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# PHARMACISTS' PERCEPTION ON MEDICATION ERRORS IN INTENSIVE CARE UNIT

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## ABSTRACT

**Introduction:** Medication error is a global issue. A medication error is one of the medical errors that can result from mild to severe complications which may violate patient safety. A holistic approach is important to prevent medication error includes contributed factor, reporting system and training for staffs. **Objective:** This research sought to determine the pharmacists' perception of medication errors in the intensive care unit. **Methodology:** This descriptive cross-sectional study involved 132 pharmacists from two hospitals in state of Pahang, Malaysia. A self-administrated questionnaire was used to collect the data. Statistical analysis of the data was carried out using SPSS and association between variables was analyzed using one way ANOVA and multiple regression tests. **Result:** The findings show that interruptions ($\bar{x}$ = 3.40) as the commonest cause of dispensing errors perceived by pharmacists, followed by pharmacists fatigue at any cause ($\bar{x}$ = 3.20) and pharmacist overwork ($\bar{x}$ = 3.17). Besides, 51% of participants practice dispensing less than 10 hours per week on average. 54% and 55% of participants believe the increase of risk of error in dispensing and actual errors become more common in pharmacy practice, respectively. The results also showed that only level of education has a significant association with possible factors in dispensing medication among the pharmacists at the hospital ($P$=0.000). Besides, multiple regressions showed no significant relationship between both dependent variables. **Conclusion:** Most of the pharmacist perceived those possible factors associated with dispensing error. This study suggests that pharmacists should be well informed regarding dispensing error in order to be more alert. Besides, future study should be more specific on pharmacists who assigned to the in-patient department.

***Keywords: Medication Error, Intensive Care Unit (ICU), Pharmacist***

## INTRODUCTION

Patient safety should be the most priority in health sector. To ensure patient safety, all health care providers need to take care of patient holistically, include physically, emotionally, and spiritually. Medication error is an example of complication from human error that can violate patient safety. Medication error can be harmful and not harmful toward patient. National Coordinating Council for Medication Error Reporting and Preventing (NCCMERP) reported that 98,000 people died every year due to medical errors in United States and a significant number from those deaths are related to medication error (Tzeng, Yin, & Schneider, 2013). Medication treatment has a set of chain which are prescribing, dispensing, administration and documentation (Alsulami, Conroy, & Choonara, 2012; Chamoun, Zeenny, & Mansour, 2016). Since medication treatment involves inter-professional collaboration, medication errors can occur at any stage of medication therapy (Demehin, Babalola, & Erhun, 2008). Based on the NCCMERP, medication error is defined as any preventable event that may lead to inappropriate medication use or patient harm (Flynn, Liang, Geri, Xie, & Suh, 2012). (Geri, 2012) also stated that "medication errors are those errors that occur but are intercepted before the error reaches the patient".

The involvement of pharmacists in the medication use process improves the quality of care by preventing medication errors (Chamoun *et al.*, 2016). Yet, they are prone to involve in medication error incidents since they are responsible in preparing medication. Dispensing is an integral part of quality use of the

medication and patient counseling while dispensing error is defined as discrepancy between a prescription and the medicine that pharmacy delivers to patients or distributes to the wards (Ojerinde & Adejumo, 2014). Dispensing errors may occur within dispensing process including screening, preparing, labeling, and verifying. There are researches that study the relation of pharmacists and medication errors but the study on medication errors among pharmacists who prepare medication for intensive care unit is understudied. Other researches only focus on medication errors among pharmacists as general. Therefore, this study will provide the information on factors associated and contributing to medication errors among pharmacists who prepare medication for intensive care unit.

## MATERIALS AND METHODOLOGY

A cross-sectional descriptive study was conducted among pharmacists from two east coast hospitals in Pahang, Malaysia: Hospital Tengku Ampuan Afzan (HTAA), Kuantan and Hospital Sultan Haji Ahmad Shah (HoSHAS), Temerloh. Purposive sampling method was used - all pharmacists from both hospitals, 193 participants were selected as respondents. The response rate is 68.4% of total participants with 132 respondents.

A pretested and well-developed questionnaire adapted from (Jones & Treiber, 2010) consisting of three parts was used as in this study. A pilot test was done to pretest the questionnaire and result a good internal consistency Cronbach's alpha, 0.701 was obtained. The questionnaire covered for the respondents' demographic data, possible factors associated to medication errors and contributing factors to medication errors. It also consisted of checklist of 15 causes of possible factors associated to medication errors with 4 Likert-type scale questions (very high association, association, either association or no association and no association). They are interpreted in scoring of minimum 1 and maximum 4. Permission to conduct the study was obtained from the Kulliyyah of Nursing Post Graduate Research Center (KNPGRC), IIUM Research Ethics Committee (IREC), Clinical Research Centre, HTAA and HoSHAS and Medical Research Ethics Committee (MREC), Ministry of Health, Malaysia. The purpose of the study was explained and after getting the informed consent from the respondents, questionnaires were distributed to them and collected back after completion. The set of answered questionnaire was put in an envelope and sealed, and the information was kept anonymous.

### Statistics

Statistical analysis program, SPSS was used for data management. Descriptive analysis, such as frequency, percentage and mean were used while inferential analysis used one-way ANOVA and multiple regression analysis. P value <0.05 was set as statistically significant.

## RESULT

Total of 132 participants were recruited in this study, comprising 24 males (18.2%) and 108 females (81.8%). 96 participants (72.7%) had been assigned in preparing medication for ICU. Most of the participants have bachelor's degree in pharmacy 128 (97.0%) and only four of them have master's degree (3.0%). The demographic data was shown in Table 1.

***Table 1: Demographic Data of Participants (n=132)***

| Variable | Frequency | Percentage (%) |
|---|---|---|
| Gender | | |
| Male | 24 | 18.2 |
| Female | 108 | 81.8 |
| Experience in preparing medication for ICU | | |
| Yes | 96 | 72.7 |
| No | 34 | 25.8 |
| Cannot remember | 2 | 1.5 |
| Level of education | | |
| Degree | 128 | 97.0 |
| Master | 4 | 3.0 |
| PHD | 0 | 0.0 |

The result showed that the participants ranked interruptions; customers or clients ($\bar{x}$ = 3.40) as the commonest cause of dispensing errors followed by pharmacists fatigue at any cause ($\bar{x}$ = 3.20) and pharmacist overwork ($\bar{x}$ = 3.17). Then, the least cause that leads to dispensing errors is the participation of pharmacist assistants in dispensing ($\bar{x}$ = 2.08).

***Table 2: Mean of Possible Factors That Perceived by Pharmacists as Associated with Errors in Dispensing Medication***

| | Factors | Mean |
|---|---|---|
| 1 | Poor Handwriting | 2.95 |
| 2 | Similar or Confusing | 3.01 |
| 3 | Existence of Generic Brands | 2.53 |
| 4 | Packaging Labeling | 3.15 |
| 5 | Between Original Prescription and Repeat Form | 2.98 |
| 6 | Pharmacist Overwork | 3.17 |
| 7 | Pharmacist Fatigue | 3.20 |
| 8 | Job Dissatisfaction | 2.29 |
| 9 | Participation In Dispensing By Pharmacist Assistant | 2.08 |
| 10 | Noise | 2.58 |
| 11 | Interruptions from Customer, Telephone | 3.40 |
| 12 | Design and Layout | 2.67 |
| 13 | Dispensing Software | 2.61 |
| 14 | Reference Book, Equipment | 2.64 |
| 15 | Lack of Privacy | 2.18 |

From 132 participants, 67 (51%) and 34 (19%) of them dispense prescription less than 10 hours and between 10 to 30 hours per week, respectively. The remaining participants, 3 (2%) of them practiced dispensing prescription more than 60 hours per week and another 3 participants (2%) were not answered this question. Besides, 71 (54%) of them believe in increasing of the risk of error in dispensing in pharmacy practice while 30 (23%) and 29 (22%) of them do not believe or have no idea for that risk. Out of 132 participants, 72 (55%) believe that actual errors in dispensing are becoming more common. Another 32 (24%) and 28 (21%) participants are not believe and no idea for the actual errors become more common, respectively.

***Table 3: Potential Factors Contributing to Medication Dispensing Errors***

| Variable | Frequency | Percentage (%) |
|---|---|---|
| Average Hours in a Week Participant Practices in Dispensing Prescription | | |
| < 10 hours | 67 | 51 |
| 10 – 30 hours | 34 | 26 |
| 30 – 60 hours | 25 | 19 |
| > 60 hours | 3 | 2 |
| Missing | 3 | 2 |
| The Risk of Error in Dispensing Is Increasing in Pharmacy Practice | | |
| Yes | 72 | 54 |
| No | 30 | 23 |
| No idea | 29 | 22 |
| Missing | 1 | 1 |
| Belief in Actual Errors in Dispensing Are Becoming More Common | | |
| Yes | 72 | 55 |
| No | 32 | 24 |
| No idea | 28 | 21 |

By using one-way an ova test, the result show that there is no significant association between the demographic data and pharmacists' perception on possible factors of dispensing error except for the level of education ($P$=0.00).

***Table 4: Relationship between the Demographic Data and Possible Factors That Perceived As Associated With Errors in Dispensing Medication.***

| ANOVA | | | | | | |
|---|---|---|---|---|---|---|
| | | Sum of Squares | df | Mean Square | F | Sig. |
| Gender | Between Groups | 7.512 | 49 | 0.153 | 0.992 | 0.506 |
| | Within Groups | 10.351 | 67 | 0.154 | | |
| | Total | 17.863 | 116 | | | |
| Prepare medication for ICU | Between Groups | 14.951 | 49 | 0.305 | 1.505 | 0.060 |
| | Within Groups | 13.579 | 67 | 0.203 | | |
| | Total | 28.530 | 116 | | | |
| Level of education | Between Groups | 2.066 | 49 | 0.042 | 3.296 | 0.000 |
| | Within Groups | .857 | 67 | 0.013 | | |
| | Total | 2.923 | 116 | | | |

In addition, for relationship between the Possible Factors That Perceived As Associated With Errors in Dispensing Medication with Potential Factors Contributing To Medication Dispensing Errors, multiple regression analysis showed that the $p$ value >0.05, hence there is no significant relationship between these two independent variables.

***Table 5: Relationship between the Possible Factors That Perceived as Associated with Errors in Dispensing Medication with Potential Factors Contributing to Medication Dispensing Errors***

| Variables | Possible Factors | | |
|---|---|---|---|
| | Coefficient (Beta) | $t$-statistic | $P$-value |
| Intercept | | 18.546 | 0.000 |
| PRACTICE | 0.318 | -1.742 | .084 |
| ERROR | 0.161 | 1.480 | 0.142 |
| BELIEVE | -0.159 | 0.456 | 0.649 |
| $R^2$ | 0.078 | | |
| Adj. $R^2$ | 0.053 | | |
| F-statistic | 3.123 | | |
| ($P$-value) | 0.029 | | |
| Df | (3, 110) | | |
| N | 113 | | |

## DISCUSSION

The highest variables perceived by pharmacists are interruptions and followed by pharmacist fatigue and

overwork. This result is slightly different with a research conducted by Catherine Ojerinde and Olabisi (Adejumo, 2014) where their result showed that exhaustion due to work pressure as the commonest cause of dispensing errors. Meanwhile, their study also showed illegible physician's prescription as the second highest cause while this study shows poor physician handwriting at seventh place out of 15 variables. Another study stated that heavy workload as the highest causes of dispensing errors (Airaksinen, 2008). A study stressed that interruption during dispensing can break up the intention on prescription, then non-professional activities such as personal phone call and chatting is dangerous and should not occur (Fshp, Wu, & Mba, 1999).

Different result in each research stressed that the influence of the setting or environment of participants effect their perception toward factors associated with dispensing error. The most important thing is most pharmacists perceived those possible factors can lead to dispensing error. As mentioned by (Reason, 2000), error that happened can be viewed in two approach: system approach and person approach. (Lehman & Kim (2005) also stressed that system failure originates more causes of error than human fallibility such as lack of dissemination of medication information and lack of availability of patient information.

From the result, most participants (51%) practice dispensing less than 10 hours in a week on average. Besides, 26% and 19% of participant dispense prescription between 10-30 hours and 30-60 hours per week, respectively. In the hospital setting, every pharmacist can be assigned at inpatient, outpatient, emergency, satellite pharmacy and other department. As the placement is different, their dispensing hour also will be different due to the different number of prescriptions brought by patients. Dispensing hour increases as dispensing load increase and lead to more dispensing errors. The relative risk of dispensing a potential drug-drug interaction increases by 3% for each additional prescription per hour (Malone et al., 2007). However, a study stated that there is no correlation between the number of prescriptions dispensed in one hour and total number of errors made, even during peak hour (Abdullah, Ibrahim, & Ibrahim, 2004).

Half of participants perceived that the risk of error in dispensing is increasing and actual errors are becoming more common. A study conducted by (Gelayee & Mekonnen 2017) mentioned the increasing of actual dispensing errors also occur in Ethopia, Saudi Arabia and Australia, which are 42.6%, 55.5% and 47% respectively. Yet, some pharmacists do not believe or have no idea on the increasing of risk of dispensing error and become more common. Many studies revealed that frequency of medication error is increasing. NCCMERP reported that 98,000 people died every year due to medical errors in the United States and at least 1.5 million people are harmed by medication errors every year, while approximately 5000 incidents of medication errors are reported in the United Kingdom (Tzeng, Yin, & Schneider, 2013; Orbæk, Gaard, Fabricius, Lefevre, & Møller, 2015). Based on these studies, those pharmacists must not take this kind of error seriously. They should be well informed and warned regarding this error.

According to one-way ANOVA test result, the *P* value for gender and experience in dispensing medication for ICU are 0.506 and 0.06, respectively. As P value is more than 0.5, this result stressed that regardless gender and experience in dispensing medication for ICU, possibility of dispensing errors to occur is same. This means that if pharmacists follow the guidelines of standard of procedures, dispensing error can be avoided. Besides, Pharmaceutical Services Division, Ministry of Health Malaysia (2016) also suggested good dispensing practice needs to ensure desired medicines are delivered correctly to the right patie nt with the right dose, frequency, strength, dosage, clear written and verbal instructions and with appropriate packaging suitable for maintaining the quality of the medicine.

On the other hand, the finding showed that only level of education from demographic data has significant association with possible factors associated to the error in dispensing medication among the pharmacists in hospital ($P$=0.00). Another study showed that poor handwriting, interruption, design of the dispensary and lack of privacy have significant relationship to the level of education as they were tested individually (Gelayee & Mekonnen, 2017). Through a formal education, someone can become a pharmacist and may dispense medication legally. Yet, the education did not provide a safe pharmacist, but the competency of a pharmacists will. Knowledge and attitude of pharmacists are more important to be discussed than educational status.

Several studies mentioned dosing errors occur due to inadequate knowledge in pharmacology, poor documentation and poor mathematical skills (Ojerinde & Adejumo, 2014).

There are no variables are statistically significance at 5% significant level for relationship between the possible factors that perceived as associated with errors in dispensing medication potential factors contributing to medication dispensing errors. Then, this result has shown even possible factors that perceived by pharmacist increase, there is no influence on potential factors that contribute to dispensing errors. However, a study mentioned that there is no correlation between the number of prescriptions dispensed per hour to dispensing errors made even in peak hour (Abdullah et al., 2004). A philosophical though stated that perception and belief are interrelated to each other. Perception plays as a reason-constituting role to develop belief (Millar, 2011). Furthermore, in normal circumstances, perceivers tend to believe something that the way they perceive it to be, but sometimes perception and belief can become a part (Smith, 2001). These philosophical approaches on perception and belief might contradict to the regression result.

## CONCLUSION

This study emphasizes that pharmacists believe on dispensing errors by perceiving those factors. Medication error becomes continuous problem among health care providers if all parties do not cooperate each other. Future research should focus on pharmacists who are assigned at inpatient unit, where prescriptions of all inpatient wards will be dispensed. Besides, average of hour of dispensing per week should be taken numerically so that data distribution can be more precise. Additional information like years of experience might be useful for further study. Even though this study cannot be generalized due to using of purposive sampling method, this study gives another alarming to health care providers especially for the pharmacists regarding medication error.

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