



ASSESSMENT OF HEALTHCARE PROFESSIONALS' SATISFACTION WITH ELECTRONIC PRESCRIPTION IN A UNIVERSITY HOSPITAL

AVALIAÇÃO DO GRAU DE SATISFAÇÃO DE PROFISSIONAIS DE SAÚDE QUANTO À PRESCRIÇÃO ELETRÔNICA EM UM HOSPITAL UNIVERSITÁRIO

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ABSTRACT: The objective was to evaluate the level of user satisfaction with electronic prescribing in a university hospital. This was a descriptive-analytical study whose target population consisted of users of the electronic prescribing system. A standardized questionnaire with closed-ended questions was used for data collection, and the Likert scale was employed as the assessment instrument. In total, 104 participants were included. Overall satisfaction with computerization was considered good. The lowest score was attributed to the training provided, while the highest score was assigned to the perceived quality of the system. There was no statistically significant difference in overall satisfaction among professional categories. It is recommended that the training program be reviewed to identify aspects that need improvement, thereby enhancing user adherence to the platform.

KEYWORDS: Electronic Prescription. Consumer Behavior. Technology Assessment, Biomedical.

RESUMO: O objetivo foi avaliar o grau de satisfação dos usuários da prescrição eletrônica em um hospital universitário. Tratou-se de um estudo descritivo-analítico, cuja população-alvo foi composta de usuários do sistema de prescrição eletrônica. Um questionário padronizado com perguntas fechadas foi utilizado para a obtenção dos dados. A escala de Likert foi empregada como instrumento de avaliação. No total, 104 participantes foram incluídos. A satisfação geral com a informatização foi boa. O menor escore foi atribuído ao treinamento ofertado e o maior escore foi dado ao grau de qualidade do sistema. Não houve diferença estatística entre as categorias profissionais quanto à satisfação geral. Recomenda-se analisar o programa de treinamento para verificar os pontos a serem aprimorados e, desta forma, aprimorar a adesão dos usuários a plataforma.

PALAVRAS-CHAVE: Prescrição Eletrônica. Comportamento do Consumidor. Avaliação da Tecnologia Biomédica.

INTRODUCTION

Currently, the digitization of healthcare is a reality in clinical practice. Various establishments and organizations worldwide have adopted this strategy to improve information flow and enhance work processes. As a result, the use of information technology in healthcare has led to improvements in safety and quality indicators, as well as cost reductions¹.

In this context, information technology (IT) is an essential tool in daily activities, driving substantial changes in manual processes. Within this framework, electronic prescribing has been described as a key strategy for increasing the efficiency and quality of hospital care. Consequently, the development of specially designed systems to assist in this activity has grown over the past decades to serve both public and private healthcare units^{1,2,3}.

Several advantages have been highlighted to justify the use of platforms aimed at managing healthcare services in Brazil and abroad. Among them, the reduction of medication errors caused by legibility issues in handwritten prescriptions or typing errors in offline medical records stands out. In contrast, the implementation of a new system must be carefully evaluated to address users' concerns, ensuring that this tool is fully utilized. Accordingly, several studies have been conducted in recent years to assess users' perceptions and acceptance of these systems in various Brazilian hospitals^{2,3}.

Regarding safety in the nosocomial environment, the use of electronic prescribing has been associated with a reduction in failures within the medication chain. In a study conducted in France, researchers evaluated the difference in error rates before and after the implementation of the system and found that issues traditionally related to manual prescribing were reduced after one year of observation. In addition to reducing prescription errors, the use of electronic systems was associated with increased interaction among healthcare professionals, particularly between physicians and pharmacists⁴.

Thus, systematic review studies have also been conducted to highlight the effects of electronic prescribing systems on hospital outcomes. For example, Vélez-Díaz-Pallarés et al. stated that the adoption of this strategy resulted in a decrease in overall medication error rates, including errors in medication selection, dosage, and the route of administration of the therapeutic agent⁵. Furthermore, Gohari et al. evaluated the effectiveness of prescribing systems in reducing adverse drug events (ADEs). The authors concluded that the introduction of this approach could significantly lower the occurrence of ADEs in hospital settings⁶.

However, several authors have also pointed out criticisms of the currently available electronic prescribing systems. In this context, the lack of alignment between the platforms and the needs of system users has been widely reported, and therefore, continuous improvements should be made to correct potential shortcomings⁷.

Moreover, the transition from paper-based prescribing to a computerized system is a crucial step in this process. According to Fumis and collaborators, the implementation of electronic prescribing requires effort and engagement from all professionals involved in the medication chain within the healthcare unit². As a result, resistance, dissatisfaction, conflicts, and stress may arise among workers during this transition⁸.

Although computerized systems have been widely implemented in hospitals to enhance safety and efficiency in medication administration, careful observation is necessary during and after the implementation of new prescribing technologies to ensure that potential new errors are monitored and prevented. Additionally, interoperability between systems and processes is crucial to optimizing electronic prescribing, improving patient safety, care integration, and the efficiency of therapeutic pathways¹.

However, the implementation of any computerized system is subject to inherent process failures. In this context, an important aspect is the possibility of new errors emerging, including drop-down menu errors⁵. Therefore, it is essential to measure user satisfaction to reduce resistance to implementation and address identified issues. Consequently, investigations in this regard have been conducted in various countries to analyze the usability of prescribing platforms, considering aspects such as accessibility, ease of use, and information quality, among others⁹.

Given this issue, several researchers have sought to assess user satisfaction with electronic prescribing systems to address the difficulties reported by healthcare workers, thereby improving work processes^{2,3,8}. In this regard, during the literature review conducted for this study, no reports involving prescribing systems in the state of Amazonas were found in the databases. Furthermore, the hospital targeted in this study was undergoing a transition to electronic prescribing, making it essential to evaluate this stage appropriately.

The Pharmacovigilance Committee of the Getúlio Vargas University Hospital identified the assessment of electronic prescribing user satisfaction as one of the annual planning goals, aiming to support full system adoption and, consequently, enhance safety and quality in clinical services provided to the population. Therefore, this study aimed to evaluate the level of satisfaction among electronic prescribing users in a university hospital. The findings are expected to be useful in the future for developing strategies to improve the observed outcomes.

METHODOLOGY

A descriptive, quantitative, and prospective study was conducted based on the approach of electronic prescribing system users. The study population consisted of 104 users of the electronic prescribing system at Getúlio Vargas University Hospital, located in Manaus, in the state of Amazonas (AM), including physicians, nurses, nursing technicians, pharmacists, and pharmacy technicians. At the time of the study, the total number of system users in the healthcare unit was 416 individuals, and sampling was performed based on convenience. The study included healthcare professionals aged 18 years or older, affiliated with the institution, and involved in activities related to electronic prescribing as inclusion criteria. The exclusion criterion was the inability to understand and respond to the questionnaire.

Data collection was carried out as described below. First, relevant study indicators and variables were determined. For this purpose, a bibliographic review was conducted in major databases and national and international guidelines to select variables and indicators appropriate to the project's reality regarding the hospital prescribing routine. Following this, participants were trained to standardize data collection procedures. Field data collection took place between November 2019 and March 2020.

The study was publicized via the hospital's direct mail system, and invitations to participate were made through in-person visits to hospital departments. Participants were informed about the importance of the research and invited to participate. Upon understanding and agreeing to participate, each individual received two copies of the Free and Informed Consent Form (TCLE), which contained all necessary research information. If the participant agreed, they signed the TCLE, with one copy retained by the individual and the other archived by the researcher.

Participants were invited to complete an electronic questionnaire containing various questions. The data collection instrument used was a standardized, closed-ended questionnaire with 40 questions, based on the investigation conducted by Majewski — a validated and pioneering study in this type of

research in Brazil¹⁰. The questionnaire was chosen for its ease of application, reasonable cost, reliability, and alignment with the study's objectives.

The first section of the questionnaire collected general information about the participant. The second section contained general opinion-related questions, while the third section focused on the implementation of the electronic prescribing process. A 10-point Likert psychometric scale was used to assess participant satisfaction. Finally, the collected data were tabulated in a Microsoft Excel spreadsheet after a double-checking process to ensure result reliability.

Regarding the statistical analysis, the results were presented descriptively using tables and graphs. Univariate analysis was applied for sample description. For continuous variables, measures of central tendency and their respective dispersion measures were evaluated, while for categorical variables, percentages were presented. The normality of the results was tested, and depending on the outcome, parametric or non-parametric tests were applied for comparison. The significance level adopted for all analyses was 5 % ($p < 0.05$), and statistical analyses were performed using STATA software.

The research was initiated only after approval by the Research Ethics Committee for Human Subjects. Confidentiality and data privacy requirements were respected in accordance with the provisions of Resolution No. 466/12. The proposal was evaluated and approved under CAAE No. 21135519.3.0000.5020.

RESULTS

PROFILE OF PARTICIPANTS

A total of 104 participants were included in the activity. Regarding sex, the majority of individuals were female (65.6 %) with a mean age of 35 ± 8.3 years. The distribution of individuals across professional categories is described in Table 1. Most participants belonged to the doctor category (54.1 %), followed by nurses (25.0 %).

Table 1. Profile of participants regarding professional categories (n = 104).

Professional category	Percentage
Doctor	54.17
Nurse	25.00
Pharmacist	9.38
Nurse technician	9.38
Pharmacy technician	2.08

Approximately sixty percent of the individuals reported having up to three years of work experience at the institution. This result is expected, given that it is a university hospital where various professionals are received annually for training and professional development.

Regarding the department allocation of the professionals surveyed, the institutional sector with the highest number of participants was the Surgical Clinic (24.2 %), followed by the Medical Clinic (21.0 %) and the Outpatient Clinic (14.7 %) (Figure 1).

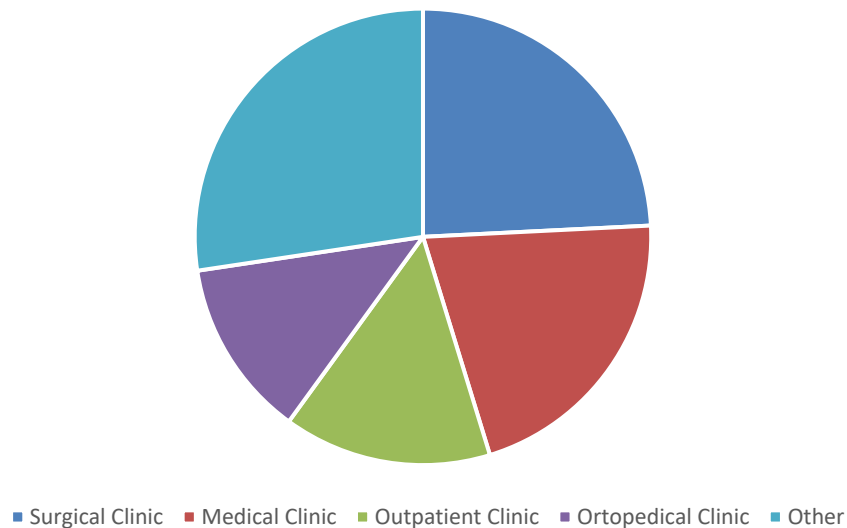


Figure 1. Distribution of individuals regarding hospital units (n=104). Font: the authors.

UTILIZATION OF AN ELECTRONIC PRESCRIPTION SYSTEM BY HOSPITAL PROFESSIONALS

Approximately two-thirds of the participants reported using the electronic prescription system for a maximum of 12 months (68.0 %). This result aligns with the fact that the system was implemented in the hospital at the beginning of 2019. Furthermore, there was a significant association between recent use (up to 12 months) and medical professionals (Table 2). Among the healthcare professionals working at the institution, a considerable proportion consists of physicians in residency programs, which may explain this finding.

Table 2. Distribution of participants regarding recent utilization of the system.

Participant	Recent utilization of the system		Total
	Yes	No	
Doctor	40 (42.55 %)	12 (12.77 %)	52 (55.32 %)
Non doctor	24 (25.53 %)	18 (19.15 %)	42 (44.68 %)
Total	64 (68.09 %)	30 (31.91 %)	94 (100 %)

*Fisher's exact test (p=0.03).

Regarding the question "Do you use electronic medical records in another location?", approximately half of the participants reported using similar systems in other workplaces outside the study institution (48.4 %). When categorizing participants into medical and non-medical professionals, a statistically significant difference was observed between the groups regarding the use of electronic medical records in other locations, with most of the interviewed medical professionals reporting access to electronic systems elsewhere (Table 3).

Table 3. Distribution of participants regarding utilization of the system in other health units.

Participant	Utilization of the system in other units		Total
	Yes	No	
Doctor	39 (41.05 %)	13 (13.68 %)	52 (54.74 %)
Non doctor	7 (7.37 %)	36 (37.89 %)	43 (45.26 %)
Total	46 (48.42 %)	49 (51.58 %)	95 (100 %)

*Fisher's exact test (p=0.00).

PROFESSIONALS' PERCEPTION OF THE COMPUTERIZATION PROCESS AND OVERALL SYSTEM SATISFACTION

Initially, questions were asked to assess professionals' perceptions of the positive aspects of computerization in healthcare in general, as well as the impact of this process on activities carried out in the hospital. In this regard, the following questions were used: "Does the healthcare sector, in general, operate at a good level of computerization?", "Will the computerization process in the clinical area provide a competitive advantage to the hospital?", and "Does computerization help in your work?" The responses to these questions are presented in Table 4. In this case, approximately half of the participants stated that the healthcare sector, in general, does not have a good level of computerization (57.29 %).

Table 4. Professionals' perception of the computerization process (n=96).

Question applied	Percentual
Does the healthcare sector, in general, operate at a good level of computerization?	Yes (42.71)
	No (57.29)
Will the computerization process in the clinical area provide a competitive advantage to the hospital?	Yes (97.92)
	No (2.08)
Does computerization help in your work?	Yes (98.96)
	No (1.04)

Subsequently, questions were asked to assess individuals' satisfaction with the electronic medical record system. In this case, the 10-point Likert psychometric response scale was used, which is the most commonly applied strategy in opinion research. The results of this assessment are shown in Table 5.

Overall, satisfaction with computerization was considered good (6.72 ± 2.05). Among the general satisfaction aspects assessed, the lowest score was attributed to the training provided (5.76 ± 2.61), while the highest score was given to the quality level provided by the system (7.38 ± 2.24).

Additionally, satisfaction with computerization was distributed according to professional category. Although the lowest average scores were reported by nurses (6.16 ± 1.94) and the highest by pharmacists (7.44 ± 2.00), no significant differences were observed between the studied groups (Kruskal-Wallis test, $p = 0.36$). Subsequently, participants were categorized as physicians (54.17 %) and non-physicians (45.83 %), and again, no statistical differences were found between the groups regarding overall satisfaction with electronic prescribing (6.86 ± 2.11 and 6.56 ± 1.99 , respectively; Mann-Whitney test, $p = 0.38$).

Table 5. Overall satisfaction of participants regarding the electronic prescription system (n=96).

Question applied	Mean $\pm$ SD*
Satisfaction with computerization	6.72 ± 2.05
Satisfaction with training provided	5.76 ± 2.61
User friendliness	6.91 ± 2.11
Clarity of information provided	6.52 ± 2.21
Advantage to the patient safety provided	7.15 ± 2.35
Quality of service provided	7.38 ± 2.24

*SD: standard-deviation.

Furthermore, participants were asked about the dissemination process of computerization and the training provided by the institution. In this case, approximately 42 % of respondents stated that they had been informed about the electronic medical record through leadership meetings. Finally, about half

of the individuals reported having undergone training with colleagues (47.4 %). However, the hospital in question implemented a training strategy using an institutional video, which could be accessed even outside the workplace. Nevertheless, only 7.2 % of participants reported having used this strategy. Therefore, the adherence of individuals to the training and the possible impact of this process should be properly studied.

When categorizing participants according to whether they accessed electronic prescription systems in other locations and their level of satisfaction with the clarity of information provided by the platform used in the hospital (Figure 2), a statistically significant difference was found between the groups (Mann-Whitney test, $p = 0.04$), with the highest score being assigned by participants who used electronic prescriptions exclusively at the study hospital.

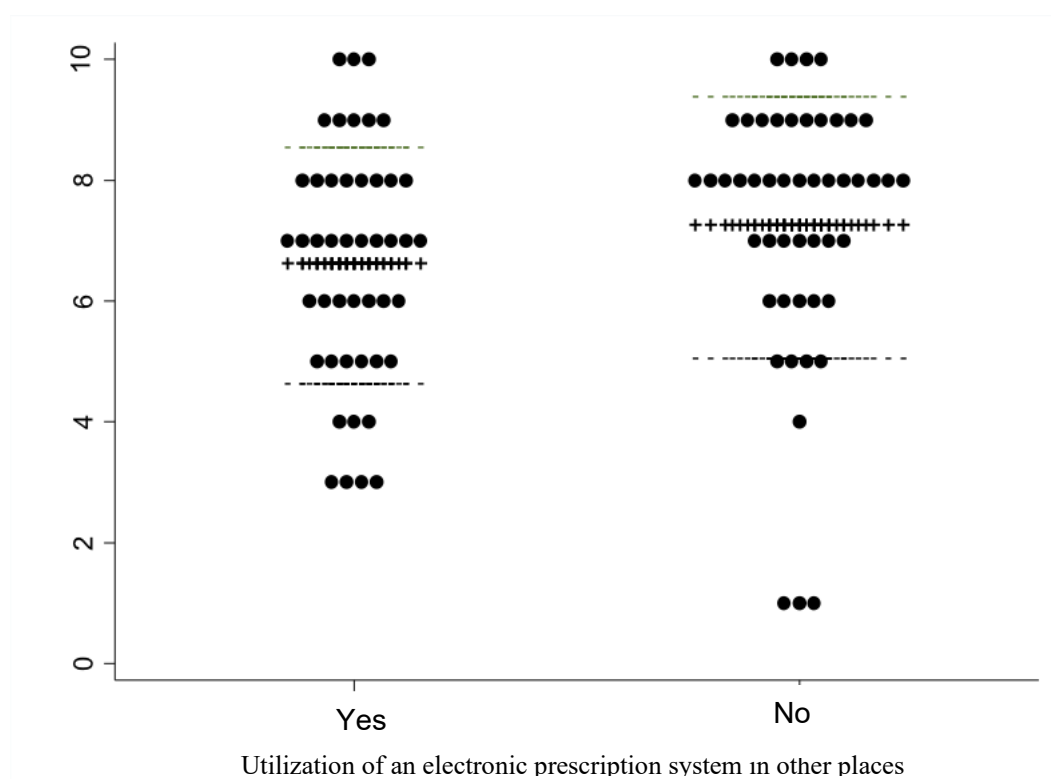


Figure 2. Distribution of participants among those who access electronic prescription systems in other locations and the degree of satisfaction regarding the clarity of the information provided by the platform used in the hospital. Font: The authors.

DEGREE OF SATISFACTION OF PROFESSIONALS REGARDING THE SYSTEM

Throughout the administered questionnaire, pre-selected questions for different professional categories were listed to assess participants' satisfaction with specific topics. Regarding medical professionals, questions relevant to medical care within the electronic prescription system were included.

The results obtained are presented below in descending order according to the generated score: prescription copy from one day to the next (7.67 ± 2.43), patient location (7.64 ± 1.95), medical prescription printing (7.48 ± 2.20), hospital discharge prescription (6.74 ± 2.68), ease of making the patient's first prescription (6.64 ± 2.33), allergy information (6.51 ± 2.71), copy of prescriptions from previous hospitalizations (5.34 ± 3.15), printing prescriptions for discharged patients (5.12 ± 3.05), automatic and semi-automatic scheduling (5.06 ± 3.23), form for non-standardized antimicrobial medications and those subject to special control (4.87 ± 3.28), and automatic alert generation for the renewal of antimicrobial and non-standardized medications (4.74 ± 3.22).

As observed above, the lowest score was assigned to the automatic alert generation for the renewal of antimicrobial and non-standardized medications, while the highest score was given to the prescription copy from one day to the next, followed by the patient location information.

For the nursing category, seven questions were added to assess the system's functionalities in relation to the nursing care process. The results obtained are presented below in descending order according to the generated score: patient location (7.77 ± 2.35), nursing prescription copy (6.91 ± 1.83), printing previous prescriptions (6.20 ± 2.66), form for antimicrobial, non-standardized medications and those subject to special control (5.67 ± 3.03), allergy information (5.41 ± 2.98), professionals' knowledge of the system generating clear and correct information (4.97 ± 2.07), and nursing prescription (4.68 ± 3.13).

In this evaluation, the lowest score was assigned to the nursing prescription, while the highest score was given to the patient location information, followed by the nursing prescription copy option, as listed above.

For the pharmacy category, seven questions were added to estimate user satisfaction with the electronic prescription system regarding the pharmaceutical assistance process. The results obtained are presented below in descending order according to the generated score: real-time prescription submission (8.08 ± 1.67), patient location (8.07 ± 1.20), receipt of dispensed item units (7.83 ± 1.85), medication requests in the form of requisitions (7.50 ± 1.73), medication quantification consultation (7.33 ± 1.71), allergy information (5.28 ± 3.31), and submission of medication requests to the pharmacy in the form of requisitions (4.00 ± 2.98).

The lowest score was assigned to the option of submitting medication requests to the pharmacy in the form of requisitions, while the highest score was given to real-time prescription submission, followed by patient location information.

DISCUSSION

There was a difference between the groups regarding the use of electronic medical records in other locations, with most of the interviewed medical professionals reporting access to electronic systems elsewhere. In this case, it is important to highlight that the study site is a public hospital, whereas the implementation of electronic systems is generally more advanced in private healthcare facilities³.

According to user perception, the vast majority of respondents understand the importance of digitizing work processes in the healthcare sector. This result corroborates the findings of Coletti Júnior et al., who reported the enthusiasm of intensive medicine physicians from different Brazilian units regarding the computerization process³. Thus, it is concluded that these healthcare professionals view the digitization process with enthusiasm and are likely open to strategies of this nature.

In several studies, providing training that meets users' needs has been identified as a key factor in professional satisfaction. Additionally, Longhurst et al. stated that satisfactory training provided by the institution was the strongest predictor of a positive user experience in a study involving 156 hospital units. This training had a significant impact on team productivity and the quality of care provided, justifying greater investment in staff training¹¹. More recently, Hareem et al. pointed out that technical issues can act as a barrier to initiating the process, requiring increased attention¹². Therefore, the availability of the IT team to address specific questions before and after the implementation of the new system is essential to prevent failures, particularly among older professionals and those less familiar with new technologies¹³.

Differences between public and private hospitals regarding user satisfaction have been reported, with private institutions generally scoring higher in system usability due to the rapid adaptations made to platforms to meet client needs. Thus, additional studies should be conducted to investigate the reasons behind the results obtained in the present study.

Medical professionals likely have higher expectations regarding functionalities that make the medical care process more dynamic. Raeesi et al. reported that these professionals consider electronic systems to be effective and safe in a study conducted in Iran⁸. In a study conducted in the neonatal intensive care unit (ICU) of a U.S. hospital, physicians were the most optimistic about the advantages provided by electronic systems¹³. This result is supported by a study conducted in Spain, where medical professionals had higher satisfaction rates compared to nurses, as well as another investigation carried out in Ethiopia, which examined the perspectives and impressions of this category regarding the implementation of this strategy^{14,15}. In contrast, the level of physician satisfaction in a study conducted in the ICU of a large referral hospital in São Paulo was lower than that of other professionals on the multidisciplinary team².

Regarding the nursing staff, it is recommended to consult the team to investigate the reasons for the lower scores assigned to this functionality. In contrast, operations traditionally associated with time optimization received positive ratings from the nursing staff in a study conducted abroad¹⁶.

Although not statistically significant, pharmacists provided a better evaluation of the system in this study. In an investigation involving more than a hundred pharmacists using the national prescription system of Saudi Arabia, this category gave an excellent evaluation of this tool, particularly regarding the security of the medication supply chain⁹. In contrast, these professionals disagreed with the hypothesis that this strategy reduces workload.

In general, all three professional categories assigned high scores to the functionality related to patient location within the hospital, which may reflect a common demand among professionals and contribute to greater security in the actions performed by system users.

The limitations of this study are primarily related to the characteristics of a field study in the workplace, where the main challenge faced by the research team was accessing study participants at times when they were available to complete the questionnaire. Nevertheless, a reasonable number of participants were included in the investigation.

Regarding the practical implications of this study, particularly for the research site, items that indicated high satisfaction may suggest that the system improves efficiency and reduces errors, while low satisfaction levels may indicate interface issues, inadequate training, or increased cognitive load, according to the literature. Furthermore, it is essential for managers to use this data to promote continuous improvements, ensuring greater adherence by professionals and, consequently, better quality of patient care^{10,14}.

CONCLUSION

In summary, overall satisfaction with the system was considered good, and no significant differences were found among the evaluated professional categories. However, the training program should be carefully analyzed to identify areas for improvement and, consequently, enhance user adherence. Finally, it is hoped that this study can contribute to the selection of strategies to improve the observed indicators, and thus increase user satisfaction with the digital tool.

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