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Assessment Of Lay First Responders Skills on Management of Trauma Patients who Present with External Hemorrhage, in the Pre Hospital Setting, in Kakamega County, Kenya

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Abstract

Trauma is a major health care issue that leads to death of 5-8 million people yearly worldwide. External hemorrhage has significant morbidity and mortality to date. Hemorrhage is responsible for almost 40% of trauma deaths and 33% of the deaths occur during the pre-hospital period. 20% of trauma-related deaths may have been prevented with receipt of optimal trauma care and the greatest opportunity to save lives is in the pre-hospital setting. Early death from traumatic hemorrhage is preventable through timely quality management, beginning with pre -hospital providers and rapid transportation to definitive care. The main objective of the study was to assess lay first responders' skills on management of patients presenting with external haemorrhage in the pre-hospital setting in Kakamega County, Kenya.. Quantitative research method was used, utilizing descriptive cross-sectional study design. Census sampling method was used to select Sub Counties. Study participants were chosen using simple random sampling method. 208 Lay first responders from 8 Sub -Counties were assessed in order to obtain their baseline skills level before training them. The assessment was done using observation checklists in a simulation setting. Collected data was analysed using Statistical package for Social Sciences version 28. Findings: 70.1 % of the participants approached the scene without checking for safety. Only 40% of the participants applied pressure to prevent bleeding. Unique contributions to Theory, Practice and Policy: Bystanders are the first people to arrive at a trauma scene in low and middle income Countries yet they have inadequate skills on Scene safety and external hemorrhage control therefore there is need for training them.

Keywords: *External Hemorrhage, Lay First Responders, Pre Hospital Setting.*

Introduction

Trauma is a major health care issue that leads to death of 5-8 million people yearly worldwide [1]. It is the primary cause of disability and mortality in people aged 1 to 44 years [2]. Hemorrhage is the second leading cause of death in Trauma globally [3]. 94% of hemorrhagic deaths among adults occur within 24 hours of injury [4]. Despite major advances in trauma care and medical devices, external hemorrhage continues to have significant morbidity and mortality to date. Early recognition and appropriate action is necessary to prevent complications and loss of life [5]. Hemorrhage is responsible for up to 40% of trauma deaths and 33% occur during the pre-hospital period [6]. Studies on trauma support shows the need for early bystander intervention [7]. The National Academies of Sciences estimated that 20% of trauma-related deaths may have been preventable with receipt of "optimal trauma care" and noted that the "greatest opportunity to save lives" is in the pre hospital[8]. In sub-Saharan Africa, hemorrhage is the most common reason for death among trauma patients, and shock contributes to organ

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failure [9]. Early death from traumatic hemorrhage is preventable through early and quality resuscitation, beginning with pre hospital providers, and rapid transportation to definitive surgical care.

Problem Statement

Globally trauma is the leading cause of death and disability. Both unintentional and violence related injuries take the lives of 4.4 million people around the world each year and constitute approximately 8% of all deaths [10]. Hemorrhage is responsible for 33% of trauma deaths that occur during the pre-hospital period [11]. Studies on trauma support the need for early bystander intervention. The National Academies of Sciences estimated that 20% of trauma-related deaths may have been preventable with receipt of "optimal trauma care" and noted that the "greatest opportunity to save lives" is in the pre hospital setting [12, 13].

In sub-Saharan Africa, hemorrhage is the most common reason for death among trauma patients, and shock contributes to organ failure. Early death from traumatic hemorrhage is preventable through early and quality resuscitation, beginning with pre hospital providers, and rapid transportation to definitive surgical care [14]. In Africa, there is lack of well-coordinated and equipped ambulance transport, and patients often wait for more than triple the international recommended response time [15].

In Kenya 27.6% mortality rate for trauma cases die from hemorrhage [16]. The most common cause of traumatic hemorrhage in Kakamega County in road traffic accidents. Motorcycle transportation commonly known as "Boda boda", is very useful in rural areas of Kenya due to poor infrastructure. Statistics from Kenya Police indicate that this mode of transport accounts for most road accidents hence severe hemorrhage [17]. No study has been carried in Kakamega County to assess lay first responders' skills on management of trauma patients presenting with external hemorrhage, in the pre hospital setting.

Specific objective: To assess lay first responders' skills on management of trauma patient's presenting with external hemorrhage, in the pre hospital setting, in Kakamega County.

Research Question: What external hemorrhage control skill gaps exist among the lay first responders in Kakamega?

Materials and Methods

This was a quantitative study

Study Design

Analytic cross-sectional design was used.

Study Area

The study was conducted in 8 Sub Counties in Kakamega County.

Study Population

Lay first responders, (motor cycle riders) locally known as" Boda boda".

Inclusion Criteria

People aged 18 years and above.

People who signed consent to participate in the study.

Motor cycle riders operating on highways within the selected Sub Counties.

Exclusion Criteria

People who had any previous training on hemorrhage control.

Sample determination: The sample size was determined using Fisher's et al method. The final sample size was 215 respondents.7 participants dropped out.

Sampling procedure: Census method was used to select 8 Sub Counties in Kakamega County (The motorcycle riders in the other 4 Sub counties had been trained on First Aid). Simple random sampling method was used to select the motorcycle riders.

Data Collection Tools

Data was collected using an observation checklists to assess lay first responders' skills on external hemorrhage control in a simulation setting.

Data Analysis

Collected data was compiled and entered into a computer for analysis. Using Statistical Package for the Social Science software version 28. Descriptive and Inferential statistics were used.

Ethical Approval

Ethical approval was sought from Institutional Ethics Review Committee of Masinde Muliro University of Science and Technology. Research permit was obtained from the National Approval Research Committee of Science and Technology in Kenya. Furthermore, permission to carry out research was sought from the County secretary and granted. Study participants signed informed consents, prior to participating in the study.

Results

Socio- Demographic Characteristics of Study Participants

A total of 208 Lay First responders were trained and all took part in pre and post training assessment. More than half, 56.7% were aged between 25 and 44 years (Table 1). More than two-thirds (69.2%) were married. The proportion of those who had attained primary (42.3%) or secondary (40.9%) level of education was comparable.

Table 1. Socio-Demographic Characteristics of Study Participants

Variable	Categories	N	%
Age group (in years)	< 25	35	16.8
	25 – 34	43	20.7
	35 – 44	54	26.0
	45 -54	44	21.1
	≥ 55	32	15.4
Marital status	Single	47	22.6
	Married	144	69.2
	Separated	5	2.4
	Divorced	1	0.5
	Widow	11	5.3
Level of education	None	22	10.6
	Primary	88	42.3
	Secondary	85	40.9
	College/University	13	6.2

Lay First Responders skills on external Hemorrhage Control

Table 2 shows results on Lay First responders' skills on external hemorrhage control. Ten items were assessed using a check list. The results were as follows: 47.5 % of the participants called for help, 70.1 % of the participants approached the scene without

checking for scene safety. 20.1% protected themselves before handling the simulated bleeding patient, 40.3 % were able to apply steady direct pressure to the wound appropriately in order to control bleeding. Concerning simulated impaled objects, 88.5 % of the participants were removing the objects before attempting to arrest bleeding.6.8 % were able to package deep bleeding wounds. Application of tourniquet was done by only 2.8 of the participants with 66.6% of those who applied not remembering to write the time applied on the tourniquet, correct use of pelvic binders/sheet, average time from injury to control of bleeding in the pre hospital setting. 98.6 % of the participants did not know how to use a pelvic binder. 72.6 % took more than 10 minutes to arrest the bleeding. Mean time taken being 24 minutes.

Table 2. Lay First Responders Skills on External Hemorrhage Control

Skill	**Category**	**N**	**%**
Ensures Scene safety	Yes	62	29.9
	No	146	70.1
	Total	208	100
Calls for help	Yes	99	47.5
	No	109	52.5
	Total	208	100
Puts on personal protective equipment	Yes	42	20.1
	No	166	79.9
	Total	208	100
Exposes, examines and identifies the source of active bleeding.	Yes	123	59.1
	No	85	40.9
	Total	208	100
Apply steady direct pressure to wound	Yes	84	40.3
	No	124	59.7
	Total	208	100
Appropriately controls bleeding if object is impaled	Yes	24	11.5
	No	184	88.5
	Total	208	100
Packages deep bleeding wounds	Yes	13	6.8
	No	195	93.2
	Total	208	100
If bleeding continues, assess distal circulation, then apply tourniquet 5 to 10cm above injury if it is on Arm or Leg	Yes	6	2.8
	No	202	97.2
	Total	208	100
	Yes	1	33.3

Writes time when tourniquet was applied on the tourniquet	No	2	66.7
	Total	2	100
Correct use of Pelvic binders/ sheets	Yes	3	1.4
	No	205	98.6.
	Total	208	100
Average time from injury to control of bleeding in the Pre hospital setting	< 10 min	57	27.4
	>10 min	151	72.6 (mean 24 min)
	Total	208	100

Discussion

It is well acknowledged that emergency care systems are generally poor in low and middle income countries [18], Upon arrival at the accident scene, the first step is to ensure the safety of the casualties, other nearby people and first-aid responder, The main aims of scene assessment are to control the situation, look for potential hazards, and protect and prioritize everyone's safety. It is also important to note that just because a scene is initially "safe" does not guarantee that it will remain so. Hence the need for constant reassessment [19]. This study showed that during the simulations, 70.1 % of the participants approached the scene without checking for scene safety. In this study, 47.5 % of the participants called for help. The rest did not know who to call or the number to dial. This is contrary to a study carried by Trine which showed that 64% of the participants called for help [20]. Use of appropriate personal protective equipment is recommended in order to protect the responders and the patients. The findings of the study showed that 20.1% of the participants put on appropriate personal protective equipment before handling the simulated bleeding patients, this is similar to a study carried out by Kraus in a simulated setup which showed that only 21% (91/437) of the participants were correctly protected before their first contact with the patient [21]. In order to stop external bleeding, one should apply direct pressure on the cut or wound with a clean cloth, tissue, or piece of gauze until bleeding stops. If blood soaks through the material, it is not removed. More cloth or gauze is placed on top of it and continues pressure applied [22]. In this study, 40.3 % participants were able to apply steady direct pressure to the wound appropriately in order to control bleeding. When controlling bleeding on patients with impaling objects in pre hospital setting, it is advisable that the object should not be removed because removing may cause more damage to blood vessels leading to massive bleeding. During this study, simulated patients with impaled objects were used, 88.5 % of the participants were removing the objects before attempting to arrest bleeding, showing knowledge gap. Filling the wound cavity with packing material aids in hemostasis by creating pressure on the vessels. Using one hand to feed gauze and the other to keep it in place allows for continuous pressure on the wound. Foreign bodies and sharp bone fragments must be cleared during wound packing [23]. Only 6.8 % of the responders were able to package simulated deep bleeding wounds. Application of tourniquet was done by only 2.8 of the participants with 66.6% of those who applied not remembering to write the time applied on the tourniquet. This is contrary to a study carried out by Hedger which showed 93% utilization of tourniquets in the pre hospital setting [24]. Study findings by Alonja suggest

that a pelvic binders is an important tool for stabilizing pelvic fractures and managing blood loss in pre hospital care [25]. 98.6 % of the participants in this study did not know how to use a pelvic binder, hence need for hemorrhage control training.

Ethical Consideration

Research approval was obtained from the ethics and research committee of Masinde Muliro University of science and technology. Research permit was issued by National Commission for Science, Technology and Innovation in Kenya. All participants voluntarily participated in the study; the purpose and method of the study was comprehensively explained to the participants; including the possibility of withdrawing from the study at any stage they wish without victimization, reading and signing the informed consent form by the participants.

Conclusion

The study revealed the lay first responders had knowledge gaps in external hemorrhage Control and therefore there was need to train them on “Stop the bleed training.

Author Contribution

Dinnah Okwiri conceived and designed the study. Dr Tecla Sum supervised the work. Dinnah Okwiri recruited participants and research assistants then conducted the study at participating centers. Dinnah Okwiri managed participant data and drafted the manuscript.

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Conflict of Interest

The author declares that there is no known competing financial interests or personal relationships that could appear to influence the work in this paper.

Availability of Data and Materials

The datasets generated and/or analysed during the current study are not publicly available due to ethical concerns but are available from the corresponding author on reasonable request.

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