

MEDICATION PREPARATION AND ADMINISTRATION: ANALYSIS OF INQUIRIES AND INFORMATION BY THE NURSING TEAM

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This study analyzed questions presented by nursing technicians and auxiliaries during medication preparation and administration. Data were collected through a form in which nurses who worked in the hospitalization unit of a general hospital in São Paulo, Brazil, were asked to take notes of any questions asked to them. Most of the 255 questions were related to medication dilution (103). Regarding the answers source, only 7.5% of answers were obtained from pharmaceutical professionals, 35.5% of the answers given by nurses was incorrect or partially correct, which can constitute a factor for medication administration errors. In addition, there are no pharmacists present in hospitalization units of Brazilian hospitals. These professionals could, jointly with nurses, facilitate medication orientation to nursing professionals during preparation and administration, as well as to patients themselves.

DESCRIPTORS: medication systems; safety management; medication errors

PREPARACIÓN Y ADMINISTRACIÓN DE MEDICAMENTOS: ANÁLISIS DE CUESTIONAMIENTOS E INFORMACIONES DEL EQUIPO DE ENFERMERÍA

Este estudio analizó las preguntas presentadas por técnicos y auxiliares de enfermería a los enfermeros durante la preparación y administración de medicamentos. Para recopilar los datos, se utilizó un formulario entregue a los enfermeros de unidades de internación de un hospital general del interior del Estado de São Paulo, Brasil, solicitando que anotaran las dudas que recibieran. La mayoría de las 255 preguntas estaba relacionada a la disolución del medicamento (103). Respecto a las respuestas, solamente el 7,5% de estas fue obtenido a través de los profesionales de la farmacia. Se destaca que el 35,5% de las respuestas emitidas por los enfermeros estaban incorrectas o parcialmente correctas, lo que puede constituir un factor para errores en la administración de medicamentos. Además, no existen farmacéuticos en las unidades de internación en los hospitales brasileños. Estos podrían, en conjunto con los enfermeros, facilitar la orientación de los profesionales de enfermería en cuanto a los medicamentos, en el momento de su preparación y administración, y también de los propios pacientes.

DESCRIPTORES: sistemas de medicación; administración de la seguridad; errores de medicación

PREPARO E ADMINISTRAÇÃO DE MEDICAMENTOS: ANÁLISE DE QUESTIONAMENTOS E INFORMAÇÕES DA EQUIPE DE ENFERMAGEM

Este estudo analisou os questionamentos apresentados por técnicos e auxiliares de enfermagem aos enfermeiros durante o preparo e administração de medicamentos. Para coleta dos dados utilizou-se um formulário entregue aos enfermeiros de unidades de internação de um hospital geral do interior paulista, solicitando que anotassem as dúvidas dos profissionais da equipe que lhe fossem endereçadas. Foram registrados pelos enfermeiros 255 questionamentos sendo que a maioria destes estava relacionada à diluição do medicamento (103). Com relação às respostas dos enfermeiros às dúvidas, somente 7,5% destas foram obtidas através dos profissionais da farmácia. Ressalta-se que 35,5% das respostas emitidas pelos enfermeiros estavam incorretas ou parcialmente corretas podendo constituir fator para erros na administração de medicamentos. Somado a isto, inexistem farmacêuticos nas unidades de internação nos hospitais brasileiros, os quais poderiam, juntamente com o enfermeiro, facilitar a orientação dos profissionais de enfermagem quanto aos medicamentos, no momento do preparo e administração dos mesmos, bem como ao próprio paciente.

DESCRIPTORES: sistemas de medicação; gerenciamento de segurança; erros de medicação

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INTRODUCTION

A study carried out at 36 American hospital institutions demonstrated that potentially dangerous errors occur more than 40 times per day at a 300-bed hospital and that, on the average, a patient is subject to two errors per day⁽¹⁾. According to the Agency for Healthcare Research and Quality, more than 770,000 hospitalized patients suffer some kind of damage or death every year due to an adverse medication event⁽²⁾.

In Brazil, the nursing team is responsible for and carries out medication administration on a daily basis at all health institutions. Therefore, this activity is very important for this professional category as well as for the clients. Nursing professionals' practice evidences several doubts during medication preparation and administration. This fact calls attention to the importance of the quality of care delivery, to the need for scientific research about this theme and to a problem that deserves interventions by health institutions.

Wrongly administered medication can harm the client due to factors like pharmacological incompatibility, unwanted reactions and pharmacological interactions, among others. Professionals who administer medication need to be aware and sure of their actions and have knowledge about or access to the necessary information. Incorrectly clarified doubts and difficulties lead to uncertainty and insecurity, and this situation represents a risk factor for the occurrence of errors in the medication administration process. These aspects evidence the need for nurses to supervise nursing activities during medication preparation and administration, as they are the only professionals in the nursing team whose education should include sufficient knowledge to conduct this practice safely.

The greater the nurses' knowledge about the drugs they administer, the greater their skills will be to develop the medication administration activity³. However, daily practice has been showing another reality, as the professionals do not always have sufficient knowledge to assume this responsibility. In this respect, a research⁴ about hospital nurses' knowledge on specific drugs identified that 79.2% of the interviewed nurses considered that the pharmacology subject they took was not sufficient for professional practice and 96.2% informed an unsatisfactory relation between theory and practice.

This fact evidences the relation between lack of knowledge and the problem of medication administration errors.

Thus, it is fundamental for nursing professionals to know about the different aspects of medication treatment and, in case of doubts, to ask a colleague, a nurse supervisor, a physician or a pharmacist from the hospital pharmacy. Moreover, at health institutions, updated information needs to be available about different aspects of medication therapy.

In the context of health systems, medication administration practice, oriented towards safe care delivery to patients, can be understood within an ecological approach. In this approach, health systems are considered living, technologically complex and increasingly vulnerable systems, needing fixing or "ecological restoration". Hence, ecological restoration is needed to strengthen the safety of the hospital environment. Research about patient safety in health systems, within the ecological perspective, has been conducted in other countries, including Canada, with a view to identifying vulnerable points in the hospital environment and incorporating practices that can strengthen the creation of safe systems at an appropriate cost. Thus, ecological thinking can provide new knowledge in order to improve the security of health systems, offering benefits for patients⁽⁵⁻⁶⁾. To obtain a safe medication system, among other elements, the existence of a sufficient amount of qualified human resources becomes essential, as well as adequate physical installations, financial resources, equipment and devices with appropriate technology⁽⁷⁾.

In view of the above, this study aims to identify and analyze the questions nursing aids and technicians who work at clinical hospitalization, surgical and intensive care units ask nurses about medication preparation and administration, as well as the sources and precision of the nurses' answers to the questions presented by the team.

METHODOLOGY

This is a descriptive and exploratory study. The theoretical approach that guided the study development was Ecological Thinking. This approach departs from the hypothesis that the principles and techniques of good ecological restoration can be used to systematically investigate and strengthen the administration and

security of the current health system⁽⁵⁻⁶⁾. The application of restoration concepts to patient safety research intends to integrate the best forms of systemic thinking into current engineering sciences for human factors, organizational sciences and security sciences, with better skills to "think like" a system⁽⁸⁾.

The study was carried out at a university hospital located in the interior of São Paulo State, Brazil. This institution is a center of referral and excellence in health care and delivers care of different complexity levels at the outpatient, specialized procedure, hospitalization and urgency units; including clinical and/or surgical prevention, treatment and rehabilitation, besides complementary diagnosis and treatment services in different medical specialties. It is an autonomous entity, characterized as a university hospital. The institution is part of the Single Health System (SUS) and its goals are teaching, research and medical-hospital care delivery.

The study was carried out at all clinical hospitalization, surgical and intensive care units, excluding outpatient units. Thus, the following clinics were included: medical, psychiatry, neurology, immunology, dermatology, pediatrics, gynecology/obstetrics, adult and pediatric intensive care center, kidney transplant unit, clinical surgery (general, proctology, ophthalmology, otolaryngology, head and neck, chest, neurosurgery, urology, vascular surgery, gastric surgery, orthopedics and plastic surgery).

The study population consisted of the nurse supervisors of these hospitalization units and the sample included all nurses who were working during the data collection period, except for: professionals on holiday, medical leave, training, not directly active in patient care and those who manifested that they were not interested in participating or did not sign the consent term.

Data collection started in the second semester of 2004, soon after the project had been approved by the Research Ethics Committee at the study hospital, during 30 consecutive days. The nurses were asked to write down the doubts presented by nursing aids and technicians, related to medication preparation and administration, in a data collection instrument.

Therefore, they received a form with the following items: date, clinic, doubts expressed by the nursing aids and technicians, related to medication therapy, employee's professional category, answer given to clarify the doubt and source this information was obtained from.

During one month, every day, the researchers delivered the form to the nurse in each shift, at each clinic, setting a date to return the completed form. The nurses who agreed to participate in the study were asked to sign the Free and Informed Consent Term.

The obtained data were inserted in a database, structured as an EXCEL worksheet, and then transported for analysis in Statistical Package for the Social Science software (SPSS, version 11.5).

RESULTS

The subjects' wrote down 270 questions, 255 of which were analyzed. It was interesting to observe that both nursing (nurses from other sectors) and medical colleagues asked these nurses for information about medication therapy. It is highlighted that all questions were presented by aids and technicians, except for nine, in which medical team professionals asked the participants, five in which other nurses asked these questions and one situation in which the bookkeeper expressed the doubt. Thus, in total, 255 doubts were analyzed.

Due to the large number and wide range, for the sake of content analysis, it was considered necessary to categorize the questions, with a view to facilitating the understanding of their meanings. These categories covered the following aspects, in alphabetic order: medication action; medication administration; medication calculation; patient conditions; medication dilution; medication indication; medication infusion; drug interaction; generic or brand name; medication preparation and medical prescription. Table 1 below presents the categories of doubts presented to the nurse, the number and percentage frequency.

Table 1 - Frequency distribution of question categories presented to nurses. Ribeirão Preto, SP, 2004

Doubt category	N	%
Medication dilution	103	40.4
Medication administration	40	15.7
Drug interaction	28	11
Medication infusion	19	7.5
Medication preparation	19	7.5
Medication indication	14	5.5
Medication action	11	4.3
Calculation	11	4.3
Generic or brand name	5	2
Medical prescription	4	1.6
Patient conditions	1	0.4
Total	255	100

The **medication dilution** category, responsible for about 40% of doubts, joined questions related to the need for dilution and what diluting agent should be used, to the quantity and expiry of the diluted medication and to the possibility of precipitation. Examples are:

Does phenytoin have to be diluted?; which diluting agent and what quantity has to be used to dilute maxcef?; can diazepam EV precipitate when diluted?; can I dilute an antibiotic that already came from the pharmacy diluted?; olanzapine comes in a wrapping protected from light, when I administer half a tablet, can I keep the other half until next time?; what is the stability of morphine after dilution?; how can I dilute amphotericin B?

As shown in Table 1, a higher percentage of doubts is related with medication dilution.

The **medication administration** category groups questions related to fluids for oral administration, to the administration technique, route and time. Statements include:

Medication should be administered with milk or water?, in what sites can I administer heparin?; can permethrin be applied all over the body?; can reglan also me administered IM?; phenergan: can it be applied EV?; is prostigmin applied EV or IM? How can IM medication be administered in the ventrogluteal region?; can heparin be administered IM?; can the same heparin that is applied EV be applied SC?; is the start of the action time the same for the SC and EV routes?; can phenytoin be applied IM?; how can I apply NPH and regular SC insulin at the same time?

The topic **drug interaction** joined inquiries about the interaction between drugs and serum, other drugs and blood derivatives. The following can be mentioned:

Can hemotherapy run with other serums in Y?; can I mix anxiolytics and antipsychotic medication in the same application in the same site?; can I associate NPH with regular insulin?; can I infuse sodium bicarbonate in a route where various drugs are being infused?; can I administer parenteral Nutrition in Y with other drugs?; can dopamine run together with serum and electrolytes?; does heparin in continuous infusion precipitate if it runs together with dormonid and fentanyl?

The **medication infusion** category covered questions about the infusion speed of medication in terms of time. Examples of this item are:

Why can't clozapine be increased faster?; what is the maximum time for amphotericin infusion?;

can an anti-fungus agent be infused purely in less than three hours?; what is the infusion time for vancomycin 1g?; what is the infusion speed of phenytoin?

The **medication preparation** category grouped inquiries about photosensitivity, graduation of syringes and equipment. The following examples can be mentioned:

Should I use photosensitive equipment to administer amphotericin?; how can I prepare SF0, 45%?; when two types of insulin are used, which should I aspire first?; why can some drugs not be infused in plastic equipment?; how can I prepare tienam for administration?; how can I read the graduation of an insulin syringe?; how can I transform the prescribed serum volume to be infused within a certain time in ml/hour in an infusion bomb?; can I remove the air from a syringe with enoxaparin before administration?

The **medication indication** category approaches aspects related to the purpose of the medication. Examples are:

What's the purpose of cimetidine?; what's the purpose of amitriptyline?; why is dexametasone part of the QT protocol?; what disease is levodopa or prolopa used for?; what's the purpose of amlodipine because I've never seen that medication?; AZT is used for treating which disease?; when should the patient use regular and intermediary insulin?

The category **medication action** contains questions related to the effects of the drug, to pharmacological action, to therapeutic action and to adverse reactions. Examples are:

Why should injectable phenergan be administered instead of injectable midazolam, Is regular insulin fast-acting?; is there a need for strict BP control when the patient receives high doses of corticoids?; how does NPH/Regular Insulin act in the organism?

Medication calculation includes questions related to mathematical calculations of medication doses and concentrations. Examples of this item are:

How can I administer 20mg of solu-medrol if the only form is 125mg?; how can I administer 2mg of rivotril in drops? Is the dose of this medication (ICU) correct?; what is the standard dose of cisapride?

The theme **generic or brand name** joined inquiries about medication names. Examples are:

What is the brand name of ranitidine?; is ceftriaxone rocephin?; is vancotrat vancomycin?"

Finally, in the **medical prescription** category, questions were grouped related to the writing of the prescription and the form of the drug:

How can I administer konakion prescribed EV if the pharmacy only had the form for IM administration?; how many mg of novamine are prescribed?

The item **patient conditions** covered questions related to medication administration in accordance with the patient's conditions, for example:

The patient is fasting for surgery, can I administer anti-depression medication?

Some questions the professionals asked to the nurses were not literally expressed because, when filling out the forms, the nurses wrote down these doubts as topics (drug interaction, medication dilution for example), which were then categorized as **not valid** (44, 17%). Hence, doubts or inquiries that literally expressed the professionals' doubt were considered as **valid** (211.83%). Table 2 presents the correctness ratio of the information the nurses supplied about the presented doubts, considering valid questions.

Table 2 - Correctness of nurses' answers to inquiries. Ribeirão Preto, SP, 2004

Answers	Total	
	N	%
Correct	136	64.5
Incorrect	39	18.4
Partially correct	36	17.1
Total	211	100

It should be mentioned that answers were considered **correct** if they provided sufficient information for safe medication administration; **incorrect** if they provided incorrect information in view of the professional's inquiries, and **partially correct** if they did not provide sufficient information for the safe administration of the respective drug.

Table 2 shows that, among the 211 questions considered valid for analysis, 35.5% received incorrect or partially correct answers, which may have entailed different consequences for the patient and deserves to be analyzed by the professionals and the institution.

Sources of answers the nurses gave to the nursing aid or technician who presented the doubt included: **medical professionals** (2.7%) including residents and hired physicians; **pharmaceutical professionals** (7.5%); **nursing professionals** (9%); **professionals from other areas** (1.6%),

mentioning CCIH, the chemotherapy central, the blood bank; **literature** (39.2%), referring to the consultation of nursing and pharmacology books, notebooks, drug package inserts, electronic dictionary of pharmaceutical specialties (DPS), the hospital's standardization manual, the unit's central venous catheter protocol, internet, subject protocol, laboratory manual, medication administration dilution guide and courses, including training; **mixed** (16.5%), in which more than one category was mentioned, such as books and pharmaceutical professionals for example, physician and DPS, package insert and physician. In 23.5% of the answers, the source was not mentioned.

In 49.8% of the situations, nurses answered the team's doubts based on their personal knowledge, literature or information obtained from colleagues from other areas. In only 7.5% of the situations, the nurses' answers were based on information provided by pharmacists, which demonstrates that nursing does not identify them as the appropriate professionals for providing this information.

DISCUSSION

Complex systems like the health system or the medication system, including different processes, implemented through planning and sequential actions, involve various professionals with distinct attributions and display combinations of multiple errors that by themselves do not represent a considerable accident risk. These errors are called latent and their behavior varies according to the mutability of the system, which is an intrinsic characteristic of their existence. The sum of the actions exerted by these different errors may or may not result in an accident⁽⁷⁾.

What the medication administration process is concerned, it can be affirmed that the lack of knowledge among professionals involved in this practice can represent an error in the system that entails damage of different intensities for the patients.

This study evidenced that the largest part of the doubts (40.4%) nursing technicians and aids presented to nurses was related to medication dilution. In their actions, nurses need to related medication dilution with patient aspects, such as the disease (patients with kidney failure, hydroelectrolytic disorders, blood pressure alterations) and age. If performed effectively, this assessment facilitates the recovery process, as it does not permit even greater

harm to organs and systems⁽⁹⁾. Moreover, it should be reminded that medication dilution also varied according to its administration route.

In view of the fact that ecological thinking presupposes a more rigorous exploration of technological aspects, it is fundamental to consider their effects in health care environments. In this context, it is known that medication systems using unit-dose technology reduce the number of adverse medication events because, in this system, the medication reaches nursing ready for administration, without the need for fractioning or dilution for example⁽¹⁰⁾. Hence, centralizing the medication preparation site can contribute to the reduction of medication errors related to medication dilution.

The professionals' doubts related to the medication administration technique also stood out (15.7%). Lack of technical knowledge in medication administration can result in more or less severe complications. In the intramuscular route for example, it can cause: intense pain, nerve injuries, hematomas, nodes, tissue necrosis, among others⁽¹¹⁾.

In the **medication administration** category, it was found that most doubts referred to the correct route for medication administration. In literature, research mentions deaths as a result of administration route errors, whose choice depends on what effect the physician wants and, hence, on the prescription. Literature reports on the death of eight patients, who received endovenous instead of oral medication, as prescribed⁽¹²⁾. Probable causes that facilitate the occurrence of route errors include: lack of attention, lack of knowledge, lack of experience, negligence and/or imprudence (incomplete reading of the prescription), among others. However, in an ecological approach, organizational conditions related to the system must be taken into account, such as: activity overload, insufficient number of employees, inappropriate work environment and unreadable medical prescription⁽¹³⁻¹⁴⁾. Thus, the proposal is to work in order to improve internal processes and the structure, as this is of considerable importance in the occurrence of errors.

What questions about drug interactions is concerned, these were mainly directed at the possibility of infusing two drugs at the same time in one and the same venipuncture. In a study on medication errors, clinically significant drug interactions were observed in 10% of the 4,026 medical prescriptions assessed⁽¹⁰⁾. It is important to

know about the possibility that a drug will result in a different pharmacological answer due to concomitant administration with another, with a view to achieving the estimated treatment results for both drugs that were administered, as well as to avoid damage to the patient.

The Medication infusion category included questions related to the infusion speed of the drugs in terms of time. In this respect, as revealed in a study at two hospitals, 48% and 77.7% of the professionals, at hospitals 1 and 2, respectively, did not use to wash the catheter when they injected more than one drug and used to administer the medication faster than recommendations⁽¹⁵⁾.

Aspects related to photosensitivity are a source of doubts. In this context, it is important to know whether drugs have this characteristic, so that they can be stored in special packages and so that instructions for handling them are strictly respected, thus avoiding the loss of their properties and, consequently, their action.

One of the causes of medication administration errors is insufficient knowledge about the indications of the drug, which is another source of doubts⁽¹³⁾.

Inquiries were made related to adverse reactions caused by medication usage, which were grouped under Medication action. It is known that these reactions can be avoided or mitigated through strict monitoring⁽¹⁴⁾. Therefore, it is fundamental for professionals involved in medication administration to have knowledge about their pharmacokinetics and pharmacodynamics, which permits adequate patient assessment during treatment and contributes to the reduction of possible harm.

Inquiries about how to calculate the dose to be administered picture daily situations related to the lack of mathematical skills, leading to dose errors, whose consequences can range from inefficacy of the desired therapeutic effect to risk for the patient's life.

It is evidenced in literature about causes of medication administration errors that dose errors stand out. In the total number of errors at a basic health unit, 45% represented dose errors, according to nurses' reports. These errors can be related to medical prescription aspects, such as the inappropriate placement of the decimal point for example (which can result in an error ten times larger or smaller than expected), to the use of inappropriate conversions and to aspects inherent in the medication

preparation to be considered, for example, a wrong concentration of the reconstituted solution⁽¹³⁾.

The use of the generic or brand name in medication prescriptions and the similarity of names and packages can result in involuntary mix-ups by health professionals and consequent damage to patients.

Doubts related to the medical prescription also lead back to the issue of the different steps in medication administration, which starts with the medical prescription; hence, in this phase, an error can also start, whether by incorrect medication selection, inadequate usage instructions by the physicians or unreadable prescriptions.

As revealed in a study, more than half of the participants (sixth-year students in human medicine, residents, graduate students and physicians) either did not remember or did not have specific classes about the elaboration of a medical prescription⁽¹⁶⁾. When incomplete, confusing or unreadable, the prescription can result in damage or death⁽¹⁷⁾, which highlights how important it is for physicians to correctly elaborate a prescription, with a view to reducing the risks of medication errors.

The place of study presents the electronic medical prescription system. This entails the advantage of standardizing medication, as a large number of drugs exist in the market. The electronic prescription also constitutes an important technology to promote a safe medication system.

Table 2 shows that, of the 211 questions considered valid for analysis, 35.5% received incorrect or partially correct answers, which may have caused adverse consequences for patients. Due to the fact that nurses are responsible for the nursing team, trust is deposited in them with respect to technical/scientific knowledge. This is proved by the fact that they are consulted to solve the doubts that arise in practice.

It is highlighted that literature constitutes the main source to obtain the information nurses use to answer the questions they receive, while only 7.5% of the answers were given based on information provided by the pharmacists, which demonstrates that nursing does not identify them as professionals capable to provide this information. This may be due to difficulties to get access to them, as they are distant from daily clinical practice, from nursing and medical colleagues, and also due to these professionals' lack of availability to help in order to solve these doubts, often expressed by providing package inserts for help.

Thus, although the pharmacist is one of the most capable professionals, because (s)he knows all aspects of the drugs and, therefore, can give correct information, (s)he was not indicated as the main source to clarify doubts. Pharmacists' knowledge turns them into key elements in the medication administration process. However, they need to be available in the different sectors of the health system and be involved in all steps of this process, with a view to patient safety.

Data about drugs are complex and demand professional updating, considering the range of new information available in literature and the technology involved in their administration, including pharmaceutical and similar products. Therefore, pharmacokinetic knowledge, ranging from the nomenclature to the chemical composition, administration routes, absorption and collateral effects is essential, as well as constant updating⁽¹⁸⁾.

The identification of errors in professionals' knowledge on medication therapy is a source of concern. The acquired and applied knowledge is important to improve patient safety. Evidence of doubts in professional practice, often clarified in an incorrect or partially correct way, cause concern with the safety of patient care delivery. When not appropriately clarified, doubts are important sources of error and risk for patients.

The 24-hour presence of the clinical pharmacist at the institution is important, thus guaranteeing the complication and dissemination of adequate information about medication, as it is known that the lack of information about medication is considered a factor that contributes to the occurrence of medication errors, creating an unsafe environment for patients⁽¹⁵⁾.

CONCLUSIONS

This study revealed that nursing technicians and auxiliaries presented 255 inquiries to nurses during medication preparation and administration, most of which were related to medication dilution (40.4%). With respect to the answers to these doubts, only 7.5% were obtained from pharmaceutical professionals. It is highlighted that 35.5% of the nurses' answers were incorrect or partially correct. This can constitute a factor for medication administration errors.

The situation pictured in this study reveals the importance of training and knowledge improvement by nursing technicians, aids and nurses about medication administration contents, including, medication action, administration and calculation; patient conditions; medication dilution, indication and infusion; drug interaction; generic or brand name; medication preparation; and the medical prescription. In addition, it is important to highlight that doubts may be clarified erroneously.

In this context, the pharmaceutical professional is needed, who needs to be present in the daily reality of hospitals, near health teams and patients.

Furthermore, institutional managers need to restructure the system, in order to improve human resources and the work environment by promoting recycling and training courses, including the presence of the clinical pharmacist, medication dilution protocols, availability of updated and appropriate literature and internet access from the clinics. Finally, this requires strategies that place the patient at the center of health actions, guaranteeing quality and safety in care delivery. Thus, a safe, ecologically adapted and restored system will be guaranteed to all professionals and patients.

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