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ORIGINAL ARTICLE

Prevalence and Factors of Adherence to Post-Exposure Follow-up Among Sharps-Injured Healthcare Workers in a Government Hospital

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ABSTRAK

Kepatuhan terhadap protokol temujanji pasca-pendedahan mencerminkan kesinambungan penjagaan dalam pengurusan kecederaan alatan tajam di kalangan kakitangan kesihatan (HCWs). Kajian ini bertujuan untuk menentukan prevalens kepatuhan terhadap temujanji pasca-pendedahan serta faktor-faktor yang berkaitan dengannya di hospital awam. Kajian keratan rentas ini telah dijalankan di Hospital Melaka, Malaysia. Semua 250 kes kecederaan alatan tajam yang dilaporkan di kalangan HCWs dipilih menerusi persampelan dalam tempoh lima tahun iaitu antara tahun 2013 hingga 2017. Data daripada Klinik Penyakit Berjangkit diekstrak dan dianalisa secara deskriptif melalui multivariat regresi logistik binari dengan menggunakan perisian IBM SPSS versi 22. Kakitangan kesihatan yang mengalami kecederaan alatan tajam kebanyakannya perempuan (64.4%) dengan median umur 26 (IQR 24 hingga 28) tahun, mempunyai dua tahun atau lebih pengalaman (36.8%), mempunyai status negatif bagi HIV/HBV/HCV (68.4%) dan bukan paramedik (84.4%). Prevalens kepatuhan terhadap temujanji pula ialah 36.8%. Paramedik lebih mematuhi temu janji (56.4%) berbanding kumpulan bukan paramedik. Hanya jenis peranti (p=0.049) dan kategori pekerjaan (p=0.006) mempunyai perkaitan yang signifikan dalam kepatuhan terhadap temujanji. Paramedik mempunyai 2.66 kali ganda odds kepatuhan terhadap temujanji pasca-pendedahan berbanding dengan bukan paramedik (95%CI: 1.32, 5.36; p = 0.006) apabila dilaraskan berdasarkan jenis peranti. Berdasarkan kajian kami, paramedik menunjukkan contoh HCWs yang baik dengan prevalens kepatuhan lebih tinggi berbanding dengan bukan paramedik. Walau bagaimanapun, prevalens kepatuhan masih rendah secara keseluruhannya. Oleh itu, kajian lanjut bagi mencari faktor penentu kepatuhan dalam konteks persekitaran setempat sememangnya diperlukan.

Kata kunci: kakitangan kesihatan, kecederaan alatan tajam, kepatuhan, pendedahan di tempat kerja, profilaksis pasca-pendedahan

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ABSTRACT

Adherence to post-exposure follow-up protocol reflects the continuity of care in managing sharps injuries among healthcare workers (HCWs). This study aimed to determine the prevalence of adherence to post-exposure follow-up and its associated factors in a public hospital. This cross-sectional study was conducted at Hospital Melaka, Malaysia. All 250 reported sharps injury cases among HCWs were conveniently sampled throughout the period of five years between 2013 to 2017. Data from the Infectious Disease Clinic were extracted and analysed descriptively via multivariate binary logistic regression using IBM SPSS version 22 software. Sharps-injured HCWs were predominantly female (64.4%) with a median age of 26 (IQR 24 to 28) years old, had two years or more of experience (36.8%), status was negative for HIV/HBV/HCV (68.4%) and non-paramedics (84.4%). The prevalence of adherence to follow-up was 36.8%. Paramedics were more adhere to follow-up (56.4%) than the non-paramedics group. The factors that were significantly associated with follow-up adherence were the type of device (p=0.049) and occupation category (p=0.006). Paramedics had 2.66 times the odds of adherence to post-exposure follow-up compared to non-paramedics (95%CI: 1.32, 5.36; p = 0.006) when adjusted for type of devices. Based on our study, paramedics showed a good example of HCWs with a higher prevalence of adherence as compared to non-paramedics. However, the overall prevalence of adherence was still low. Hence, further research on finding the determinants of adherence in a local setting is undoubtedly needed.

Keywords: adherence, healthcare workers, occupational exposure, post-exposure prophylaxis, sharps injury

INTRODUCTION

Adherence is defined as "the extent to which a person's behaviour in taking medication, following a diet and/or executing lifestyle changes, which corresponds with agreed recommendations from a health care provider" (WHO 2003). In comparison, compliance is a patient's ability to take medications as prescribed (Miller & Hays 2000). This article examines whether healthcare workers (HCWs) abide by the post-exposure follow-up after a sharps injury event in the workplace. Therefore, this research will focus on adherence rather than compliance.

Adherence to post-exposure follow-up among sharps-injured HCWs is a serious issue among healthcare providers. This concern is due to the fact that sharps injury poses a risk of transmission of bloodborne infections. For example, the risks following a sharps injury event are 33.3% for Hepatitis B Virus (HBV), 3.3% for Hepatitis C Virus (HCV) and 0.3% for Human

Immunodeficiency Virus (HIV). The risk levels of infection from a sharps injury incident depend on patient source status, depth of the wound, type of sharps, age of sharps and visibility of blood on sharps (Riddell et al. 2015). Collectively, these are among the crucial pieces of information to be obtained, particularly post-exposure to any contaminated sharps.

Post-exposure follow-up is essential for the continuity of healthcare to ensure that sharps-injured HCWs remain healthy. Some immediate intervention can be taken place. For example, post-exposure prophylaxis (PEP) by using antiretroviral drugs can be started as soon as possible without waiting for the test results of the source patient. This measure is done to minimise the risk of HIV transmission at an individual level (Riddell et al. 2015).

While some researchers point out the benefits of adherence at an individual level, others have highlighted the importance of adherence at the community level. For example, the infectiousness of HIV is said to be mediated by the patient's adherence. Poor adherence might cause increased shedding of HIV inside the genital compartment, thereby escalating its infectivity at a community level, especially among those at risk for infection (Kashuba et al. 1999; Robbins et al. 2014).

Furthermore, adherence to recommended guidelines could avoid the waste of human resources at an organisational level. In line with this, western researchers have proven that the workload was almost halved when there was an adherence to the recommended follow-up guidelines (Thomas et al. 2005).

There is a plethora of contributing factors or behaviours that may promote or hinder adherence to follow-up (WHO 2003). On the other hand, researchers in the least developed countries found that stigmatisation in initiating the procedure for PEP might cause HCWs to hesitate in getting medical attention (Mill et al. 2014; United Nations & Committee for Development Policy 2018). On the other hand, researchers in developing countries found that 20.4% of the respondents indicated uncertainty regarding to the local protocol as their top reason for non-adherence to occupational sharps injury protocols (Lakbala et al. 2014; United Nations 2019). However, these contributing factors were not examined in this study.

The previous study on follow-up adherence had persistently shown a suboptimal prevalence either internationally or locally, which were 30.5% and 72.3%, respectively (Escudero et al. 2015; Mohd Fadhli et al. 2018). Therefore, the objectives of this study were to measure the HCWs' adherence to follow-up management after a sharps injury event and to identify its associated factors. It was hoped that the information from this study would be used in the future to capture a clearer picture of adherence to post-exposure follow-up.

MATERIALS AND METHODS

STUDY DESIGN

This was a cross-sectional study design that explored all reported sharps injury data from January 2013 to June 2017 at the Melaka Hospital, Malaysia. This site was chosen as it is a public facility with full secondary care services that provide post-exposure follow-up management after the event of sharps injury (Shariff 2012).

SHARPS INJURY DATA

The sharps injury data were obtained from the Occupational Health Unit in the hospital. Sharps injury was defined as any injury resulting from needles, glass, surgical instruments or other items as recorded in the Sharps Injury Surveillance OHU/SIS-1 notification form (Ministry of Health Malaysia 2007). The first author examined the data from 250 out of the 263 sharps injury cases after excluding two non-HCWs, two cases contracted with uncontaminated sharps and nine cases with missing data. Calculation of sample size was performed using the Kish L. 1965 formula, which resulted in a minimum of 243 samples needed based on the prevalence of follow-up adherence from a prior study (Dean 1996; Oliveira-Filho et al. 2012).

VARIABLE DEFINITIONS

Dependent Variable

In the present study, adherence was defined as the extent to which HCWs complied with the post-exposure follow-up at their workplace as was recommended in the guidelines (Ministry of Health Malaysia 2009). The recommended follow-up periods were three months and six months with or without a six weeks follow-up visit at an infectious diseases clinic based on local hospital policy, taking into consideration the exposure risk level of the affected HCWs. On the other hand, the risk of exposure was stated to be high when the source was positive or likely to be in the window period of HIV/HBV/HCW. On the other hand, it was regarded as moderate if the source status was unknown. HCWs in both the above-mentioned exposure risk categories were subjected to a series of six weeks, three months and six months follow-up intervals. Whereas, in certain isolated low-risk cases where the source was negative or likely to be negative for HIV/HBV/HCW, HCWs were only subjected to three and six months follow-up intervals after the event of sharps injury.

Independent Variables

The independent variables were studied based on the recorded data in the sharps injury surveillance OHU/SIS-1 notification form. The variables were gender, race, location of the sharps injury incident, job title, work shift, work experience, Hepatitis B vaccine status, baseline HCWs status, source status (negative vs positive HBV/HCV/HIV), seroconversion status (negative vs positive HBV/HCV/HIV), type of device, procedure and task taking place when the sharps injury incident happened.

A high-risk location means a high-stress environment requiring urgency in handling or manipulating sharps

which can cause an increased risk of sharps injury. In our study, the Medical, Paediatric, Pathology, Pharmacy, Radiology and Dermatology Departments were categorised as low-risk locations. Surgery, Orthopaedic, Obstetrics & Gynaecology, Emergency & Traumatology, Operating Theatre, Paediatric Surgical, Anaesthesiology, Dental, Forensic, Sterile Materials Service Unit and Plastic Surgery Departments were categorised as high-risk locations.

The job title was re-classified into two occupational categories; (i) Paramedics, such as Nurses, Medical Assistants and X-Ray Medical Technicians; and (ii) Non-Paramedics, such as Doctors, Dental Officers, Pharmacists, Trainees, Health Attendants and Hospital Support Service Staffs.

Unknown source status was considered to be positive according to the universal precaution statement, "all patients' body fluids should be treated as infectious since it is not known who is infected and carries a virus". However, this term was later replaced with the term Standard Precaution (Ministry of Health Malaysia 1995).

DATA ANALYSIS

The data were analysed using IBM SPSS version 22 (IBM Corp., Armonk, NY). The occupational categories, type of device, years of experience, gender and source status were regressed to adherence status, which was dummy coded as 1 = 'Adhering to follow-up' and 0 = 'Not adhering to follow-up' and were analysed using a simple or binary logistic regression approach. This analysis could enhance the preliminary understanding of associated factors that contributed to follow-up adherence. In addition, we decided to include experience as a variable instead of age because both were highly correlated ($r = 0.776$, $p<0.010$).

ETHICS APPROVAL

Ethical approval was obtained from the Ministry of Health Malaysia Medical Research & Ethics Committee (MREC) with the code [NMRR-18-18-39720] as well as from the Ethics Committee of the Faculty of Medicine, Universiti Kebangsaan Malaysia (UKM) (UKM Ethics No.: 316 FF-2018-066).

RESULTS

Descriptive Analysis

As presented in Table 1, the sharps-injured HCWs were predominantly female (64.8%), with a median age of 26 (IQR 24 to 28) years old. Most were Bumiputera (62.4%), worked in a ward (68.0%), did the morning shift (48.4%) and had working experience of fewer than two years (63.2%). A majority of the studied sample had completed Hepatitis B vaccination (67.9%), had been exposed to sharps from negative source status for HBV/HCV/HIV (68.4%), needle-stick injury (78.0%) and had injuries sustained while drawing blood (28.8%). The hospital ward (68.0%) was a frequently reported location, and Non-Paramedics (84.4%) was often the occupation category for incidents of sharps injury. A total of

Table 1: Descriptive analysis of the data studied

Variable	Description	Frequency (n)	Percentage (%)
Gender	Male	88	35.2
	Female	162	64.8
Race	Bumiputera	156	62.4
	Chinese	46	18.4
	Indian	36	14.4
	Non-Malaysian	12	4.8
Experience	Less than 2 years	158	63.2
	2 years and above	92	36.8
Hepatitis B vaccination	Not immunised	24	9.6
	Incomplete immunisation	56	22.5
	Complete immunisation	169	67.9
Baseline HCWs status	Unknown	0	0.0
	Negative HBV/HCV/HIV	250	100.0
	Positive HBV/HCV/HIV	0	0.0
Source status of HBV/HCV/HIV	Unknown/ Positive	79	31.6
	Negative HBV/HCV/HIV	171	68.4
Seroconversion status	Unknown	93	37.2
	No seroconversion	157	62.8
	Positive HBV/HCV/HIV	0	0.0
Device	Needles	195	78.0
	Surgical instruments / Other items	55	22.0
Location	Operating Theatre	29	11.6
	Accident & Emergency	16	6.4
	Ward	170	68.0
	Others	35	14.0
Procedure	Suturing	27	10.8
	Drawing blood	72	28.8
	Injections	33	13.2
	Placing intravenous catheter / Line	50	20.0
	Others	68	27.2
Task	Suturing / Operating / Autopsy	38	15.2
	Disposal related / Unusual location	45	18.0
	Handling sharps / equipment / specimen	167	66.8
Work shift	Morning shift	121	48.4
	Evening shift	82	32.8
	Night Shift	47	18.8
Occupation category	Non-paramedics	211	84.4
	Paramedics	39	15.6
Department	High risk	117	46.8
	Low risk	133	53.2
Adherence	Adherence	92	36.8
	Non-adherence	158	63.2

37.2% had no record of seroconversion status. The range of sharps injury incidents per year was 32 to 72 cases from the year 2013 to 2016. Finally, the prevalence of adherence to post-exposure follow-up among sharps-injured HCWs was 36.8%.

Univariable Univariate Analysis

Table 2 demonstrates that the paramedics were more adherent to follow-up (56.4%) than the non-paramedics group (33.2%). Only the type of device (χ^2 = 2.752, p =0.049) and occupation category (χ^2=7.641, p=0.006) had a significant association with follow-up adherence. In addition, we observed a higher prevalence of follow-up adherence among females (37.9%), those with working experience of two years and above (41.3%) and unknown/positive source status of HBV/HCV/HIV (39.2%). Other tested variables were shown not to have a significant association with follow-up adherence.

Multivariable Univariate Analysis

Binary logistic regression analysis showed that the odds of paramedics adhering to post-exposure follow-up were 2.66 times higher as compared to non-paramedics (95%CI: 1.32, 5.36; p = 0.006) when adjusted for type of devices (Table 3).

The Hosmer and Lemeshow Test showed a p-value >0.05, indicating that the dataset in this study fitted well with the logistic model. In addition, the model was 68.0% correct in predicting HCWs' adherence to the recommended post-exposure follow-up after a sharps injury event at their workplace.

They were no multicollinearity issues between the occupation category and device by the fact that both variables showed a tolerance value of more than 0.4 (Chan 2004a), a VIF value of less than 10 (Edimansyah et al. 2008) and a standard error of less than 5.00 (Chan 2004b) in the collinearity diagnostic test.

In addition, a possible two-way interaction between independent variables (occupation category and device) was tested by including the interaction terms as additional independent variables in the models. Based on the analysis, the interaction term was significant (p=0.02), suggesting that the association between device and adherence to post-exposure follow-up differed significantly with the different types of occupation category.

In order to interpret these two-way interaction effects, we used the method discussed by a previous researcher (Dawson 2014). The analysis was performed on Excel worksheets with pre-embedded formulas as provided via an online source from the same researcher. The result can be summarised in Figure 1, where the y-axis was the probability of adherence to post-exposure follow-up. At the same time, the x-axis corresponds to the devices in which the high-risk device for follow-up adherence was the needles and low-risk device for follow-up adherence was the surgical instruments/other items. In summary, the plots showed that paramedics type of occupation category were

Table 2: Univariable univariate analysis between factors and adherence to follow-up status

Variable	Description	Adhere	Non-adherence	*P*-value
Gender				0.513
	Male	30 (34.1%)	58 (65.9%)	
	Female	62 (38.3%)	100 (61.3%)	
Race				0.327
	Bumiputera	54 (34.6%)	102 (65.4%)	
	Chinese	22 (47.8%)	24 (52.2%)	
	Indian	13 (36.1%)	23 (63.9%)	
	Non-Malaysian	3 (25.0%)	9 (75.0%)	
Experience				0.260
	Less than 2 years	54 (34.2%)	104 (65.8%)	
	2 years and above	38 (41.3%)	54 (58.7%)	
Hepatitis B vaccination				0.661
	Not immunised	7 (29.2%)	17 (70.8%)	
	Incomplete immunisation	20 (35.7%)	36 (64.3%)	
	Complete immunisation	65 (38.5%)	104 (61.5%)	
Source status of HBV/HCV/HIV				0.587
	Unknown/ Positive	31 (39.2%)	48 (60.8%)	
	Negative	61 (35.7%)	110 (64.3%)	
Device				0.049*
	Needles	77 (39.5%)	118 (60.5%)	
	Surgical instruments / Other items	15 (27.3%)	40 (72.7%)	
Location				0.446
	Operating Theatre	7 (24.1%)	22 (75.9%)	
	Accident & Emergency	5 (31.3%)	11 (68.8%)	
	Ward	66 (38.8%)	104 (61.2%)	
	Others	14 (40.0%)	21 (60.0%)	
Procedure				0.921
	Suturing	8 (29.6%)	19 (70.4%)	
	Drawing blood	26 (36.1%)	46 (63.9%)	
	Injections	13 (39.4%)	20 (60.6%)	
	Placing intravenous catheter / Line	20 (40.0%)	30 (60.0%)	
	Others	25 (36.8%)	43 (63.2%)	
Cause				0.506
	Suturing / Operating / Autopsy	11 (28.9%)	27 (71.1%)	
	Disposal related / Unusual location	16 (35.6%)	29 (64.4%)	
	Handling sharps / equipment / specimen	65 (38.9%)	102 (61.1%)	
Work shift				0.344
	Morning shift	50 (41.3%)	71 (58.7%)	
	Evening shift	26 (31.7%)	56 (68.3%)	
	Night shift	16 (34.0%)	31 (66.0%)	
Occupation category				0.006**
	Non-Paramedics	70 (33.2%)	141 (66.8%)	
	Paramedics	22 (56.4%)	17 (43.6%)	
Department				0.955
	High risk	43(36.8%)	74(63.2%)	
	Low risk	49(36.8%)	84(63.2%)	

* $p < 0.05$ (1-tailed); ** $p < 0.05$ (2-tailed)

Table 3: Multivariable univariate analysis (binary logistic regression)

Variable (N = 250)		Simple Logistic Regression		Multiple Logistic Regression	
		Crude OR	P value	Adjusted OR	*P*-value
Occupation category	Paramedics	2.607	0.007*	2.661	0.006*
	Non-Paramedics	1.00 (ref)		1.000 (ref)	
Device	Needles	1.740	0.046**	1.791	0.044**
	Surgical instruments / Other items	1.00 (ref)		1.000(ref)	
Experience	2 years and above	1.355	0.261		
	Fewer than 2 years	1.000 (ref)			
Gender	Female	1.199	0.517		
	Male	1.000 (ref)			
Source status HBV/HCV/HIV	Unknown/Positive	1.165	0.587		
	Negative	1.000 (ref)			

*p < 0.05 (2-tailed); **p < 0.05 (1-tailed)

likely to have a more positive effect on adherence when contracting an injury with a needle-typed device as compared to non-paramedics.

DISCUSSION

Approximately one out of three HCWs adhered to the post-exposure follow-up, a result similar to a previous study (Escudero et al. 2015). This finding may be because there was a nearly identical follow-up interval parallel to the scheduled serological testing by affected HCWs after the exposure event.

In this study, we found that there was higher adherence among females as compared to males, which was similar to that of a previous study (O'Donnell et al. 2014). Nurses might contribute to this value as they showed 77.0% adherence in the paramedics group. Furthermore, being females (no

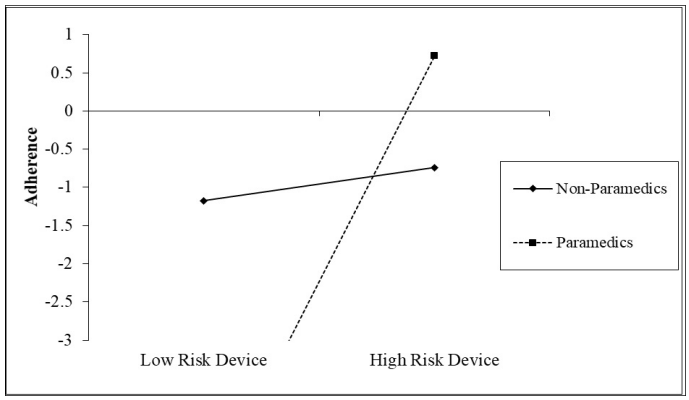

Figure 1: Moderating effect of occupation category on the relationship between device and adherence to post-exposure follow-up (two-way interaction with binary moderator)

male nurses in our data), they showed more adherence than males (Escudero et al. 2015; O'Donnell et al. 2014). On the other hand, the behaviour among male HCWs was possibly related to masculinity. Even during illness, men were less likely to visit a doctor. In addition, men were less likely to expose or reveal their symptoms when they saw a doctor (Baker et al. 2014).

Hypothetically, one would usually tend to adhere if the source of exposure was revealed as positive for bloodborne infection, particularly HIV (Escudero et al. 2015). Although information regarding the serological profile of the source status could give HCWs a rough idea of the risk of contracting the bloodborne disease after a sharps injury, this was not recorded as an associating factor of adherence to a post-exposure follow-up. Instead, we found a nearly similar prevalence of follow-up adherence between sources who tested positive for HBV/HCV/HIV or unknown (39.2%) and sources who tested negative (35.7%). This contradicted findings from a previous study that reported follow-up adherence was significantly associated with sources who were HIV positive (Escudero et al. 2015). Plausibly due to the pre-existing inclusion criteria whereby only those HCWs exposed to contaminated sharps were included in this study.

The existing literature showed that age, gender, occupation, department, source status and type of sharps device were associated with adherence (Abdulrahman et al. 2017; Díaz & Johnson 2016; Escudero et al. 2015; Mohd Fadhli et al. 2018). However, in this study, we noticed that only the occupation category and type of sharps device had a significant association with the HCWs' adherence. Therefore, the current study's result might reflect differences in HCWs' demography and standard operating procedure (SOP) in handling sharps in various workplace settings which were significantly associated with follow-up adherence.

This result should be interpreted with caution. It is well known that the capacity for holding blood and its volume might dictate the risk of transmission of the bloodborne infection. Such capacity is possessed by needles especially due to their hollow-bore properties. Studies have shown that when the source was positive for Hepatitis B, the risk of transmission through sharps injury caused by a needle with hollow-bore properties can be as high as 62.0% among those who were susceptible (Riddell et al. 2015).

Therefore, upon adjusting and controlling for the type of devices during analysis via multiple logistic regression, it was noteworthy to find that paramedics had nearly three times higher odds for follow-up adherence as compared to non-paramedics. Contrary to our expectations, this finding was surprising, particularly when doctors comprised 81.0% of HCWs from the non-paramedics occupation category. A possible explanation for this might be that paramedics who adhered to follow-up were primarily contributed by nurses who generally took charge in most of the infectious control activities and programmes in the workplace compared to doctors.

Generally, it is believed that doctors are among the top professionals among medical personnel. Therefore, there is a usual assumption that doctors have higher health literacy than others. In addition, a meta-analysis study showed that patients who were more follow-up adherent to treatment had higher levels of health literacy (Miller 2016). Surprisingly, this assumption might be questionable or rendered obsolete in our study. Doctors are expected to show a good example of follow-up adherence to recommended procedures, which they would routinely emphasise to the patients they encounter daily. The reason for this is still not entirely clear, but reasonable explanations might be suitable such as time factors, busy workplace schedule, the ability to self-tracing serological tests on their own, perception of risk of bloodborne disease and effectiveness of post-exposure follow-up.

Upon further analysis, the effect of the device on adherence to post-exposure follow-up was moderated by the type of occupation category. This meant that the association between device and follow-up adherence differed significantly with a different kind of occupation category. Paramedics type of occupation category were likely to have a more positive effect on follow-up adherence when contracted injury with a needle-typed device as compared to non-paramedics.

Even though both occupation categories may contract needles with hollow-bore properties that could carry a higher risk of bloodborne pathogens transmission, paramedics may have a different level of stress perceptions as compared to non-paramedics which favoured them positively towards follow-up adherence behaviour. In addition, an eastern scholar found that stress perception was a mediator for the relationship between psychosocial working conditions and needle-stick injury, where different stress levels would be perceived when different individuals faced similar stressful situations (Wang et al. 2019).

In terms of race, the Chinese constituted the majority of HCWs who adhered to the post-exposure follow-up (47.8%). Perhaps, the most plausible explanation for this was the values of Chinese philosophies that emphasised promoting health (Chen 2001). However, the race variable tested was not significantly associated with follow-up adherence, probably due to the small sample size as Chinese HCWs comprised only 18.4 % of the overall sharps-injured HCWs in this study. In addition, this low proportion is probably the result of best practices, such as taking standard precautions in the first place.

Another study reported that side effects and communication with the provider were the most perceived barriers to follow-up adherence (Barnes 2016). It was proven that a better outcome in adherence to antiretroviral treatment was achieved through good relationships and communication between the patients and their physicians (Schneider et al. 2004). However, due to the constraints of our data, the adherence barrier could not be stated in our study.

A limitation of this study was the

lack of standard measurements for adherence to post-exposure follow-up. Even though well-established tools for quantifying follow-up adherence had been developed, such as the Morisky Medication Adherence Scale (Al-Qazaz et al. 2010), this tool basically measured adherence to taking medication. Furthermore, the definition of adherence in our study was subjective as the follow-up interval depends on the clinician's judgement, and different patients might be treated differently. Hence, this could result in a treatment bias (Hampton 2002). However, this was minimised by the local post-exposure follow-up guidelines developed by the hospital. A strength of this cross-sectional study was that, it was based on all reported sharps injury cases in Melaka Hospital although the data was collected via convenience sampling. Hence, the finding of this study might represent the population of HCWs in Melaka Hospital during the study period.

Furthermore, information regarding adherence to post-exposure follow-up is still scarce, especially in Malaysia. Therefore, this study fills the knowledge gap pertaining to this area by providing outcome measures of the level of follow-up adherence for the planning of control measures by local authorities.

CONCLUSION

This study provided valuable knowledge and information that contributed to local government practice, specifically health authorities, by guiding priorities and resource allocation for effective control measures in managing occupational sharps injury in Malaysia. Based on our study, paramedics showed an excellent example of HCWs with a higher prevalence of adherence as compared to non-paramedics. However, this work has demonstrated that escalated efforts on awareness and infectious control training highlighting the importance of adherence to post-exposure follow-up need to be strengthened, particularly among doctors who supposedly become examples for other HCWs. The present study also highlighted that the overall prevalence of HCWs adherence was still low. In public health, we advocated people to promote good behaviour and prevention rather than correcting bad behaviour or what we term non-adherence. However, the determinants of follow-up adherence were equally important without neglecting barriers to follow-up adherence. Hence, future research on finding the determinants of follow-up adherence in a local setting is undoubtedly needed.

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