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COMPARISON AND EVALUATION OF DISPENSING ERRORS FROM 2017 TO 2018 AT KING ABDULAZIZ MEDICAL CITY (KAMC) AND KING ABDULLAH SPECIALIZED CHILDREN'S HOSPITAL (KASCH), RIYADH, THROUGH THE SAFETY REPORTING SYSTEM (SRS)

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ABSTRACT: Any errors in medical dispensing may threaten the patient's life. Hence, this research aimed to compare and evaluate the dispensing errors and to identify its prevalence and severity through the safety reporting system (SRS) and providing feedback at "King Abdulaziz Medical City, Central Region (KAMC-CR)" and "King Abdullah Specialized Children's Hospital (KASCH)".The KAMC-SRS was used to collect data on dispensing errors. In order to analyze the dispensing errors, the reasons for the errors were reviewed and the errors were classified. In order to study and categorize the medication error data, the "National Coordinating Council for Medication Error Reporting and Prevention (NCCMERP)" index was utilized. Out of 3017 safety reports submitted to the SRS during 2017, the number of dispensing errors recorded was 448 (14.84% of the errors). Out of 2381 safety reports submitted to the SRS in 2018, approximately 18% of dispensing errors were recorded, which were significant ($p < 0.001$). Generally, "KAMC and KASCH" pharmacies showed relatively low percentages of dispensing errors that did not exceed 0.01% of the total orders received. Furthermore, only a minority of the errors (2.6% at KASCH and 3% at KAMC in 2017 and 1% at KASCH and 2% at KAMC in 2018) reached the patients. Overall, the reporting of incidents increased in 2018, indicating good awareness of patient safety in the staff. Annual evaluation of dispensing errors will help to reduce these errors in the near future.

INTRODUCTION: Any preventable incident that can cause or contribute to inappropriate medication usage or patient damage when the medicine is under the control of the health care provider or patient is characterized as a medication error.

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Such errors may occur during any phase of the drug delivery process, prescribing, transcribing, preparing, dispensing, administration and monitoring [1].

Medication errors are among the most common patient safety incidents reported in hospitals. Published studies evaluating hospital pharmacy practice in Saudi Arabia are extremely scarce [2]. However, in the Riyadh region, a cross-sectional survey of community pharmacists shows that the majority acknowledged an increased risk of

dispensing errors was increasing due to human factors such as handwritten by the physicians or the work load [3]. Human errors are common due to the incompetency of staff in hospitals. New technology introduced to the pharmacy to make their services more efficient named automated pharmacy services, which had great benefit as saving time and decreasing medication error. A system for reporting medication errors considers a quality measure for medication process [2]. Between October 1, 2013 and March 31, 2014, about 80,000 drug mistakes were reported to the "National Reporting and Learning System (NRLS)" by National Health Service Institutions in England and Wales [4].

The dispensing of medications, which includes the selection of medications, transfer to a container and product labeling is one of the most important responsibilities of pharmaceutical care. Medication dispensing is a complex process that entails more than merely selecting medications from a pharmacy shelf, applying a label to a box, and handing it over to the patient [5]. Dispensing is the most common sort of pharmaceutical error, which refers to a divergence from a prescription order due to drug type, dose, or storage. A dispensing error occurs when there is a mismatch between a prescription and the medicine that the pharmacy delivers to the patient or distributes to the ward-based on the prescription, such as dispensing a medicine of poorer pharmaceutical quality or incorrect information [6].

The dispensing error can be rung from potential harm to life-threatening. A potentially fatal error with high-alert pharmaceuticals is treatments with a higher risk of causing serious patient harm if taken incorrectly[7]. According to the NRLS, 17 percent of pharmaceutical errors recorded in the UK between January and December 2007 were due to dispensing problems in general, acute, or community hospitals [4].

An observational study in 50 pharmacies in the United States found four dispensing errors per day per 250 prescriptions [4]. The objective of our study was to compare and evaluate the dispensing errors and to identify the prevalence and severity level of dispensing errors reported through the Safety Reporting System (SRS) and the secondary objective to provide benchmark data for our region, a web-based tool used to collect safety reports, collate related information and provide feedback, at "King Abdulaziz Medical City, Central Region (KAMC-CR)" and "King Abdullah Specialized Children's Hospital (KASCH)".

METHODS: The KAMC-SRS was used to collect data on dispensing errors. The reasons for dispensing errors were examined; the errors were then grouped according to the causes. The "National Coordinating Council for Medication Error Reporting and Prevention (NCC MERP)" index was used to evaluate and categorize the medication error data.

A Chi-square test was used to compare data where appropriate. The data analysis was performed using "Statistical Package for the Social Sciences (SPSS) software, version 23". A value of $P < 0.05$ was considered statistically significant.

Data Management:

***Outcome variables*:** Dispensing error was defined as reported previously [6]. Dispensing process is the term used to describe the process of delivering medications to patients. It consists of five stages [8]:

- Acceptance and verification of prescription details.
- Review of the patient's dispensing history.
- Labeling and assembly of the dispensed products (review of expiry, instructions, and cautionary labels).
- Supply of the prescription to the patient/relative and revivification.
- Counseling of the patient/relative on safe and appropriate use.

Classification of dispensing errors by severity type

- Potentially caused harm/damage.
- Near-miss event that did not reach the patient.
- Event reached the patient but caused no harm/damage.
- Monitoring is required to confirm no harm/damage.

- Event caused temporary harm requiring hospitalization.
- Event caused temporary harm requiring intervention and hospitalization.
- Event caused permanent harm requiring extensive follow-up.
- Event caused life-threatening or serious injuries requiring intervention necessary to sustain life and hospitalization.
- Event caused death.

Ethical Consideration: Ethical approval (institutional review board [IRB] no: H-01-R-005) was obtained from the ethical approval committee of the Ministry of National Guards Health Affairs before the start of the study.

RESULTS: Annual reports on dispensing errors for 2017 and 2018 according to an analysis of safety reports, 3017 safety reports were filed to the SRS in 2017, with 448 (14.84%) dispensing errors reported as indicated in **Table 1.**

TABLE 1: DISPENSING ERRORS REPORTED AT KASCH AND KAMC DURING 2017 AND 2018

Year	**2017**		**2018**	
Total number of a safety report	3017		2381	
Total number of dispensing error	448		429	
Total number of prescribing error	66		68	
Total number of administrative error	91		106	
Building	**KAMC**	**KASCH**	**KAMC**	**KASCH**
Total number of prescription	2144104	867983	217695	888920
Dispensing error	215	233	231	198
Dispensing error of high alert medication	16%	21%	20%	15%
Age				
Adult (>18 years old)	161	131	153	101
Child (1- 18 years old)	4	67	6	81
Infant (< 1 year old)	37	27	55	10
Not Applicable (Incident not related to patient)	13	8	17	6

In 2018, there was around 2381 safety reports with a considerable percentage of dispensing problems (18%). The total number of errors significantly differed between 2017 and 2018, the level set of p value <0.05 in our results ($p < 0.001$). The error rate was lower in 2018 than in 2017 (0.078% *vs.* 0.10%). Furthermore, the total number of dispensing errors significantly differed between 2017 and 2018 ($p = 0.002$). The rate of dispensing errors was higher in 2018 than in 2017 (18%, 14.84%) as shown in **Table 2.**

TABLE 2: THE DIFFERENCES OF MEDICATION ERRORS BETWEEN 2017 AND 2018

Error in general			< 0.001*
Yes	3017 (0.10%)	2384 (0.078%)	
No	3009070 (99.9%)	3066231 (99.92)	
Dispensing errors from total errors			
Yes	448 (14.84%)	429 (18%)	0.002*
No	3017 (85.16%)	2384 (82%)	

* Significant at level 0.05

Generally, "KAMC and KASCH" pharmacies had relatively low percentages of dispensing errors that did not exceed 0.01% of the total orders received in 2017 and 2018 **Table 1**. In 2017, based on the dispensing error reports for high-alert and regular medications, at KAMC, 20% of the total number of dispensing errors occurred in high-alert medications. The corresponding percentage at KASCH was 14.06%. Similar percentages were documented at both institutions in 2018 (Pie chart 2). The errors made by pharmacies were categorized based on the patient age group. Table 1 shows the percentages of errors that occurred in 2017 and 2018. The data from 2017 show that 55.2% of the dispensing errors among adults were found at KAMC and 44.8% at KASCH. In 2018, 94.3% of the errors among children were recorded at KASCH and 5.6% at KAMC.

Almost the same error percentages were reported among infants. In 2018, the percentages were similar to those in 2017, except in the infant group; the percentages of dispensing errors were 84.6% for KAMC and 15.4% for KASCH **Table 1**. Further analysis of the 2017 reports revealed medication delay as the most common type of dispensing error, accounting for 28% and 27.4% of the errors at KASCH and KAMC, respectively. The next most common types were incorrect medications, which accounted for 23% of the errors at KAMC, and packaging issues, which accounted for 20.17% of the errors at KASCH **Fig. 1.**

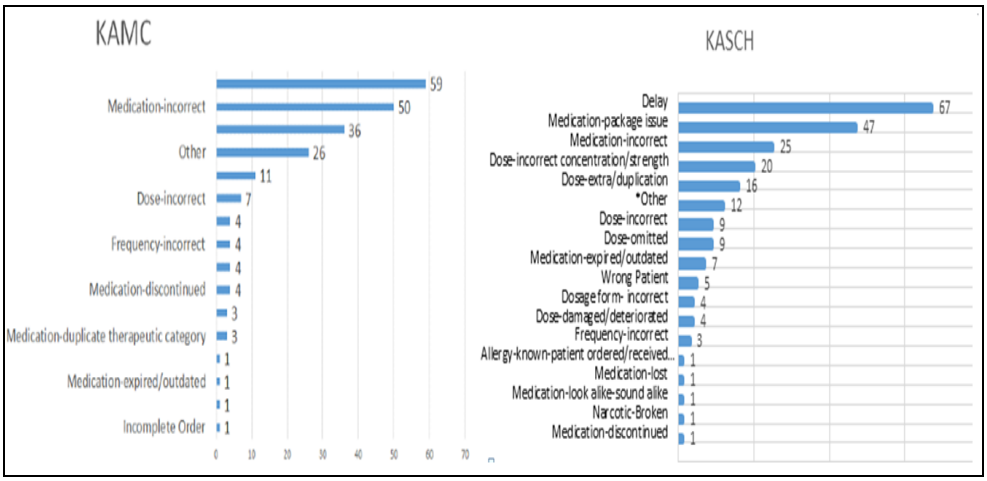

FIG. 1: NUMBER OF DISPENSING ERROR REPORTS CLASSIFIED BY SPECIFIC EVENT TYPE IN 2017

A sub-analysis by severity degree was also carried out. According to 2017 data, 97.4 percent of KASCH errors and 97 percent of KAMC faults did not reach the patients **Fig. 2**. In 2018, approximately 98 percent of the errors at KAMC and 99 percent of those at KASCH did not reach the patients **Fig. 2**. Overall, only a minority of the errors (2.6 percent at KASCH and 3 percent at KAMC in 2017 and 1 percent at KASCH and 2 percent at KAMC in 2018) reached the patients.

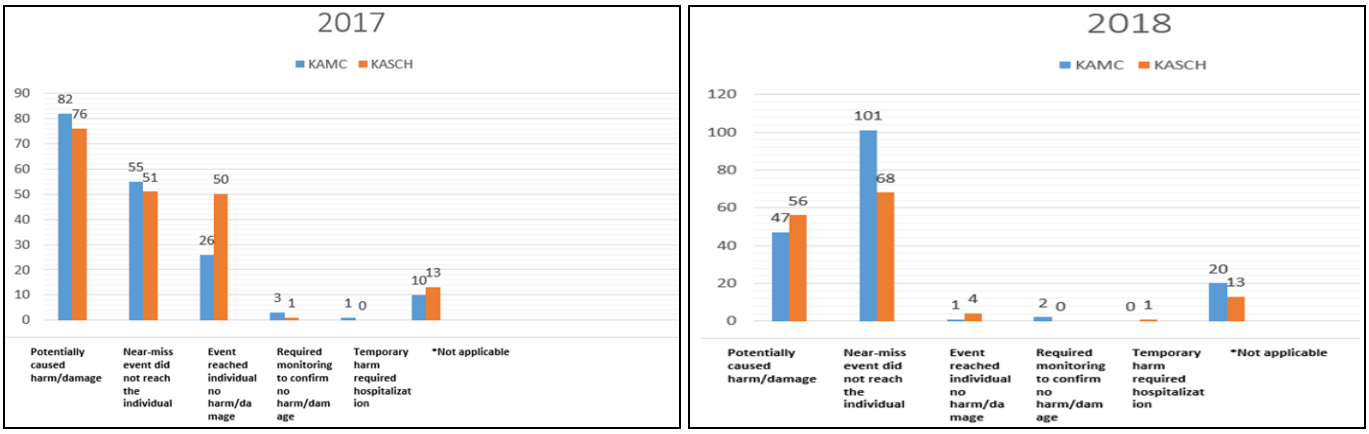

FIG. 2: NUMBER OF DISPENSING ERROR REPORTS PER SEVERITY LEVEL (AT KASCH AND KAMC) IN 2017 AND 2018

DISCUSSION: Dispensing medication is a risky stage in the medication use process. One of a pharmacist's main responsibilities is to dispense prescriptions. It's a lengthy procedure that entails a number of cognitive and manual steps. There is evidence that the likelihood of dispensing errors is rising, resulting in a rise in the requirement for medical care and the use of pharmacological therapy as a result of these errors [3].

Our retrospective study compares and evaluates dispensing errors, which leads to elucidating the types and/or causes of dispensing errors reported at KAMC-CR and KASCH for two years. Dispensing errors are more frequent than the prescribed and administrative errors. **Table 1** shows the total number of safety reports submitted to the pharmacy quality system for the detection of dispensing errors. In 2017, more errors occurred during

dispensing of medication than during other stages, with a total of 448 errors reported as having occurred during the medication dispensing stage (14.84%). In 2018, approximately 429 such errors were reported, and a significant increase (approximately 18%) in dispensing errors was noted. Improper medicine strength proved to be the most common dispensing error, followed by inappropriate drug, incorrect quantity, incorrect dosage form, and label [8]. In a retrospective study, 1005 un-prevented dispensing incidents were recorded, which cannot be avoided by following patient's safety measures reported by 20 hospitals. Furthermore, **Fig. 2** displays that the near miss errors in 2018 increased, which means it prevented errors did not reach the patients due to following patient safety measured in KAMC and KASCH. Dispensing the wrong strength of drug (n = 241, 24 percent), wrong drug (n = 168, 17 percent), inappropriate form (n = 134, 13 percent), and writing the wrong warnings/directions on the label (n = 112, 11 percent) were the most common events reported [9].

Generally, dispensing errors can be classified by the severity level of the dispensing error (potentially caused harm/damage, near-miss event that did not reach the individual. Our study showed that medication delay was the most common type of dispensing error, accounting for 28% and 27.4% of the errors at "KASCH and KAMC", respectively, followed by improper medications and pharmaceutical packaging issues. **Fig. 1** presents the differences in safety reports between 2017 and 2018 based on error severity level and the data show that there was a decrease in near-miss error events that did not reach the patients at KASCH, while there was an increase in such events at KAMC **Fig. 2**. Based on order review, consistently low percentages of dispensing errors that reach the patient were reported at KASCH and KAMC pharmacies.

The limitations of our study include the increase in dispensing errors during 2018 due to the implementation of automated dispensing cabinets (ADCs) in the hospitals and the fact that the monthly reporting rate was affected by factors such as holidays. ADCs are a new technology, and the staffs are unfamiliar with it. Despite the partial implementation of ADCs and monitoring, there are some drawbacks associated with this initiative.

CONCLUSIONS: This retrospective study summarized the safety reports submitted to the pharmacy quality system (SRS) by KASCH and KAMC in 2017 and 2018. The SRS is used to improve pharmaceutical care services and to train employees to be more cautious when distributing medications. Overall, this study found a minimal percentage of dispensing errors. Furthermore, due to the adoption of ADCs in hospitals, dispensing errors rose in 2018. An annual examination of dispensing errors can assist in identifying the incidence of and predisposing factors for such errors, allowing work to be done to eliminate these errors. Error reporting and error cause analysis are important tools for identifying the major causes of medication errors. Reporting of medication errors by staff should be encouraged to ensure safe practices and a fair environment.

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REFERENCES:

1. Elden NM and Ismail A: The importance of medication errors reporting in improving the quality of clinical care services. Glob Journal of Health Sciences 2016; 8: 243-251.
2. Rasheed MK, Alqasoumi A, Hasan SS and Babar ZU: The community pharmacy practice change towards patient-centered care in Saudi Arabia: a qualitative perspective. J of Pharmaceutical Policy and Practice 2020; 13: 59.
3. Ajabnoor AM and Cooper RJ: Pharmacists' prescribing in Saudi Arabia: cross sectional study describing current practices and future perspectives. Pharmacy 2020; 8: 160.
4. Abdel-Kader DH, Al Meslamani AZ, Lewis PJ and Hamadi S: Incidence, nature, severity and causes of dispensing errors in community pharmacies in Jordan. InternationalJournal of Clinical Pharmacy 2021; 21: 165-173.
5. Franklin BD and Puaar S: What is the impact of introducing inpatient electronic prescribing on prescribing errors? a naturalistic stepped wedge study in an English teaching hospital. Health Informatics Journal 2020; 26: 3152-3162.
6. Gelayee DA and Mekonnen GB: Perception of community pharmacists towards dispensing errors in community pharmacy setting in Gondar Town, Northwest Ethiopia. Bio Med Research International 2017; 2017: 2137981.

7. Schepel L, Lehtonen L, Airaksinen M and Lapatto-Reiniluoto O: How to identify organizational high-alert medications. Journal of Patient Safety 2021; 17: 1358-1363.
8. Mulac A, Taxis K, Hagesaether E and Granas AG: Severe and fatal medication errors in hospitals: findings from the Norwegian incident reporting system. European Journal of Hospital Pharmacy 2021; 28: 56-e61.
9. James KL, Barlow D, Burfield R, Hiom S, Roberts D and Whittlesea C: A study of unprevented dispensing incidents in Welsh NHS hospitals. International Journal of Pharmacy Practice 2008; 16: 175–188.

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