

Determinants of Hospital Emergency Preparedness in Machakos Level 5 and Kangundo Level 4 Hospitals

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Abstract

Introduction: Emergency preparedness is emerging as a key security priority globally. Plans are needed not only for responding to the impacts of events, but also to maintain business while managing the crisis and to guide recovery and reconstruction effectively. Machakos, which is along Nairobi-Mombasa highway, recorded a 27% increase of emergency cases in 2017, 39% in 2018 in Machakos Level 5. During this period, deaths increased from 191 to 497 from 2016. A 35% increase of referrals to other hospitals was recorded. In the face of these emergencies, the ability of affected facilities like Kangundo Level 4 and Machakos Level 5 Hospitals in Kenya to provide care to the injured can quite literally make the difference between life and death.

Objective: To examine the influence of the capacity of health workers on hospital emergency preparedness in Kangundo Level 4 and Machakos Level 5 Hospitals.

Methodology: The study adopted a cross-sectional design and simple random sampling method. A sample size of 128 respondents was obtained: 49 respondents from Kangundo Level 4 and 79 from Machakos Level 5 Hospitals. Simple random sampling was applied to select respondents. Self-administered questionnaire as a data collection tool was applied.

Results: The findings reveal high understanding of the meaning of emergency preparedness ($M = 4.29$; $SD = 0.67$), with 94 (74%) of the respondents considering themselves prepared for an emergency. The mean was 3.67; $SD .06$. Eighty (64%) considered themselves key leadership figures in emergency preparedness. One hundred and eleven (88%) of the respondents agreed with the statement that training on emergency preparedness should be conducted quarterly, with mean of $M = 4.27$; $SD = 0.95$. Respondents agreed that emergency tray is well equipped with various equipment for management of emergency, with a mean of 3.51 1.101 , and that the hospital has a drug supply system with drug suppliers, with a mean of 3.51 1.108 . The results showed a strong and positive relationship between commodity availability, financial resources, policies and emergency preparedness, with coefficient of correlation of $r=0.619$, $p<0.001$, $r=0.626$, $p<0.001$, and $r=0.702$, and $p<0.001$, respectively. In a combined relationship, Commodities ($p<0.05$), Finance ($p<0.05$) and Policies ($p<0.05$), all had a significant influence on hospital emergency preparedness.

Conclusion: The study found that policy formulation and implementation, commodities and finances significantly influenced emergency preparedness. The variables under this study are important in determining emergency preparedness, and emergency preparedness will work well if the variables in this study are taken into account. Therefore, hospital management needs to build a stable drug supply system with adequate drug suppliers. Resources should be allocated to purchase ultra-modern equipment. Additionally, a clear mechanism of access of emergency commodities should be developed by hospital management, and staff should be made aware of it. There is a need for staff participation in emergency policy formulation, guidelines, emergency plans, and lobbying for emergency preparedness. Additionally, the institutions need to make emergency drills and safety inspections regular.

Key Words

Hospital Emergency Preparedness; Health Systems Management

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Background

The World Health Organization defined the Health Systems Management pillars, which include health workforce, service delivery, leadership and governance, health information systems, access to

essential medicines, and financing. The main pillar of focus is service delivery in emergency preparedness that aims to provide quality and effective health care services to all. The service offered does not vary in terms of quality, irrespective of characteristics such

as gender, ethnicity and socioeconomic status. Furthermore, the pillar has other aims, which include safety to patients and caregivers, patient-centered approaches, timeliness and efficiency (Carroll, 2006).

Emergency preparedness is a critical component in healthcare and disaster medicine (Rådestad, 2013). The term 'emergency' refers to any extraordinary event or situation that requires an intense, rapid response and that can be addressed with existing community resources (Qureshi Kristine and Gebbie, 2001). Preparedness, on the other hand, is defined as arrangements to ensure that, should an emergency occur, all those resources and services, which may be needed to cope with the effects, can be rapidly mobilized and deployed (Peter Aitken, 2015).

Emergency preparedness is conceptualized, therefore, as the comprehensive knowledge, skills, abilities and actions needed to prepare for, and respond to, threatened, actual or suspected chemical, biological, radiological, nuclear or explosive incidents, man-made incidents, natural disasters or other related events (Slepski, 2008). Public emergency is defined as an event that happens unexpectedly and has huge negative impacts on human health, the economy, and social stability (Qiu, 2016).

Meanwhile, hospital preparedness encompasses those actions, programs and systems developed and implemented before a major incident to improve the capability and capacity of the hospital to respond to disasters and emergencies (Djalali et al., 2014; Wachira and Martin, 2011; Djalali et al., 2014).

Statement of the Problem

Globally, health facilities are considered to be the pillar of emergency response plans, with the capacity of healthcare workers and policy formulation being identified as the major determinants of emergency response plans (Balicer, et al., 2006). Study results from a survey conducted in New York City to determine the ability and willingness of healthcare workers to report to work during various catastrophic events revealed that about 84.75% were more likely to report and attend to emergencies (Qureshi, 2005). More than half (77.45%) of the respondents reported that capacity building through training improved healthcare workers' knowledge, skills and competencies in emergency response plans (Qureshi, 2005).

According to Kenya Health Strategic Plan (KHSP 2018), level 4 and 5 hospitals can refer or receive emergencies. Kangundo Level 4 and Machakos Level 5 Hospitals are arguably the most advanced in Machakos County. Unfortunately, there is not an assessment of a hospital's vulnerability to identify the state of emergencies preparedness plans of the hospitals to anticipate, prepare for, and manage client flow trends and their effects. For example, Kangundo Level 4 Hospital's records showed a 27% increase in emergency patients in 2017 (18,705 cases) compared to 14,728 cases in 2016, and a 39% increase in 2018 (25,991 cases) compared to 2017, while Machakos Level 5 Hospital's records showed an increased casualty patient flow by 35% from 43,542 (2017) to 66,987 in 2018. During this period, the deaths in the two hospitals also were reported to have increased compared to previous years. Kangundo Level 4 Hospital reported 375 deaths in 2018 compared to 209 in 2017, while Machakos Level 5 Hospital's mortality records showed 497 deaths in 2018 compared to 362 in 2017, and 191 in 2016 (DHIS, 2019). Referrals from Kangundo Level 4 and Machakos Level 5 were increased by 23% and 35%, respectively (DHIS, 2018). At the same time, data published by the Ministry of Health Kenya demonstrated an increase in emergency situations in Machakos environments (Government of Kenya; Ministry of Health, 2014). In the face of these emergencies, the ability of Kangundo Level 4 and Machakos Level 5 Hospitals can quite literally make the difference between life and death (Government of Kenya; Ministry of Health, 2014). Therefore, establishing the determinants of emergency preparedness in Kangundo Level 4 and Machakos Level 5 Hospitals will inform policy formulation, as well as adjustments of resource allocation and commodities for better emergencies preparedness.

Research Objective

The objective of this study was to establish the determinants of hospital emergency preparedness in Machakos Level 5 and Kangundo Level 4 Hospitals.

Research Design

The study adopted cross-sectional study design.
Study Population

The study population was 55 outpatient health workers in Kangundo Level 4 Hospital and 98 in Machakos Level 5 Hospital.

Results

Demographic Characteristics of the Respondents

The majority of the respondents (n=77; 61%) were from Machakos Level 5 Hospital. This was based on proportionate distribution of sample size relative to staff numbers per facility. The majority (n=108; 86%) of the respondents were aged between 20 and 40 years, with a mean age of 32.8 ± 5.4 years; above

51 years was the least since the retirement age is 50 years in Kenya. Seventy percent of the respondents had trained up to college level; this is in line with their age group. While almost two-thirds of the respondents were females (n=81; 64%).

Table 1: Respondents Characteristics

Facility Level	Frequency (n)	Percent (n)
Machakos Level 5 Hospital	77	61
Kangundo Level 4 Hospital	49	39
Total	126	100
Age		
20-30	59	47
31-40	49	39
41-50	13	10
51 and above	5	4
Total	126	100
Education Level		
College	88	70
University	38	30
Total	126	100
Sex		
Male	45	36
Female	81	64
Total	126	100
Years of Work experience		
Less than 5 years	57	45
5-10	49	39
11-15	6	4
16-20	7	6
21-31	7	6
Total	126	100

Table 2: Descriptive on Health Workers' Capacity and Hospital Emergency Preparedness

Description	Disagree n (%)		Agree n (%)		Mean	Std. Dev	Chi-Square	P-Value
Understand meaning of emergency preparedness	5(4)		121(96)		4.29	0.67	58.91	0.001
I consider myself prepared for emergency	33(26)		94(74)		3.67	1.07	81.37	0.001
I would be considered a key leadership figure in emergency preparedness	46	(36)	80 (64)		3.39	1.19	60.1	0.001
All hospital staff are well equipped with knowledge on emergency preparedness	77(62)		48 (38)		2.66	1.18	63.27	0.001
The hospital management organizes training in emergency preparedness among its staff	60	(47)	66 (53)		3.02	1.15	80.79	0.001
I am trained to train other staff and stakeholders on emergency preparedness	94	(75)	32(25)		2.23	1.20	43.71	0.001
Training on emergency preparedness should be conducted quarterly	15	(13)	111(88)		4.27	0.95	128.84	0.001
Emergency preparedness training should be included in all medical training curricula	4	(3)	122 (97)		4.66	0.65	94.43	0.001

There was a consensus (n=122; 97%) that emergency preparedness training should be included in all medical training curricula. This is supported by Tang (2015), who wrote that the value of continuous training is well documented (Tang, 2015). The natures of work and emerging conditions such as COVID may explain this high score. Linkage of nature and training of health workers on disaster preparedness and planning is well documented (Perry, 2013). This is in line with Jaye *et al.* (2016) that capacity is a critical element in emergency preparedness (Jaye *et al.*, 2016). The mean was $M = 4.66 \pm 0.65$. The majority (n=77; 62%) of the respondents disagreed with the statement that all hospital staff are well equipped with knowledge on emergency preparedness. The mean was $M = 2.66 \pm 1.18$. This is not in agreement with Walsh *et al.* (2012), who argued that the majority of the documented efforts have been limited primarily to individual specialties or targeted professionals, which has resulted in a lack of definitional uniformity across professions with

respect to education, training, and best practices within the discipline of public health (Walsh *et al.*, 2012). It is important, therefore, to document and develop a combination of new employee orientation, continuous on-the-job learning, and regular exercises and drills with interwoven quality improvement loops.

Similarly, 60 (47%) disagreed with the proposition that the hospital management organizes training in emergency preparedness among its staff. The mean was $M = 2.23 \pm 1.20$. The lack of continuous training contrasts with the principle of capacity building and of creating an enabling environment with appropriate policy and legal frameworks, personnel continuous development, health workers' development, and strengthening of managerial systems (NIDM, 2013). The Chi-Square results indicate that there was a significance difference ($p < 0.001$) in the responses by individuals under each category of Agree and Disagree for influence of health worker capacity for emergency

preparedness.

The Chi-Square results indicate that there was a significance difference ($p < 0.001$) in the responses by individuals under each category of Agree and Disagree for influence of commodities availability on emergency preparedness (see Table 4.3). The importance of commodities is well elaborated by Özdamar (2004). Özdamar writes that logistical planning in emergency situations involves putting commodities, such as medical materials, personnel and equipment, in open and strategic places (Özdamar, 2004) a statement backed by Rios

(2015) that commodities are central in emergency medical situations and influence the scope of the service offered, as well as the behavior of the provider, facility, and entire countries (Rios, 2015).

Inferential Statistics

Bivariate Analysis

The results show that there is a strong and positive relationship between the independent variables and dependent variable of emergency preparedness.

Multiple Regression

Table 3: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.768 ^a	.589	.576	.57185	1.660

a. Predictors: (Constant) Health Workers Capacity

b. Dependent Variable: Emergency Preparedness

Table 4: Analysis of Variance

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	56.773	4	14.193	43.403	.000 ^b
	Residual	39.568	121	.327		
	Total	96.342	125			

a. Dependent Variable: Emergency Preparedness

b. Predictors: (Constant) Health Workers, Capacity

The results in Table 4 indicate that the prediction model of hospital emergency preparedness was influenced by the study variables.

Table 5: Regression Weights

Model		Coefficients ^a			Collinearity Statistics			
		Unstandardized Coefficients	Standardized Coefficients		T	Sig.	Tolerance	VIF
1	(Constant)	-.009			-.025	.980		
	Workers Capacity	.008	.011	.044	.717	.475	.909	1.100

a. Dependent Variable: Emergency Preparedness

The VIF index is below 10 for all the variables, indicating that there was no multicollinearity. From Table 5, the constant was not significant with $p > 0.05$. This infers that the study variables under this study are important in determining emergency preparedness and that emergency preparedness will work well if the variables in this study are taken into consideration in addition to other variables not in this study.

From the finding, Y-Intercept ($B_0 = 0.000$) depicts that, in holding all independent variables constant, the emergency preparedness will not be functional at the health facilities in Machakos County.

Further, the findings on health worker capacity (X_1 , $B_1 = 0.044$, $P = 0.475$) imply that a unit change in health workforce capacity will improve the emergency preparedness by 4.4%. However, the improvement is not statistically significant, at 5% level of significance.

This study also reveals that the health workers in this study never fully felt their role in emergency preparedness of the health facilities.

Conclusion

The study indicates that health workers' capacity did not influence hospital emergency preparedness. While the majority disagreed that all staff are well equipped with knowledge in emergency preparedness, they also agreed with the proposition that emergency preparedness should be conducted quarterly and that training on emergency preparedness needs to be included in all medical training curricula since this will enhance their emergency preparedness skills. In my opinion, health workers should be fully equipped with knowledge, especially including hospital emergency preparedness, as suggested by the respondents.

Recommendation

This study recommends that continuous professional training be conducted regularly, seminars be conducted regularly, and finance for specialized training be provided. This will equip health workers with the necessary skills to handle emergencies, thus reducing deaths and referrals to other facilities and saving life, time, and resources.

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