EMERGENCY MEDICAL SERVICES: SAFETY AWARENESS BETWEEN TEACHING AND PUBLIC HOSPITAL

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Abstract. Increased in demand from the public for a better Emergency Medical Services (EMS) have alert the Malaysia Ministry of Health to increase the quality of this services as it act as a frontline. Emergency medical provider deals with any patient from their homes and street to the hospital door in pre-hospital care, from the non-critical to the most critical cases in the department, and for society from all strata of life. In order to give the best service and as a frontline medical provider, acquiring a very good safety culture in the workplace is important so that they can serve and give the best services to the patient. The purpose of this article is to identify the safety awareness in workplace between teaching and public hospital at emergency medical services provider. This paper also offers a review of work culture in EMS as a frontline of the medical services. Results of the survey later will be explained by the statistic provided. This will serve as a guideline for emergency medical provider on the knowledge about the importance of safety awareness at the workplace.

Keywords: Emergency Medical Services (EMS), safety awareness, teaching hospital, public hospital.

1. Introduction

The concept of emergency medical health care systems in Malaysia has existed since the 1950s. As in other countries in Asia, their functions and important contributions to the overall healthcare system have been much underestimated compared to other specialties. As for Malaysia, this services only came a little bit later, and still in an early phase of development, but have improved significantly over the last 10 years since the start of an Emergency Medicine physician training program [1]. Increased in demand from the public for better emergency medical services have alert the Ministry of Health to increase the quality of this services as it perform as a frontline. Emergency medical provider deals with any patient from their homes and street to the hospital door in pre-hospital care, from the non-critical to the most critical cases in the department, and for society from all strata of life [1]. As a frontline medical provider, the emergency medical team (EMT) has to give as best services as possible. In order to give the best service, they ought to have a very good culture in the workplace so that they can serve the patients and give the best service to their patients.

Safety experts believe that patient safety begins with the enforcement of system safety of healthcare organizations [2-4]. Thus, an organization's safety culture is a fundamental factor that influences system safety. Safety culture is typically defined as "the shared attitudes, beliefs, values and assumptions that underlie how people perceive and act upon safety issues within their organizations [5]. The term "safety climate" generally refers to the outward expression or measurable components of "safety culture" such as management behaviours, safety systems, and employee perceptions of safety [6]. Although the exact meanings of "safety culture" and "safety climate" are different, these two terms have been used interchangeably in daily work and in previous studies [3]. However, the focus of this study was on hospital's safety culture awareness at the Emergency Medical Services (EMS).

2. Literature Review

2.1. Safety in Healthcare

In any industry, most safety management is about minimizing accidents to workers. Although, some sectors such as transportation, nuclear power generation or food production acquire most safety management, however, the public is also at risk. In healthcare industry it is not only patients who are injured, but also the medical team can be affected too. Malaysian Trades Union Congress Vice-President, Mr. Balasubramaniam had mentioned in his talk during International Commemoration Day for Dead and Injured Workers, that "workplace-related accidents in Malaysia have continued to rise, with 57,639 cases reported in 2010 compared with 55,186 in 2009" [7]. According to a statistics of occupational accident prepared by Malaysia Department of Occupational Safety and Health for 2011, public service was the 3rd highest ranking followed by agriculture and manufacturing. The level of workers well being (in terms of physical or mental health) do affect the rate of adverse events for patients. Yassi and Hancock [9] described a number of studies showing that interventions designed to reduce health care worker's injuries and illness also have positive effect on patient safety.

Wide variation in workplace safety culture is not surprising given that the EMS work environment contains many threats to patient and safety provider [10]. Suyama, et al. [11] showed that in one urban environment, injury rates associated with lost time at work were higher among paramedics and EMTs than fire and police. Other studies showed that many EMS personnel often deviate from written protocols, fail to properly secure patient airways, experience high levels of stress and burnout, suffer from poor sleep quality and high fatigue, and have a questionable commitment to the profession. When combined, these factors may surface as non positive perceptions of worker safety culture [10].

2.2. Measuring safety culture in healthcare

Safety climate surveys are now being used to measure the safety culture of healthcare organizations and a number of research studies have been published. According to Patterson, et al. [10], safety culture can be assessed using psychometric questionnaire that measure collective attitude of personnel within the organization. High risk business, e.g. aviation industry has regularly evaluated employee's safety attitude and their organizational safety culture. Healthcare organizations are now becoming increasingly aware of the importance of measuring and transforming organizational culture to ensure patient safety. Lee, et al. [3] mentioned in his study that there were strong association between safety culture and healthcare worker's safety behaviours (collaboration, safety training, and adverse event reporting), which are closely linked to patient safety. Measuring the safety culture is inexpensive, sustainable and has the inherent value of being a 'leading' rather than a 'lagging' indicator of safety.

McCaughey, et al. [12] in his study mentioned that workplace-derived injury and illness are associated with poor perceptions of safety climate, and that perceptions of safety climate mediate the relationship between workplace-derived injuries and sick days and three outcomes variables (job stress, turnover intention and job satisfaction).

The most commonly used and rigorously validated tool to measure safety culture is Safety Attitude Questionnaire (SAQ) [13]. Sexton, et al. [14] mentioned that SAQ is a psychometrically sound instrument for assessing six safety-related climate domains by systematically eliciting input from front-liner caregivers. The six domains which included in SAQ are safety climate, teamwork climate, working conditions, stress recognitions, perception of management, and job satisfaction.

Historically, the SAQ is a refinement of the Intensive Care Unit Management Attitudes Questionnaire which was derived from a questionnaire widely used in aviation, the Flight Management Attitude (FMAQ). The FMAQ was created after researchers found that most airlines accidents were due to breakdown in interpersonal aspects of crew performance such as teamwork, speaking up, leadership, communication and collaborative decision making. The FMAQ later have

been adapted for and validated in a range of medical setting such as ambulatory care, the operating room, the ICU and skilled nursing facilities [10].

2.3. Operational definitions

For the purpose of this study, the researchers have identified and defined several terms based on previous studies. Safety culture of an organization is defined as the product of individual and group values, attitudes, perceptions, competencies and patterns of behaviour that determine the commitment to, and the style and proficiency of an organization's health and safety management.

Emergency Medical Service (EMS) is defined as a network of services coordinated to provide aid and medical assistance from primary response to definitive care, involving personnel trained in the rescue, stabilization, transportation, and advanced treatment of traumatic or medical emergencies. Meanwhile, Emergency Medical Team (EMT) is defined as a person trained and certified to appraise and initiate the administration of emergency care for victims of trauma or acute illness before or during transportation of victims to a health care facility.

Public tertiary hospital is defined as specialized consultative care, usually on referral from primary or secondary medical care personnel, by specialists working in a centre that has personnel and facilities for special investigation and treatment. Likewise, teaching hospital is generally understood as a centre of secondary or tertiary care in a major city that is affiliated with a medical school, often with a large academic department and a reputation for excellence in research.

There are six domains used in this study namely safety climate, teamwork climate, perception of management, working condition, stress recognition and job satisfaction. The researchers defined safety climate as a perception of strong and proactive organizational commitment to safety. Teamwork climate is identified as a perceived quality of collaboration between personnel. Meanwhile, perception of management is identified as an approval of managerial action. Moreover, working condition is defined as perceived quality of work environment and logistical support (staffing, equipment). Next, stress recognition is identified as an acknowledgment of how performance is influenced by stressors. Finally, job satisfaction is defined as positivity about the work experience.

3. Methods

3.1. Study design

This study performed a cross-sectional survey of two EMS hospitals which is a teaching and a public tertiary hospital in Kelantan.

3.2. Study Setting and population

The researchers administered the survey instrument to two selected EMS providers located in Kelantan. All paramedics and Emergency Medical Team (EMT) in Emergency Department at the working place were eligible and therefore were asked to complete the survey. All Emergency Medical Team staff in Emergency Department at the time of data collection included in the study was doctors, paramedics, staff nurses, medical assistants, attendants and drivers.

3.3. Study Protocol

To conduct the study, the researchers called up the Head of Emergency Department to explain the purpose of the study and the intention to include his/her pre-hospital care provider as the study subject. Subsequently, a date was set up so that the respective head of department can make an arrangement for the researchers to go and distribute the questionnaires to the study subjects. On the date agreed, the researchers travelled to the hospital concerned and meet with the study subjects in a group. Selection of the respondents and completion of the survey was voluntary. Later, the purposes of the study were explained and a written consent was obtained from each study subjects. Once consent is obtained, the questionnaire SAQ-M was distributed to each of the study subjects and the subjects are required to

complete the questionnaire on the same session. It is a self administered questionnaire and estimated time of completion is 15-20 minutes. While the subjects answering the questionnaire, the researcher were in the same room to give guidance and clarification of terms or clauses in the questionnaires. Once completed, the questionnaires were collected and the researcher thanked the subjects for their participation.

3.4. Instrument

The SAQ was translated to the Malay version (SAQ-M) from the generic version, which contains the following six safety dimensions: safety climate, teamwork climate, perception of management, stress recognition, working conditions, and job satisfaction [2]. Linguistic validation of the translation was performed using the back-translation technique [3]. A pilot validity study was conducted at an academic medical centre in Kubang Kerian, Kelantan. Analytical results demonstrated that all six dimensions had good reliability. The revised SAQ-M was a questionnaire with 30 core items in six dimensions – safety climate, teamwork climate, perception of management, stress recognition, working conditions, and job satisfaction. Extra items were added to identify respondents' demographic information (age, gender, race, type of job, working experience in EMS and educational level). Responses to all questions were scored on a 5-point Likert scale (1 = disagree strongly, 2 = disagree slightly, 3 = neutral, 4 = agree slightly, 5 = agree strongly).

3.5. Reliability and validity

The study used confirmatory factor analysis to validate the six domain structures of core SAQ items adapted for this study. For internal consistency and validity, Cronbach's α and the Pearson chi-square were identified respectively. Poor model fit measurements would indicate poor transferability of the SAQ to the EMS setting.

4. Results

4.1. Study sample

The results from both EMS providers showed that the most common age range was 31 to 40 years of age (43.6%); 56.4% of respondents was male with 91.8% was Malay. Doctors and staff nurses contributed to the large proportions for the study, 28.2% and 23.6% respectively. Meanwhile, most respondents hold a Bachelor Degree (32.7%) and total of working experience in EMS was less than 5 years (37.3%). Table 1 shows the socio demographic data of the respondents.

4.2. Reliability and validity

Evaluation of the 6 domain structures revealed acceptable model fit and validity ($p = 0.496$; $df = 11$; $p > 0.05$). Comparable with previous adaptations of the SAQ, internal consistency (reliability) was acceptable for 5 of the 6 scales: safety climate ($\alpha = 0.613$), teamwork climate ($\alpha = 0.696$), stress recognition ($\alpha = 0.640$), working conditions ($\alpha = 0.670$), and job satisfaction ($\alpha = 0.729$). Internal consistency for perceptions of management was 0.418.

4.3. Variation in SAQ scores

Mean scores for safety climate, teamwork climate, perceptions of management, stress recognition, and workplace condition varied across EMS agency ($p > .05$; Table 2). However, job satisfaction does not show much different ($p < .05$; Table 2). For safety climate domain, majority respondents had positive perceptions that they feel safe being treated by the EMS agency as a patient and they agree that the EMS agency is willing to discuss any errors happen. Meanwhile, mean score results for team climate perception of management and workplace condition, did not show much different between both hospitals. Nonetheless, stress recognition domain shows that the teaching hospital is more likely to make errors in tense or hostile situation. However, both teaching and public tertiary hospital have very high mean score for the job satisfaction at EMS department. Table 2 and 3 shows details the comparison in EMS workplace safety culture between teaching hospital and public tertiary hospital.

Table 1: Socio-demographic Data

Variables	Teaching Hospital	Public Tertiary Hospital	Total (%)
Age			
• ≤ 30 years	32	11	43 (39.1%)
• 31– 40 years	29	19	48 (43.6%)
• 41 – 50 years	7	8	15 (13.6%
• ≥ 51 years	3	1	4 (3.6%)
Gender			
• Male	38	24	62 (56.4%)
• Female	33	15	36 (43.6%)
Race			
• Malay	63	38	101 (91.8%)
• Chinese	6	1	7 (6.4%)
• Indian	1	0	1 (0.9%)
• Others	1	0	1 (0.9%)
Respondent job type			
• Specialist	5	2	7 (6.4%)
• Doctor	24	7	31 (28.2%)
• Staff nurse	17	9	26 (23.6%)
• Medical assistant	6	12	18 (16.4%)
• Paramedic	4	0	4 (3.6%)
• Attendant	9	5	14 (12.7%)
• Driver	6	4	10 (9.1%)
Total experiences in EMS			
• ≤ 5 years	29	12	41 (37.3%)
• 6 – 10 years	21	8	29 (26.3%)
• 11 – 15 years	10	10	20 (18.2%)
• 16 – 20 years	6	7	13 (11.8%)
• ≥ 21 years	5	2	7 (6.7%)
Educational level			
• SPM	15	12	27 (24.5%)
• Certificate	2	0	2 (1.8%)
• Diploma	20	15	35 (31.8%)
• Bachelor Degree	26	10	36 (32.7%)
• Master Degree	8	2	10 (9.0%)
Total	71 (64.5%)	39 (35.5%)	110 (100%)

Table 2: EMS workplace safety culture among university hospital and public tertiary hospital in Kelantan

	Groups (n= 110)		Mean Different. (95% CI)	p-Value*
	Teaching Hospital Mean (SD)	Public Tertiary Hospital Mean (SD)		
Safety Climate	3.56 (0.541)	3.62 (0.388)	-0.059 (-0.254, 0.135)	0.105
Teamwork Climate	3.69 (0.533)	3.65 (0.430)	0.042 (-0.155, 0.240)	0.171
Perception of management	3.46 (0.638)	3.58 (0.557)	-0.122 (-0.363, 0.119)	0.700
Stress recognition	3.38 (0.562)	3.22 (0.585)	0.159 (-0.067, 0.384)	0.581
Workplace condition	3.67 (0.656)	3.71 (0.544)	-0.040 (-0.284, 0.205)	0.122
Job satisfaction	4.06 (0.647)	4.01 (0.479)	0.046 (-0.188, 0.280)	0.002

**Independent t-test, significant at $p < 0.05$*

Table 3: EMS workplace safety culture between teaching hospital and public tertiary hospital

Variables	Teaching Hospital Mean score (Std. dev.)	Public Tertiary Hospital Mean score (Std. dev.)	Mean Differences
Safety Climate			
• I would feel safe being treated by this EMS agency as a patient	4.13 (0.773)	4.10 (0.502)	0.03
• Medical errors are handled appropriately in this EMS agency	3.94 (0.860)	3.95 (0.394)	-0.01
• I receive appropriate feedback about my performance	3.65 (0.776)	3.72 (0.647)	-0.07
• I am encouraged by my colleagues to report any patient safety concern I may have	3.08 (1.025)	3.56 (0.968)	-0.48
• I know the proper channels to direct questions regarding patient safety	3.66 (0.940)	3.85 (0.587)	-0.18
• The culture at this EMS agency make it easy to learns from the errors of others	3.51 (0.908)	3.62 (0.673)	-0.11
• In this EMS agency, it is difficult to discuss errors	2.97 (0.985)	2.56 (1.188)	0.41
Average	**3.56**	**3.62**	
Teamwork Climate			
• I have the support that I need from other personnel to care for patients	3.82 (0.946)	3.85 (0.630)	-0.03
• Personnel here work together as a well-coordinated team	3.87 (0.955)	3.92 (0.739)	-0.05
• Disagreement at this EMS agency are resolved appropriately (i.e., not who is right, but what is best for the patient)	3.83 (0.862)	3.90 (0.680)	-0.07
• It is easy at this EMS agency to ask question when there is something that they do not understand	4.01 (0.784)	3.87 (0.615)	0.14
• EMS personnel input is well received in this EMS agency	3.86 (0.850)	3.74 (0.751)	0.12
• At this EMS agency, it is difficult to speak up if I perceive a problem with patient care	2.73 (1.041)	2.59 (0.966)	0.14
Average	**3.69**	**3.65**	
Perception of management			
• Management does not knowingly compromise the safety of the patient	3.82 (1.004)	3.82 (0.790)	0.00
• The management of this EMS agency supports my daily efforts	3.80 (0.786)	3.90 (0.552)	-0.09
• I am provided with adequate, timely information about event that might affect my work	3.39 (0.886)	3.64 (0.668)	-0.25
• The levels of staffing at this EMS agency is sufficient to handle the numbers of calls	2.83 (1.183)	2.97 (1.181)	-0.14

Average	**3.46**	**3.58**

Table 3: EMS workplace safety culture between teaching hospital and public tertiary hospital (cont')

Variables	Teaching Hospital Mean score (Std. dev.)	Public Tertiary Hospital Mean score (Std. dev.)	Mean Differences
Stress recognition			
• Fatigue impairs my performance during emergency situation	3.45 (1.106)	3.33 (0.955)	0.12
• I am more likely to make errors in tense or hostile situation	3.41 (1.008)	3.00 (1.051)	0.41
• When my workload becomes excessive, my performance is impaired	3.70 (1.006)	3.67 (1.084)	0.04
• I am less effective at work when fatigued	2.94 (1.170)	2.87 (0.978)	0.07
Average	**3.38**	**3.22**	
Workplace condition			
• Trainees in my discipline are adequately supervised	3.92 (0.890)	3.69 (0.694)	0.23
• This EMS agency does a good job of training new personnel	4.04 (0.801)	3.95 (0.456)	0.09
• This EMS agency deals constructively with problem personnel	3.20 (0.904)	3.59 (0.751)	-0.39
• All the necessary information for treating patients is routinely available to me	3.51 (0.998)	3.59 (0.910)	-0.08
Average	**3.67**	**3.71**	
Job satisfaction			
• I like my job	4.41 (0.871)	4.26 (0.549)	0.15
• This EMS agency is a good place to work	3.90 (0.740)	4.00 (0.459)	-0.10
• Morale at this EMS agency is high	3.76 (1.062)	3.90 (0.788)	-0.14
• I am proud to work at this EMS agency	4.08 (0.890)	3.95 (0.605)	0.14
• Working at this EMS agency is like being part of a large family	4.13 (0.861)	3.95 (0.724)	0.18
Average	**4.06**	**4.01**	

5. Discussion

The continuous variables were described in mean and standard deviation. Categorical variables were described in frequency and percentage. This study compared the possibility of characterizing safety awareness in two different EMS providers in Kelantan. A potential value of the EMS-SAQ is as a tool to evaluate the impact of safety improvement initiatives and programs. Evaluation of safety culture prior to and immediately following programs may provide an indirect measure of the success of such initiatives. The most prominent observation was the variation in domain scores across the two hospitals. Although these agencies are located in the same state and serve the same area, they exhibited very different attitudes toward safety. This observation highlights the variation in EMS workplace culture, even within a distinct geographic area. Prior studies of hospital settings have identified variations in SAQ scores across wards, departments, or organizations [4, 14].

Given these observations regarding safety culture awareness, an important unanswered question is how to facilitate change [15]. Corrective efforts might focus on specific domains such as attention to safety climate, stress recognition and working conditions. Examples of potential actions in EMS providers may include attentiveness and stress recognition/reduction exercises. With respect to working conditions, the Head of Department or management may need to take time to explore in great detail the sources of low scores in this domain. EMS providers could consider a range of organization-level initiatives to improve safety. Several common examples include a blameless error-reporting system, a patient safety work plan or safety learning report program, and medication safety feedback forms [2].

6. Limitations

The findings of the study are limited by the two EMS providers from Kelatan only. Safety culture awareness among members of the employees is not well represented by this study design. Furthermore, this study was not designed to examine factors responsible for variations in EMS providers and respondents.

7. Conclusion

Emergency Medical Services has been acknowledged by the health care system in Malaysia. However, safety culture awareness in the EMS setting has received little study and thus is inadequately understood. This paper successfully adapted a popular safety culture instrument for use in the EMS setting as part of research or safety culture improvement initiatives. Furthermore, variation in safety culture awareness scores between EMS providers within a similar area, as well as variation across respondent characteristics, needs further exploration.

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9. References

[1] N. A. R. N. Hisamuddin, M. S. Hamzah, and C. J. Holliman,(2007), "Prehospital emergency medical services in Malaysia," *The Journal of Emergency Medicine,* Vol. 32, No. 4,pp. 415- 421.

[2] P. D. Patterson, D. T. Huang, R. J. Fairbanks, and H. E. Wang,(2010), "The Emergency Medical Services Safety Attitudes Questionnaire," *American Journal of Medical Quality,* Vol. 25, No. 2,pp. 109-115.

[3] W. C. Lee, H. Y. Wung, H. H. Liao, C. M. Lo, F. L. Chang, P. C. Wang, *et al.*,(2010), "Hospital safety culture in Taiwan: a nationwide survey using Chinese version safety attitude questionnaire," *BMC Health Services Research,* Vol. 10, No. 234,pp. 1-8.

[4] D. Wilson, R. W. Redman, A. Talsma, and M. Aebersold,(2012), "Differences in perceptions of patient safety culture between charge and noncharge nurses: Implications for effectiveness outcomes research," *Nursing Research and Practice,* pp. 1-7.

[5] V. F. Nieva and J. Sorra,(2003), "Safety culture assessment: a tool for improving patient safety in healthcare organizations," *Qual Saf Health Care,* Vol. 12, No. Suppl 2,pp. ii17-23.

[6] F. W. Guldenmund,(2000), "The nature of safety culture: a review of theory and research," *Safety Science,* Vol. 34, No. 1,pp. 215-257.

[7] BERNAMA, "MTUC: Workplace accidents increasing," in *New Straits Times*, ed, 2012.

[8] Malaysia Department of Occupational Safety and Health, "Occupational Accidents Statistics by Sector " 2011.

[9] A. Yassi and T. Hancock,(2005), "Patient safety--worker safety: building a culture of safety to improve healthcare worker and patient well-being," *Healthc Q.,* Vol. 8, No. 32-8.

[10] P. D. Patterson, D. T. Huang, R. J. Fairbanks, S. Simeone, M. Weaver, and H. E. Wang,(2010), "Variation in emergency medical services workplace safety culture," *Prehospital Emergency Care,* Vol. 14, No. 4,pp. 448-460.

[11] J. Suyama, J. C. Rittenberger, P. D. Patterson, and D. Hostler,(2009), "Comparison of public safety provider injury rates," *Prehosp Emerg Care,* Vol. 13, No. pp. 451-455.

[12] D. McCaughey, J. L. DelliFraine, G. McGhan, and N. S. Bruning,(2013), "The negative effects of workplace injury and illness on workplace safety climate perceptions and health care worker outcomes," *Safety Science,* Vol. 51, No. 1,pp. 138-147.

[13] P. J. Pronovost, S. M. Berenholtz, C. A. Goeschel, D. M. Needham, J. B. Sexton, D. A. Thompson, *et al.*,(2006), "Creating high reliability in health care organizations," *Health Serv Res.*, Vol. 41, No. 4,pp. 1599-1617.

[14] J. Sexton, R. Helmreich, T. Heilands, K. Rowan, K. Vella, J. Boyden, *et al.*,(2006), "The Safety Attitudes Questionnaire: psychometric properties, benchmarking data, and emerging research. ," *BMC Health Services Research,* Vol. 6, No. 44.

[15] M. Fleming,(2005), "Nurturing a patient safety culture patient safety culture measurement and improvement: A "how to" guide," *Healthcare Quarterly,* Vol. 8, No. Sp,pp. 14-19.