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RESEARCH ARTICLE

AUTOMATION OF DRUG DISPENSING: FEEDBACK FROM A HOSPITAL PHARMACY

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Key words:-
Automation, Drugs Dispensation, Advantages, Constraints, Motivation, Hospital Pharmacy

Abstract

Background: Ensuring drug circuit security is the ultimate goal for hospital pharmacists. Alarmed by the excessive drug consumption at its on-duty pharmacy, Mohammed V Military Teaching Hospital of Rabat (Morocco) installed a centralized automation for drugs dispensation. This experience is expected to be decentralized to all care units.
Our study purpose is to evaluate automation's impact on pharmaceutical drug management, and then to determine limits to be improved.
Resources and procedures: We analyzed, over a period of 10 months, data from the database of the automated distribution system deposited at our on-duty pharmacyin order to determine its usage profile. We also evaluated through a questionnaire the point of view of our 13 pharmacy technicians toward drug dispensing automation.
Results: Over the study period, we got the following results:
- 5446 transactions were accomplished and 8864 drugs unit were dispensed;
- Parenteral route drugs are the most delivered (67%);
- Anti-inflammatories and analgesics are the most required (26%), followed by the anti-infective drugs (25%);
- Young technicians did more transactions (63%) than the elders did (37%);
- According to pharmacy technicians, main automation's advantages are saving time in locating medications (8/13) and limiting drugs errors (5/13). Otherwise, main constraints are the irregular machine replenishment (10/13) and the reduced capacity for storing all medications (6/13), specially refrigerated and oversized ones.
Conclusion: Automation of drug delivery offers many advantages. However, there are still limits to be improved before it's decentralization to all care units.

Introduction:-

Ensuring the quality and security of the drug circuit is the ultimate goal for hospital pharmacists. In this sense, automated drug dispensing system offers many advantages: registered drug distribution, optimized stock management and traceability with less expiration and drug errors, stock rationalization, remote monitoring, economic gains (CADTH, 2010; Lehnbom, 2013)…

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Alarmed by the excessive drug consumption at its on-duty pharmacy, Mohammed V Military Teaching Hospital installed a centralized automation for drugs dispensation. This experience is expected to be decentralized to all care units.

The purpose of our study is to evaluate the impact of automation on pharmaceutical drug management, and then to determine limits to be improved.

Resources and procedures:-

In this study we analyzed, over a period of 10 months, data from the database of the automated distribution system deposited at on-duty pharmacy of Mohammed V Military Teaching Hospital of Rabat (Morocco), in order to determine its usage profile. We also used a questionnaire filled at the end of the study period by the 13 Pharmacy technicians working at our hospital pharmacy (6 young and 7 seniors), in order to evaluate their point of view toward automation.

Results and Discussion:-

Automated dispensing systems are drug storage devices that electronically dispense medications in a controlled fashion and track medication use. Most systems require user identifiers and passwords, and internal electronic devices track users accessing the system, track the patients for whom medications are administered, and can even provide usage data to the hospital's financial office for the patients' bills.

Our centralized automation experience allowed us to obtain the following results:

Level and nature of use

Over the study period, 5446 transactions have been accomplished, among which 4524 were accomplished by pharmacy technicians. The residual transactions (n=922) were mostly preventive and corrective maintenance transactions done by computer technicians to prevent or to right mechanical or computer breakdowns. These latters would tend to regress as pharmacy technicians are getting familiar with machine use. Otherwise, certain anomalies could be solved more quickly through training and support, especially during the early stages of implementation (Hyland, 2007). The detail of transactions for all profiles combined is shown on Fig 1.

Characteristics of dispensed drugs

Dispensing operations totaled 8864 units of dispensed drugs over the study period. Injection forms are the most delivered followed by oral forms. Topical route remains negligible (Fig 2). This is consistent with the hospital context where injectable drugs are most commonly used. As shown on fig 3, the category combining anti-inflammatories and analgesics is the most required (with paracetamol as the most used analgesic), followed by the anti-infective drugs category (with amoxicillin/clavulanic acid as the most used antibiotic). These drugs categories are the most ordered at the on-duty pharmacy by emergency and intensive care units. These lattersare known for their considerable drug consumption at hospitals. In this wake, paracetamol is widely used due to its high tolerance, especially for patients with compatible particular terrain (children, pregnant women, elderly patients…), same goes for amoxicillin/clavulanic acid which is privileged for its high efficiency as a first-line empirical treatment.

Motivation

Young pharmacy technicians are more motivated than the elder ones toward automation, as young technicians did more transactions (63%) than the elders did (37%), even if the latters were more numerous. This may be due to the fact that juniors are more familiar with technology than seniors (Fig 4). Moreover, it is widely admitted that perceived usefulness is related to the intention of use and usage behavior. Experiments have shown that “resistance-to-change” phenomena are more common in seniors compared to young professionals (Chapuis, 2010; Lehnbom, 2013).

Advantages and constraints

According to the 13 pharmacy technicians, main automation’s advantages are saving time in locating medications (8/13) and limiting drugs errors (5/13). Otherwise, main constraints are the irregular machine replenishment (10/13) and the reduced capacity for storing all medications (6/13), specially refrigerated and oversized ones.

To access the machine, pharmacy technicians must use a specific password. This secures the access to risky drugs like narcotics and reduces the risk of dispensing errors, especially for high alert medications stored in the dispensing machine secured drawers. These are composed of compartments with selective opening, and which allow the pharmacy technician to be guided during dispensing by specifically opening the compartments containing the risky drug and by asking the pharmacy technician to check and confirm the stock of the said drug before and after its picking up from the compartment (CADTH, 2010; Hyland, 2007; ISMP, 2019; Lehnbom, 2013; UTMC, 2020).

Fig 1:- Transactions accomplished (n=5446).

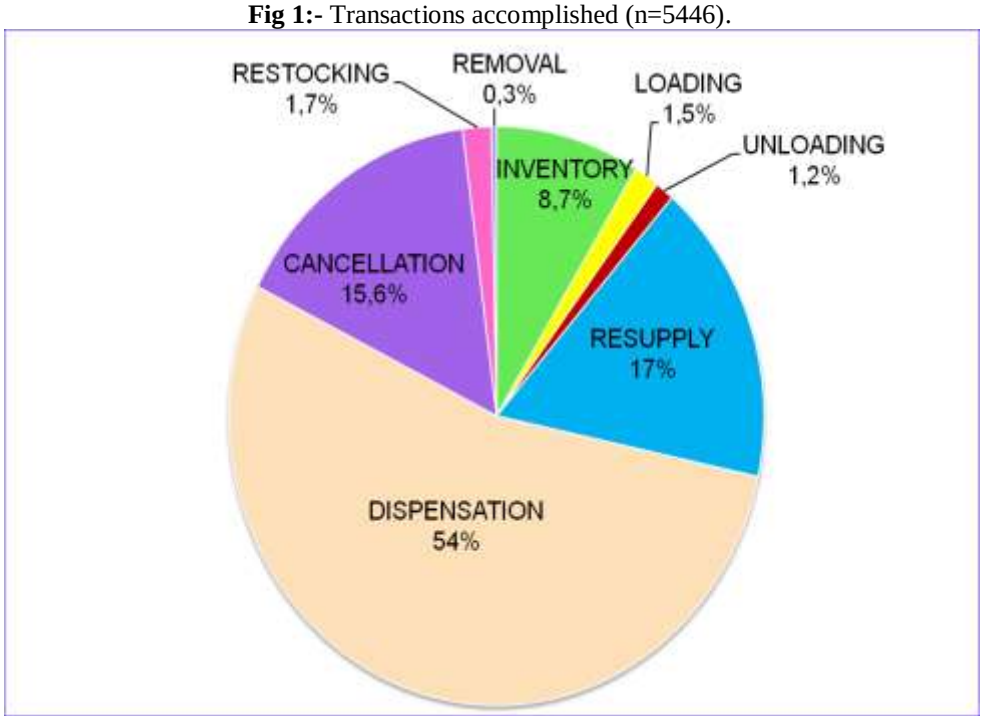


Fig 2:- Dispensed drug units by the route of administration (n=8864).

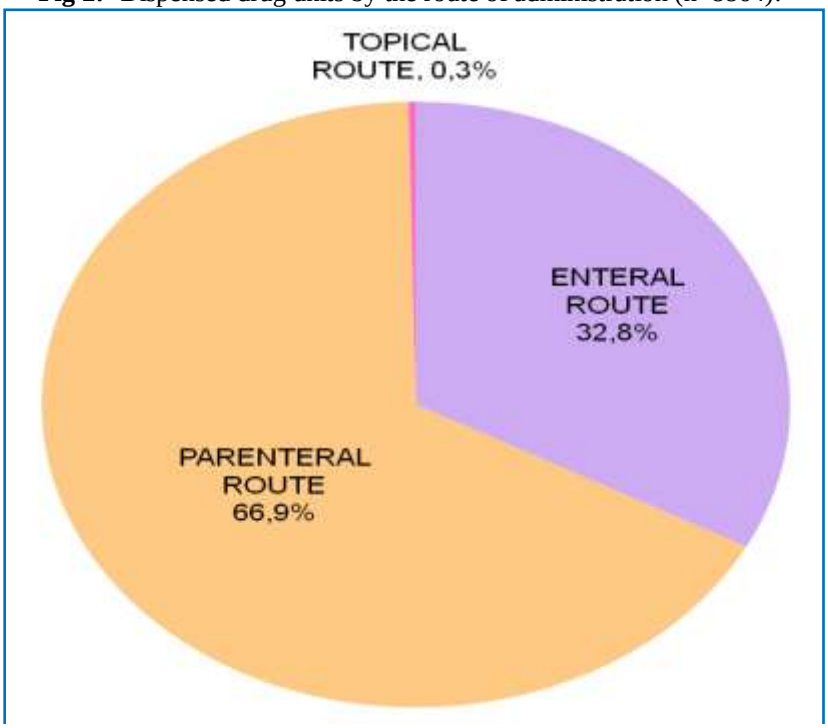


Fig 3:- Drug consumption by therapeutic classes (n=8864).

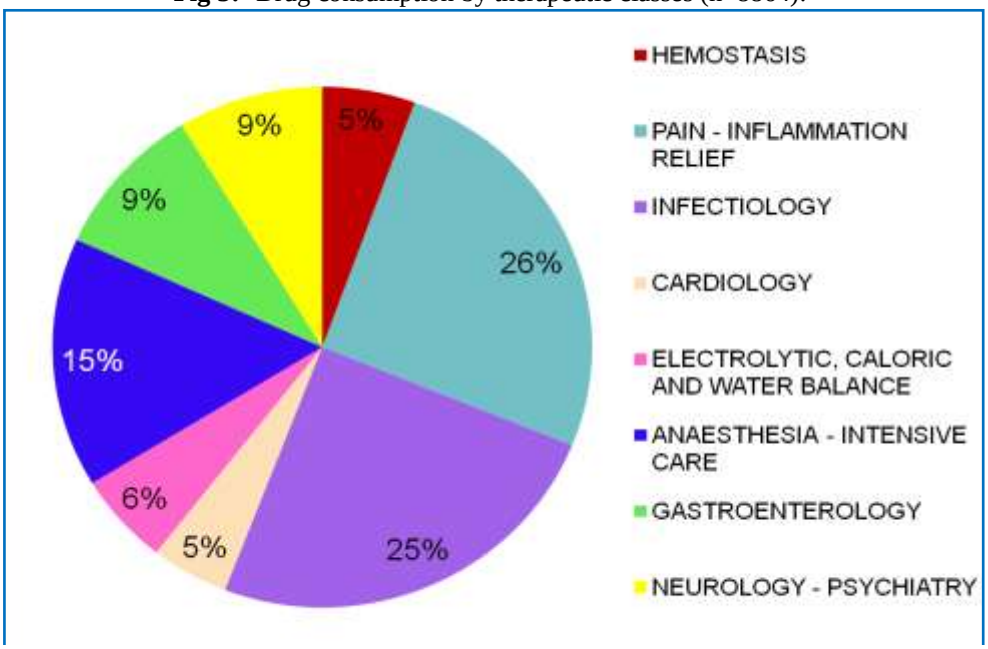
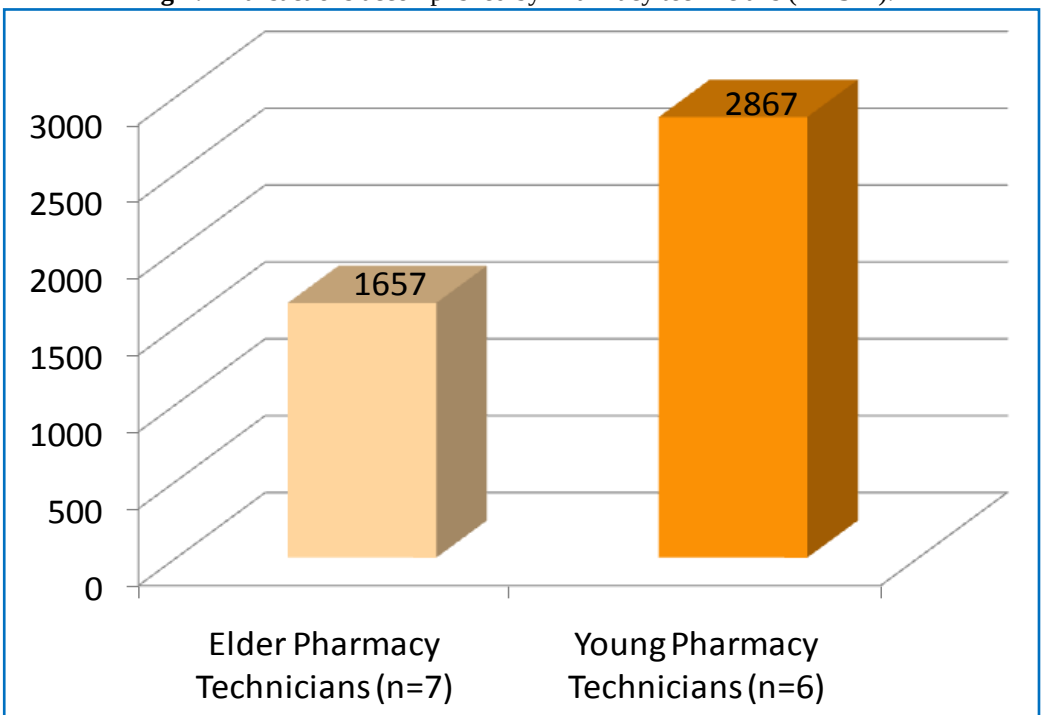


Fig 4:- Transactions accomplished by Pharmacy technicians (n=4524).



Conclusion:-

The contribution of drug dispensing machines in improving the quality and safety of care is well established. However, in our context, there are still limits to be improved concerning machine replenishment (by accountability and adherence to schedules), storage capacity and storage conditions (by extending the number of dispensing machines and providing refrigerated units), without forgetting the lack of motivation among seniors (by sensitization and support) and the occurrence of breakdowns (by training on compliance with terms of use). This would stabilize the automated solution before its decentralizing to cover all care units. In this sense, the main advantage to reach is permitting nurses to obtain medications for inpatients at the point of use, in order to save time and to prevent drugs administration errors.

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