SJP Sarawak Journal of Pharmacy

Journal Homepage: http://jknsarawak.moh.gov.my/spj/

Perception of Pharmacists in Miri General Hospital Towards Causes of Medication Errors and Their Precautions

Amanda Lim Sze Hui [1], Wong Xiao Jen [1], Yii Ee Ming [1], Chong Chung Ming [1], Grace Chieng Hie King [1], Kamarudin Ahmad[1]

[1]Pharmacy Department Hospital Miri, Clinical Research Center, Ministry of Health

Corresponding author name and email: Kamarudin Ahmad (kamarudin_a @moh.gov.my)

Abstract

INTRODUCTION: Pharmacists dispense a high volume of prescription each day. Majority of pharmacists indicated the risk of dispensing errors was increasing and most of them were aware of dispensing errors. This study will explore the cause and prevention of errors.

METHODS: A cross sectional survey done among all dispensing pharmacists in Miri General Hospital (MGH) using a validated questionnaire. Chi-square test and Mann-Whitney U test used in this study.

RESULT: We found that 75% of pharmacists with more experiences believe the risk of errors is increasing in pharmacy practice. They believe that causes of dispensing errors include similar packaging and labelling, new installation of computer software, technical resources and lack of privacy. Pharmacists who believe the actual errors are increasing agreed that noise is one of the most significant causes and avoiding interruptions is the best way to reduce the errors. They also believe that distinctive drug names can reduce the dispensing errors.

CONCLUSION: The major causes were familiarisation on the drugs, new interface that involving new software and a lesser interrupted environment. New methods and procedures needed to improve to avoid medication error.

KEYWORDS: medication error, dispense, pharmacist, survey, environment, hospital

Introduction

The dispensing process is an integral part of the quality use of medicines. It allows the safe and efficient provision to the general public of what would normally be dangerous or restricted drugs. The process of dispensing composed of a sequence of steps, which if interrupted, could result in poor quality outcomes for the patient (1).

Dispensing errors defined as any inconsistencies or deviations from the prescription order such as dispensing the incorrect drug, dose, dosage form; wrong quantity; inappropriate, incorrect, or inadequate labelling, confusing, or inadequate directions for medication use; incorrect or inappropriate preparation, packaging, or storage or medication prior to dispensing. Majority of pharmacists indicated the risk of dispensing errors was increasing and most of them were aware of dispensing errors. (2) Although rates of dispensing errors are generally low, further improvements are still important because pharmacies dispense such high volumes of medications that even a low error rate can translate into a large number of errors. (3)

Main causes of dispensing errors include handwritten prescriptions, similarities in packaging or names, or strength and dosage stated in misleading ways, lack of effective control of prescription label and medicine and lack of concentration caused by interruptions. (2) Workload negatively affects pharmacists' performance on various activities undertaken at various settings. Workload known as potential causes of medication errors. Their inadequate clinical knowledge also affected their performance. (4)

Factors that may reduce the risk of dispensing errors include improving doctors' handwriting, reducing pharmacist's workload, using distinctive drug names, having more than one pharmacist in duty, privacy when counselling patients, avoiding interruptions, systematic dispensing workflow, counselling patients at the time of supply, having mechanism for checking dispensing procedure, keeping drug knowledge up-to-date, checking

original prescription, improving packaging and labelling and performance of physical dispensing by pharmacy assistants. (2) Double-check systems can reduce the risk of error by having one person independently check another's work. When this procedure properly carried out, the likelihood that two individuals would make the same error with the same medication for the same patient is quite low. (5)

Dispensing errors may have minimal outcomes or clinical significance where few or no consequences that adversely affect a patient. However, some errors will cause serious patient morbidity or mortality. (6) At United State, the number of patient mortality due to drug errors increased from 198000 in 1995 to 218000 in 2000 and the cost for these misadventures to the United State economy is more than $177 billion per year. (7) The errors might arise the false attitude of placing "blame" on the professional involved in the incident. Formal punishment such as fines, license suspension or even license revocation will be fall on the individual professional. (7) Reducing the risk in dispensing errors among pharmacist and identify the cause leading to dispensing errors is important while pharmacist should be aware towards the precaution steps to prevent dispensing errors. Therefore, this study conducted to investigate association between working experience, believe and actual error against the causes and prevention factors of dispensing errors.

Methods

All pharmacist in Miri General Hospital invited for this study. A cross sectional survey was undertaken on pharmacists' perceptions towards medication errors and their demographic information by adopting a validated questionaire (1). The questionnaire undergo face validation to check for readability, understandability, question design and length of question. The questionnaire distributed as self administered. Data analysed on the relationship between variables were investigated using the non-parametric statistical procedures such as Mann-

Whitney U-Test and Chi-Square test with a p-value below 0.05 considered as statistically significant.

Results

Table 1. Demographic of the pharmacist in Miri Hospital.

	Pharmacist experience	
	>9 months	**<9 months**
Age (Years)	26 (25-35)	26 (24-32)
Gender		
Female	19	10
Male	5	1
Years registered	3 (2-11)	2.5 (1-9)
Hours dispensing per week	20-29 (0-60)	20-29 (0-49)
Continuous hours per day	3.00 (1-9)	3.00 (0-6)

Table 2. Association between experiences in dispensing and the views on the increasing actual errors and the risk of errors that contribute to dispensing errors.

Types of error	**Response**	**Pharmacist experience**		**P-value**
		<9 months	>9 months	
Risk of error	Yes	4 (36.4%)	18 (75%)	**0.057***
	No	7 (63.6%)	6 (25%)	
Actual error	Yes	5 (45.5%)	14 (58.3%)	0.716
	No	6 (54.5%)	10 (41.7%)	

Significance tested via chi-square test

Table 3. Difference between experiences in dispensing and the views on the causes of dispensing errors.

Causes of dispensing error	Mean scores		P value
	Pharmacist experience		
	<9 months	>9 months	
Handwriting	17.03	19.16	0.719
Drug names	15.79	20.63	0.471
Generics	15.82	20.59	0.914
PHIS distraction	16.97	19.22	0.057
***Package/label**	17.16	19	**0.046***
Original-repeat	17.63	18.44	0.493
Overwork	18.45	17.47	0.123
Fatigue	18.84	17	0.059
Job dissatisfaction	16.74	19.5	0.062
High prescription volume	16.74	19.5	0.055
Sole pharmacist	17.89	18.13	0.515
Assistants	17.5	17.5	0.745
Noise	15.66	20.78	0.825
Interruptions	16.32	20	0.181
Design of dispensary	16.82	19.41	0.197
***Software**	15.53	20.94	**0.012***
***Technical resources**	18.21	17.75	**0.009***
***Lack of privacy**	20.18	15.41	**0.048***
Non-professional activities	18.71	17.16	0.871
Insufficient time for counselling	18.05	17.94	0.398

Significance tested via Mann-Whitney test

Table 4. Difference between the years of experiences as dispensing pharmacists and their views on ways to reduce dispensing errors.

Ways to improve dispensing errors	Mean scores		p-value
	Pharmacist experience		
	<9 months	<9 months	
Improve handwriting	17.29	18.84	1.000
Reduce work	16.42	19.88	0.059
More than one pharmacist	16.92	19.28	0.363
Assistants dispensing	19.61	16.09	0.625
Updating knowledge	18.13	17.84	0.125
Avoid interruptions	17.45	18.66	0.970
Distinctive names	17.16	19.00	0.573
Improve labels etc	17.50	18.59	0.663
Checking the originals	18.05	17.94	0.635
Systematic workflow	18.53	17.38	0.627
Mechanisms for checking	17.82	18.22	0.308
Counselling	19.39	16.34	0.495
Privacy when counselling	20.11	15.50	0.316

Significance tested via Mann-Whitney test

Table 5 Difference between the responses pharmacists regarding their belief in increasing risk of errors and actual errors against their causes that leads dispensing errors.

Causes of dispensing errors	Believe the risk of errors in dispensing is increasing in pharmacy practice		p-value	Believe the actual errors in dispensing are becoming more common		p-value
	Mean Score			Mean Score		
	Yes	No		Yes	No	
Handwriting	17.32	19.15	0.604	16.58	19.69	0.365
Drug names	17.36	19.08	0.628	18.03	17.97	0.987
Generics	18.43	17.27	0.744	20.87	14.59	0.069
Software interface	19.02	16.27	0.437	19.39	16.34	0.375
Package/label	18.98	16.35	0.458	19.08	16.72	0.493
Original-repeat	17.68	18.54	0.808	18.45	17.47	0.775
Overwork	17.77	18.38	0.863	16.34	19.97	0.292
Fatigue	17.86	18.23	0.917	16.76	19.47	0.430
Job dissatisfaction	20.02	14.58	0.124	19.32	16.44	0.402
High prescription volume	19.64	15.23	0.210	18.18	17.78	0.906
Sole pharmacist	18.98	16.35	0.455	17.95	18.06	0.973
Assistants	17.11	18.21	0.757	17.39	17.63	0.944
Noise	19.05	16.23	0.417	22.50	12.66	***0.003**
Interruptions	19.07	16.19	0.408	20.16	15.44	0.162
Design of dispensary	18.59	17.00	0.654	18.87	16.97	0.581
Software	18.91	16.46	0.491	18.16	17.81	0.920
Technical resources	17.73	18.46	0.836	17.39	18.72	0.700
Lack of privacy	18.70	16.81	0.593	19.26	16.50	0.422
Non-professional activities	18.75	16.73	0.567	18.89	16.94	0.567
Insufficient time for counselling	17.32	19.15	0.062	19.79	15.88	0.254

Significance tested via Mann-Whitney test

Table 6 Difference between the responses of pharmacists regarding their belief in increasing risk of errors and actual errors against the ways to reduce dispensing errors.

Ways to improve dispensing errors	Believe the risk of errors in dispensing is increasing in pharmacy practice		p-value	Believe the actual errors in dispensing are becoming more common		p-value
	Mean Score			Mean Score		
	Yes	No		Yes	No	
Improve handwriting	18.75	16.73	0.557	18.00	18.00	1.000
Reduce work	19.64	15.23	0.209	18.16	17.81	0.919
More than one pharmacist	20.14	14.38	0.093	17.89	18.13	0.945
Assistants dispensing	19.11	16.12	0.395	18.87	16.97	0.578
Updating knowledge	19.48	15.50	0.237	16.61	19.66	0.349
Avoid interruptions	20.68	13.46	***0.036**	17.71	18.34	0.849
Distinctive names	21.11	12.73	***0.017**	18.50	17.41	0.748
Improve labels etc	20.02	14.58	0.120	17.05	19.13	0.542
Checking the originals	19.75	15.04	0.177	17.42	18.69	0.709
Systematic workflow	18.52	17.12	0.679	18.66	17.22	0.663
Mechanisms for checking	18.80	16.65	0.533	18.50	17.41	0.743
Counselling	19.45	15.54	0.256	17.71	18.34	0.850
Privacy when counseling	20.36	14.00	0.074	19.87	15.78	0.236

Significance tested via Mann-Whitney test

Of the 36 survey forms that sent out, 35 completed returns received (response rate of 97.2%). Of the respondents, 6 (17.14%) were male and 29 (82.86%) were females which shows there was a higher proportion of female pharmacists. Among the dispensing pharmacists, the age of pharmacists that have experiences more than 9 months of dispensing ranged from 26 to 35 with the median age of 26 years old. The age of pharmacists that have experiences less than 9 months of dispensing ranged from 24 to 32 with the median age of 26 years old. The median years of registration of pharmacists with more than 9 months of dispensing experiences in Miri hospital was 3 years whereas the median for those less than 9 months was 2.5 years.

Table 1 reveals basic information for fully registered pharmacists and provisionally registered pharmacists. The 'years registered' variable refers to how long the fully registered pharmacists has been working in the hospital. The 'hours dispensing' refers to how long the pharmacists spend dispensing per week. The 'continuous hours' refers to how many hours on average the pharmacist spend dispensing each working day.

Table 2 presents correlation between the years of experiences as dispensing pharmacists and their views on the increasing risk of errors and actual errors that contribute to dispensing errors. Options were sought on whether the actual dispensing errors are increasing. For dispensing pharmacists that has experiences more than 9 months, there was a combine response of 14 (58.3%) answering 'yes' and 10 (41.6%) answering 'no'. However, for dispensing pharmacists that has experiences less than 9 months, there was a combine response of 5 (45.45%) answering 'yes' and 6 (54.55%) answering 'no'. There were no significant differences between the two pools of pharmacists. Similarly, opinions were sought on whether risk of errors in dispensing is becoming more common among pharmacists. Table 2 also shows that dispensing pharmacists that has experiences more than 9 months, there was a combine response of 18 (75%) answering 'yes' and 6 (25%) answering 'no'. However, for dispensing pharmacists that has experiences less than 9 months, there was a combine

response of 4 (36.3%) answering 'yes' and 7(63.6%) answering 'no'. Thus, there was a significant difference of P value of between the two pools of pharmacists.

Table 3 shows the correlation between the years of experiences in dispensing and the views on the causes of dispensing errors. As can be seen from the results, handwriting, drug names, generic drugs, PHIS, original-repeat, overwork and fatigue level despite being possible factors were all not statistically significant. The packaging and label of the medications viewed to be a significant factor causing dispensing errors with p-value of 0.046. Other possible factors such as job dissatisfaction, high prescription volume, sole pharmacist at work, participation of dispensing by pharmacist assistants, noise, design layout, presence of non-professional activities in vicinity and lack of time despite were viewed to be possible causes of errors however were not significant. The design of computer dispensing software, insufficient technical resources and lack of privacy when dispensing were all viewed to be causes of dispensing errors with statistical significance. The p-values were 0.012, 0.009 and 0.048 respectively for each of the mentioned factors above.

Table 4 describes the correlation between the years of experiences as dispensing pharmacists with their views on the precautions of dispensing errors. However, the results collected show no statistical significance for all the mentioned factors. Table 5 shows the correlation between the responses of all dispensing pharmacists regarding their belief in increasing risk of errors and actual errors against their causes that minimize dispensing errors. As can be seen from the results, handwriting, drug names, generic drugs, PHIS, original-repeat, overwork and fatigue level, packaging and label of the medication were all not significant factors. Other possible factors such as job dissatisfaction, high prescription volume, sole pharmacist at work, and participation of dispensing by pharmacist assistant, design layout, presence of non-professional activities in vicinity and lack of time were also not significant. However, from the results obtained noise was the only factor that

shows statistical significance for those who believe there is increasing of risk of errors against their causes of dispensing errors.

Table 6 shows the correlation between the responses of dispensing pharmacists and their belief in increasing risk of errors and actual errors against the precautions that contribute to dispensing errors. The precautions that considered as being able to minimize the risk of dispensing errors were improving doctors' handwriting, reducing workloads, having more than one pharmacist on duty, dispensing by pharmacy assistants, up-to-date drug knowledge, avoiding interruptions, distinctive drug names, checking with original prescription when dispensing repeats, systematic dispensing process, counselling patients and providing privacy when counselling were all not statistically not significant in terms of actual errors. However, it found that having distinctive names and avoiding interruptions viewed to be significant preventive measures for reducing risk errors with p-value less than 0.05. On the other hand, in terms of increasing actual errors against the precautions, those preventive measures listed in the table were non-significant.

Discussion

Prescription dispensing is one of the core functions of a pharmacist. It is a complex process that involves a range of cognitive and manual steps. There is evidence the risk of dispensing errors is increasing and this has led to an increase in the intensity of medical care and use of medication therapy. It is still necessary to pay close attention to dispensing errors, because nowadays pharmacies dispense such high volumes of medications that even a low error rate can translate into a large number of errors (2) The response rate for the survey of 97.2% considered acceptable for this form of research.

As was tabulated previously, Table 2 shows the correlation between the years of experience of dispensing pharmacists in Miri General Hospital and their views on the

increasing actual errors and risk of errors that contribute to dispensing errors. Majority of the respondents in Miri General Hospital indicated the risk of error is increasing in pharmacy practice. However, a significant difference in opinion between the pharmacists that having experience less than 9 months and more than 9 months was observed. For pharmacists that attached at dispensing department less than 9 months, most of them (63.6%) do not believe the risk of errors is increasing in pharmacy practice but for pharmacist that attach more than 9 months, most of them (75%) believe the risk of errors is increasing in pharmacy practice. The longer the pharmacists attached to the dispensing department, the longer they exposed to medication dispensing; hence the more chances they would observe any occurrence of dispensing errors. Thus, they are more prone to believing and be aware the risk of error is increasing. It shown in the research by Al-Arifi (2) where most of the community pharmacist that believe the risk of dispensing error was increasing were aware of the dispensing errors.

There are more respondents (54.3%) believe the actual error is becoming more common in pharmacy practice however there are no significant difference of opinions between pharmacist with longer attachment and shorter attachment. However, according to (3), it is still necessary to pay close attention to dispensing errors as pharmacies nowadays dispense such high volumes of medications that even a low error rate can translate into a large number of errors.

Besides that, Table 3 in the results describes the correlation between the duration of pharmacist at the dispensing department in Miri General Hospital and their views on causes of dispensing errors. Errors can occur due to incorrect selection from drug storage systems. Packaging and label of medications were one of the significant causes of errors according to the dispensing pharmacists in Miri hospital. Thus, drugs of the same brand should stored separately due to similar appearances. Fortunately, an increasing number of pharmaceutical companies are opting for packaging that reflects a ‘corporate look’ and this has resulted in

errors due to incorrect drug selection. (1) Besides that, the design of computer software was agreed to be another one of the causes of medication errors. This is mainly due to the unfamiliarity of the dispensing pharmacists with the computer system that was just established in Miri hospital. Thus, training courses should be conducted to equip the pharmacists to reduce the possibility of errors. It also found that most dispensing pharmacists in Miri Hospital agree that lack of privacy is one of the significant causes of medication errors.

The design and layout of the dispensary may also contribute to occurring dispensing errors as they do not provide the pharmacist sufficient privacy to consult references, counsel patients or concentrate for difficult preparations. (1). Thus, to optimise the patient counselling, the dispensary area should be designed in a way that provides better patient privacy and comfort. (2) According to Al-Arifi 2014, another reported significant cause of dispensing errors is an insufficient technical resource which is also consistent to the one of the causes of medication errors occurring in Miri Hospital. A study done which involved implementing a computerised drug–drug interaction alerting system and thus resulted dispensing prescriptions with serious interactions by pharmacists was reduced. (3)

Table 4 describes that years of experiences as dispensing pharmacists showed similar views on views on the precautions of dispensing errors as no significant values discovered. Hence, further study need to be carried out.

Table 5 presents the differences in the views of causes of dispensing errors between the dispensing pharmacists regarding their belief in increasing of risk of errors and actual errors. For those pharmacists who believe the actual errors are in increasing trend, they also think that noise is one of the significant factors prone to medication error. However, it is not the same for those who believed there is no increasing in actual errors. Noise is usually one of the interruptions faced by dispensing pharmacist. Thus, interruptions to the pharmacist should

be reduced, as they break up the attention on the prescription at hand. Distraction by non-professional activities is potentially dangerous, and thus should not occur. Provision of comfortable waiting areas and opportunities to shop while waiting may reduce distractions by the patient. Use of faxes and answering machines should be encouraged to reduce distractions from answering telephone calls. (3)

Table 6 shows the differences in the views of precaution steps of dispensing errors between dispensing pharmacists regarding their belief in increasing risk of errors and actual errors in pharmacy practice. Among pharmacists in Miri General Hospital that believe and not believe that the actual error becoming more common, there are significant difference between them towards the precaution step to prevent dispensing error. Distinctive drug names and avoiding interruptions are the two precaution steps that having highest mean differences among the pharmacist who believing actual errors becoming more common and the pharmacist who not believing that actual errors becoming more common in Miri General Hospital. Majority of the pharmacists who believing the actual error becoming more common have opinion that having distinctive drug names are important compared to those who not believe.

Similar or confusing names as a contributing factor in dispensing errors perceived as a significant factor by (41%) of the respondents compared with 24% in a study conducted in Scotland. This might be due to the high number of medicines marketed with some similarities in trade names. Thus, it is very important to have distinctive drug names as the precaution to reduce dispensing errors. Other than that, interruptions during dispensing (9.4%) considered as the third most important factors for dispensing errors as reported by a study in the United Kingdom. In a Danish study on the other hand, a research team analysed self-reports of pharmacist to identify the causes of dispensing errors. Root causes identified are similarities in packaging or names, and lack of concentration caused by interruptions. Another significant

preventive measure that studied would be avoiding unnecessary external interruptions such as from telephone calls and noise from nearby dispenser. (2).

Study Limitations and Future Research

One of the significant limitations of this research study is its sample size which may cause the difficulty in finding significant relationships from the data, as statistical tests normally require a larger sample size to ensure a representative distribution of the population. However, we have included all the dispensing pharmacists in Miri General Hospital, thus our study results not biased. For further future research, it would be best to increase the sample size for example including other dispensing pharmacists from private settings or other smaller polyclinics at the same area.

Another limitation to this study would be the computer system (Pharmacy Information System also known as PHIS) that has not been widely implemented in Malaysia like in the rural areas if compared to overseas settings.

Besides that, the absent involvement of pharmacy assistants in Miri General Hospital is considered one of the limitations of this study research as some pharmacy assistant in other smaller hospitals may be actively involved in dispensing. Thus, this factor was not considered as a strong cause of dispensing errors among dispensing pharmacist in Miri General Hospital.

Conclusion

In conclusion, majority of pharmacists with more working experiences indicated the risk of dispensing errors was increasing and most of them were aware of dispensing errors. The major causes were similar packaging and labelling, new installation of computer software PHIS, technical resources and lack of privacy. Over the years pharmacists have implemented various methods to reduce the rates of dispensing errors. However, further improvements in pharmacy practice are still important.

References

1. G. M. Peterson MSHWaJKB. Pharmacists' attitudes towards dispensing errors: their causes and prevention. Journal of Clinical Pharmacy and Therapeutics. 1999(24):57-71.

2. Al-Arifi MN. Community pharmacists' attitudes toward dispensing errors at community pharmacy setting in Central Saudi Arabia. Saudi pharmaceutical journal : SPJ : the official publication of the Saudi Pharmaceutical Society. 2014;22(3):195-202.

3. Cheung KC, Bouvy ML, De Smet PA. Medication errors: the importance of safe dispensing. British journal of clinical pharmacology. 2009;67(6):676-80.

4. Acheampong F, Anto BP. Perceived barriers to pharmacist engagement in adverse drug event prevention activities in Ghana using semi-structured interview. BMC health services research. 2015;15:361.

5. Vijay Roy PG, Shouryadeep Srivastava. MEDICATION ERRORS : CAUSES & PREVENTION. Health Administrator. 2005;XIX(1):60-4.

6. Pharmacists ASoH. ASHP Guidelines on Preventing Medication Errors in Hospitals. Am J Hosp Pharm. 1993;50:305-14.

7. Pharmacy AoMC. Medication Errors. The Academy of Managed Care Pharmacy's Concepts in Managed Care Pharmacy. 2010:1-9.