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| RESEARCH ARTICLE

Assessment of the Medication Administration Errors in the Tertiary Hospital in Saudi Arabia: A prospective Observational Study

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| ABSTRACT

Medication errors can occur at any of the three steps of the medication use process: prescribing, dispensing and administration. Drug administration errors were the second most frequent type of medication error, after prescribing errors, but the latter were often intercepted; hence, administration errors were more probably to reach the patients. Therefore, this study was conducted to determine the frequency and types of drug administration errors in a Taif hospital ward. Prospective study based on a disguised observation technique in nine wards in a general hospital in Taif, Saudi Arabia (800 beds). A pharmacist accompanied nurses and witnessed the preparation and administration of drugs to all patients during the three drug rounds on each of six days per ward. The main outcomes were the number, type and clinical importance of errors and associated risk factors. The drug administration error rate was calculated. Relationships between the drug dose frequency, dosage form and types of medication administration error were measured. A total of 7105 medications administered by 250 nursing staff members to 700 patients were observed. Observers intervened in seven administrations. There are 1769 medication administration errors confirmed. The most common medication administration errors were drug preparation error (40.56%, n =727) then, improper dose error (18.58%, n=333); the most common drug class error was Antibiotic (38.9%, n =399) then Analgesic and anti-inflammatory drugs (17%, n =176). The most drug dose frequency had Drug preparation error was seen in a drug used three times a day by 484. MAEs were more likely to occur in the evening shift compared to the morning and afternoon shifts. The study indicates that the frequency of drug administration errors in developing countries such as Malaysia is similar to that in developed countries.

| KEYWORDS

Drug administration error, hospital ward, medication error, observation, types of error

| ARTICLE INFORMATION

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1. Introduction

Medication administration errors are defined as any preventable action that results in a patient's disability or death due to improper medication use during the treatment process (Nkurunziza, 2019; Bennett, 2017). It impacts human relationships, threatens trust in the healthcare system as a whole, and can also destroy life(Elliott, 2018; Nwagwu, 2016). Failures in any of the ten rights, which include the right patient, right medication, right dose, right time, right route, right education/advice, rights to refuse, right evaluation/response, right assessment, and documentation, may result in medication administration errors (Edwards et al. 2015). Health workers committed medication administration errors during the processes of ordering, prescribing, dispensing, preparing, or administration (Bennett, 2017).

Globally, medication administration errors are the most common cause of different injuries and avoidable harms in the healthcare system. They account for about 10% of the total preventable harm for hospitalized patients (Grissinger et al. 2009). In 2017, the World Health Organization reported that the annual cost of medication administration errors around the world is estimated to be about US$ 42 billion, which is about 0.7% of the total cost of health care (Mohajan, 2018). In 2018, a British report on the prevalence and costs of medication errors estimated that 237 million medication errors happen every year at all stages of medication administration (Härkänen, 2006). In Finland, 700 to 1700 people die each year because of medication-related errors (Mohajan, 2008). Similarly, in the United States, about 7,000 deaths occur, and about 400,000 people are injured by medication errors per year, which cost about US $3.5 billion. In low and middle-income countries, the impact is about twice as much in terms of the number of years of healthy life lost (Veselik, 2014). MAE is a worldwide challenge, and 18.7%-56% of hospitalized patients encounter medication administration errors, and patients who encounter this problem account for 60% to 80% in Australia and 64% in Nigeria (Nkurunziza, 2019).

2. Literature review

A study performed in Tigray regional state of Ethiopia revealed that wrong dose, administering at the wrong time, administering a wrong patient, administering a wrong drug, medication omission, administering un-prescribed medication, and administering via a wrong route was the very common types of MAE (Baraki, 2018). As per the types of literature, MAE can be controlled with consistent reporting systems and by removing barriers to reporting errors, like fear, a lot of work, time constraints, and negative employee perceptions of errors (Soydemir et al. 2017). Having a consistent reporting system and providing care based on guidelines could stop 75% of the incidence of harm to hospitalized patients (Grol, 2013). Medication administration errors can also be controlled by the use of technology like bar-coding for medications and patients, single-use medication packages, smart infusion pumps for intravenous administration, and package design features, and minimizing interruptions during the medication administration process. Medication errors, often in the administration phase, are considered the most common cause of both disability and death in the world (Huynh, et al. 2016). It may also prolong a patient's stay in the hospital, resulting in higher healthcare costs for patients, their families, and healthcare professionals (Veselik, 2014).

Clinical observations at different public health hospitals show that nurses make medication administration errors. Generally, significant results about medication administration errors are few in Sub-Saharan African countries, particularly Ethiopia. It is the least researched and least discussed health issue where economics, education, and trained labor are common. Furthermore, previous studies have focused on the six rights of medication administration and the magnitude of medication administration error and causing factors in the study hospitals unknown.

Multicenter, cluster, controlled, randomized trials took place in 29 adult units from March to July 2017. (4 hospitals). The administration error rate (number of Opportunities for Error (OE), which is computed as one or more errors divided by the total Opportunities for Error (TOE) and multiplied by 100) 178 nurses and 1346 patients were enrolled in 14 experimental units and 15 control units over the course of 383 medication rounds. The experimental group had a 7.09 percent administration error rate (188 OE with at least one error/2653 TOE) during the intervention period, while the control group had a 6.23 percent administration error rate (210 OE with at least one error/3373 TOE) ($p = 0.192$). The error rate is unrelated to the risk factors (patient age, nurses' experience, nurses' workload, unit exposure, and interruption). In both groups, the most common type of error was incorrect dose form (Bennett, 2017).

In a prospective, observational study that took place in three nursing homes in the Netherlands, Medication errors were measured by using the observation technique. They looked at the relationship between potential risk variables and the occurrence of the errors. There were 2,025 medicine administrations to 127 consumers. There were 428 mistakes throughout these administrations (21.2 percent). Wrong administration practices, inappropriate crushing, not controlling drug intake and wrong time were the most common types of errors in administering the medication at least 1 h early or late. (Patel, 2010)

A systematic Review study of Medication Errors (MEs) in Several Countries was conducted, in several nations, including Iran's two major hospitals, Korea's University Teaching Hospital, Mansoura Teaching University Hospital, Egypt's Bolak Eldakror Hospital, and India's Midnapore Medical College and Hospital. Implementing Various strategies, such as medication administration's six rights. The medication errors should be classified into five groups based on reports from different nations (two largest hospitals in Isfahan, Iran; University Teaching Hospital, Korea; Mansoura Teaching University Hospital, case report in Bolak Eldakror Hospital, Egypt). (1) Drug mistakes are from 34 to 5.6 percent; (2) Dose errors are from 4.5 to 9.6 percent; (3) Route error is 0.5 percent; (4) Time or frequency errors are from 15.6 to 23.1 percent, and (5) Documentation errors range from 30 percent to 34 percent.

3. Methods

3.1 Study design and setting:

This prospective observational study was performed in a tertiary hospital in Saudi Arabian, King Faisal medical complex in Taif city, with more than 500 patient beds. The Medical Ethics Review Committee of Erasmus MC waived approval for this study (reference number MEC-2018-1532) in accordance with the Dutch Medical Research involving human subjects Act. Verbal consent from nursing staff members was obtained for participation in this study, and data were handled confidentially From January 2022 until May 2022. Medication errors can occur at any stage of the medication-use process; they are not limited to the pharmacy. Medication Administration errors can be divided into 11 categories, according to the ASHP Guidelines on Preventing Medication Errors in Hospitals, including, Prescribing errors, Omission errors, Wrong time errors, Unauthorized drug errors, Improper dose errors, Wrong dosage form errors, Wrong drug preparation errors, Wrong administration technique errors, Deteriorated drug errors, monitoring errors, and Compliance errors.

The wards in our hospital include more than 500 beds with expert nursing staff in pulmonary, cardiothoracic surgery, maternity, neonate intensive care unit, medical critical care, nephrology, and anesthesiology. All IV medications are produced by an expert pharmacist and given on the wards by nursing staff since pharmacists at our institution play an important role in drug preparation and administration. The Nursing Department, which was aware of the objectives of the study, has been briefed that the ethics committee has approved the study. A study was also done purposefully to improve pharmaceutical care.

3.2Data collection

We collected data on medication administration using the disguised observation method meaning that nursing staff were not aware of the detailed purpose of the study to prevent a Hawthorne effect. They were informed that the study was performed to examine the medication process.

A pharmacist accompanied nurses and witnessed the preparation and administration of drugs to all patients during the three drug rounds on each of six days per ward.

Observers that had completed an extensive training programmed of several days accompanied the nursing staff to observe and record every dose administration on data collection forms designed for this study. After having arrived at a ward, observers selected the nurses to be observed through convenience sampling. Observation rounds were planned in periods of 1–2 weeks for each clinical ward. For ethical reasons, observers were instructed to intervene right before the administration if they had noticed a severe MAE (i.e., a dose deviation of at least 20%, wrong patient or wrong medication). Observation data were compared with medication prescriptions and protocols after the observation and not during observation, which complies with the gold standard of methods to detect medication errors in the hospital**.** Medication Observations number 1025 were reviewed by the reviewer to assess whether an MAE occurred.

3.3. Inclusion and exclusion criteria

Medication administrations to inpatients performed by nursing staff were included. Excluded were medication administrations that were 1. not completed during the observation, 2. were declined by patients for other reasons than being erroneous, or 3. medication administrations with the medication name missing on the data collection form.

3.4. Study outcomes

The primary outcome was the Frequency of medication administration errors (MAEs). The secondary outcomes were the type of MAEs and their relationship with drug dose frequency and dosage form.

3.5 Data analysis

Descriptive statistics were used for the prevalence and type of MAEs. Because of data clustering and the quantified number of MAEs in our study, fewer variables were tested than planned.

4. Result

A total of 7105 medications administered by 250 nursing staff members to 700 patients were observed. Observers intervened in seven administrations. There are 1769 medication administration errors confirmed.

The most common medication administration errors were drug preparation error (40.56%, n = 727) then, improper dose error (18.58%, n = 333); the most common drug class error was Antibiotic (38.9%, n = 399) then Analgesic and anti-inflammatory drugs (17%, n = 176).

1-Total number and percent of types of Medication Administration error

The types of MAEs were classified based on ASHP Guidelines on Preventing Medication Errors in Hospitals, including Prescribing errors, Omission errors, Wrong time errors, Unauthorized drug errors, Improper dose errors, Wrong dosage form errors, Wrong drug preparation errors, Wrong administration technique errors, Deteriorated drug errors, monitoring errors, and Compliance errors. The total number of MAEs was 1769. The most common error category was Wrong drug preparation error (51%, n =727) and then Improper dose error (32.5%, n=333); other types of MAEs listed in table 1

Table 1. Types of Medication Administration Error

Type of MAEs	**Total number**	Error rate (%)
Duration error	291	16.4
Wrong time error	61	3.4
Improper dose error	333	18.8
Drug preparation error	727	41.09
Wrong administration technique error	7	0.39
Deterioration drug error	255	14.41
Monitoring error	95	5.37
Total	1769	100

No errors	**Total number**	**Percent**
Duration error	734	13.7
Wrong time error	964	18.06
Improper dose error	692	12.9
Drug preparation error	298	5.58
Wrong administration technique error	1018	19.07
Deterioration drug error	700	13.11
Monitoring error	930	17.42
Total	5336	100

2- Drug dose frequency

In this study, the total numbers of drug dose frequency observed were 1025. The Table below shows that 47.2% of patients who received a drug three times per day was the most common drug dose frequency error seen, then once a day by 30.2% and other frequencies seen in the below table1.

Table 2: Drug dose frequency

Drug dose frequency		Percent
Once Daily	310	30.2
BID	159	15.5
TID	484	47.2
QID	29	2.8
As Need	19	1.9
Weekly	2	0.2
Every Other Day	1	0.1
Stat	20	2.0
Once A Month	1	0.1
Total	1025	100.0

3-Dosage form frequency

As shown in Table 1, in this study, there are Six dosage form categories. The most dosage forms frequencies were IV administration by 47.4%, n= 486then oral form41.75% n= 428, and others dosage forms are shown in table 2.

Table 3: Dosage form frequency

Dosage form	Frequency	**Percent**
IV	486	47.4
IM	4	0.4
Oral (Tab, Capsule, Syrup, sub-liquid, drops and sprays)	428	41.75
Subcutaneous	83	8.1
Suppository	7	0.7
Topical	17	1.7
Total	1025	100.0

4-Relationship between drug dose frequency and their duration

As seen in the table below, the duration of drug dose frequency that was not mentioned represents around one-third of mentioned duration by 291 out of 734. Three times a day was the most drug dose frequency that had not mentioned duration then once a day.

Duration Frequency	Not mentioned	Mentioned	Total
Once daily	94	216	310
BID	60	99	159
TID	128	356	484
QID	7	22	29
As need	2	17	19
Weekly	0	2	2
Every other day	0	1	1
Stat	0	20	20
Once a month	0	1	1
Total	291	734	1025

4. Relationship between drug dose frequency and Improper dose error

The absence of documentation was more seen than delay in documenting dose in improper dose error by 303 and 30, respectively. Regarded its relation, the absence of documentation in TID drug dose frequency represents the highest Improper dose error then Once daily dosing. The same trend is seen in the Delay of documenting dose.

NO ERROR sub category in the Improper dose category was more than Delay in documenting dose and Absence of documentation.

Table 4. Relationship between drug dose frequency and Improper dose error

Drug dose frequency	Improper dose error			Total
	NO ERROR	Delay in documenting dose	Absence of documentation	
Once daily	202	11	97	310
BID	84	4	71	159
TID	365	12	107	484
QID	27	2	0	29
As need	9	1	9	19
weekly	1	0	1	2
Every other day	1	0	0	1
Stat	3	0	17	20
Once a month	0	0	1	1
Total	692	30	303	1025

5. Relationship between drug dose frequency and Deteriorated drug error Regarded to deteriorated drug error is divided into refrigerated drugs stored at room temperature, no monitoring of expiration dates and no error was compared with drug dose frequencies. No monitoring of expiration dates in TID dose frequency represents one-third of no error; in the BID, dose frequency represents half of the deteriorated drug error when compared with no error. No Monitoring of expiration dates is more seen than refrigerated drugs stored at room temperature. NO ERROR in Deteriorated drugs more seen than No Monitoring of expiration dates and Refrigerated drugs stored at room temperature, and this was statically sig.

Table 5. Relationship between drug dose frequency and Deteriorated drug error

Drug dose frequency	Deteriorated drug error			Total
	Refrigerated drugs stored at room temperature	No Monitoring of expiration dates	NO ERROR	
Once daily	1	63	246	310
BID	1	55	103	159
TID	0	105	379	484
QID	0	3	26	29
As need	0	9	10	19
Weekly	0	1	1	2
Every other day	0	0	1	1
Stat	0	17	3	20
Once a month	0	0	1	1
Total	2	253	770	1025

6 Relationship between drug dose frequency and monitoring error

The table below compares drug dose frequency and monitoring error, which is divided into inadequate drug therapy monitoring and no error seen. As shown below in table 3. Less drug therapy monitoring was seen in three drug dose frequencies; the next was twice a day frequency dose. NO ERROR seen more than Inadequate drug therapy monitoring by 930, 95 respect.

Drug dose frequency and monitoring errors were less to occur in this study.

Table 6: Relationship between drug dose frequency and monitoring error

Drug dose frequency	Monitoring error		Total
	NO ERROR	Inadequate drug therapy monitoring	
Once daily	288	22	310
BID	128	31	159
TID	445	39	484
QID	29	0	29
As need	16	3	19
Weekly	2	0	2
Every other day	1	0	1
Stat	20	0	20
Once a month	1	0	1
Total	930	95	1025

7- Relationship between drug dose frequency and wrong administration technique
As seen in below table less wrong administration techniques were found in relation to drug dose frequency
There was less wrong administration technique error related to drug dose frequency, and this was statically sig.

Table 7. Relationship between drug dose frequency and wrong administration technique

Wrong administration technique error / frequency	No	Yes	Total
Once daily	309	1	310
B.I. D	159	0	159
T.I. D	480	4	484
QID	27	2	29
As Need	19	0	19
Weekly	2	0	2
Every Other Day	1	0	1
Stat	20	0	20
Once A Month	1	0	1
Total	1018	7	1025

8. Relationship between Drug dose frequency and Drug preparation errors
As seen in table 8 below, drug preparation errors are sub-grouped into Five categories: No double check, Poor knowledge, No label, Calculation mistakes and No error. The most frequent drug preparation error in relation to drug dose frequency was seen on No double check and then No label by 283 and 222, respectively.

The most drug dose frequency had Drug preparation error was seen in a drug used three times a day by 484.

Table 8. Drug dose frequency and Drug preparation errors

		Frequency									Total
		once daily	**BID**	TID	QID	As need	weekly	every other day	Stat	once a month	
Wrong drug preparation error	no double check	91	73	89	3	9	1	0	17	0	283
	poor knowledge about Aseptic technique, no label	22	19	75	10	0	0	0	0	0	126
	NO ERROR	107	25	151	7	5	1	0	2	0	298
	no label	64	28	116	8	4	0	1	1	0	222
	poor knowledge about Aseptic technique	7	1	8	0	1	0	0	0	0	17
	no double check, calculation mistakes	0	1	1	0	0	0	0	0	0	2
	poor knowledge about Aseptic technique, no label, no double check	17	12	43	1	0	0	0	0	1	74
	poor knowledge about Aseptic technique, no double check	1	0	1	0	0	0	0	0	0	2
	calculation mistakes	1	0	0	0	0	0	0	0	0	1
Total		310	159	484	29	19	2	1	20	1	1025

9**. Relationship between Dosage form and Wrong time error**

As shown in below table 6, the most tow dosage form preparation seen with wrong time error was IV and oral by 486 and 398, respectively. Oral dosage form preparation represents the highest wrong time error in this study by 32 interventions, then IV preparation.

Table 9. Relationship between drug dosage form and time error

Dosage form	**Wrong time error**		**Total**
	No	**Yes**	
IV	471	15	486
IM	4	0	4
Oral (Tab, Capsule, Syrup, Spray)	394	34	428
Subcutaneous	75	8	83
Suppository	6	1	7
Topical	14	3	17
Total	964	61	1025

10. Relationship between drug dosage form and improper dose error

Dosage form	Improper dose error			Total
	NO ERROR	Delay in documenting dose	Absence of documentation	
IV	346	13	127	486
IM	4	0	0	4
Oral (Tab, Capsule, Syrup)	254	16	158	428
Subcutaneous	73	1	9	83
Suppository	4	0	3	7
Topical	11	0	6	17
Total	692	30	303	1025

Table 10. Relationship between drug dosage form and improper dose error

11. Relationship between drug Dosage form and Drug preparation error

As seen in table 6 below, drug preparation errors are sub-grouped into Five categories: No double check, Poor knowledge, No label, Calculation mistakes and No error. The most frequent drug preparation error in relation to dosage form was No label on the drug, then no double check by 423 and 361, respectively.

The intravenous dosage form had more drug preparation errors, around 586, than others; the second one was the oral form, around 316.

Table 11. Relationship between drug Dosage form and Drug preparation error

		wrong_drug_preparation_error									Total
		no double check	poor knowledge about Aseptic	NO ERROR	no label	poor knowledge about Aseptic	no double check, calculation mistakes	poor knowledge about Aseptic technique, no label, no double check	poor knowledge about Aseptic technique, no double check	calculation mistakes	
osage_form	IV	101	89	97	134	10	1	54	0	0	486
	IM	0	1	0	3	0	0	0	0	0	4
	Oral (Tab, Capsule, Syrup, sub-liqual and drops, Inhaler or spray)	155	28	156	62	5	1	18	2	1	428
	Sebcoutenous	19	6	35	20	2	0	1	0	0	83
	suppository	3	0	3	1	0	0	0	0	0	7
	Topical	5	2	7	2	0	0	1	0	0	17
Total		283	126	298	222	17	2	74	2	1	1025

Time characteristics Day of the week

As seen in the table below, evening shift duty had more than half of MAEs than morning and afternoon shifts by 624 (60%). MAEs more likely to occur in the evening shift.

Table12. Time characteristics Day of the week

		Frequency	Percent
Valid	**Afternoon**	141	13.8
	Morning	260	25.4
	Evening	624	60.9
	Total	1025	100.0

Medication classes administration frequencies

As seen in this study, the most medication administration were antibiotics, analgesic anti-inflammatory and anticoagulants by 399, 176 and 132 frequencies, respectively. Others medication classes are listed below in table 12.

Medication Class	**Frequency**	**Percent**
Analgesic and anti-inflammatory drugs	176	17.17
Antibiotic	399	38.92
Antihypo/hyperthyroidism	8	0.78
Vitamins and minerals	47	4.58
Anticoagulants	132	12.87
proton pump inhibitor	58	5.65
Antitussive Antiemetic and laxative	36	3.51
Antihypertensive medications	81	7.90
NSAIDs	7	0.68
Antidiabetic	15	1.46
Statins	7	0.68
Inotropic agents	1	0.09
Antihistamine	6	0.58
OB-Gyn medication	8	0.78
Psychotic medications	16	1.56
Cream, lotion and ointment	3	0.29
prostaglandins, endocrine	6	0.58
Asthma-COPD medication	19	1.85
Total	1025	100.0

Table 12. Medication classes administration frequencies

Distribution of medication administration by clinical wards.

In this study, there were nine clinical wards observed for MAEs. The most seen medication administration errors were observed in Surgical males, Internal males and post-partum siting.

Table 13. Distribution of medication administration by clinical wards.

Wards	Frequency	Percent
Surgical male	310	30.2
Internal male	310	30.2
Post-partum	159	15.5
ER	20	2.0
Critical care	59	5.8
Long term care unit	108	10.5
Antenatal	40	3.9
Delivery Room	15	1.5
NICU	4	.4
Total	1025	100.0

		wrong_drug_preparation_error									Total
		no double check	poor knowledge about Aseptic technique, no label	NO ERROR	no label	poor knowledge about Aseptic	no double check, calculation mistakes	poor knowledge about Aseptic technique, no double check	poor knowledge about Aseptic technique, no double check	calculation mistakes	
frequency	once daily	91	22	107	64	7	0	17	1	1	310
	b.i.d	73	19	25	28	1	1	12	0	0	159
	t.i.d	89	75	151	116	8	1	43	1	0	484
	QID	3	10	7	8	0	0	1	0	0	29
	As need	9	0	5	4	1	0	0	0	0	19
	Weekly	1	0	1	0	0	0	0	0	0	2
	every other day	0	0	0	1	0	0	0	0	0	1
	Stat	17	0	2	1	0	0	0	0	0	20
	once a month	0	0	0	0	0	0	1	0	0	1
Total		283	126	298	222	17	2	74	2	1	1025

5. Discussion

In this prospective observational study in Taif hospital with supportive electronic medication systems, Medication errors have been identified as the most common type of error affecting the safety of patients and the most common single preventable cause of adverse events. MAEs are most often made by nurses administering medications in the patient care unit. (Barker, 2002). The methodology used was direct observation of medication administration, which is the most efficient and practical medication-error-detection method and one that produces valid and reliable results.

This study revealed that the magnitude of medication administration error was 24.8%; this finding was similar to other published studies conducted in the Netherlands (21.2 %), Paris teaching hospital (27.6 %), Paris Pediatric unit (31.3 %) and Morocco ICU (15.5 %) [Benkirane et al., 2009)

Wrong time errors were seen more in the oral and IV dosage form in this study, but many of these errors were not likely to cause patient harm except for those drugs that require close serum concentration monitoring. One of the main causes of medication errors is the heavy staff workload (11, 24). In the most hospital, the scheduled time for drug administration is the busiest time when the nurses have to make the patients' beds, monitor patients' physical signs and assist the doctors in their ward rounds (18). One possible solution is to increase the number of ward staff. The drug administration schedule can also be planned such that not all patients take their medications at 8 hours. Medications that are prescribed as a daily dose could be administered during noon or evening time when the staff workload is lighter (Grol, 2013)

This study found that the most common medication administration errors were drug preparation error (40.56%, n =727) then, improper dose error (18.58%, n=333); the most common drug classes were Antibiotic (38.9%, n =399) and Analgesic and anti-inflammatory drugs (17%, n =176).

In our study, increasing drug dose frequencies, the chance of Improper dose error was increased; this is due to changes in shifting duty led to decrease documentation, and health care providers may be overworked then forgetting the next scheduled dose.

Chua and colleagues showed an association between errors and injectable route administration compared to oral route (Grol, 2013).

In this study, Pts. On more drug dose frequent such as TID, showed less drug therapy monitoring due to changes in shifting duty which needs further attention on high alert medication to be monitoring

Wrong administration technique error related to drug dose frequency was the lowest error in this study due to highly qualified and well-trained health care providers. In our study, the wrong time error in oral dosage form was higher than in other routes of administration. This may be due to the high number of oral dosage forms used in this study.

In the current study, comparing dosage form with improper dose error showed that absence of documentation and delay in documenting dose illustrate around half of no error. So, we need to encourage health care providers to document their work.

MAEs were more likely to occur in the evening shift compared to the morning and afternoon shifts. This may be related to factors such as workload, the uneven distribution of tasks during the day, and vigor or fatigue of nursing staff. Especially administration during the night shift has been previously reported as error-prone (Benkirane, 2009), as the lack of circadian adaptation to night work may lead to impaired alertness and performance (Benkirane, 2009). These time-related determinants warrant a critical review of the daily routines in relation to standard medication administration rounds and workload distribution during the day. This may lead to insights on preferred standard medication administration times tailored to a specific clinical ward.

In this study, the most frequent medication class used was antibiotics, so we need to limit our antibiotics usage (for necessary cases only) and increase health care provider knowledge by providing lectures to them. Others medication classes after antibiotics were Analgesic and anti-inflammatory drugs and Anticoagulants.

Almost all pharmaceutical forms were associated with an increased probability of MAEs compared to oral solids. Most of these forms require additional steps within the administration process (e.g., shaking suspensions, calculating volumes or tuning infusion pump settings). Each additional step introduces an extra opportunity for error. Especially parenteral medication has been widely associated with an increased risk of errors (Westbrook, 2011).

6. Conclusion

The aim of this study was to determine the frequency and types of drug administration errors in a Taif hospital ward. The most frequent medicine dosage had Drugs used three times a day by 484 were found to have preparation errors. Compared to the morning and afternoon shifts, the nighttime shift had a higher incidence of MAEs. Each medication and each patient had at least one type of medication administration error. Documentation error was the most dominant type of error, followed by technique and time error, respectively. Organizational factors such as error reporting systems and routine checks could possibly help in handling the problem of medication errors.

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