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Applying the Nominal Group Technique for Specifying the Interacting Dimensions Affecting Adherence to Post–Sharps Injury Follow-Up Services

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Abstract

Scale of adherence to post–sharp injury follow-up services among healthcare workers is uncommon compared to medication adherence scale. To develop a novel and culturally adapted scale, stakeholders should be consulted to specify dimensions by deducing it from the existing framework. This study was to demonstrate how health stakeholders were consulted to specify the dimensions.

This study employed two sessions of Nominal Group Technique. Each session consisted of 12 purposive-sampled mixed participants i.e., healthcare managers and providers. A four-step sequential protocol was used for collecting participants' key ideas on what adherence factors in post–sharp injury follow-up services: silent idea generation, round-robin collection, idea clarification, and ranking. Similar ideas were clustered and coded with an appropriate group theme and categorized it into subdimensions. Results: A total of 116 key ideas, yielding 13 and 10 themes in session 1 and 2, respectively. Those themes were coded into 16 sub-dimensions affecting adherence. They were distributed under five emerged dimensions in decreasing order of relative importance: (a) healthcare team and system-related factors; (b) patient-related factors; (c) therapy-related factors; and (d) condition-related factors. These findings guide researchers in developing culturally adapted items for measuring the level of adherence to post–sharp injury follow-up services.

Keywords

nominal group technique, qualitative research, healthcare workers, dimensions affecting adherence, sharps injury

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Scale of adherence to post–sharp injury follow-up services among healthcare workers is uncommon compared to medication adherence scale. To develop a novel and culturally adapted scale, stakeholders should be consulted to specify dimensions by deducing it from the existing framework. This study was to demonstrate how health stakeholders were consulted to specify the dimensions. This study employed two sessions of Nominal Group Technique. Each session consisted of 12 purposive-sampled mixed participants i.e., healthcare managers and providers. A four-step sequential protocol was used for collecting participants' key ideas on what adherence factors in post–sharp injury follow-up services: silent idea generation, round-robin collection, idea clarification, and ranking. Similar ideas were clustered and coded with an appropriate group theme and categorized it into subdimensions. Results: A total of 116 key ideas, yielding 13 and 10 themes in session 1 and 2, respectively. Those themes were coded into 16 sub-dimensions affecting adherence. They were distributed under five emerged dimensions in decreasing order of relative importance: (a) healthcare team and system-related factors; (b) patient-related factors; (c) therapy-related factors; and (d) condition-related factors. These findings guide researchers in developing culturally adapted items for measuring the level of adherence to post–sharp injury follow-up services.

Keywords: nominal group technique, qualitative research, healthcare workers, dimensions affecting adherence, sharp injury

Adherence to periodic post–sharp injury follow-up services at 6 weeks, 3 months and 6 months is vital in bloodborne disease risk management. The services are to ensure the injured healthcare workers (HCWs) are, finally, stratified into bloodborne disease-free status or

disease-positive status over a period of time. Although the risk of Human Immunodeficiency Virus (HIV), Hepatitis C Virus (HCV) and Hepatitis B Virus (HBV) infection are 0.03%, 3% and 30%, respectively (US NIOSH, 2016), determining the injured HCWs disease status is magnanimous. Infected HCWs may jeopardize the patient's quality of care especially if they did not aware of their bloodborne infection status.

HIV infection confirmation takes, relatively, longer time compared to HBV and HCV infection. It is because the time period from exposure to HIV infection to when the body produces enough HIV antibodies to be detected by standard HIV tests varies greatly. Up to 95% of people will have detectable antibodies after 6 weeks, and 99% of people will have detectable antibodies after 3 months (WHO, 2020b). In some individuals, the test may not be positive until 6 months or longer. Therefore, all post-sharp injured HCWs are expected to adhere to the follow-up services. Surprisingly, only 36.8% (Wahab, n.d.) to 72.3% (Fadhli et al., 2018) adhered to the services, according to studies from researchers in central region of Malaysia.

This phenomenon intrigued us on what more could be done to boost the adherence behaviour. Perhaps, having an adherence scale on post-sharps injury follow-up services can gauge the adherence level of the injured HCWs. Hence, we can implement precautionary measures to boost the adherence level. In our limited knowledge, medication adherence scale is commonly cited, revised and re-developed (Chung et al., 2015; Krousel-Ueno et al., 2018; Wood et al., 2009), but not service adherence scale. This motivates us to develop an adherence scale for post-sharps injury follow-up services, explicitly for HCWs. In the light of hope, the scale can be shared in similar culture in South East Asia in near the future.

In developing an adherence scale for post-sharps injury follow-up services, health stakeholders' insights should be sought for specifying the most important interacting dimensions affecting adherence to the service. We are adopting a framework of five interacting dimensions affect adherence to therapy, i.e., social/economic dimension, health care team- and system-related dimension, condition-related dimension, therapy-related dimension, and patient-related dimension (World Health Organization, 2003). These dimensions had an exhaustive list of factors which were believed contributed to adherence. To assist lessening of the factors, nominal group technique (NGT) was used. NGT is one of the tools in qualitative method used to elicit information from the resourceful persons in a dynamic interacting atmosphere. Thus, it allows and encourages all participants (resourceful persons) as in this study they were health care workers, including the health managerial to share their ideas on factors for adherence to post-sharps injury follow-up services.

The generated ideas are then discussed to obtain consensus themes and are ranked in order of priority by individual participants. The NGT allowed equal participation and allowed all opinions to be respectfully and democratically considered, which minimized dominant personalities within a group and limiting the discussion to a single viewpoint. In addition, the NGT facilitated the achievement of clear outcomes, providing participants with a sense of accomplishment while simultaneously requiring less time and resources than other discussion methods (McMillan et al., 2014).

Opinions pertaining factors for adherence to post-sharps injury follow-up services may be influenced by daily job description (e.g., being health managerial post on the top and health provider at ground level). Therefore, it is importance to recognize the diverse opinions of these two groups, particularly those directly managing healthcare workers (HCWs) who have experienced sharps injury. We predict that health provider has closer relationship with the affected HCW workers compared to the managerial post. So, they know better what the specific need/factor is, to improve adherence to post-sharps injury follow-up services. HCW workers are more likely to adhere to follow-up services if the services meet their specific needs.

It is worth paying attention to the needs of HCWs, as they are the most susceptible personnel exposed to sharps injury at work, especially needle stick injury. The Ministry of Health Malaysia reported an overall incidence of six needle stick injuries per 1000 HCWs in 2016 (Ishak, Haque, & Sadhra, 2018). In view of the high burden of patient-centered care, the incidence of sharps injury is rising (U.S. EPINet, 2017). Therefore, the current management of post-sharps injury HCWs is heightened. It includes post-exposure follow-up, counselling, serological testing for bloodborne diseases, e.g., HIV, hepatitis B and C, and availability of post-exposure prophylaxis (PEP) (Occupational Health Unit, 2009).

The present study was aimed at demonstrating how health stakeholders are consulted to specify which interacting dimensions affect adherence to post-sharps injury follow-up services. Hopefully, the exhaustive sub-dimensions lists from the existing framework (World Health Organization, 2003) can be distilled into more a meaningful list. Therefore, a culturally adapted scale can be developed for measuring the adherence level to post-sharps injury follow-up services among HCWs.

Methods and Materials

Study Design, Site and Access, Sampling and Participants

In this study, researchers conducted two NGT sessions during the first quarter of 2019. Each NGT session entailed face-to-face discussion in a small group lasted about 3 hours. There were no subsequent meetings after the session had ended.

We conducted NGT at two different sites of healthcare facilities, specifically, at a seminar room in a district health office for session 1 whilst at a meeting room in a hospital block for session 2. These two locations within 15 km away from each other. The locations were chosen because it was the participants' recruitment location. The access of the participants was obtained from a public health officer-in-charge of state health department which is located in the central region of Malaysia. We recruited all participants with the help of two health middle managers at the district health facility and hospital service. In this study, a purposeful sampling with a convenience strategy was used. The participants were selected purposively based on their level of expertise in their service experiences (Ministry of Health Malaysia, 2007).

At one hand, we recruited 12 participants from a district health facility (which was labelled as session 1) to gain more insight at the post-sharp injury implementation level. On the other hand, 10 participants were recruited from a hospital setting (which was labelled as session 2) to gain insight about managerial perspectives pertaining to managing post-sharp injury. But, additional two house-officers were included because of the higher prevalence of sharps injury among house officers as compared to the national statistics (Ishak et al., 2018; Wahab et al., 2019). The health managers keen to gain some insights from the house-officers on how they wanted to be best managed if they got sharp injury

Overall, each group consisted of a mix of middle managerial healthcare experts and healthcare provider experts. "Managerial healthcare expert" was defined as personnel with experience in managing preventive and curative services for a minimum of 3 year. "Healthcare provider expert" was defined as personnel who had experience providing community health preventive and curative services for a minimum of 3 years. By understanding these two types of diverse job descriptions, we predicted that we would be able to obtain exhaustive ideas from the perspective of healthcare provider and managerial healthcare.

Health provider experts were the majority in session1 (66.7%), whereas managerial healthcare experts were the majority in session 2 (66.7%). Their input may balance the information bias stemming from overstatement or understatement of the post-sharps injury

follow-up service dimensions. Their deep insights were useful for ensuring the diversity of ideas from multiple perspectives. The sample size for each session was deemed adequate, with evidence that prior literature reported between two and 14 participants (McMillan, King, & Tully, 2016). The participants were predominantly female (87.5%) with a median experience of 7 years (IQR: 3, 10).

Data Collection

Preparation Prior to NGT

The participants seating was arranged in a U shape facing the whiteboard display as suggested by the literature (Centers for Disease Control and Prevention, 2006; Dunham, 1988;). The second author acted as a moderator, delivered an opening statement and face-to-face interview script based on a previously published protocol (Dunham, 1988). We had obtained permission to use the protocol. We prepared at least seven pieces of 7.4 cm x 21 cm white papers for each participant to write down their ideas (aka field note) and a large, felt-tipped marker pen. Some 7.4 cm x 21 cm colorful papers were set for thematic labelling purposes.

During NGT Procedures

The moderator did a brief ice-breaking session among participants at the beginning of the NGT session. The participants introduced themselves by name and years of services in recent unit followed by a summary of their job descriptions to establish rapport between the participants and the research team.

The moderator had initiated the NGT by informing set rules of the NGT and reading an opening statement (Appendix A), based on previous guidelines (Dunham, 1988). It was read in the Malay language (Appendix B) to clarify the roles of the participants in the group, objectives of the session, to highlight the importance of each participant's contribution, and to describe how the output would be used to map the identified dimensions and compare them with the existing dimensions found in the literature (World Health Organization, 2003). We adopted the four core phases of NGT (McMillan et al., 2014): (1) silent generation of ideas after the opening statement, (2) round-robin collection of key ideas, (3) clarification of the ideas, and (4) ranking the displayed themes, as described below.

1. Silent generation of ideas:

At the beginning of each NGT session, the moderator read out a question to the group: "In your opinion, what are the factors that determine whether HCWs who experience sharps injury adhere to scheduled post-sharps injury follow-up services?" The participants were given up to 7 minutes, to independently, silently generate and write down key ideas. The participants had been allowed to write down as many individual ideas as possible in response to the question. The participants were instructed to write down their key ideas as keywords, or phrases. One key idea per one 7.4 x 21 cm paper. Facilitator distributed extra 7.4 x 21 cm papers sized to the needed participants. Discussion was not allowed between participants.

2. Round-robin collection of key ideas:

A facilitator collected all written ideas from each participant in a round-robin fashion, and attached the field notes to the whiteboard, which was visible to the entire group. The participants could continue writing down new ideas during this process until all ideas were exhausted. They were required to wait their turn before any new field notes were

3. *Discussion for clarifying the ideas:*

Image 1

The image displays 18 hand-drawn sticky notes on various colored paper, organized into a grid-like structure. The notes are categorized into 10 groups, each with a title on a colored header. The categories are:

- Konseling** (green):
 - Konseling
 - Confidential
 - Keterampilan komunikasi
- Perawatan** (blue):
 - Care
 - Perawatan
 - Perawatan
 - Perawatan
- Perawatan** (red):
 - Perawatan
 - Perawatan
 - Perawatan
- Nurse** (pink):
 - Perawatan
 - Perawatan
 - Perawatan
- Perawatan** (yellow):
 - Perawatan
 - Perawatan
 - Perawatan
- Konseling** (pink):
 - Perawatan
 - Perawatan
 - Perawatan
- Konseling** (green):
 - Perawatan
 - Perawatan
 - Perawatan
- Konseling** (orange):
 - Perawatan
 - Perawatan
 - Perawatan
- Psychosocial** (yellow):
 - Perawatan
 - Perawatan
 - Perawatan
- Follow up** (light green):
 - Perawatan
 - Perawatan
 - Perawatan

Moderator instructed each participant to privately rank the displayed themes on individual ranking sheets in terms of importance by allocating an ordinal number. Smaller numbers reflected greater importance. Although participant anonymity was not possible

during NGT session discussions, the individual numbers on the ranking sheets were made with confidentiality. Each individual ranking sheet was collected, and the scored numbers were recorded in a Microsoft Excel sheet. Finally, the scores for each theme were summed up and projected in front of the participants.

The same NGT protocol was replicated with the other NGT session, which was conducted on the same day. The whole process was audio-recorded using an ICD-UX543F Sony Audio Recorder and field notes.

Data Analysis

Data analysis was performed from the beginning to the end of the NGT process. Key ideas were raised by participants in the silent generation and round-robin stages of each NGT session were then discussed and clustered. The ideas were coded into group themes which were suggested by the participants, and the themes were ranked based on importance. Their relative importance was calculated using the following formula using a Microsoft Excel sheet: *Relative importance* = $[1 - (\text{score for the theme} \div \text{maximum points for the group})] \times 100$.

On a separate occasion, the ranked themes and its respective key ideas were reviewed analyzed by the first two authors. The authors used manifest analysis to describe what the participants actually said, stayed very close to the text data, used the words themselves, and described the visible and obvious in the text data. A literature on interacting dimensions affecting adherence framework (World Health Organization, 2003) was used as guidance for the operational definition for each coding category lead to a list of pre-determined codes development (Appendix C). The NGT's generated themes were coded immediately with the list of predetermined codes because the authors felt confident that initial coding would not bias the identification of relevant text. Data that cannot be coded were identified and analyzed later to determine if they represent a new category or a sub-category of an existing code. Similar style was applied to combined categories between the NGT sessions to become sub-dimensions and dimensions. The sum relative importance for each dimension was calculated. The overall findings were reported adopting to the consolidated criteria for reporting qualitative research (COREQ) checklist (Tong, Sainsbury, & Craig, 2007).

Ethic and Participants Consent

This study employed participants' human rights must be respected during the NGT session. Participants were given enough information during briefing to decide whether they wish to participate or withdraw at any time they wish to do so. Informed consent was obtained from the participants prior NGT procedure. The team recognized that participants had high-quality expert information and deep insight into their own opinion on the dimensions affecting adherence to scheduled post-sharps injury follow-up services. They also had the responsibility of caring for the injured HCWs as well as safeguarding the workers' humanity.

Results

NGT session 1 generated a total of 13 group themes from 58 key ideas (Image 1); in descending rank order (Image 2): 1) treatment, 2) awareness, 3) counselling, 4) management, 5) confidentiality, 6) future protection, 7) link nurse, 8) reminder, 9) psychosocial, 10) fast lane, 11) follow-up, 12) employee's order, and 13) facility. Whilst NGT session 2 generated only 10 themes from 58 key ideas (Image 3); in descending rank order (Image 4, the result were projected in Microsoft Excel): 1) reminder, 2) knowledge, 3) time, 4) wants to know the

outcome, 5) awareness, 6) treatment, 7) standard operating procedure, 8) patient factor, 9) healthcare provider's factor, and 10) enforcement.

Image 2

Themes Ranking by NGT Session 1

A photograph of a whiteboard with a list of 13 themes and their corresponding rankings. The themes are written in blue marker on the left, and the rankings are written in red marker on the right. The rankings are: 10, 6, 13, 5, 8, 12, 7, 4, 1, 2, 3, 9, 11.

1) Fast Lane	10
2) Future Protection	6
3) Fasilitas	13
4) Confidential	5
5) Peringatan	8
6) Arahan Majikan	12
7) Link Nurse	7
8) Pengurusan	4
9) Rawatan	1
10) Kesedaran	2
11) Kaunseling	3
12) Psychosocial	9
13) Follow up	11

Themes and Key Ideas Generated by NGT Session 2

Image 4*Themes Ranking by NGT Session 2*

	A	B	L	M	N	O	P	Q	R
1							RANK		
2	6 Reminder		1	3	7	38	1		
3	8 Knowledge		4	5	2	49	2		
4	5 Time		3	1	4	51	3		
5	7 Wants to know the outcome		2	4	3	64	4		
6	9 Awareness		7	6	8	66	5		
7	1 Rawatan		8	2	1	70	6		
8	2 SOP		9	4	10	72	7		
9	3 Patient factor		6	8	5	77	8		
10	4 Healthcare Provider's factor		5	9	6	84	9		
11	10 Enforcement		10	10	9	86	10		

Image 5*Themes and Key Ideas: Management, Facility, and Fast Lane*

All generated themes from NGT session 1 were coded directly with the list of predetermined codes because it was obvious in the text data except for health services coding category. Management, facility and fast lane themes (Image 5) were coded to health services because the nature of the text data referring to the characteristic of well-functioning health system delivery services i.e., people-centeredness and efficiency (WHO, 2020c). A people-centered approach is characterized by equity in access for everyone, everywhere they need, when and where they need them (WHO, 2020a) were implied by 1) facility with its key idea closeness to workplace (real words: *kemudahan seperti dekat dengan tempat kerja*) and 2)

management with its key idea: simplify the follow up process (real words: *mudahkan proses follow up*). The participants had voiced out the need of the post-sharp injury follow-up services should coordinate around their needs in term of timely care and efficient in giving the care via these themes and its key ideas 1) management theme (i.e., fast action (real words: *tindakan cepat*), and well management (real words: well management); 2) facility (i.e., clean environment (real words: *persekitaran bersih*) and; 3) fast lane (i.e., fast lane, you are our priority (real words: *anda keutamaan kami*) and fast lane treatment).

All generated themes from NGT session 2 were coded directly with the predetermined codes because it was obvious in the text data except for adherence's intervention, level of disability and capacity of self-management coding categories. It was derived from reminder, wants to know the outcome and standard operating procedure themes, respectively (Image 6). Under the theme of reminder, the participants had voiced out phone calls and social network such as WhatsApp group can be used to remind the affected HCWs about appointment date for post-sharp injury follow-up services in timely basis. Adherence's intervention was chosen to code this theme because this was hardly ever done. This is because they are HCWs. They are equipped with enough knowledge and have experiential lifelong learning about the importance of disease treatment. They are expected to plan and do self-managed, appropriately, without the need for a reminder.

Image 6

Themes and Key Ideas: Reminder, Want to Know Outcome, and Standard Operating Procedure

Under the theme of wants to know the outcome, the key ideas represented illness-related information (e.g., source status) and mixed emotion-related to result i.e., curiosity of the result vs. fear of the result status (Image 6). Getting life-changing information about the patient source status is easier compared to getting information about one-self status. HCWs able to predict the source status based on the recorded history of presenting illness and detail contents of a history taking, in addition to tale-tell clinical signs. Fear of getting bloodborne diagnostic test results make them anxious, and they let their imagination run wild. They may imagine a worst-case scenario, when in fact, the test is the best prevention and further treatment

can be initiated. They may adopt self-sabotage actions hence; they do not adhere to post-sharp injury follow-up services which further increase their fear of known (Schweizer & Szech, 2018). The level of disability code was chosen to represent both cognitive and emotion disabilities pertaining to result positivity or negativity rather than the progression of the illness per se. That is why standard operating procedure (SOP) should be existed to give legal direction to HCWs to adopt heroic forward actions rather than contemplating, just thinking what the result of HIV, HBV and HCV infection status would be.

Under the theme of standard operating procedure, the key ideas were good occupational safety and health (OSH) environment, clear flow chart of post-sharp injury follow-up and confidentiality of the status. Good OSH environment was a such strong keyword. This is about how the environment orchestrated by legally-bind requirements can shape the actions of the HCWs. If they do not cooperate with the employer's rules and regulations to protect themselves and others at work, they can be given penalties (DOSH Malaysia, 1994). Flow chart of post-sharp injury follow-up can be created to empower the HCWs on what is the next step to be taken. It should parallel with the OSH rules and regulations. Therefore, the theme of SOP was observed as a measure to enhance capacity of self-management

A total of 11 coding categories for each NGT session theme were formed. Using similar content analysis style, these 11 coding categories were harmonized to form 16 combined categories as sub-dimensions. Finally, only four out of five interacting dimensions affecting adherence emerged from this analysis: healthcare team and system-related factors, patient-related factors, therapy-related factors and condition-related factors.

Figure 1 summarizes the analytical process and its result. Relative importance weighting for each theme were calculated as shown in Figure 1. The generated themes were coded into its respective coding categories as shown in Figure 1.

Figure 1
Summary of analytical process and its results

Discussion

This study we aimed to specify which interacting dimensions affect adherence to post-sharps injury follow-up services, in order to have lesser, meaningful sub-dimensions from a framework of five interacting dimensions affect adherence to therapy. Therefore, a culturally adapted scale can be developed for measuring the adherence level to post-sharps injury follow-up services among healthcare workers (HCWs). Our initial findings showed two diverging thematic rankings between the two NGT sessions. The healthcare provider experts ranked the theme of Treatment as the top priority, whereas the managerial healthcare experts ranked it sixth. In contrast, Reminder was more popular among the managerial healthcare experts (ranked first), but it was ranked eighth by the healthcare provider experts.

The most plausible explanation was that the managerial healthcare experts may have proactive personalities, which would explain why that group placed high priority on the theme Reminder. In contrast, the healthcare provider experts may have reactive personalities, explaining why they placed high priority on the theme Treatment. Managers with proactive personalities tend to identify solutions or actively uncover potential issues before they occur (Xu et al., 2019). For example, in our case, proactive actions may be represented by the utilization of reminder systems prior to the follow-up date to ensure adherence. In contrast, reactive actions only occur after problems have surfaced and warrant attention, which in our case may be represented by the theme Treatment. For example, unlike managers, subordinates may provide treatment or counselling only after the occurrence of a sharp injury event.

Upon clustering the sub-dimensions, we encountered difficulties in deciding whether Counselling should be placed under the theme of Healthcare team and System-related factors (Patient-Provider Communication) or Therapy-related factors (Understanding Instructions). The WHO framework (World Health Organization, 2003) states that counselling is necessary for ensuring adherence to follow-up during the management of HIV patients and that counselling should convey clear therapy-related information (Ministry of Health & Social Welfare Tanzania, 2013). Therefore, we decided to place this theme within the sub-dimension Understanding Instructions, which was later placed within the dimension of Therapy-related factors. Although nearly all of the themes were consistent with theory, our analysis yielded three new themes: awareness, confidentiality, and enforcement (World Health Organization, 2003). Awareness was defined as the “knowledge that something exists or understanding of a situation or subject at the present time based on information or experience” (Cambridge University Press, 2017a). One may be aware before gaining knowledge, and vice versa. Awareness and knowledge are often used interchangeably, although their meanings are conceptually distinct (Trevethan, 2017). In the existing research model, knowledge has been clearly defined under Patient-related factors and Healthcare team and system-related factors (World Health Organization, 2003). However, both NGT sessions clearly emphasized awareness among patients. In addition, there was evidence that awareness shared the same continuum with knowledge, with the latter sitting on the higher end of the continuum (Trevethan, 2017). Therefore, we decided to create a new sub-dimension for Awareness under the dimension Patient-related factors.

For healthcare providers, restricting the circulation of patient information provided to those involved in patient care was viewed as important, which was classified under the theme Confidentiality (Saunders, 2016). Breaches in confidentiality and flaws in the integrity of information can lead to disease stigma (World Health Organization, 2015). Stigmatization with regards to the initiation of PEP might cause HCWs to delay seeking medical attention (Mill, Nderitu, & Richter, 2014). Although disease stigma exists as a patient-related factor, as one of the five dimensions affecting adherence (World Health Organization, 2003) we believe that

confidentiality must first be breached for disease stigma to occur. Therefore, we finally reached a consensus by assigning Confidentiality to a new theme based on our first NGT.

Another new theme discussed was Enforcement, which can be defined as “the process of making sure that people obey something such as a law or rule” (Cambridge University Press, 2017b). Both healthcare providers and managerial healthcare experts from our NGTs believed that this theme can result in plan of execution, and thus determines whether those with sharps injury will adhere to post-exposure follow-up procedures. However, both NGT sessions ranked this new theme the lowest priority.

As the demography of the representative samples differed between groups, with the majority of the first group consisting of healthcare provider experts, whereas the second group primarily consisted of managerial healthcare experts, we expected that the most important themes in the analyses of each group would differ. However, both groups identified similar dimension priorities, generally pertaining to Healthcare teams and system-related factors.

Whereas the NGT session in the hospital setting appeared to focus more on treatment, the NGT session in the district health setting appeared to focus more on health prevention and promotion, such as increasing patient awareness. As the saying goes, “hospitals as the antithesis of community health” (Wright et al., 2002). We found that Awareness was ranked third during the NGT in the district health setting, compared with being ranked fifth during the NGT in the hospital setting. In addition, only three keywords were identified during the NGT session in the hospital, whereas the NGT in the district health setting identified 11 keywords related to the theme Awareness.

When analyzing the dimensions affecting adherence, we found that healthcare team and system-related factors was prioritized the highest, followed by patient-related factors. Our finding contradicts the results of a systematic review examining the patient-reported barriers to adherence, which found that most surveys (76%) measured patient-related barriers (Alghurair et al., 2012). These differences may be due to the fact that, as a developing and an upper middle-income country (World Bank, 2018) the healthcare systems in Malaysia still have much room for improvement.

Surprisingly, our study yielded only four out of the five dimensions affecting adherence proposed by the WHO (World Health Organization, 2003). Social/economic factors were not raised during either NGT meeting. This finding likely indicates that the experts in both NGT meetings did not consider socioeconomic factors to be among the major determinants of adherence to post-exposure follow-up management plans, based on the local cultural background in Malaysia. This result might represent precious information for future researchers when determining whether to include this dimension during studies performed in Malaysia.

Although NGT allows freedom of speech, where ideas may be channeled democratically, inevitably, the prominent figures, for example, a specialist or other higher authority, may influence their subordinates' answers and become prominent over others during the discussion, as they shared similar meeting rooms. However, participants' votes are channeled independently at the end of the discussion without being dominated or influenced by the higher authority. In addition, superiors might recognize their subordinates' handwriting, which may indirectly inhibit the employee from freely conveying their opinions. To overcome this problem, we collected field notes from all participants at once, mixed them up, and presented them as aggregate rather than individual results. While the mixture of healthcare providers and managerial healthcare experts in both NGT sessions may have enriched idea generation, how their votes may have influenced the results remains questionable, as we could not trace from whom each field note came, as they were unlabeled to maintain anonymity. Hence, we suggest that future researchers interested in conducting NGT consider having a

means of tracing participants' identities from their field notes for analyzing how differences in the participants' demography might influence the result.

Conclusion

The stakeholder is a vital contributor to theme construction, hence sub-dimensions specification. We believe that the developed sub-dimensions and its respective dimensions have been validated. In hierarchy, the themes were collated into four interacting dimensions: healthcare team and system-related factors, patient-related factors, therapy-related factors, and condition-related factors. The sub-dimensions and their dimensions are ready for guiding researchers in developing culturally adapted scale items for measuring the level of adherence to post-sharps injury follow-up services.

What Is Already Known?

The nominal group technique (NGT) is one of the simplest tools in qualitative method for eliciting information from the resourceful persons in a dynamic interacting atmosphere.

What Does This Paper Add?

Only four out of five interacting dimensions affecting adherence emerged from this study. The dimension of healthcare team and system-related factors (405.96%) was highly important, followed patient-related factors (383.85%), therapy-related factors (216.03%), and condition-related factors (41.67%). The sub-dimensions and their dimensions are appropriate for guiding researchers in developing culturally adapted scale items for measuring the level of adherence to post-sharps injury follow-up services.

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Appendix A: English Version

NGT Session Meeting (Information Sheet)

Opening Statement:

I would like to thank each of you for attending this NGT session meeting to explore the determinants of adherence with post-exposure follow-up services among healthcare workers who have experienced sharps injury. I welcome you to this meeting and want you to know that I am very happy to have each of you with us today. Our objective is an important one. At the end of this meeting, we will have mapped the potential themes associated with determinants of adherence with post-exposure follow-up services among healthcare workers who have experienced sharps injury to those in the existing literature. During our meeting, it is important that each of us fully participate. Indeed, success will depend on our equal and full participation. Each of us is here as an important group resource. There are no status differences between us in this meeting. Our success depends on every member fully sharing the insights from his or her own work experience perspectives. I appreciate, therefore, the willingness of every one of you to fully share your ideas and to work intensely during the next 60 minutes we will be together. The ideas that you generate during this meeting will become the basis for developing a questionnaire about the determinants of adherence to post-exposure follow-up management plans among healthcare workers who have experienced sharps injury, which will be used in the future. Before we start, perhaps it will be beneficial for us to know each participating member. Please state your name, job title, duration of service in the current unit, history of sharp injury (yes/no), and if yes, adherence to follow-up services (yes/no).

Opening Statement to Start Step 1:

The following is the organizational issue identified for today's session: "In your opinion, what are the factors that determine whether healthcare workers who experience sharps injury will adhere to scheduled post-exposure follow-up services?" I would like each of you to take 7 minutes to list your ideas in response to this question. Describe each idea as a full thought, keywords, or phrases on the worksheet in front of you. Please work independently of other members. During this period of independent thinking, I ask that you not talk to other members, interrupt their thinking, or look at their worksheets. Because this is an opportunity for each of us to prepare his or her contributions to the meeting, I would appreciate intense effort during the next 7 minutes. At the end of the 7 minutes, I will call time and suggest how we can proceed to share our ideas. Are there any questions? Let's proceed then with our individual efforts for the next 7 minutes.

Opening Statement to Start Step 2:

During the last 7 minutes, each of you has used your worksheet to list ideas for dealing with today's issue. Now, I would like to have each of you share your ideas with the other members of the group. This is an important step because our list of ideas will constitute a guide for further discussion, help us understand the richness of the ideas we must work with, and stimulate additional ideas. To accomplish this goal as quickly and efficiently as possible, I am going to go around the table and ask individuals, one at a time, to give me all of their written ideas, summarized in a brief phrase, keywords, or verbatim. After the entire list is on the board, we will have the opportunity to discuss, clarify, and dispute the ideas. If someone else in the group lists an idea that you also had on your worksheet, you need not repeat the idea. If,

however, in your judgment the idea on your worksheet contains a different emphasis or variation, we would welcome the idea. Variations on a theme are important and will help us to be creative. [Turning to the first person in the group, the moderator now asks, “Would you please give me all of the ideas from your list?”]

Opening Statement to Start Step 3:

Now that we have listed our ideas on the board, I want us to take the time to go back and briefly discuss each idea. The purpose of this discussion is to clarify the meaning of each item on the board. It is also an opportunity to express our understanding of the logic behind the ideas and the relative importance of each item. We should feel free to express varying points of view or to disagree. We will, however, want to pace ourselves so that each of the items on the board receives the opportunity for some attention, so I may sometimes ask the group to move on to further items. Finally, let me point out that the creator of the idea being discussed need not feel obliged to clarify or explain an item. Any member of the group can play that role. [Going to the board, the moderator points to the first item and says, “Are there any questions or comments group members would like to make about this first item?” This is then repeated with each idea.]

Opening Statement to Start Step 4:

We have now completed our discussion of the entire list of ideas, have clarified the meaning of each idea, and have discussed the areas of agreement and disagreement. At this time, I would like to have the judgment of each group member concerning the most important ideas on the list. I would like you to determine and rank the most important items from our list of themes. This will require careful thought and effort on your part. As you look at the board and rank a theme which you feel is very important, please record the rank on the given sheet.

Appendix B: Malay Version

Mesyuarat Kumpulan Focus (Maklumat Responden)

Pernyataan Pembukaan:

Saya ingin berterima kasih kepada semua yang menghadiri mesyuarat kumpulan focus ini untuk mengenal pasti penentu kepatuhan kepada temu janji di kalangan kakitangan kesihatan selepas mengalami kecederaan tusukan alatan tajam. Saya mengalu-alukan kehadiran anda ke mesyuarat ini. Pada akhir mesyuarat ini, kami akan memetakan tema berkenaan faktor penentu kepatuhan terhadap perkhidmatan susulan berjadual selepas pendedahan terhadap kecederaan alatan tajam di kalangan anggota kesihatan berdasarkan dapatan kajian kepustakaan. Dalam mesyuarat ini, adalah penting bahawa setiap orang terlibat sepenuhnya bagi memastikan objektif yang dirancang tercapai. Tiada perbezaan status antara kita di dalam mesyuarat ini. Kejayaan mesyuarat ini bergantung kepada sumbangan daripada setiap ahli untuk berkongsi sepenuhnya pandangan dari sudut perspektif pengalaman kerja sendiri. Oleh itu, saya menghargai kesudian setiap orang untuk berkongsi sepenuhnya idea dan bekerja dengan gigih selama 60 minit akan datang. Idea yang tuan puan hasilkan dalam mesyuarat ini akan menjadi asas untuk membangunkan soal selidik mengenai penentu kepatuhan terhadap perkhidmatan susulan di kalangan anggota kesihatan yang mengalami kecederaan tajam untuk kegunaan di masa depan. Sebelum kita mulakan, mungkin adalah bermanfaat bagi kita untuk mengetahui setiap ahli yang mengambil bahagian. Sila perkenalkan nama, jawatan, tempoh perkhidmatan dalam unit semasa, sejarah kecederaan tajam (ya/tidak); sekiranya ya, mematuhi perkhidmatan susulan (ya/tidak).

Pernyataan Pembukaan Untuk Memulakan Langkah 1:

Berikut adalah isu penjagaan kesihatan yang perlu dikenalpasti untuk sesi hari ini: “Pada pendapat anda, apakah faktor-faktor penentu kepatuhan terhadap perkhidmatan susulan berjadual selepas pendedahan terhadap kecederaan alatan tajam di kalangan anggota kesihatan?” Tuan puan diberi masa 7 minit untuk menyenaraikan idea berdasarkan soalan ini. Catat idea tersebut dalam bentuk verbatim, kata kunci, atau frasa pada lembaran kerja di hadapan anda tanpa dipengaruhi oleh ahli-ahli lain. Dalam tempoh ini, saya meminta agar tuan puan tidak bercakap dengan ahli lain, mengganggu pemikiran mereka, atau melihat lembaran kerja mereka. Ini adalah peluang bagi setiap daripada ahli mesyuarat untuk memberikan idea yang bernas. Pada akhir 7 minit, idea tuan puan akan dipungut untuk perkongsian bersama. Adakah terdapat sebarang pertanyaan? Mari kita mulakan sekarang.

Pernyataan Pembukaan Untuk Memulakan Langkah 2:

Tuan puan, 7 minit telah berakhir. Sekarang saya ingin tuan puan berkongsi setiap idea yang ada dengan ahli kumpulan lain. Ini adalah langkah penting kerana senarai idea ini akan menjadi panduan untuk perbincangan selanjutnya dan merangsang idea tambahan. Untuk mencapai matlamat ini dengan cepat dan efisien, pembantu saya akan pergi ke meja dan meminta individu, satu demi satu, memberi semua idea yang bertulis di atas lembaran kerja, dalam bentuk frasa ringkas, kata kunci, atau kata kerja. Setelah seluruh senarai idea ditampal untuk paparan semua, kita akan mempunyai peluang untuk membincangkan, menjelaskan dan mempertikaikan idea-idea tersebut. [Menoleh kepada orang pertama dalam kumpulan, moderator bertanya: “Bolehkah anda memberi saya semua idea yang telah direkodkan dalam kertas anda?”]

Pernyataan Pembukaan Untuk Memulakan Langkah 3:

Sekarang kita telah mempamerkan semua idea-idea di hadapan, saya mahu kita mengambil masa untuk melihat kembali dan membincangkan secara ringkas setiap idea. Tujuan perbincangan ini adalah untuk menjelaskan makna setiap idea di paparkan. Ia juga adalah peluang untuk menjelaskan pemahaman kita tentang logik di sebalik idea serta kepentingan relatif perkara tersebut. Tuan puan boleh menzahirkan secara bebas untuk menyatakan pandangan yang berbeza-beza atau tidak bersetuju dengan idea tersebut. Walau bagaimanapun, saya mahu kita memberi peluang setiap item untuk dinilai dengan adil dan sewajarnya. Oleh yang demikian, pada masa tertentu, saya boleh meminta kumpulan untuk bergerak ke item selanjutnya jika perbincangan melebihi had masa dari yang sepatutnya. Akhir sekali, ingin saya nyatakan bahawa penulis idea yang dibincangkan tidak diwajibkan untuk menjelaskan atau menerangkan item tersebut sekiranya tiada keperluan untuk berbuat demikian. Mana-mana ahli kumpulan yang lain juga boleh memainkan peranan tersebut. [Pergi ke papan, moderator menunjuk ke item pertama dan berkata, “Adakah terdapat sebarang pertanyaan atau komen yang ingin dibuat oleh ahli kumpulan mengenai idea pertama ini?” Hal ini kemudian diulang bagi setiap idea.]

Pernyataan Pembukaan Untuk Memulakan Langkah 4:

Kini, kita telah selesai mengadakan perbincangan untuk keseluruhan senarai idea dan telah menjelaskan maksud bagi setiap idea yang dipamerkan. Kita juga telah mencapai kesepakatan yang baik. Seterusnya, saya ingin mendapatkan undian dari setiap ahli kumpulan mengenai kedudukan idea-idea dalam senarai dari yang paling penting ke yang paling kurang penting. Ianya memerlukan penilaian teliti di pihak tuan dan puan. Seperti yang anda lihat di hadapan, berikan undian pada tema yang anda rasa sangat penting dengan menyatakan nilai kedudukan pada helaian yang diberikan.

Appendix C: A Nomological Network of the Adherence Domains and Constructs

Author Note

The first author, Abdullah Aliff Abdul Wahab, is a Doctor of Public Health, gazette as a Public Health Medicine Specialist. She was directly involved in developing the NGT protocol, guided by a previously published protocol. She moderated the NGT sessions and collected all input using NGT. She had received about 50 hours training in qualitative research in health care from the third author, a Professor of the Department of Social and Development Sciences, Faculty of Human Ecology, Universiti Putra Malaysia (UPM). She relates more to protecting HCWs against all hazards, especially biological hazards, at work. She was a Medical and Health Officer for the first 8 years of her career, subsequently working as a medical lecturer and active researcher for understanding workers' personalities and work environment interactions, and regularly developed occupational health mitigation plans to ensure worker safety, health, and welfare. Espousing the academic and practitioner perspectives, she has about 12 years of experience in occupational health risk assessment and management, in both healthcare and non-healthcare settings. She also has considerable experience in community development work: managing and coordinating occupational health programs for institution and capacity-building, and health promotion and incident command system-related simulations through participatory processes and integrated approaches. These experiences have shaped her reflexivity on the research objective.

The second and corresponding author, Rosnah Ismail, is a medical doctor, a Doctor of Public Health (DrPH) candidate. He acted as a facilitator. He was motivated to perform this research after analyzing a state data in central region of Malaysia. His job scope in investigating and managing HCWs post-sharps injury made him realize that it is vital to specify the adherence factors to the follow-up services. Subconsciously, he began to explore how he could manage HCWs so that they would opt to adhere to the post-sharp injury follow-up services as per national guidelines. He wishes to be able to employ the existing interacting dimensions affect adherence framework and has focused on it to satisfy his curiosity. Please direct correspondence to drrose@ppukm.ukm.edu.my.

The third author, Asnarulkhadi Abu Samah, is a Professor at the Department of Social and Development Sciences, Faculty of Human Ecology, Universiti Putra Malaysia, and past Director at the Institute for Social Science Studies, Universiti Putra Malaysia. He has over 20 years of experience in the field of community development and community work and has been actively involved in community development research, particularly in climate change and human adaptability, and community empowerment. Besides, he is also engaged in education and training on the community work modules for community-based organizations, non-governmental organizations, government agencies, and specializing in qualitative research methodology.

The fourth author, Noor Dalila Inche Zainal Abidin, is a Medical and Health Officer since 2014, also a Doctor of Public Health (DrPH) candidate. She acted as a facilitator. Throughout her journey as Medical and Health Officer, she realized that a worker's health is a vital pillar in a successful organization. The aim of protecting and promoting health at the workplace made her a critical thinker by providing and communicating evidence for action and practice in workers' health. This has shaped her as a researcher and future Public Health Medicine Specialist, forming her reflexivity.

The fifth author, Nurul Asyikin Mustaffa, is a female medical doctor who worked in Occupational Safety & Health Unit, Melaka Hospital, Malaysia. Her experience was basically as an investigator and management of the sharps injury incident besides involved in the National Sharps Injury Surveillance at the workplace. She acts as a liaison officer and ensure relationship between researcher and participant was established prior and during the study commencement.

The sixth author, Halim Ismail, is a Public Health Medicine Specialist with special interest in occupational health. Previously, he worked with Ministry of Health, Malaysia and join Universiti Kebangsaan Malaysia as a lecturer. He was involved in qualitative and quantitative research throughout my work with the university.

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