ICC) (n=152, 66.7%), dissonant (DC) (n=40, 17.5%), and patient-centered (PCC) (n=36, 15.8%). Initially, an analysis was conducted to determine whether there were differences in the results by clinical case and in the total scores obtained on the EAA II between the different communication profiles; however, no statistically significant differences were identified, as shown in Table 7.

**Table 7.** Overall score and score by clinical case obtained by students in the EAA II based on the different communication profiles (data are expressed as medians and interquartile ranges).

| Clinical case | n= 228 | Disease-focused (n=152) | Dissonant (n= 40) | Patient-centered (n= 36) | p |
|---|---|---|---|---|---|
| 1 | 67.4 (55.8-76.7) | 67.5 (55.8-75.8) | 65.1 (56.9-74.4) | 68.5 (55.8-81.4) | 0.41 |
| 2 | 53.5 (44.2-65.1) | 53.5 (41.8-65.1) | 53.5 (48.9-61.6) | 54.7 (48.8-61.6) | 0.90 |
| 3 | 62.8 (53.5-72.1) | 65.1 (55.8-74.4) | 62.7 (52.3-68.6) | 63.9 (51.1-70.9) | 0.35 |
| Global | 61.2 (52.7-69.8) | 61.6 (51.9-69.8) | 60.0 (53.8-67.8) | 60.5 (54.7-70.5) | 0.99 |

Subsequently, a multinomial logistic regression model was fitted, considering peer groups as the adjustment variable and using the PCP profile as the reference category. In this analysis, neither the clinical case nor the total EAA II scores showed a statistically significant association with the communication profiles ($p > 0.05$). Since the clinical cases and the global results include items corresponding to various competencies, a specific comparison was made between the scores obtained in the items used to classify communication styles and the identified profiles. The scores for items E1.11 and E2.4 were significantly higher in the PCP profile compared to the PD and PCE profiles ($p < 0.05$), as shown in Table 8.

**Table 8.** Score of the items designed to evaluate effective communication competence according to the communication profiles (data are expressed as medians and interquartile ranges).

| Item | n= 228 | Disease-focused (n=152) | Dissonant (n= 40) | Patient-centered (n= 36) | p |
|---|---|---|---|---|---|
| E1.8 | 5.0 (5.0-7.5) | 5.0 (2.5-7.5) | 5.0 (2.5-7.5) | 5.0 (5.0-7.5) | 0.27 |
| E1.11 | 7.5 (5.0-10.0) | 7.5 (5.0-7.5) | 7.5 (5.0-10.0) | 7.5 (7.5-10.0) | 0.01 |
| E2.4 | 7.5 (5.0-10.0) | 7.5 (5.0-10.0) | 7.5 (5.0-10.0) | 7.5 (7.5-10.0) | 0.02 |
| E3.8 | 5.0 (2.5-7.5) | 5.0 (2.5-7.5) | 5.0 (5.0-7.5) | 5.0 (2.5-7.5) | 0.91 |

*Association of communication profiles with the response category profile*

Subsequently, a correspondence analysis was conducted to assess whether specific response categories were associated with a particular communication profile. In item E1.8, both PD and PCP were associated with categories 2.1 and 2.2 of effective communication. In contrast, PCE was associated with its respective response categories, particularly category 2.3. In item E1.11, PD was associated with categories 1.3 and 2.2, suggesting a combination of both disease- and patient-centered characteristics. On the other hand, PCP was associated with category 2.1, and PCE with category 1.1.

Additionally, in item E2.4, the PCP, PCE, and PD profiles were associated with categories 2.1, 2.2, and 1.1, respectively. In the clinical case where communication about the disease process was assessed (E4.8), PCE was associated with categories 1.2 and 1.3, corresponding to a disease-centered style. Students with PCP combined patient-centered communication characteristics, associating themselves with categories 2.1 and 2.2, while PD was associated with category 1.1.

A correspondence analysis was also conducted to examine the association between communication profiles and performance levels obtained according to the EAA II rubric. In item E1.8, the PCE was associated with the "sufficient" level, while the PCP and PD showed a weak association with the "excellent" and "poor" levels, respectively. In item E1.11, the PCP showed no significant association with any performance level, although the PCE was associated with the "excellent" level and the PD with the "insufficient" and "poor" levels. For item E2.4, only PD was associated with the "sufficient" level, with no clear associations observed for the other profiles. Also, in item E4.4, PD was related to the "deficient" level and the PCP with the "sufficient" level, while PD also showed a weak association with the "insufficient" level.

Finally, the relationship between performance levels and specific response categories was assessed. For items in clinical case 1 (E1.8 and E1.11), a gradient in the association was observed: the "excellent" level was associated with category 2.1, the "sufficient" level with categories 1.1 (E1.8) and 2.2 (E1.11), and the "insufficient" level with categories 1.1 (E1.11) and 2.2 (E1.8). In clinical cases 2 and 3, the "excellent" and "sufficient" levels were associated with categories 2.1 and 2.2, respectively, linked to the PCP. In contrast, the "insufficient" and "deficient" levels were associated with categories 1.1 and 1.2, related to the PCE.

## 4. Discussion

Effective communication is a fundamental competency in medical practice. When evaluating the communication profiles identified in the present study, a high proportion of students with a PCE (Intermediate Communication Profile), followed by a PD (Degree of Competence), and, to a lesser extent, a PCP (Person of Positive Disabilities). No significant association was found between communication profiles and overall performance on the EAA II, possibly because this assessment encompasses various competencies of the Intermediate Profile II defined in the PE-2010. However, when specifically analyzing performance on items related to the effective communication competency, a clear association was identified between the PCP (Intermediate Communication Profile) and the "excellent" or "sufficient" performance levels, according to established rubrics. In contrast, the PD (Degree of Competence) was predominantly associated with the "insufficient" and "deficient" levels. These findings suggest that the items focused on assessing the effective communication competency adequately discriminate between communication profiles, providing further evidence of their validity as indicators of the development of this competency.

Although effective communication is recognized in the curriculum as a fundamental competency for the professional development of physicians, in our context, there are still no strategically designed assessments or feedback models to promote its acquisition (2, 9-11). Therefore, it is essential to implement specific assessment strategies aimed at developing communication skills in order to strengthen this key competency in medical training.

In recent years, several educational institutions have been forced to modify both their teaching methods and their assessment strategies (12). Most of these changes included the implementation of online exams with the aim of reducing the spread of the virus. Consequently, innovation was made in the generation of specific instruments for the practical phase of AAS, adapted to our institutional context and aligned with the objectives of evaluating the clinical performance of students. However,

the limited direct interaction between students and patients in real clinical scenarios had a considerable impact on the development of fundamental skills for establishing an adequate physician-patient relationship (13). When evaluating third-year LMC students who were exposed to these changes, it was observed that only a small proportion demonstrated competencies associated with patient-centered communication.

A high proportion of students with a PCE were observed; however, it is important to consider that these students are still in training and have recently resumed contact with patients in real-life clinical settings. In this context, it was possible to identify profiles that demonstrate both disease-centered and patient-centered communication skills, depending on the type of clinical situation assessed.

The PD could represent a transitional stage in which students migrate from a disease-centered approach to a patient-centered one. Several studies have documented that certain communication skills tend to deteriorate as students progress through their medical training.

Over time, physicians in training may lose focus on compassionate, person-centered medical care (4-5). This observation underscores the importance of establishing ongoing and systematic teaching, assessment, and feedback processes that promote the development and consolidation of effective communication skills in students.

Clinical communication training is most effective when implemented during clinical cycles compared to preclinical cycles, especially when planned pedagogical strategies are employed. This training has been shown to be cost-effective, as it improves the performance of physicians in training and positively impacts patients' health status (10, 14). Several educational institutions have developed simulated scenarios that have allowed students to strengthen skills related to the physician-patient relationship (15-16). Although experiential methods continue to be the most effective and preferred by students, one of the main concerns reported by them is the lack of confidence in maintaining a fluid and structured conversation in real clinical contexts (14, 17).

In the EAA II, although brief written responses were assessed, they partially simulated the interaction between student and patient. However, this modality did not fully emulate live interaction, as occurs in the OSCE, which prevented the assessment of relevant aspects such as nonverbal communication, which plays a fundamental role in the physician-patient relationship. Despite these limitations, the constructed-response items in the EAA II evoke complex cognitive processes characteristic of medical practice, such as information synthesis, structuring of communicative content, and critical thinking (7-8).

When comparing response profiles across clinical scenarios, it was observed that in clinical case 3, which addressed communication about a pathophysiological process related to the current condition, the majority of students demonstrated adequate medical knowledge; however, they were unable to translate this technical knowledge into colloquial language that facilitated patient understanding.

It is important to note that medical students learn models of the doctor-patient relationship primarily in real-life clinical settings, where the emphasis is often on integrating diagnoses and developing problem-solving skills. As a result, they rarely observe, and even less frequently discuss, the broad spectrum of communication skills that are part of this interaction. This situation can lead to confusion among students, leading them to assume that effective communication is limited solely to solving clinical problems, neglecting fundamental aspects such as empathy, clarity of information, and adapting language to the patient's understanding (18, 20).

This study has both strengths and limitations. One of its main strengths lies in its sequential mixed methodological approach, which allowed us to identify communication profiles in medical students and, consequently, areas of opportunity in the development of skills related to effective communication. However, one of its limitations is that the evaluation of the construct of effective communication was partial, as the process analyzed was unidirectional and written; consequently, it did not allow us to assess fundamental aspects such as nonverbal communication in doctor-patient interactions.

On the other hand, student performance in communication skills was not compared with other assessment instruments, such as the OSCE, which could have provided a more comprehensive and comparative view of the development of this skill in different assessment contexts. Despite this, the response profiles obtained through the EAA II can be considered representative of complex cognitive processes, given that students must construct their responses based on the knowledge, skills, and attitudes developed throughout the LMC. However, in previous experiences of the research group, other components of communication—verbal, paraverbal, and nonverbal—have been assessed using the OSCE with standardized patients, observing a higher level of performance when direct interaction is assessed. However, in the present study, communicative skills were assessed using a written instrument, which represents a recognized limitation and a line of exploration for future research.

Finally, the analysis did not allow for the consideration of other confounding variables that could influence the communication profile, such as gender, student academic status, or clinical location, as the data were disaggregated and completely anonymized. However, these limitations open up the possibility of further studies or analyses. To summarize the main results, an infographic summarizing the most relevant findings of the study is shown below (Figure 1).

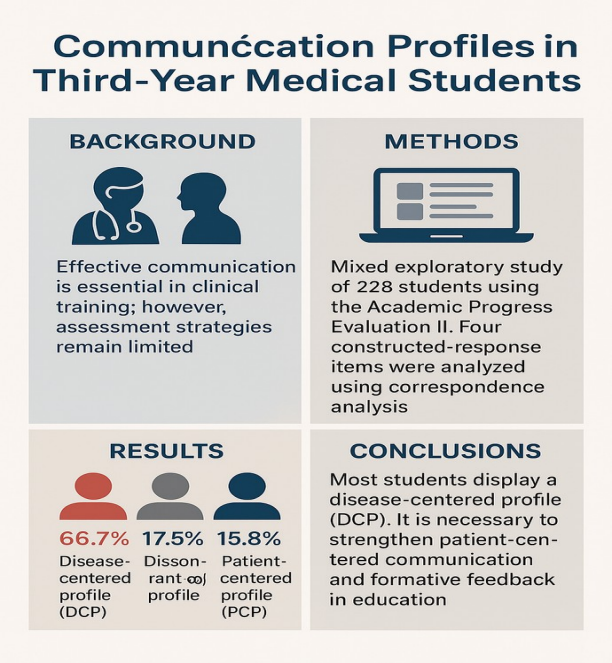


**Figure 1.** Infographic with the most relevant findings of the study.

## 5. Conclusions

- Effective communication is an essential component of the doctor-patient relationship. The findings of this study show that the majority of students present a disease-centered communication profile, underscoring the need to strengthen the development of patient-centered skills.
- It was also identified that traditional assessment strategies do not specifically or adequately address this competency, which highlights the importance of implementing relevant assessment mechanisms, accompanied by systematic feedback processes.
- Continuing education in effective communication should be a priority throughout the curriculum, especially during clinical rotations. This also involves training medical educators to design authentic clinical scenarios and provide meaningful feedback in real-life practice settings.

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Resources, Supervision. RGD: Conceptualization, Writing - original draft. ACSV: Conceptualization, Resources, Supervision, Project administration. TVV: Conceptualization, Methodology, Investigation, Validation, Project administration.

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