UNIVERSITI SAINS MALAYSIA
GERAN PENYELIDIKAN UNIVERSITI PENYELIDIKAN
LAPORAN AKHIR

HEALTH AND SAFETY: APPLICATION OF AN INTEGATED MEDICAL RESPONSE PROTOCOL TO IMPROVE CLINICAL WORKFLOW FOR HEALTHCARE SERVICE DURING FLOOD DISASTER IN KELANTAN

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2017

KEMENTERIAN PENDIDIKAN MALAYSIA

FINAL REPORT
GERAN PENYELIDIKAN PENGURUSAN BENCANA BANJIR
Laporan Akhir Skim Geran Penyelidikan Transdisiplinari (TRGS)
Tahun 2015

A. PROJECT INFORMATION

YEAR: 2015

RESEARCH TITLE:

APLLICATION OF AN INTEGRATED MEDICAL RESPONSE PROTOCOL TO IMPROVE CLINICAL WORKFLOW FOR HEALTHCARE SERVICE DURING FLOOD DISASTER IN KELANTAN

THEME CODE:1.0 **SUBTHEME CODE:**
(Please refer attachment)

Please Tick (√)

PHASE:	**01: Pre-Disaster**		**02: During Disaster**	/	**03: Post-Disaster**		
AREA:	**01: Preventive**		**02: Preparedness**		**03: Rescue anf Recovery**	/	
	04:Adaptation		**05: Mitigation**				

START DATE: 1 APRIL 2015
END DATE (EXPECTED): 30 DISEMBER 2015

PROJECT STATUS: COMPLETED

PROJECT LEADER: DR TUAN HAIRULNIZAM BIN TUAN KAMAUZAMAN
I/C / PASSPORT NUMBER:

PROJECT MEMBERS :
(including GRA/RA/RO)

1. DR NIK HISAMUDDIN NIK AB RAHMAN
2. DR CHEW KENG SHENG
3. DR ABU YAZID MD NOH
4. PROF MADYA DR KAMARUL ARYFFIN BAHARUDDIN
5. DR NIK ARIF NIK MOHAMAD
6. DR SHAIK FARID ABDULL WAHAB
7. DR ANDEY RAHMAN
8. DR YAN NAING HTUN
9. DR SHAHARUDIN SHAH CHE HAMZAH
10. DR MOHAMAD ZIKRI AHMAD

B. PROJECT ACHIEVEMENT *(Prestasi Projek)*

ACHIEVEMENT PERCENTAGE				
Project progress according to milestones achieved up to this period	**0 - 25%**	**26 - 50%**	**51 - 75%**	**76 - 100%**
Percentage (please state #%)				100%

RESEARCH OUTPUT		
Number of articles/ manuscripts/ books *(Please attach the First Page of Publication)*	**Indexed Journal**	**Non-Indexed Journal**
	3	
Conference Proceeding *(Please attach the First Page of Publication)*	**International**	**National**
Intellectual Property *(Please specify)*	BORANG SOALSELIDIK TAHAP PENGETAHUAN, SIKAP DAN AMALAN PENGURUSAN PESAKIT SEMASA BENCANA BANJIR (FloodDMQ-BM) - Intelectual Property Cooperation of Malaysia number: LY2016001283	
Number and title of Policy Paper / SOP / Technology Solution *(Please specify)*	1. 2. 3.	

HUMAN CAPITAL DEVELOPMENT					
Human Capital	**Number**				**Others** (please specify)
	On-going		**Graduated**		
Citizen	Malaysian	Non Malaysian	Malaysian	Non Malaysian	
No. PHD STUDENT					
Student Fullname: IC / Passport No: Student ID: Date of appointment:					
No. MASTER STUDENT					
Student Fullname: IC / Passport No: Student ID: Date of appointment:	1. MOHD FAQROLL BIN MOHD FUDZI I/C: 830704075493 STUDENT ID: PUM0143/14 DATE OF APOINTMENT: 1 JUNE 2014 2. MOHD NAJIB BIN ABDUL GHANI				

Conference Proceeding *(Please attach the First Page of Publication)*	**International**	**National**
	-	-
Intellectual Property *(Please specify)*	-	

HUMAN CAPITAL DEVELOPMENT					
Human Capital	**Number**				**Others** (please specify)
	On-going		**Graduated**		
Citizen	Malaysian	Non Malaysian	Malaysian	Non Malaysian	
No. PHD STUDENT					
Student Fullname: IC / Passport No: Student ID: Date of appointment:					
No. MASTER STUDENT					
Student Fullname: IC / Passport No: Student ID: Date of appointment:	MOHD FAQHROLL MUSTAQIM BIN MOHD FAUZI MOHD NAJIB BIN ABDUL GHANI				
No. UNDERGRADUATE STUDENT					
Student Fullname: IC / Passport No: Student ID: Date of appointment:					
Total					

C. EXPENDITURE *(Perbelanjaan) as Borang K1(RMC)*

Budget Approved *(Peruntukan diluluskan)* :
Amount Spent *(Jumlah Perbelanjaan)* :

Balance *(Baki)* :
Percentage of Amount Spent :
(Peratusan Belanja)

D. SUMMARY OF RESEARCH FINDINGS *(Ringkasan Penemuan Projek Penyelidikan)*

In the phase 1 of the study Focus Group Discussion and Elite Interviews among healthcare providers were carried out to determine factors and limitations of effective patient management during flood disaster in Kelantan. Themes commonly emerged from the discussions to saturation were:

1. Radio amateur will be used as alternative to Governmental Interagencies Radio Network (GIRN) during flood disaster.
2. Radio amateur will be coordinated by USM
3. Jabatan Kesihatan Negeri Kelantan (JKNK) to set up dedicated talkgroup for MEDEVAC during disaster.
4. USM should be included in the Kelantan State health response flood committee.
5. HUSM to be the venue for state level flood disaster command center.
6. Representatives of each agencies should place a liason officer at the state command center.
7. There is a need to have dedicated helicopter for patient transfer.
8. There is a need for communication between pilot and officer at landing point.
9. There is a need for patient holding area at helicopter landing point.
10. There is a need for integrated protocol for patient handling.
11. There is a need for action cards for key personnel.
12. There is a need for satelite treatment area to reduce hospital burden.
13. Clean water and electricity should be adequate at district hospital.
14. Disaster prone area should place ambulance at dry area once flood warning issued.
15. E-banjir is the best mechanism of river water level monitoring and alert mechanism.
16. NGO and healthcare volunteer should be coordinated by a dedicated person at state command center.

E. PROBLEMS / CONSTRAINTS IF ANY *(Masalah/ Kekangan sekiranya ada)*

1. Project leader receive fund into research account quite late hence FGD and elite interview (phase 1) was started towards the end of April.

Date : 30/6/2015
Tarikh

Project Leader's Signature:
Tandatangan Ketua Projek

F. COMMENTS, IF ANY/ ENDORSEMENT BY RESEARCH MANAGEMENT CENTER (RMC)
(Komen dan Pengesahan oleh Pusat Pengurusan Penyelidikan)

.....

.....

.....

Name:
Nama:

Signature:
Tandatangan:

Date:
Tarikh:

Pejabat Pengurusan & Kreativiti Penyelidikan
Universiti Sains Malaysia

END OF REPORT

Project Title: APPLICATION OF AN INTEGRATED MEDICAL RESPONSE PROTOCOL TO IMPROVE CLINICAL WORKFLOW FOR HEALTHCARE SERVICE DURING FLOOD DISASTER IN KELANTAN

A. PROJECT INFORMATION

Start Date	: 01/04/2015
End Date	: 31/12/2015
Extension Date	: 31/04/2016
Project Status	: Completed
Project Leader	: **DR TUAN HAIRULNIZAM BIN TUAN KAMAUZAMAN**
I/C Number	:
University	: Universiti Sains Malaysia
Address	: Department of Emergency Medicine, Universiti Sains Malaysia, Kubang Kerian, 16150, Kelantan
Contact number	:
Project Members	: Assoc Prof Dr Nik Hisamuddin Nik Ab Rahman Shaharuddin Shah Che Hamzah Dr Chew Keng Sheng Assoc Prof Dr Kamarul Aryffin Baharudin Dr Shaik Farid Abdull Wahab Dr Abu Yazid Md Noh Dr Yan Naing Htun Dr Andey Rahman Dr Nik Arif Nik Mohamad

B. PROJECT ACHIEVEMENT

Project Progress	: 100% completed
Research Output	: Indexed Journal (3), Intelectual Property (1) Conference Proceedings (2), Book (1).
Talent	: Mohd Najib Abdul Ghani (MMed) Mohd Faqhroll Mustaqim Muhd Fudzi (MMed)

C. EXPENDITURE

Budget Approved	:
Amount Spent	:
Balance	:
% of Amount Spent	:

SUMMARY OF RESEARCH FINDINGS

1.0 Introduction

Kelantan had experienced the worst flood disaster in December 2014, since the major floods of 1927 and 1967. It was caused by heavy rainfall intensity and duration pummeled by the Northeast monsoon and the man use of river catchment areas [1]. It was considered a 'Tsunami-

like' disaster displacing almost 202,000 victims over a period of five days. The flood left healthcare facilities badly crippled and patients were not able to receive urgent medical treatment in timely manner because most of the health facilities were located at the major Kelantan river basin. There were two major hospitals in Kota Bharu of which Hospital Raja Perempuan Zainab II (HRPZII) was badly affected leaving Hospital Universiti Sains Malaysia (HUSM) as the only functioning referral hospital in the whole of Kelantan during the flood period. This was compounded by haphazard medical response among medical and non-medical personnel of various agencies during the response phase of the disaster due to existence of many disaster protocols in place that varied widely in terms of definition and workflow. None of these protocols were specific to medical management during flood disaster in Kelantan [1]. We carried out a study to investigate the effect of a proposed integrated medical protocol (IMP) on the knowledge, attitude and practice (KAP) of healthcare providers in Kelantan, Malaysia. IMP is a flood disaster response protocol pertaining to patient management during the response phase of flood disaster in Kelantan. It was written based on various disaster response protocol by various agencies involved in patient management during the disaster as well as findings from focus group discussion (FGD) among healthcare providers (HCP) involved in patient management during response phase of flood disaster in Kelantan [2]. The specific objectives of this study were (1) to investigate real-life issues of patient management during flood disaster in Kelantan (2) to develop and validate a questionnaire measuring KAP of healthcare providers involved in patient management during flood disaster in Kelantan and (3) to investigate the effect of IMP on the knowledge, attitude and practice (KAP) of healthcare providers in Kelantan, Malaysia.

2.0 Methodology

There were 3 phases to the study. In phase 1, a qualitative study was carried out to investigate the issues of patient management during the response phase of flood disaster in Kelantan, Malaysia since little is known or documented on this issues [3]. We conducted a FGD and a subsequent Elite Interviews (EI) among various agencies workers to extract responses to three predetermined categories namely policies, communication and patient transportation. Respondents who involved in patient management during flood disaster in Kelantan were recruited into the FGD session by convenience and snowballing sampling to identify additional potential participants [4]. All responses were audio recorded and translated verbatim. Content analysis included identifying, coding, and categorizing participants' response. Any issues that need further clarifications were followed up in a semi-structured interview for triangulation [3]. Data collection ended once saturation had been achieved in both FGD and EI sessions.

In the next phase, a questionnaire measuring knowledge, attitude and practice of HCP in managing patient during response phase of a flood disaster (FloodDMQ-BM©) was developed and validated. The questionnaire development consisted of generation of questionnaire items, content validation and face validation [5,6]. The psychometric assessment involves Exploratory Factor Analysis (EFA) and Item Response Theory (IRT) analysis. Expert panels were tasked to develop items based on 4 issue domains (1) communication (2) transportation (3) standard operating procedure (SOP) and (4) alert system. The questionnaire was written in Bahasa Malaysia language. There were 4 sections to the questionnaire (1) demographic data (2) knowledge (3) attitude and (4) practice where each section of the knowledge, attitude and practice contained items reflecting all four issue domains. Construct validation was done to measure underlying hypothetical concepts of the questionnaire [7]. A total of 150 staffs involved

in patient management during flood disaster consented to participate in the study. They were asked to answer the questionnaire. Principal axis factoring method was used to extract the factors. The knowledge dichotomous response items were analysed by 2-parameter logistic (2PL) model of IRT.

In the final phase of the study a randomized controlled trial (RCT) was conducted to investigate the effect of IMP on the knowledge, attitude and practice (KAP) of HCP involved in patient management during response phase of flood disaster in Kelantan. All HCP were randomized via simple randomization into control group receiving standard disaster protocol and intervention group receiving IMP. Participants were required to complete FloodDMQ-BM© before and after a flood disaster table top exercise held at a predetermined date. Analysis was performed on intention-to-treat basis. Between-group analysis of variables was conducted using one-way analysis of variance (ANOVA) and reported in terms of means and standard deviations with 95% confidence intervals (CI). A two-way repeated measures ANOVA was conducted to determine whether there was a significant difference between control and intervention group in knowledge, attitude and practice mean scores measured at two time-points as well as the resulting two-factor interaction of group and time.

3.0 Results and Discussion

3.1 Focus Group Discussion results

Thirty eight participants were recruited in to the FGD session. Twelve participants were assigned to the communication group, 12 to the transportation group and the remaining 14 participants to the SOP group. The main themes emerged from the thematic analysis interview transcript of the communication group were unreliability of Government Integrated radio Network (GIRN) during flood disaster and Radio Amateur suggested as an alternative to GIRN. Participants were unfamiliar with air transportation protocol for Madevac cases and suggested patient triaging to be done at landing point (LP). Regarding SOP, participants were unsure of how to utilize existing flood warning system to aid clinical decisions, flood coordination center being relocated quite often, healthcare volunteer were not coordinated and existing SOP lacking specificity to flood disaster in Kelantan.

3.2 FloodDMQ-BM© validation

Out of 150 questionnaires distributed for construct validation of FloodDMQ-BM©, 131 applicants responded to this study yielding an 87% response rate. Based on eigenvalue value of 7.1, observation of scree plot and cumulative percentage of variance of 54.6%, only one factor determined in the attitude section. All the items in the attitude section had factor loading of more than 0.5 and were retained. The internal consistency via Cronbach's alpha coefficient was 0.925. Based on eigenvalue value of 7.063, observation of scree plot and cumulative percentage of variance of 58.85%, only one factor determined for the practice section. All 12 items in practice section had factor loading of more than 0.5 and were retained. The internal consistency via Cronbach's alpha coefficient was 0.935. Based on 2PL model using IRT assessment of the knowledge section, item K5 and item K12 had a negative discrimination estimate of -0.04 and -0.13 respectively while item K8 had an extreme difficulty estimate of 91.48. These items were subsequently removed. The IRT analysis of the remaining items is summarised in Table 1. Item K7 had a high difficulty estimate of 6.88 and low standardized loading value of 0.34 but was retained as it was important to assess knowledge. Two-way marginal fit for the finalized items in

knowledge section had residues less than 4 and considered a good fit at 5% significant level [8]. The overall model data fit was adequate with a Root Mean Square Error of Approximation (RMSEA) value of 0.086 and statistically non-significant of S-*X2* [9,10]. All of the items had good standardized loading ranging from 0.3 to 0.9 and marginal reliability of 0.623. There are finally 9 items retained in the final model of the knowledge section.

Table 1: Item Response Theory parameters estimate of items of the knowledge section of the FloodDMQ-BM

	Item parameters			S- *X2* fit index		
Item after removal	Difficulty (SE)	Discrimination (SE)	Standardized loading	*X2*	df	*P*
K1	0.30 (0.20)	1.24(0.50)	0.78	6.9689	2	0.0307
K2	-0.73(0.21)	1.92(0.78)	0.89	1. 1329	2	0.5675
K3	-0.77(0.20)	2.07(0.78)	0.90	10.7892	2	0.0045
K4	3.30(2.32)	0.46(0.34)	0.42	3.2992	3	0.3477
K6	1.93(0.73)	1.43(0.85)	0.82	6.3548	2	0.1702
K7	6.88(8.10)	0.37(0.45)	0.34	6.7194	3	0.0814
K9	4.03(2.71)	0.73(0.56)	0.59	0.5879	2	0.7453
K10	1.82(0.94)	0.60(0.33)	0.52	2.0620	3	0.5596
K11	0.38(0.26)	0.86(0.34)	0.65	6.3548	3	0.0956

RMSEA = 0.086, M2=52.67, TLI-0.62, CFI=0.72

Abbreviations: S- *X2*=Standardized *X2*, RMSEA =Root Mean Square Error of Approximation, TLI=Tucker-Lewis Index, CFI= Comparative Fit Index

3.3 RCT results of IMP effect on HCPs' KAP

Out of 132 participants, a total of 120 were eligible to participate in third part of the study. Sixty candidates were allocated in each group of control and intervention. However, 13 were lost to follow-up and 5 had missing data and were not included in the analysis. Therefore, only 102 respondents were included in the final analysis giving a response rate of 85%.

3.3.1 Knowledge score

Among control group, the mean knowledge score between pre and post intervention is significantly difference ($p<0.001$, 95% CI -2.99,-1.54). We observe that the mean (SD) knowledge score after intervention is higher than pre-intervention [3.13 (1.51) vs 5.40 (2.10)]. This shows that the knowledge level has improved even without intervention (72.5 % increment). Among intervention group, the mean knowledge score between pre and post intervention is significantly difference ($p<0.001$, 95% CI -4.26, -2.90). We observe that the mean (SD) knowledge score after intervention is higher than pre-intervention [2.98 (1.50) vs 6.56 (1.69)]. This shows that the knowledge level has improved after intervention (120 % increment).

3.3.2 Attitude score

Among control group, the mean attitude score between pre and post intervention is not significantly difference ($p=0.924$, 95% CI -1.96, 2.16). We observe that the mean (SD) attitude score after intervention is not much different than pre-intervention [46.43 (4.55) vs 46.33 (4.82)]. This shows that the attitude score does not show much improvement. Among intervention group, the mean attitude score between pre and post intervention is significantly difference ($p=0.001$,

95% CI -3.37, -0.91). We observe that the mean (SD) attitude score after intervention is higher than pre-intervention [48.26 (4.28) vs 50.40 (1.28)]. This shows that the attitude level has improved after intervention (4.4 % increment).

3.3.3 Practice score

Among control group, the mean practice score between pre and post intervention is significantly difference ($p<0.001$, 95% CI -15.87,-11.24). We observe that the mean (SD) practice score after intervention is higher than pre-intervention [31.13 (6.62) vs 44.69(3.91)]. This shows that the practice level has improved even without intervention (43.56 % increment). Among intervention group, the mean practice score between pre and post intervention is significantly difference ($p<0.001$, 95% CI -16.85, 11.10). We observe that the mean (SD) practice score after intervention is higher than pre-intervention [31.54 (9.93) vs 45.52 (3.12)]. This shows that the practice level has improved after intervention (44.32 % increment).

3.4 Multivariable analysis

Table 3 shows the comparison of knowledge, attitude and practice scores on Integrated Medical Protocol (IMP) between the two groups based on time using Repeated Measure Anova.

Table 3 Comparison of knowledge, attitude and practice scores on Integrated Medical Protocol (IMP) between the two groups based on time using RMA

Variables	Group	Time	Mean score (SD)	95% CI	p-value*
Knowledge	Control	Pre	3.10 (1.50)	(2.68, 3.52)	<0.001
		Post	5.43 (2.12)	(4.84, 6.03)	
	Intervention	Pre	2.98 (1.51)	(2.55, 3.41)	<0.001
		Post	6.56 (1.69)	(6.08, 7.04)	
Attitude	Control	Pre	46.43 (4.55)	(45.15, 47.71)	0.924
		Post	46.33 (4.82)	(44.98, 47.69)	
	Intervention	Pre	48.26 (4.28)	(47.05, 49.48)	0.001
		Post	50.40 (1.28)	(50.04, 50.76)	
Practice	Control	Pre	30.98 (6.59)	(29.13, 32.83)	<0.001
		Post	44.67 (3.94)	(43.56, 45.78)	
	Intervention	Pre	31.54 (9.93)	(28.72, 34.36)	<0.001
		Post	45.52 (3.12)	(44.63, 46.42)	

*Two-way Repeated measures ANOVA (RMA)

There is a significant change of knowledge score over time [$F(1, 100 = 138.34)$, $p<0.001$]. There is significant interaction between group and time [$F(1,100= 6.95)$ $p=0.010$]. Based on F test, $p=0.035$ ($p<0.05$), hence, there is overall mean difference by group (control and intervention) on knowledge score. There is no significant change of attitude scores over time [$F(1,99)= 2.90$], $p=0.092$ ($p>0.05$). There is no significant interaction between group and time [$F(1,99)= 3.49$], $p=0.065$ ($p>0.05$). Based on F test, $p<0.001$, hence, there is overall mean difference by group (between control and intervention) on attitude score.

There is a significant change of practice score over time [$F(1,100)= 226.56$, $p<0.001$. There is no significant interaction between group and time [$F(1,100)=0.053$], $p=0.818$ ($p>0.05$). Based

on F test, p=0.491 (p>0.05), hence, there is no overall mean difference by group on practice score.

4.0 Conclusion

4.1 Issues of transportation during flood disaster in Kelantan include unclear air transportation protocol, inadequate fuel storage, patient triaging at LP and unknown proper LP coordinate.

4.2 Issues of communication during flood disaster in Kelantan include unreliability of GIRN and radio amateur as a good alternative to GIRN.

4.3 Issues of SOP during flood disaster in Kelantan include inconsistent definitions in various response protocols, protocols not specific to managing patients during response phase of flood disaster in Kelantan and unclear interpretation of alert system parameters into medical decision.

4.4 FloodDMQ-BM© is a reliable and validated tool to measure KAP of HCP managing patients during a flood disaster.

4.5 IMP has significant improvement on HCPs' knowledge, attitude and practice of patient management during flood disaster in Kelantan.

5.0 Based on F test, p<0.001, hence, there is overall mean difference by group (between control and intervention) on attitude and knowledge scores.

References

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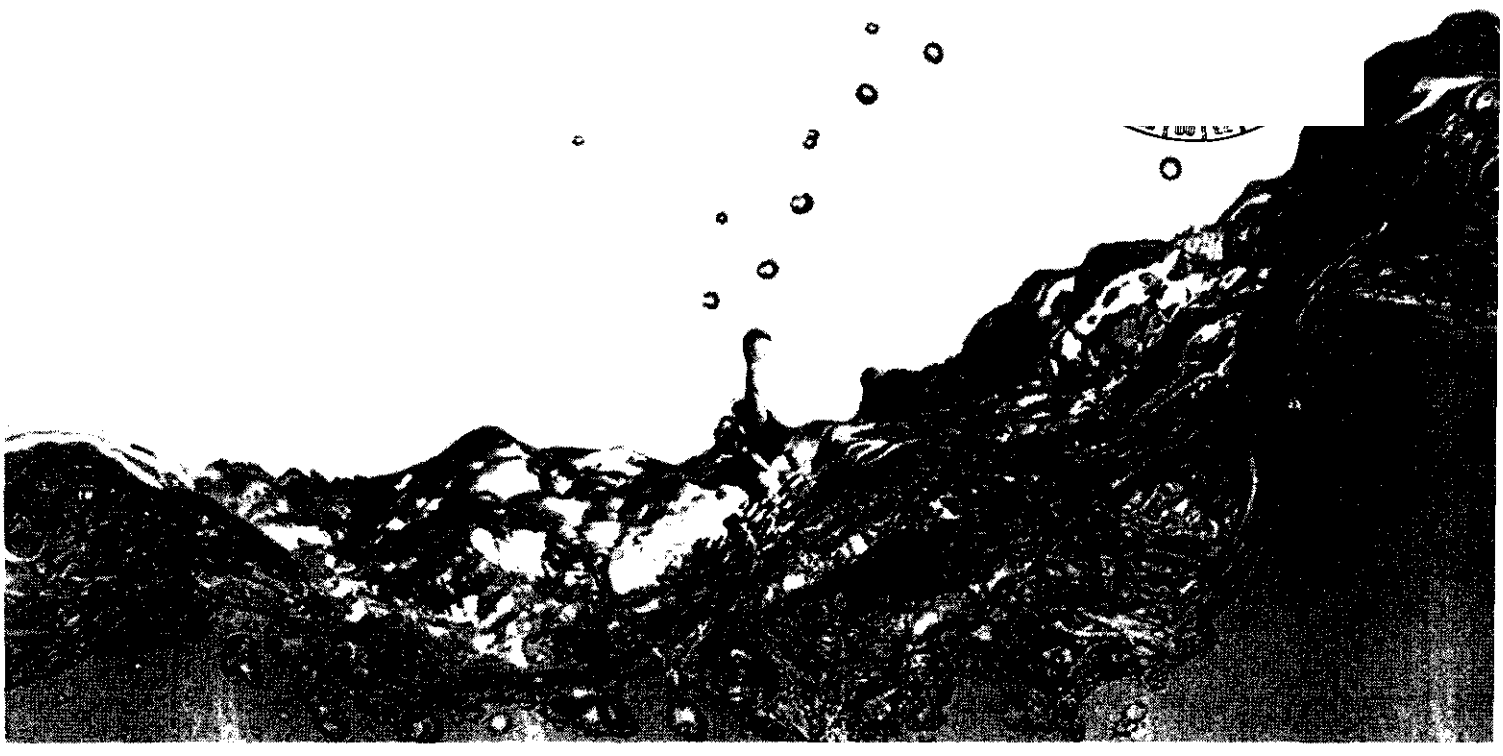
PROTOKOL PERUBATAN BERSEPADU PENGURUSAN PESAKIT SEMASA BENCANA BANJIR DI KELANTAN

TUAN HAIRULNIZAM TUAN KAMAUZAMAN



© Protokol Perubatan Bersepadu Pengurusan Pesakit Semasa Bencana Banjir di Kelantan

Edisi Pertama

Novermber 2015

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Hakcipta terpelihara. Tidak dibenarkan mengeluar ulang mana-mana bahagian penulisan, ilustrasi dan isi kandungan buku ini dalam apa jua bentuk sama ada secara elektronik, fotokopi, mekanik, rakaman atau cara lain sebelum mendapat kebenaran bertulis daripada penerbit.

Penyunting/Penulis:
Tuan Hairulnizam Tuan Kamauzaman

Diterbit dan diedarkan oleh:
Pusat Pengajian Sains Perubatan
Universiti Sains Malaysia
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Kota Bharu, Kelantan

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DEVELOPMENT AND PSYCHOMETRIC EVALUATION OF FLOOD DISASTER MANAGEMENT QUESTIONNAIRE-(FloodDMQ-BM): EXPLORATORY FACTOR ANALYSIS AND ITEM RESPONSE THEORY ANALYSIS

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ABSTRACT

Background: Flood catastrophe has a major impact on healthcare service in Malaysia. However, there is no validated tool to measure the knowledge, attitude and practice of flood disaster management among healthcare providers involved in the response phase of a flood disaster in Malaysia.We aim to develop and validate a questionnaire in Bahasa Malaysia (FloodDMQ-BM) to measure the level of knowledge, attitude and practice of flood disaster management among healthcare providers.

Materials and Methods: The questionnaire was developed based on four domains: standard operating procedure, transportation, alert system and communication. Psychometric analyses were tested on healthcare providers involved in patient management during flood disaster in Kelantan. The hypothetical concept of the items in attitude and practice sections was assessed using Exploratory Factor Analysis (EFA) and internal consistency reliability. The knowledge section were analysed using 2-parameter logistic model of Item Response Theory.

Result: 36 items were generated for FloodDMQ-BM.For both the attitude and practice items, the EFA have good factor loading (>0.5) and satisfactory internal consistency of 0.925 and 0.935 respectively. The remaining items in the knowledge section have good marginal fit and adequate Root Mean Square Error of Approximation of 0.08. All the remaining items have good standardized loading (>0.3) and marginal reliability of 0.623.

Conclusion: The results suggested that the FloodDMQ-BM has valid and reliable psychometric properties.

Keywords: Flood, disasters, questionnaire, psychometric, healthcare providers