

The use of technology to guarantee the correct dose of medicines in a hospital in agreste pernambucano

O uso da tecnologia para garantia da dose correta de medicamentos em um hospital do agreste pernambucano

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ABSTRACT

Introduction: The health care process is one of many attributions to the pharmacy at the hospital. This function has the priority to assure the correct use of the the drug according with the prescription, dosage, validation and others as well are checked. Therefore the best way to garante and minimize the erros is the process of unitization. **Objetives:** Demonstrate one of the strategies adopted in a private hospital, highlighting the use of technology as a contributing factor combined with reducing waste and evasion of liquid medicines, verifying the benefits after implementing the equipment in the service, ensuring economic and care efficiency. **Methods:** The oral liquid consupcion report was used to check medicines consupcion before and after, issued through our ERP system, the MV Soul, between the months of December 2022 and January 2023 from Hospital Unimed Caruaru- Pernambuco. For the study, we choosed four medicines witch follow the samen rules and program that the others, with the same analysis and comparison of prescribed versus prescribed medicines. Data processing was done using graphs. **Results:** Using the MK5 liquid unitizing machine, there was a significant reduction of 5.57% in the total consumption of bottles, less divergence in stock and greater product traceability. **Conclusion:** It is concluded that, with the implementation of the service, there were improvements in the care aspect and patient safety, as it contributed to the precision of the doses dispensed and administered, thus contingency spending was carried out in a more balanced way.

Key-Words: Hospital Pharmacy; Medication Fractionation; Patient safety.

RESUMO

Introdução: A farmácia hospitalar tem como responsabilidade contribuir no processo de cuidado à saúde, certificando a utilização correta do fármaco de acordo com sua prescrição, evitando erros associados aos medicamentos. Dessa forma, como medida para minimizar estes erros está o processo de *unitarização de doses*. **Objetivos:** Demonstrar uma das estratégias adotadas em um hospital privado, destacando o uso da tecnologia como fator colaborador aliado à diminuição de desperdícios e evasão de medicamentos líquidos, verificar os benefícios após implantação do equipamento no serviço, garantindo eficiência econômica e assistencial. **Métodos:** Utilizou-se para coleta de dados o relatório de consumo dos medicamentos líquidos orais, emitido através do *Sistema Soul MV* entre os meses de dezembro de 2022 e janeiro de 2023, do Hospital Unimed Caruaru-Pernambuco. Para o estudo foram selecionadas amostras piloto de quatro medicamentos para análise e comparação de medicamentos prescritos x atendidos. O processamento dos dados foi feito por meio de gráficos. **Resultados:** Com o uso da máquina unitarizadora de líquidos MK5 ocorreu uma redução significativa de 5,57% no consumo total de frascos, menor divergência no estoque e maior rastreabilidade do produto. **Conclusão:** Conclui-se que, com a implantação do serviço, houve melhoras no aspecto assistencial e na segurança do paciente, uma vez que contribuiu para a precisão das doses dispensadas e administradas, com isso o contingenciamento de gastos se deu de forma mais equilibrada.

Palavras-chave: Farmácia Hospitalar; Fracionamento de Medicamentos; Segurança do Paciente.

Introduction

The hospital pharmacy is a healthcare service responsible for the storage, distribution, dispensing, and control of all medications and materials essential to the process of restoring health.¹ Among its objectives are ensuring the safe and rational use of medications, meeting the needs of hospitalized patients, and guaranteeing that the products offered are of high quality. However, to achieve these goals, it is necessary to have an efficient system for information management, inventory control, and cost monitoring.²

Furthermore, considering the importance of patient safety within healthcare services, which consists of preventing, avoiding, and improving the outcomes and harm related to healthcare, the hospital pharmacy also aims to collaborate in the healthcare process by providing quality care. This ensures that the patient uses the prescribed medication in the correct form, time, dose, dosage regimen, and route of administration.³ In this way, efforts are made to avoid medication-related errors, since it is estimated that in Brazil, 7.6% of hospital admissions are due to such adverse events.⁴

The prevention of these adverse events arises from the adoption of measures that help reduce the likelihood of their occurrence.⁵ One important measure to reduce the occurrence of errors is the unit dose process for medications and supplies, which ensures greater safety and efficiency, aiming to guarantee the quality and traceability of the product until administration to the patient, thereby reducing related errors. In this process, distribution is carried out using unit-dose packaging, with forms and doses ready for the patient, under pharmaceutical supervision throughout the process.⁶

The objectives of fractionating liquid medications are: to provide individually prescribed doses of medications, to protect the medication from environmental agents and deterioration caused by handling, and to ensure that the medication is administered quickly and safely to the patient, achieved through the combination of these factors, as well as to contribute to cost reduction, particularly costs related to loss due to expiration of supplies.⁷

Considering that the stability of medications in

multidose bottles in the pharmaceutical forms of solution, emulsion, and oral suspension, after opening the original packaging, acquires a new expiration date, that is, 25% of the remaining time between the opening date and the expiration date stated on the original packaging, not exceeding six months. This is due to the fact that stability is no longer guaranteed because of factors such as temperature, humidity, light, hydrolysis, and oxidation.⁸

In this context, this study aims to present one of the strategies adopted in a private hospital service in the Agreste region of Pernambuco, highlighting the use of technology as a contributing factor to patient safety and an ally in reducing waste of liquid medications, in addition to evaluating the benefits after implementing the liquid unit-dose machine in the service, ensuring both economic and healthcare efficiency.

Methodology

This study is a descriptive research with a quantitative approach. Data collection used the consumption report of oral liquid medicines issued through the Soul MV System between December 2022 and January 2023 at Hospital Unimed Caruaru, Pernambuco. The study was based on a comparison between the percentage of milliliters prescribed and the milliliters dispensed by the pharmacy before and after the start of dispensing unit-dose sachets using the liquid unit-dose packaging machine. At no stage of this study were patient/user data used.

The unit-dose packaging and fractionating machine used was the Opuspac Hospital Automático, manufactured by Ibtex Innovative Solutions, model MK5, with size specifications ranging from 30 x 50 mm to 50 x 250 mm. The packaging offers better presentation compared to sachets due to the availability of different sizes. The machine has a production capacity of 1,200 units per hour, offering greater economy, safety, inventory control, quality, and agility in processes.⁹

To put the machine into operation, a space was required to ensure proper functioning, with cabinets for storing the bottles to be unit-dosed, a scale for measuring the sachets of solutions, and a bench with a computer running software provided by Opuspac.

This software supplies product information such as internal code, batch, expiration date, barcode, and the registration of the responsible pharmacist, integrated into the Soul MV System of Hospital Unimed Caruaru.

Training was also provided by Opuspac for the entire team operating the machine, including hospital pharmacists, pharmacy assistants, and pharmacy technicians. Thus, the entire process of selecting the machine, training, and compiling statistical data on the most used liquid medicines in the hospital lasted six months, from August 2022 to February 2023, with sachet dispensing starting on February 6, 2023.

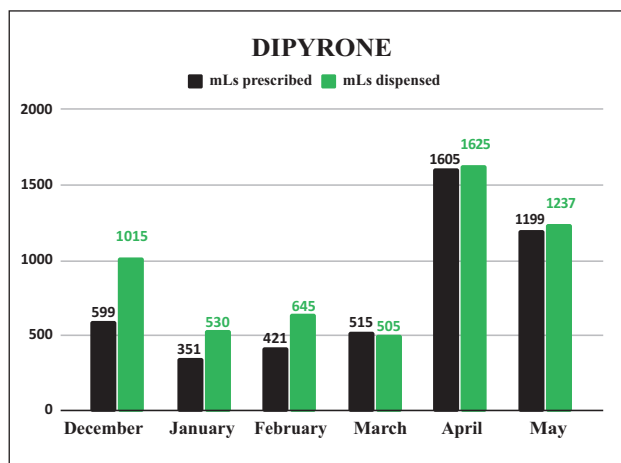
For the study, pilot samples of four medicines were selected for analysis and comparison:

simethicone 75 mg/mL (15 mL bottle), dipyrone 50 mg/mL (100 mL bottle), prednisolone 3 mg/mL (120 mL bottle), and zinc 4 mg/mL (75 mL bottle). These medicines were chosen due to their high consumption in the hospital. The volume of the sachets was determined based on the analysis of medical prescriptions.

Results

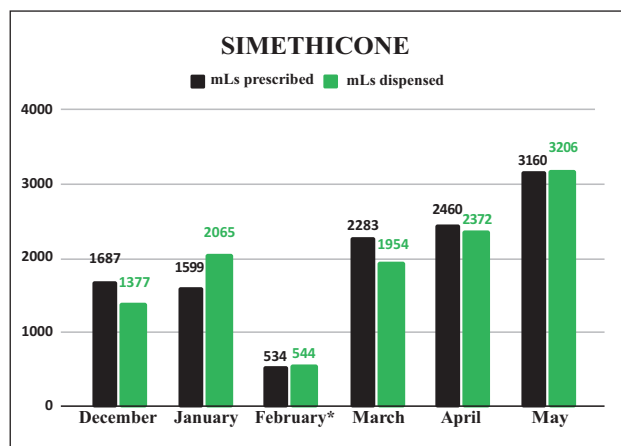
Figures 1, 2, 3, and 4 present the volume of medications prescribed compared to the volume dispensed by the hospital satellite pharmacy. The medications shown are dipyrone, simethicone, prednisolone, and zinc, respectively.

Figure 1. Prescribed vs. Dispensed Comparison – Dipyrone.



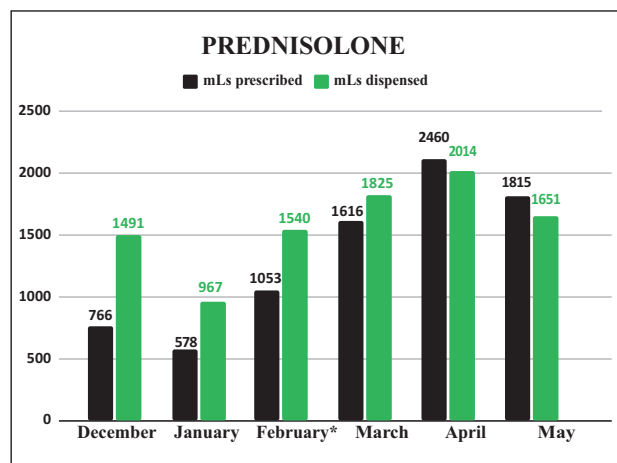
Source: Author's own elaboration

Figure 2. Prescribed vs. Dispensed Comparison – Simethicone.



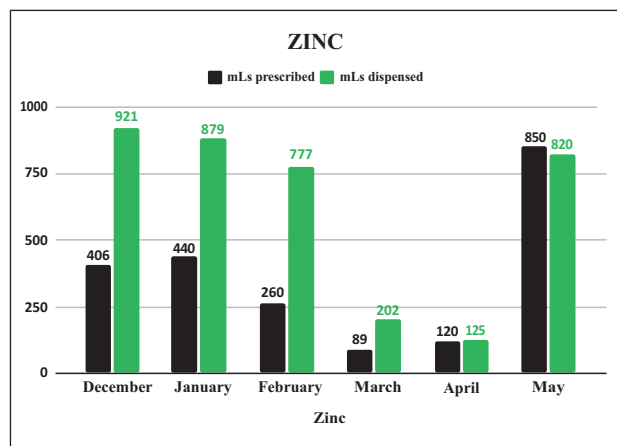
Source: Author's own elaboration

Figure 3. Prescribed vs. Dispensed Comparison – Prednisolone.



Source: Author's own elaboration

Figure 4. Prescribed vs. Dispensed Comparison – Zinc.



Source: Author's own elaboration

Moreover, Table 01 shows the medication to be unit-dosed, its pharmaceutical form, the sachet volume in mL, and the equivalence between the bottle and the sachet, indicating the number of sachets that can be produced from a single bottle. It also specifies the start date of unit-dosing for each item.

Discussion

During the process of implementing the machine, some difficulties were observed regarding the sachets of the medications: determining the most suitable type of sealing, adjusting the graphic printing, and calibrating the milliliter volumes. Initially, it was a procedure of difficult execution, as each medication has its own characteristics such as stability, density, and viscosity, which must be carefully considered.¹⁰

Later on, another challenge emerged due to the lack of an initially standardized calculation for the solutions. To address this, tests were conducted with the solutions until the appropriate dosing value was determined for each unit-dosed medication. This value corresponds to the time the machine takes to fill the sachet with the desired volume, following the proportion that the greater the volume present in the doser, the larger the sachet volume, and the smaller the volume in the doser, the smaller the sachet volume, with all results recorded in a spreadsheet for future use.

The results presented show that in the months of December to January, prior to liquid unit-dos-

ing, the dispensed volume exceeded the prescribed amount, and that after the implementation, in the months of February to May, the dispensed volume aligned with the prescribed volume, despite a loss of approximately 5.5% in sachet production due to operational issues with the equipment. This loss rate was calculated during the adaptation months, when some inconsistencies were observed between the number of sachets produced and the total bottle volume for each medication.

Moreover, the hospital management reports that, as a result of implementing this service, there was a significant decrease in the total consumption of bottles, with a 5.57% reduction in medication costs, excluding the monthly equipment rental cost of R\$8,000. Additionally, there were fewer stock discrepancies and greater product traceability.

Conclusion

It was concluded that, with the implementation of the service, there were improvements in care quality and patient safety, as it contributed to the accuracy of the doses dispensed and administered, thereby promoting the rational use of medicines. Furthermore, this study also states that investment in technology and equipment is a contributing factor, as its use is justified and offset in the medium and long term, given that the avoided costs associated with the medication increase over time, thus generating greater savings for the hospital.

Table 1: Bottle-to-Sachet Equivalence.

Medication	Pharmaceutical form	Sachet volume	Bottle/sachet equivalence	Start of unit-dosing
Simethicone 75 mg/ml 15 ml	Oral Emulsion	2ml	1 Bottle / 5 Sachets	02/2023
Dipyron 50 mg/ml 100 ml	Oral Suspension	5ml	1 Bottle / 17 Sachets	03/2023
Prednisolone 3 mg/ml 120 ml	Oral Solution	5ml	1 Bottle / 23 Sachets	03/2023
Zinc 4 mg/ml 75 ml	Oral Suspension	2.5ml	1 Bottle / 24 Sachets	04/2023

Source: Author's own elaboration

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