

Effect of First Aid Education on First Aid Knowledge and Skills of Commercial Drivers in South West Nigeria

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Abbreviations:

BTLS: Basic Trauma Life Support
EMS: Emergency Medical Services
LGAs: Local Government Areas
NURTW: National Union of Road Transport Workers
PHTLS: Prehospital Trauma Life Support
WHO: World Health Organization

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Abstract

Background: Prompt prehospital care is essential for improving outcomes of road crash victims; however, this service is sub-optimal in developing countries because Emergency Medical Services (EMS) are not readily available. Training of lay responders in first aid has been suggested as a means of filling this gap in settings with inadequate EMS. This study was conducted to determine the effect of first aid training on the first aid knowledge and skills of commercial drivers.

Methods: A before-and-after study was conducted among 128 commercial drivers (62 intervention and 66 controls) selected by multi-stage sampling. Drivers' first aid knowledge and skills were assessed at baseline, immediate, and three months post-intervention. The intervention involved a 2-day training session in first aid. Repeated measures ANOVA was used to test for differences in respondents' pre- and post-intervention scores over the three assessment points.

Results: Mean first aid knowledge scores for intervention drivers were 48.9% (SD = 12.0), 57.8% (SD = 11.2), and 59.2% (SD = 9.0) at baseline, immediate, and three months post-intervention. Corresponding scores for the controls were 48.3% (SD = 12.8), 39.2% (SD = 15.3), and 46.8% (SD = 15.3). Mean first aid skill scores for intervention drivers were 17.5% (SD = 3.8), 80.7% (SD = 8.3), and 72.3% (SD = 16.8). Scores for control drivers were 16.5% (SD = 4.5), 16.3% (SD = 4.7), and 20.4% (SD = 9.1), respectively. Repeated measures ANOVA showed significant differences in first aid knowledge and skills scores over the three phases. Independent t-test revealed significant differences in scores between the intervention and control groups post-intervention.

Conclusion: The training led to significant improvement in first aid knowledge and skills of intervention drivers. This confirms that lay responders can be trained in provision of first aid. The slight drop in skills scores, which occurred three months post-intervention, highlights the need for periodic refresher trainings to be conducted for the drivers in order to maintain the knowledge and skills acquired.

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Introduction

Road traffic injuries are a growing problem disproportionately affecting those in low- and middle-income countries.¹ Global estimates indicate that every year, approximately 20 to 50 million people are injured² and approximately one million people are killed from road injuries.³ Furthermore, a significant proportion of those who die are aged 15-44 years.⁴ These are people in their most economically productive years. Thus, the aftermath of death or severe injury from road crashes has far-reaching socio-economic, emotional, and psychological consequences on the immediate families and the nation at large. Data from low-income countries like Nigeria are often sparse. Findings from the 1999 Transport Research Laboratory (TRL; Wokingham, Berkshire, United Kingdom) report, "Estimating Road Fatalities," revealed that South Africa and Nigeria were responsible for more than one-half of the road fatalities in the African region.³ Information from the facts sheet, "Road Safety in the [World Health Organization; Geneva,

Switzerland] WHO African Region: The Facts 2013," which was based on data from the second Global Status Report on Road Safety 2013: Supporting a Decade of Action, revealed that in 2010, Nigeria and South Africa had the highest estimated mortality rates from road traffic crashes for the WHO African Region with rates of 33.7 and 31.9 deaths per 100,000 population per year, respectively.⁵ There are indications that road crashes and ensuing injuries and deaths in many low- and middle-income countries will continue to rise if definite measures are not taken to curtail this trend.⁶

Findings from road safety research over the years have shown that interventions to prevent road traffic injury could be implemented at various phases,⁶ comprising the pre-crash, crash, and post-crash phases.^{7,8} Interventions in the pre-crash phase comprise measures instituted to prevent the road crash from occurring, and the phase interventions aim to reduce the impact of the crash when it occurs. Post-crash interventions aim to avoid preventable death and disability, limit the severity of the injury and suffering caused by the crash, and to ensure the crash survivor's best possible recovery and reintegration into society.² Studies have shown that a large proportion of those who died as a result of road crashes died before they reached the hospital.^{9,10} A comparative study of mortality among seriously injured patients in different countries showed higher death rates in low- and middle-income countries, and the majority of deaths occurred in the prehospital phase.¹¹ The marked difference in mortality across countries in various development strata were mainly attributed to differences in the mortality from prehospital deaths. These findings suggest that improvements in prehospital care probably would have a greater impact on post-crash deaths compared with improvements in hospital-based care.

In developed countries, Emergency Medical Services (EMS) are well-developed and EMS officers provide prehospital care to victims of road traffic crashes at the crash site, and they transport affected persons to the most appropriate hospital.¹ However, this is not the same in developing countries as most do not have developed EMS. Indeed, findings from the 2013 Global Status Report on Road Safety revealed that most countries did not have EMS.⁶ Hence, in many of these countries, crash victims usually are attended to and taken to the hospital by bystanders, relatives, commercial drivers, or the police. A study carried out in Kenya found that the police and hospital ambulances evacuated only 5.5% and 2.9% of crash victims, respectively.¹² In Ghana, studies showed that the majority of injured persons reached the hospital by means of some form of commercial vehicle.^{11,13} A study carried out in Ilorin, Southwestern Nigeria reported that 52.8% of crash victims were brought to the hospital by relations, 40.4% by the police or Federal Road Safety Commission officials, and 6.7% by bystanders.¹⁴ All of these result in delays in providing appropriate care to road crash victims, such that by the time they arrive at an appropriate health facility, the victim's chances of survival are considerably reduced.

In the absence of well-developed EMS in Nigeria, empowering lay people, such as commercial drivers, to perform the role of first responders has been advocated. Mock et al suggested that basic first aid training for commercial drivers might be helpful in countries where there are no formal emergency services.¹¹ By virtue of their profession, commercial drivers are likely to be on-site at a road crash scene and they can better act as first responders and provide first aid to accident victims after undergoing first aid training. Lay first responders have been trained in

the provision of first aid for road crash victims in a number of countries.^{15,16} In Ghana, commercial taxi drivers were trained on basic first aid, crash scene management, and triage. Follow-up interviews with these drivers revealed that 61% of them had utilized the skills they learned in the subsequent year.¹⁵ Interventions that provide commercial drivers with first aid skills would therefore go a long way towards improving the outcome of victims of road traffic accidents. This study was thus conducted to evaluate the effect of a first aid training intervention on commercial drivers' knowledge and their skills on provision of first aid for accident victims.

Materials and Methods

Study Design

A quasi-experimental study of an educational intervention conducted as a 3-month longitudinal study was carried out to determine the effect of first aid training on the drivers' first aid knowledge and skills.

Study Area

Ibadan City is located 78 miles inland from Lagos, the former capital of Nigeria, and is a prominent transit point between the coastal region and inland parts of the country. There are 11 Local Government Areas (LGAs) in Ibadan and 11 branches of the National Union of Road Transport Workers (NURTW), each located within a LGA in the city. Each of these branches comprises two to three units which operate out of various vehicle parks.

Study Participants

The study participants were drivers of commercial passenger vehicles plying the Lagos-Ibadan expressway and registered in the NURTW branches in Ibadan, Southwestern Nigeria.

Sample Size Determination

The sample size formula for comparison of paired (matched) proportions (ie, comparing a proportion to a null hypothesis value of 50.0%) was used.^{17,18} Values of Z_{α} of 1.96 corresponding to an α of 5%, Z_{β} of 1.28 based on a power of 90%, and an expected difference of at least 25% between pre- and post-intervention knowledge and skills were used to determine the sample size. This gave a minimum sample size of approximately 38 per group. An additional 10% was added to account for loss to follow-up and gave a minimum of 42 per group. A total of 62 drivers in the intervention and 66 in the control groups eventually were recruited. Sixty drivers in the intervention and all drivers in the control group completed the study giving an overall attrition rate of 1.6%.

Sampling Technique

A 2-stage sampling technique was used to select the drivers in both groups. There were 10 NURTW units in the 10 registered parks for vehicles plying the Lagos-Ibadan route, each unit comprised a cluster. In the first stage, five units each were assigned to the intervention and the control groups using a simple random-sampling technique (balloting). In the second stage, the number of registered drivers per unit was obtained from the NURTW unit, and a probability proportional to size (PPS) technique¹⁹ was used to determine the number of drivers to be recruited per unit. Following this, the required number of drivers per unit was selected using simple random-sampling techniques. This procedure was applied to both study and control groups. In order to

minimize contamination, the control groups of drivers were trained before the intervention group.

Intervention

The intervention involved a 2-day training session in first aid and comprised didactic lectures, practical demonstrations, and skill-building exercises. The training covered immediate life-saving and evacuation procedures following a crash and first aid skills for management of bleeding and fractures. Selected topics included general knowledge of first aid, safety at a crash scene, initial assessment of the crash victim, rapid survey/focused examination of the crash victim, and important information to be obtained from the crash victim. These were adapted from the Basic Trauma Life Support (BTLS) manual.²⁰ The training was facilitated by: the Principal Investigator (who had undergone the St. Johns Ambulance On-line Crash Course and the BTLS Advanced Providers Course); a certified first aid trainer of the Nigerian Red Cross, Ibadan; and a senior officer from the Federal Road Safety Commission (FRSC), Ibadan. The drivers were trained in groups of 10–20 to enhance participation and skills acquisition. The drivers in the control group were given training on HIV/AIDS prevention and the implication of HIV/AIDS on the workplace. Seven research assistants (some of whom were members of drama groups and all of whom received first aid training by the Nigerian Red Cross trainers prior to the study) assisted with the simulated scenarios and the administration of the questionnaires.

Measurement of Outcome Variables

The outcome variables were drivers' first aid knowledge and drivers' first aid skills. Two examiners (the investigator and one of the research assistants) assessed and independently scored the drivers' first aid skills in simulated post-crash scenarios at the training venue with the aid of a semi-structured grade sheet. The first aid skills grading sheet was adapted from the BTLS patient assessment grading sheet from the BTLS manual and trainer's CD-ROM.²⁰ The BTLS 3-man team-approach, in which a team comprising of three members attends to victims in each simulated crash scenario, was used.²⁰ A team leader was selected and he took charge during the scenario. Team leadership was taken in turns. Scores were allotted to the team leader only by the investigator and one of the trained research assistants. The average score given by the two assessors was computed and awarded to the participant. An overall first aid skill grade based on the drivers' performance during the simulated crash scenario²⁰ was also allotted as:

- Inadequate: actions not performed, actions performed too late, or actions performed inadequately;
- Adequate: actions performed late or out of sequence, actions performed with marginal skill, or actions incomplete;
- Good: actions performed in sequence or actions performed with skill; and
- Excellent: actions performed in sequence, actions performed with skill, actions performed rapidly and calmly, and excellent team leadership.

Where there were discrepancies in assigned scores, the two assessors discussed them and a final grade was arrived at. The study instruments were pre-tested and ambiguous questions were re-framed and the necessary corrections were made. Data were

analyzed using the IBM SPSS Statistics for Windows, Version 20.0. (IBM Corp.; Armonk, New York USA).

Data Management

Participants' first aid knowledge and skills were assessed at baseline, immediately post-intervention, and three months after the intervention. Drivers' knowledge of first aid for accident victims was assessed based on a set of 24 questions. A point was awarded for each correct answer and zero for incorrect answers giving minimum and maximum aggregate scores of 0 and 24. For assessment of first aid skills, a 25-item skills grade sheet was developed. A point was allotted for each activity correctly performed and zero for an activity which was not performed or incorrectly performed. The minimum and maximum obtainable scores were 0 and 25, respectively. All scores were converted to percentage points for ease of comparison. The respondents' mean score and standard deviation were calculated for both first aid knowledge and skills. These scores were compared across the three assessment points using repeated measure analysis of variance (ANOVA) and the independent *t*-test for between-group comparisons. A *P* value of <.05 was considered statistically significant.

Ethical Considerations

Ethical approval for the study was obtained from the Oyo State Ministry of Health Research Ethical Review Committee (Ibadan, Nigeria). Permission was also obtained from the State Secretariat of the NURTW. Verbal informed consent was obtained from each participant.

Results

Respondents' Socio-demographic Characteristics

A total of 128 respondents, 62 (48.4%) in the intervention group and 66 (51.6%) in the control group, participated in the study. The socio-demographic characteristics of the drivers in the intervention and control groups were largely similar, although a higher proportion of control (34.8%) than intervention (11.3%) drivers had ever received training in first aid (Table 1).

First Aid Knowledge of Intervention and Control Drivers

At baseline, the intervention and control drivers had low first aid knowledge on all items assessed (Appendix Table 1; available online only). Pre-intervention, 35 (56.5%) of the 62 intervention drivers had a first aid knowledge score of $\geq 50\%$. This increased to 51 (83.6%) and 55 (88.7%) of the 62 drivers in the immediate and three months post-intervention assessments. Figure 1 depicts the change in mean scores among the drivers over the three study phases. There was no significant difference in mean first aid scores of the intervention (48.9%; SD = 12.0) and control (48.3%; SD = 12.8) drivers at baseline. The intervention drivers experienced a significant improvement in first aid knowledge over the three assessment periods: 48.9% (SD = 12.0), 57.8% (SD = 11.2), and 59.2% (SD = 9.0), respectively. Corresponding scores for the control drivers were 48.3% (SD = 12.8), 39.2% (SD = 15.3), and 46.8% (SD = 15.3; Figure 1).

Post-intervention first aid knowledge scores of the intervention drivers were significantly higher than those of the control drivers (Table 2). Repeated measures ANOVA showed a statistically significant difference in first aid scores over the three study phases ($P < .05$).

Socio-demographic and Driver Characteristics	Intervention n (%) N = 62	Control n (%) N = 66
Socio-demographic Characteristics		
Age Group (years) ^a	n = 59	n = 63
20-29	5 (8.6)	3 (4.8)
30-39	15 (25.9)	12 (19.0)
40-49	21 (36.2)	28 (44.4)
≥50	17 (29.3)	20 (31.7)
Mean Age in Years (SD)	42.7 (8.7)	44.7 (9.22)
Marital Status		
Single	0 (0.0)	3 (4.5)
Married	62 (100.0)	63 (95.5)
Family Type ^a	n = 59	n = 63
Monogamous	38 (64.4)	42 (66.7)
Polygamous	21 (35.6)	21 (33.3)
Highest Level of Education ^b		n = 60
No Formal Education	2 (3.2)	7 (11.7)
Primary	26 (41.9)	33 (55.0)
Secondary	29 (46.8)	19 (31.7)
Post Secondary	5 (8.1)	1 (1.7)
Respondents' Driving History		
Proportion of Respondents who have been Involved in Accidents		
Yes	16 (25.8)	22 (33.3)
No	46 (74.2)	44 (66.7)
Proportion of Respondents who have Assisted RTA Victims in the Month Preceding the Survey		
Yes	5 (8.1)	9 (13.6)
No	57 (91.9)	57 (86.4)
Proportion of Respondents who have Received Training on First Aid		
Yes	7 (11.3)	23 (34.8)
No	55 (88.7)	43 (65.2)

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Table 1. Socio-demographic Characteristics Including Respondents' Driving History^aNo response (3 in the intervention group, 3 in control group).^bNo response (6 in the control group).*First Aid Skills of Intervention and Control Drivers*

Prior to the intervention, all the drivers demonstrated low skills for each action assessed (Appendix Table 2; available online only). Pre-intervention, mean first aid scores of the intervention (17.5%; SD = 3.8) and control (16.5%; SD = 4.5) drivers ($P = .176$) were comparable. There were marked differences in the mean first aid skills scores of the intervention drivers over the three

assessment periods [17.5% (SD = 3.8), 80.7% (SD = 8.3), and 72.3% (SD = 16.8)]. Scores for control drivers were 16.5% (SD = 4.5), 16.3% (SD = 4.7), and 20.4% (SD = 9.1), respectively (Figure 2).

Post-intervention, the Independent t-test showed significant differences between the mean first aid skill scores of the intervention and control drivers. Repeated measures ANOVA revealed

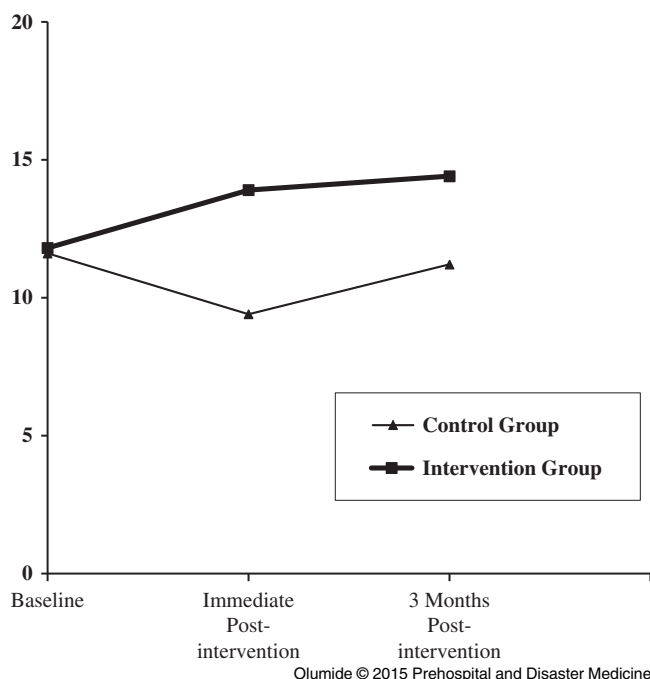


Figure 1. Respondents' Mean First Aid Knowledge Score by Assessment Points.

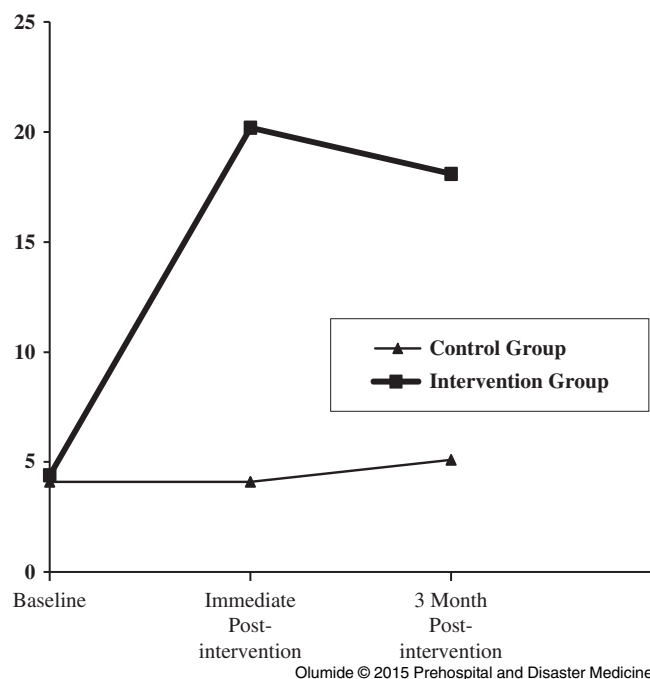


Figure 2. Respondents' Mean First Aid Skill Score by Assessment Points.

Study Phase	Mean Score on First Aid Knowledge (%)		P Value ^a
	Intervention n = 62 Mean (SD)	Control n = 66 Mean (SD)	
Baseline	48.9 (12.0)	48.3 (12.8)	.752
Immediate Post-intervention	n = 61		
	57.8 (11.2)	39.2 (15.3)	<.0001 ^b
Three Months Post-intervention	n = 61		
	59.2 (9.0)	46.8 (15.3)	<.0001 ^b

Table 2. Respondents' Aggregate First Aid Knowledge Scores by Assessment Points

^aP value for independent t-test.

^bStatistically significant.

significant differences in mean first aid skills scores over the three study phases (Table 3).

The proportion of intervention drivers who had “adequate” to “good” overall scenario grades increased from 0 at baseline to 60 (100%) and 54 (88.6%) immediately and three months post-intervention, respectively. Among the controls, those with “adequate” to “good” overall scenario grades were 0, 1 (1.5%), and 2 (3.0%) over the three study phases, respectively (Table 4).

Discussion

This study was conducted to determine the effect of first aid education on the capacity of commercial drivers to provide first aid for accident victims. The intervention resulted in significant increases in first aid knowledge and skills.

Prior to the intervention, the drivers in the intervention and control groups recorded less than average knowledge of first aid at

baseline. Olugbenga-Bello et al also reported in their study relatively low first aid knowledge,²¹ emphasizing the need for these drivers to be trained in provision of first aid, especially as they are likely to be the first to arrive at a crash scene.

The post-intervention surveys showed that there was an improvement in the mean first aid knowledge scores among the intervention drivers compared with the control group at both the immediate and three months post-intervention surveys. This is similar to findings reported by Sangowawa and Owoaje in their study among University drivers.¹⁶ Ali et al, in their study on the effect of basic Prehospital Trauma Life Support (PHTLS) program on cognitive and trauma management skills of paramedics, also showed that pre-PHTLS scores on a multiple choice questionnaire were similar in the intervention and control groups at baseline [45.8% (SD = 9.4) vs 48.8% (SD = 8.9)]; however, following a PHTLS training, the

Study Phase	Mean Score First Aid Skills Score		P Value ^a
	Intervention Mean (SD)	Control Mean (SD)	
Baseline	n = 62	n = 66	
	17.5 (3.8)	16.5 (4.5)	.176
Immediate Post-intervention	n = 61	n = 66	
	80.7 (8.3)	16.3 (4.7)	<.0001 ^b
Three Months Post-intervention	n = 61	n = 66	
	72.3 (16.8)	20.4 (9.1)	<.0001 ^b

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Table 3. Respondents' Demonstrated Mean First Aid Skills Scores by Assessment Points^aP value for independent t-test.^bStatistically significant.

Overall Scenario Grade	Intervention Group			Control Group		
	Baseline n = 62	Immediate Post- intervention n = 60	3 Months Post- intervention n = 60	Baseline n = 66	Immediate Post- intervention n = 66	3 Months Post- intervention n = 66
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Nothing Done	62 (100.0)	0	0	66 (100.0)	0	2 (3.0)
Inadequate	0	0	7 (11.4)	0	65 (98.5)	62 (93.9)
Adequate	0	47 (78.3)	27 (44.3)	0	1 (1.5)	2 (3.0)
Good	0	13 (21.7)	27 (44.3)	0	0	0
Excellent	0	0	0	0	0	0

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Table 4. Overall Scenario Grade for Drivers' Demonstrated First Aid Skills by Assessment Points

post-PHTLS scores were higher in intervention paramedics (80.4%; SD = 5.9) than in controls (52.6%; SD = 4.9).²²

The effect of the first aid training in improving first aid skills of drivers was remarkable as there was a significant increase in the intervention drivers' mean scores over the three assessment periods. Among the controls, mean scores remained approximately the same. This is comparable to findings from other intervention studies. Ali and colleagues, in their intervention study among paramedics, also reported that at baseline, the mean PHTLS scores were comparable for both their intervention and control participants. However, post-intervention, the intervention group experienced an increase in scores while the controls did not.²²

Regarding the overall scenario grades, there was a significant difference in the proportion of intervention drivers who had adequate to good overall scenario grades from baseline to immediate and three months post-intervention phases. It was noted during the skills testing sessions that prior to the intervention, all the drivers generally were in a hurry to move the crash victims from the simulated accident scene without thought for

their own safety or observance of proper lifting techniques. After the training, however, the intervention drivers were more likely to carry out the same and other critical actions in a prompt and step-wise manner, and thus, performed better.

In the third post-intervention phase, the first aid skills scores for the intervention drivers reduced slightly. This finding was also noticed among the University drivers in Sangowawa and Owoaje's study¹⁶ and emphasized the need for refresher trainings to sustain the knowledge and skills acquired.

Limitations

This study has some limitations: first, drivers' skills were assessed in controlled settings, and this may differ from actual behavior at crash sites. In order to minimize this limitation, the training comprised didactic lectures, was interactive, and included several hands-on sessions aimed at ensuring the drivers could perform these skills to a reasonable extent in real-life crash situations. The training was also staggered and participants were trained in groups of 10-12 to facilitate hands-on learning. There was a possibility of contamination as the drivers do not work in isolation; however,

this was addressed by training controls before the intervention drivers. Finally, this study was conducted among commercial drivers in Southwestern Nigeria. They may differ in certain characteristics (level of education and participation in previous first aid training) from drivers in other parts of Nigeria and other low- and middle-income countries. While these would not prevent acquisition of knowledge following the training, the drivers' level of education and previous first aid training could influence levels of first aid knowledge and skills at baseline.

Conclusion

Findings from this study revealed that the first aid education intervention significantly improved the first aid knowledge and

skills of the intervention drivers. Drivers in the control group did not record any significant change in these measures, thus affirming the effectiveness of the first aid training. These findings confirm that lay responders can acquire first aid skills if taught. It is thus recommended that: (1) policy makers in countries where EMS are not yet established could institute policies directing potential drivers to undergo first aid training; and (2) periodic re-training should be stipulated to maintain knowledge and skills acquired.

Supplementary material

To view supplementary material for this article, please visit <http://dx.doi.org/10.1017/S1049023X15005282>

References

- World Health Organization. *Global Status Report on Road Safety: Time for Action*. Geneva, Switzerland: World Health Organization; 2009.
- World Health Organization. *World Report on Road Traffic Injury Prevention*. Geneva, Switzerland: World Health Organization; 2004.
- Jacobs G, Aeron-Thomas A, Astrop A. *Estimating Global Road Fatalities*. Crowthorne: Transport Research Laboratory; 2000; Contract No.: TRL Report 445.
- Peden M, McGee K, Sharma G. *The Injury Chart Book: A Graphical Overview of the Global Burden of Injuries*. Geneva, Switzerland: World Health Organization; 2002.
- World Health Organization. *Road Safety in the WHO African Region-The Facts 2013*. Geneva, Switzerland: World Health Organization; 2013. http://www.who.int/violence_injury_prevention/road_safety_status/2013/report/factsheet_afro.pdf. Accessed September 14, 2015.
- World Health Organization. *Global Status Report on Road Safety 2013: Supporting a Decade of Action*. Geneva, Switzerland: World Health Organization; 2013.
- Haddon W. Options for the prevention of motor vehicle crash injury. *Isr J Med*. 1980;16(1):45-68.
- Baker SP, O'Neill B, Karpf RS. *The Injury Fact Book*. Massachusetts, USA: Lexington Books; 1984.
- Hussain IM, Redmond AD. Are prehospital deaths from accidental injury preventable? *BMJ*. 1994;308(6936):1077-1080.
- Mock CN, Nii-Amon-Kotei D, Maier RV. Low utilization of formal medical services by injured persons in a developing nation: health service data underestimate the importance of trauma. *J Trauma*. 1997;42(3):504-513.
- Mock CN, Jurkovich GJ, Nii-Amon-Kotei DM. Trauma mortality patterns in three nations at different economic levels: implications for global trauma systems development. *J Trauma*. 1998;44(5):804-814.
- Nantulya VM, Reich MK. The neglected epidemic: road traffic injuries in developing countries. *BMJ*. 2002;324(7346):1139-1141.
- Forjuoh S, Mock CN, Friedman D, Quansah R. Transport of the injured to hospitals in Ghana: the need to strengthen the practice of trauma care. *Prehospital Immediate Care*. 1999;3:66-70.
- Ofoegbu C, Adekanye A, Abdur-Rahman L, Udoffa U, Taiwo J, Solagberu B, (eds). *Pre-Hospital Transport of Road Traffic Injury Victims in Nigeria*. 8th World Conference on Injury Prevention and Safety Promotion: Durban, South Africa; 2006.
- Mock C, Tiska M, Adu-Ampofo M, Boakye G. Improvements in prehospital care in an African country with no formal emergency services. *J Trauma*. 2002;53(1):90-97.
- Sangowawa AO, Owoaje ET. Building capacity of drivers in Nigeria to provide first aid for road crash victims. *Inj Prev*. 2012;18(1):62-65.
- Taylor DW. (unpublished work) The calculation of sample size and power in the planning of experiments, 1983.
- Fox N, Hunn A, Mathers N. *Sampling and Sample Size Calculation*. East Midlands/Yorkshire: The National Institutes for Health Research. Research Design Service for the East Midlands/Yorkshire and the Humber; 2009.
- World Health Organization. *Guidelines for Conducting Community Surveys on Injury and Violence*. Geneva, Switzerland: World Health Organization; 2004.
- Campbell JR, (ed). *Basic Trauma Life Support for Paramedics and Other Advanced Providers*. 5th edition. New Jersey, USA: Prentice Hall; 2003.
- Olugbenga-Bello AI, Oluwadiya KS, Bret AN, Olakulehin A, Olawole D, Adewole OA. First aid knowledge and application among commercial inter-city drivers in Nigeria. *African Journal of Emergency Medicine*. 2012;2:108-113.
- Ali J, Adam R, Josa D, et al. Effect of basic Prehospital Trauma Life Support program on cognitive and trauma management skills. *World J Surg*. 1998;22(12):1192-1196.