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The In-Hospital Medication Administration Process from the Nurse's Point of View

El proceso intrahospitalario de administración de medicamentos desde la mirada de la enfermera

O processo de administração de medicamentos no hospital do ponto de vista do enfermeiro

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ABSTRACT

Introduction: The nurse holds both an ethical and legal responsibility in medication administration, ensuring correct indications and monitoring side effects. Despite strategies set by the World Health Organization (WHO), errors continue to occur. This study describes the strategies nurses use to ensure safe and quality medication administration, highlighting often-unrecognized actions that are essential for effective pharmacological therapy. **Objective:** To describe the hospital-based experiences of nurses in the medication administration process in Medellín, Colombia, in 2024. **Methodology:** A qualitative study with a particularistic ethnographic approach, including 80 hours of observation, 8 interviews, and field note recording. **Results:** Medication administration involves the following steps: prescription, dispensing, organization, preparation, administration, and documentation. At each stage, nurses perform "invisible" activities that are not always recognized, which are crucial for organizing and preparing the medication, as well as providing support during dispensing, to enhance the safety of the process. **Discussion:**The findings highlight the importance of strengthening existing strategies to prevent medication errors. The six steps identified by nurses in the medication administration process contribute to establishing a safety culture for the patient. **Conclusion:** The creativity and resourcefulness of nurses are essential to ensuring the timeliness, safety, and effectiveness of pharmacological treatment.

Keywords

nursing; medication therapy management; hospitals; medication errors; nursing care; drug interactions.

RESUMEN

Introducción: La enfermera tiene un compromiso ético y legal en la administración de medicamentos, verificando indicaciones y efectos secundarios. A pesar de las estrategias de la Organización Mundial de la Salud, siguen ocurriendo errores. Esta investigación describe las estrategias de la enfermera para garantizar una administración segura y de calidad, resaltando acciones no reconocidas, pero clave para una terapia farmacológica efectiva. **Objetivo:** Describir la experiencia intrahospitalaria de la enfermera en el proceso de administración de medicamentos en Medellín (Colombia), 2024. **Metodología:** Estudio cualitativo con etnografía particularista, mediante ochenta horas de observación, ocho entrevistas y registro en el diario de campo. **Resultados:** La administración de medicamentos incluye: prescripción, dispensación, organización, preparación, aplicación y registro. En cada etapa, la enfermera realiza unas actividades "invisibles" no siempre reconocidas, para la organización, preparación del medicamento y apoyo en la dispensación con el fin de mejorar la seguridad del proceso. **Discusión:**Los resultados de esta investigación muestran el fortalecimiento de las estrategias existentes para prevenir los errores de la medicación. Los seis pasos planteados por las enfermeras en el proceso de administración de medicamentos se convierten en una cultura de seguridad para el paciente. **Conclusión:** Se evidencia la creatividad y recursividad de la enfermera para garantizar la oportunidad, seguridad y efectividad del tratamiento farmacológico.

Palabras clave

enfermería; administración del tratamiento farmacológico; hospitales; errores de medicación; atención de enfermería; interacciones farmacológicas.

RESUMO

Introdução: O enfermeiro tem compromisso ético e legal na administração de medicamentos, verificando indicações e efeitos colaterais. Apesar das estratégias da Organização Mundial da Saúde, erros continuam a ocorrer. Esta pesquisa descreve as estratégias do enfermeiro para garantir uma administração segura e de qualidade, destacando ações não reconhecidas, mas fundamentais para uma terapia farmacológica eficaz. **Objetivo:** Revelar o processo de administração de medicamentos em nível intra-hospitalar na perspectiva do enfermeiro, Medellín - Colombia, 2024. **Metodologia:** Etnografia qualitativa e particularista; 80 horas de observação, 8 entrevistas e registro em diário de campo. **Resultados:** A administração de medicamentos inclui: prescrição, dispensação, organização, preparo, aplicação e registro. Em cada etapa, o enfermeiro realiza atividades "invisíveis" e nem sempre reconhecidas, para organização, preparo da medicação, apoio na dispensação a fim de melhorar a segurança do processo. **Discussão:** Os resultados desta pesquisa mostram o fortalecimento das estratégias existentes para prevenção de erros de medicação. As seis etapas propostas pelos enfermeiros no processo de administração de medicamentos tornam-se uma cultura de segurança para o paciente. **Conclusão:** Fica evidente a criatividade e desenvoltura do enfermeiro para garantir a oportunidade, segurança e eficácia do tratamento farmacológico.

Palavras-chave

enfermagem; conduta do tratamento medicamentoso; hospitais; erros de medicação; cuidados de enfermagem; interações medicamentosas.

Introduction

Nurses have a legal and ethical responsibility in the medication administration process, as their actions are required to verify the indications and side effects of medications in patients. Therefore, knowledge of medication administration is a fundamental competence that must be acquired during their training, strengthened, and updated throughout their professional life (1). In addition, the World Health Organization is dedicated to promoting strategies aimed at ensuring the safe administration of medications: campaigns, training programs, evidence-based recommendations, and protocols. Despite these efforts, medication administration errors continue to occur (2).

This research aims to unveil the medication administration process in the hospital setting from the nurse's perspective, as well as to identify the strategies developed to ensure that the medication administration process in each of its phases (prescription, dispensing, organization, preparation, administration, and recording) is safe, timely, humane, and of high quality. In this process, activities that are not the direct responsibility of the nurse, that are neither standardized nor time-bound, but are essential for proper and timely pharmacological therapy, are emphasized.

Materials and Methods

This was a qualitative research study with elements of particularistic ethnography (3),

conducted in the city of Medellín (Colombia) during the period of 2023-2024. Data were collected through participant observation, semi-structured interviews, and field diaries. The inclusion and exclusion criteria were: nursing professionals working in clinical areas, such as intensive care units (ICU), hospitalization, and emergency departments, with at least one year of professional experience. Age, sex, race, or postgraduate education were not considered. The number of participants was determined by theoretical saturation (4). Eight interviews were conducted (seven women and one man), with an average age of 30 years and six years of experience. In addition, 80 hours of observation were carried out. Some of the key aspects observed were the description of the context, participant dynamics, communication processes, and interpersonal relationships.

For the data analysis, the constant comparative method of Glasser and Strauss, as described by Taylor and Bogdan (5), was employed, and it was developed in three phases: 1) open coding, through line-by-line analysis, which allowed for the identification of central concepts; 2) axial coding, which led to the emergence of the main categories and their respective subcategories, grouped into conceptual maps; and 3) selective coding, where the concepts that emerged were integrated to reveal the meaning.

To meet the rigor criteria, the interviews were transcribed immediately after they were conducted. The interpretation of the results was carried out from the perspective of the researchers, maintaining consistency with what was expressed by the participants. The validity of the study was ensured by continuously observing the relationship between the objectives and the categories.

Results

The nursing professionals participating in the study were seven women and one man, with an average age of 30 years and an average of 6 years of experience in clinical areas, such as emergency services (adult and pediatrics), adult ICU, and hospitalization (adult and pediatrics). For them, medication administration follows several steps in which each member of the interdisciplinary team assumes a leadership role; however, the nurse plays an important role in all stages of the process: prescription, dispensing, organization, preparation, administration, and recording of medications.

Step One: Prescription

The prescription is the physician's indication of the pharmacological treatment. This order is sent directly to the pharmacy staff to continue with the dispensing process; however, issues may arise regarding the quantities of medication prescribed by the physician, as it is the nursing staff who determines the quantities of medications for a 24-hour period. To avoid this situation, nurses assist physicians in the prescription process: "Sometimes some prescribe less, others more, so they ask us how many quantities should be prescribed" (E1ICU).

Therefore, it is preferred that the prescription first pass through the nursing filter and then through the pharmacy for subsequent dispensing. This ensures that the medication quantities are accurate and timely: "…the physician makes the prescription, but before reaching the pharmacy, it must pass through our filter as nurses…" (E1EmergP).

Step Two: Dispensing

Dispensing is a process that involves a two-way communication between the nursing staff and the pharmacy department: *delivery/return of supplies and medications*. The pharmacy delivers the medications and supplies required for the patient's care, bringing them to the service and handing them over, performing a double-check to ensure that the dispensed medications match the medical prescription: "When receiving the medications, we must verify that they are correct, that they are what the doctor actually ordered, so

we receive the medication along with the system to make sure it's correct…" (E2EmergA).

There are two types of dispensing, depending on the type of request: scheduled or urgent. When it is scheduled, the pharmacy staff delivers the medication at established times, typically in a cohort, where the unit dose for each patient is supplied: "The pharmacy staff arrives at the service with a cart containing containers marked with the patient's room number; they deliver the medications, and the nursing assistant receives them…" (OB11ICU).

When the patient requires the medication urgently, the nurse informs the pharmacy by phone, and they deliver it as quickly as possible: "If something is requested outside of the scheduled time, it is requested as urgent…" (E1ICU). However, if the pharmacy is delayed in delivering the urgent medication, the nursing staff has three mechanisms to ensure its timely administration:

The first is to call the pharmacy service again to expedite the delivery, informing them of the patient's condition and the necessity of the medication: "The nursing assistant calls by phone to notify the start time, so it can be dispatched as quickly as possible" (OB09HP).

The second is to go to the pharmacy and personally retrieve the medication; this involves the nurse's time: "If I need something urgently, I have to go from the fourth floor to the seventh to get the medication and supplies; so it takes a lot of time, and it's an unnecessary effort…" (E1ICU).

The third is the "hand-to-hand" strategy, which involves taking the medication needed by patient A from patient B's medication stock. When patient A's medication arrives from the pharmacy, it is "paid back" to patient B: "Sometimes a patient requires an urgent medication that wasn't ordered; there are occasions when other patients have the same medication, so we 'borrow' that ampoule and administer it immediately! When patient A's medication arrives, we 'pay it back' to patient B" (E3EmergP).

Step Three: Organization

The goal of organization is to properly arrange the medications. This is done by the nursing staff through two strategies: labeling and storage: "The pharmacy staff dispenses each patient's supplies and medications one by one, delivering them to the nursing assistant, who counts, organizes, labels with masking tape, and stores them in the medication cart" (OB10H).

The *labeling* process is intended to indicate which supplies and medications correspond to each patient, with information such as name, surname, identification number, and room number. For labeling, they use materials such as micropore tape, masking tape, markers, and pens; they also design labels that are printed as adhesive *stickers*: "The medications are labeled with the patient's name and identification number using an adhesive sticker" (OB12ICU).

After labeling the medications and supplies, they are *stored.* There are different storage spaces available: the clean room, the medication cart, and towers/columns in the ICU rooms: "We have a room called the clean room or medication room, where each patient's cart and box are placed, so everything is organized there…" (E2EmergA).

Depending on the type of medication, the nursing staff uses specific spaces for *storage*: tablets can be stored in bags placed in each drawer of the medication cart or in the towers/columns of the ICU rooms; medications that require cold storage are kept in the refrigerator, and controlled substances are stored in a locked briefcase, for which the nurse is responsible:

> Next to the nursing station is a refrigerator for storing medications that require cold chain, labeled on the top with the medications that need this process. (OB09HP)
>
> As nurses, we are responsible only for the custody of controlled medications, but their administration is carried out by the nursing assistant. (E3EmergP)

Step Four: Preparation

Medication can be prepared in two locations: inside the patient's room or outside of it. If it occurs *inside the room*, it is done on the medication cart, which is commonly used in the hospitalization service; in the ICU, the support table of the towers/columns is used: "Each unit has a cart for medication administration; the medications are organized there, and it has a tray where the prepared medications are stored" (E1ICU).

If it occurs *outside the patient's room*, the medication cart is used in hospitalization services, while in the emergency department, there is a room dedicated to preparation: "The medication cart does not enter the patient rooms. The staff prepares the medications in the hallway, in front of the patient's room door, and once everything is organized, they enter the room with the supplies on the tray" (OB20H).

In this preparation step, the nurse describes six phases: 1) verification, 2) labeling, 3) sanitization, 4) preparation of supplies, 5) organizing the medications, and 6) performing calculations:

Phase One: Verification

This phase involves confirming the medications, infusion equipment needed, patient allergies, and the expiration date and start date of the medications. In some cases, the nurse makes a phone call to the doctor to confirm the prescription, especially in cases where it seems inconsistent with the patient's clinical situation: "The nurse verifies with the doctor over the phone an order for antihypertensives regarding the number prescribed, since the patient had more than four" (OB01H).

The nurse also seeks help from more experienced colleagues or refers to the institutional medication binder, the nursing Kardex, or the stability table; however, the importance of peer support in verification is emphasized: "If I have doubts, I first ask around. There are supervisors with more experience than I have…" (E2EmergA).

In the Kardex, which is organized and updated by the nurse, not only is the medication prescription checked, but when scheduling the start, potential drug interactions are also considered: "Leave a well-organized Kardex. The medications: one, avoiding interactions as much as possible; two, ensuring that the medications are scheduled at the right time... so it's essential to keep the Kardex well organized" (E4HA).

Phase Two: Labeling

This phase involves labeling the medications to be administered with tape or adhesive labels, indicating the medication, solution, and dosage to be administered: "We must label the medication, indicating how much will be administered, what we will administer, and the time over which it will be administered" (E7EmergA).

Phase Three: Sanitization

In this step, the nursing staff uses personal protective equipment and performs hand hygiene before preparing the medications: "One of the nursing assistants prepares some medications; she sanitizes her hands, puts on goggles, a mask, and gloves" (OB15H).

Phase Four: Preparing the Supplies

This involves preparing the necessary supplies to ensure nothing is missing during administration: "If a dose is, say, 1 dipyrone, what do we need for administration? 1 saline... So we check everything to make sure it's exact" (E2EmergA).

Phase Five: Organizing the Medications

This step involves determining whether reconstitution/dilution is required, only dilution, or disaggregation in the case of oral medications.

If the medication comes pre-mixed, this step is skipped, which speeds up the application time: "The ones that come from the central mixing unit or the pre-filled syringe are easier, so we don't have to do the dilution..." (E4HP).

Phase Six: Performing the Calculations

This involves calculations for medication administration, both for dilution and for the flow rate using an infusion pump or macrodrip: "Next to the patient, the nurse confirms the equipment's date, checks the patient's allergy history, performs asepsis on the port of the patient's adapter, prepares it with saline before installing the macrodrip equipment […] and calculates the flow rate for one hour of administration" (OB20H).

Step Five: Administration

In this step, the patient receives the medication. It also involves four phases implemented by the nursing staff:

Phase One: Preparing the Medication

In this phase, the route by which the medication will be administered is prepared: intravenous, oral, inhaled, etc. If the route is intravenous, the nurse sanitizes and salinizes the adapter, purges the infusion equipment, and connects it to the catheter. In the case of the enteral route, depending on whether it is oral or through a gastric tube, preparations vary. For oral administration, water is prepared and the pills are placed in a container to be given to the patient later. For gastric tube administration, the tube is first made patent: "If it has an adapter or similar, we sanitize it well to connect the equipment, purge it, and begin the procedure to administer the medication. Normally, antibiotics take about 3 hours, 2 hours, depending on the medication" (E2EmergA).

Phase Two: Explaining to the Patient and Family

This phase involves explaining to the patient and their family what the medication is and why it is being administered in a clear and concise manner: "We explain to the patient in words they can understand what the medication is for and why it was ordered for them" (E2EmergA).

Phase Three: Administering the Medication

The medication is administered via the prescribed route for it to enter the patient's system. In some cases, this is not directly done by the nursing staff but is instead assigned to the accompanying person, after receiving instructions from the nurse or assistant: "The family member reported that the night nursing assistant had given her (Nifedipine) to administer when the patient woke up, first thing in the morning" (OB20H).

Phase Four: Discarding

The nursing staff discards the supplies used for medication administration, such as syringes, gloves, saline solution, among others, and places them in designated containers for disposal, such as sharps containers (ampoules and needles), trash bins (red, black, and white), and sinks (for leftover intravenous solutions): "Around the nursing station, plastic containers are observed for discarding ampoules, pharmaceutical waste, appropriately labeled, and materials for recycling or discarding" (OB18UP).

Step Six: Recording

In this final phase, the administration of the medication is recorded in the electronic health record system:

> I must go back to my workstation, access the system again, and register what I administered, verify and specify how I'm administering it, and the infusion rate. […] I must indicate that

> I reconstituted it with saline solution, that I will administer it over three hours, that I will administer it through a venous access, either 18 or 22 gauge, and that the venous access was patent… (E4HA).

Discussion

In the hospital setting, medication use is one of the primary practices related to patient care. *The National Ethical Nursing Tribunal of Colombia* states that "the medication administration process includes: medical prescription, reception, preparation, administration, recording, education, and follow-up of the patient" (6). For the nurses participating in this study, the steps are: prescription, dispensing, organization, preparation, administration, and recording. These phases allow for a more detailed identification of each of the elements that are important to nurses and involve activities aimed at ensuring safer, more timely, and effective medication administration.

According to Vera-Carrasco (7), "prescription is the link between the prescriber, the pharmacist or dispenser, and the patient," marking the initiation of pharmacological treatment. According to the author, the prescription requires that the healthcare professional, in this case the physician, possess pharmacological knowledge to select the most suitable medication for the patient's clinical condition (8). This aligns with the World Health Organization's guidelines on good prescribing (2), which emphasize the importance of adopting a reasoned therapeutic approach. This method requires careful evaluation of the causes, signs, and symptoms the disease causes in the person and, based on this, guides the correct prescription of medications in terms of efficacy, safety, convenience, and cost. This is where the nurse continuously verifies the physician's prescriptions in relation to the patient's clinical situation, the continuity of treatment, and the optimization of resources.

Regarding dispensing, the timely receipt of medications is crucial for administering them at the scheduled times. According to the *Ministry of Health of Colombia's Technical Guide on Good Practices for Patient Safety in Health Care* (8), dispensing must be accurate, complete, and timely. The study revealed two activities through which the nurse ensures the timely administration of medications: displacement (going from the nursing station to the pharmacy) and "lending" (taking a medication from another patient while waiting for the delivery from the pharmacy), both of which aim to minimize delays in pharmacological administration.

In the medication preparation phase, the participants stated that one of the phases they always follow is verification and the use of labels before administering the medication. This is done to prevent errors in administration, similar to findings in studies by Henry Basil et al. (9) and Bryan et al. (10), where nurses used verification as a preventive barrier due to the presence of look-alike and sound-alike (LASA) medications.

Organization involves labeling the supplies, medications, and devices as one of the key activities, as well as ensuring the complete writing of the patient's name, ID number, and room number to avoid confusion between patients. This aligns with the results of Rojas-Marín et al. (11), who stated that "using labels during the preparation phase with complete information (medication, units, dosage, type of diluent, total volume to be administered, time, and the name of the person preparing the medication) helps prevent errors." Additionally, medications are stored according to their physicochemical characteristics, following the good storage practices defined by the Ministry of Health and Social Protection of Colombia (12), which are the minimum standards for the storage of pharmaceutical products.

Regarding medication administration, literature strongly supports studies related to adverse events and errors that delay correct administration (13). Additionally, evidence exists on strategies to prevent these errors, such as cross-checking, patient and family involvement, and training on the proper handling of medications (14). This research not only corroborated the phases followed by

nurses to determine the order of medication administration, but also the safety actions required. However, visible involvement from nursing professionals during patient and family education about proper medication administration and delegation is crucial.

Finally, the clinical recording made by the nurse regarding medication administration must contain clear, concise, and complete information about the procedure performed (15). In this regard, literature confirms that although nursing staff record adequately, they may be influenced by their understanding of the implications of non-compliance and, at the same time, the importance of timely and correct recording in the clinical history as a legal document (16). This study highlighted the commitment and responsibility assumed by nurses when making such records.

The six steps outlined by nurses in the medication administration process can guide new guidelines to strengthen the patient safety culture, as they highlight the strategies and activities of nurses, and because they are not currently described in the existing protocols for medication administration. Therefore, the knowledge of nursing professionals is essential in daily work, not only to provide humanized care but also to guide and organize teamwork aimed at achieving a more effective implementation of the patient safety culture in healthcare institutions (17,18).

Conclusion

The hospital-based medication administration process involves six steps: prescription, dispensing, organization, preparation, administration, and recording. In this process, nurses carry out activities that are not formally recognized but are essential for the proper execution of medication administration. These activities highlight the creativity and resourcefulness of nurses in ensuring the timeliness, safety, and effectiveness of pharmacological treatment.

Ethical Considerations

The project was classified as minimal risk (19). Ethical criteria for human research as outlined by Ezekiel Emanuel (20) were followed. It received approval from the Technical Research Committee (Act 2023-59711) and the Ethics Research Committee (Act 237 CEI-FE), both from the School of Nursing at the University of Antioquia, and approval from the Ethics Research Committee of the healthcare institution where the fieldwork was conducted (Act FR-DV-3420). Informed consent was provided, which was legible, clear, and consistent, emphasizing voluntary participation and the ability to withdraw from the study at any time. Participant confidentiality was maintained by assigning codes (E1, E2) to the interviews.

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Notes

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