Road Safety and First Aid Educational Program among Alexandria Port Commercial Drivers

Eman Ahmed Elkaluby[1*], Ahlam Mahmoud Mohamed[1] & Neama Yousef Mohamed[2]
[1] Lecturer, Community Health Nursing, Faculty of Nursing, Alexandria University, Egypt
[2]Assistant professor, Community Health Nursing, Faculty of Nursing, Alexandria University, Egypt

Corresponding author: Eman Ahmed Elkaluby

Abstract:

Background: Road safety has recognized as a major public health concern. It has considered an important sustainable developmental issue as illustrated by its express inclusion in the 2030 Agenda for Sustainable Development Goals. Road crashes have been responsible for increasing number of deaths and disabilities worldwide with a disproportionate growth in developing countries. Egypt is one of top 10 countries in the world with highest mortality rates due to road crashes. In fact, these crashes related deaths and injuries are largely preventable, and its prevention can be achieved by raising the commercial drivers' knowledge and skills in maintaining road safety in all conditions and environments. **Aims:** this study aims to assess the knowledge regarding road safety and first aid measures among the commercial drivers and measure the effect of implementing road safety and first aid educational program on commercial drivers' knowledge regarding road safety practices and first aid in Alexandria - Egypt. **Design:** A quasi experimental study design was adopted to carry out this study. **Setting**: the study was conducted at Alexandria Sea Port including Alexandria and Dekhila Port. **Subjects**: forty drivers were selected using systematic random sample technique **Tools**: three tools were used; **Tool (I**) Personal Characteristics and Health Status of The Commercial Drivers Structured Interview Schedule, Tool **(II)** Commercial Drivers' Knowledge Regarding Road Safety and First Aid Measures Assessment and Tool (**III)** Commercial Drivers' Road Safety and First Aid Related Practices Assessment Checklist. **Results:** The findings of the present study revealed that commercial drivers had poor knowledge and practices regarding road safety and first aid measures moreover, the implementation of the educational program related to road safety and first aid leads to improvement in both total knowledge score and total practice score among the studied commercial drivers. **Recommendations:** As the commercial drivers are not formally taught a wide array of safe driving practices, the traffic unit should put legislation for obligatory first aid training and safe driving for every driver who looking for driving license issue. Because road safety is a shared responsibility the collaboration is needed between the Egyptian ambulance organization in the form of first aid training and providing special hot line for commercial cars in case of accidents.

Key Words: Road Traffic Crashes, Speed limit, Driving Rules.

INTRODUCTION

Road crashes have become an important public health concern over the past decades; it is one of the main causes of mortality and disability in the world. The World Health Organization (**WHO**) estimates that deaths from road crashes will become the fifth leading cause of death worldwide in 2030 **[1,2].** Worldwide, each year, more than 1.24 million people die in road crashes, and some 50 million are injured. Ninety percent of these victims are belonging to low- or middle-income countries and they will experience the greatest growth in casualty rates over the coming decades. In fact, there are differences among road traffic

deaths in respect of WHO Regions. The European Region cause at least 120,000 deaths and injure 2.4 million people each year, While in African Region continues to be the highest with an average population at risk of 24.1 deaths per 100,000 populations [3,4]. In this respect, road safety has considered an important sustainable development issue as illustrated by its express inclusion in the 2030 Agenda for Sustainable Development, in targets 3.6 aiming for the reduction of global road traffic deaths and injuries by 50 per cent by 2020; and target 11.2 aiming to provide access to safe, affordable, accessible and sustainable transport systems for all by 2030 [5]. However, in Egypt according to **WHO global status report on road safety (2018)** every year about 12,000 Egyptians lose their lives as a result of a road traffic crash [2]. Many thousands are non-fatally injury, which lead to long-term disability [6].

The occurrence of Road crashes is related to modifiable determinants and tackling them is not substantially different from tackling other health problems. A road crash results from a combination of several factors that include the vehicle type, the road, in terms of poor road infrastructure which include design consistency and pavement surface performance (friction, texture),especially in wet conditions , the third factor is the driver, who is the main factor for the occurrence of an accident [7]. Unsafe and a distracted driving behavior related to driver's psycho-physical conditions, his mental workload, the reduction of the attention threshold and the increase of the perception-reaction time resulting from frequent use of mobile phones while driving, poor road user behavior exhibited by drivers in some developing countries may be due to their lack of knowledge about road safety rules and regulations or their general attitude toward road safety matters [7,8]. Additionally, other factors out of driver's control is the environmental factors which known by weather conditions or climate changes such as rain, snow, ice, fog, wind and temperature these factors needs a competent driving skills to deal with such changes and preventing accidents [8,9].In this regard, it is unhappy to declare that in Egypt it is relatively easy for people to get a license without proper driving skills. Hence, emphasis on proper training of drivers through a proper driving license system should be viewed as an effective way to increase traffic safety attitude. The trends of road accidents and huge socio- economic losses shows that there is an urgent need of systematic approach and development of road safety improvement program to reduce road accidents and fatalities [9,10].

Road accidents not only impose huge economic losses representing between 1-3% of annual Gross Domestic Product in most countries but also causes great emotional and financial stress to the millions of families affected. The continued steep increase in the number of road accidents indicates that these losses are undoubtedly inhibiting the economic and social development of the countries and adding to the poverty and hardships of the poor. Thus, there is an urgent need to improve safety of the roadway and its adjacent development, considering this importance of improving road safety [7, 9,10].

Actions to prevent road traffic crashes and reduce associated mortality and disability include modifying the various factors involved in collisions. These factors may include policy change, activities toward road infrastructure improvement, as well as modifying driving behaviors and first aid training [10-12]. The Hoddon Matrix is the most commonly used paradigm in the injury prevention field. The matrix looks at factors related to the human factors such as attitude, knowledge, and driving experience and vehicle condition as well as the environmental factors which include road design, pedestrian facilities, traffic law before, during and after an injury or death [13,14].

Road safety is a multi-sectorial and a public health issue, all sectors need to be fully engaged in the responsibility. Activity and advocacy for road crash and injury prevention and providing effective trauma care services are the main concern of the community health nurse [11,12]. In fact, many of the road crashes deaths and injuries could be avoided if people were

trained in basic first aid and were able to provide an appropriate and rapid response. That is why the general public awareness of the of basic first aid principles make a significant impact on the road safety issue [11,15]. First aid knowledge constitutes life-saving interventions for accidents, it is important for every individual as well as more important for drivers as they are more prone to involve or witness road traffic accidents than others. In many countries, few victims receive treatment at the site of accident, and fewer still can hope to be transported to hospital by ambulance since these simple actions will save their life [16,17].

Significance of the study:

Egypt is ranked among the countries with the highest rates of road crashes. According to the American Chamber of Commerce more than 96% of Egypt's goods are transported by trucks and due to their large volume and excessive weight, the severity and number of truck accident fatalities are much higher than other vehicles in Egypt. The victims of road fatalities are mostly young and middle-aged people which have a great impact on the emerging economy [17]. In addition, the first-person attending road traffic accident is likely to be another driver. According to **Badawy et al. (2016)**[18] study on commercial drivers in Egypt in 2016, they found that commercial drivers have a poor understanding of basic first aid knowledge and road traffic safety, they were also eager to be trained in delivering first aid at road traffic accidents. Moreover, the study pointed to the need of developing an educational programs and campaigns for commercial drivers on road safety and driving behavior and first aid training. **Badawy et al. (2016)** [18]. Road safety is a very serious issue in Egypt and the Middle East in general. Therefore, the reduction or prevention of road crashes is one of the top priorities of researchers. Finally speaking it is expected that training commercial drivers on first aid and road safety will play a role in decreasing accidents levels and considered an important step in improving trauma care [19,20]. So that the current study aimed to assess the knowledge regarding road safety and first aid measures among Alexandria port commercial drivers and measure the effect of road safety and first aid educational program on Alexandria port commercial drivers' road safety and first aid related knowledge and practices.

Aims of The Study

The current study aims to:

1- Assess the knowledge regarding road safety and first aid measures among Alexandria port commercial drivers.
2- Measure the effect of road safety and first aid educational program on Alexandria port commercial drivers' knowledge and practices

Research Hypothesis:

1- Commercial drivers who receive road safety and first aid educational program will exhibit higher knowledge score post educational program implementation than before.
2- Commercial drivers who receive road safety and first aid educational program will exhibit higher road safety and first aid practice score post educational program implementation than before.

MATERIALS & METHOD

Materials

Design:

A Quasi –experimental study design was used to carry out this study.

Setting:

The study was conducted at Alexandria Sea Port including Alexandria and Dekhila Port (at Containers Handling Yards and Charge and Discharge yards). Alexandria port harvesting large number of commercial drivers especially those who drive on the highway, they usually drive heavy trunks and most probably prone to road traffic crashes.

Subjects:

According to this study, commercial drivers who transport goods in different vehicles of various sizes including huge size as truck, semi-trailers, bus or any size vehicle that can carry 15 or more passengers. The G* Power Program (Version 3.1.9.4) was used to estimate the effect size of the sample in experimental /quasi experimental research design according to the following parameters; Effect size d (0.80), α error probability/significance level (0.05), 1-β error probability /power (0.95). The total sample size expected to be 31 commercial drivers. A total number of 40 commercial drivers who accepted to participate in the study were included (20 commercial drivers from Alexandria port and 20 from Dekhila port) they were selected using systematic random sample technique).

Tools:

In order to collect the necessary data for this study, the following tools were used.

Tool I: Personal Characteristics and Health Status of The Commercial Drivers Structured Interview Schedule:

It was developed by researchers after reviewing the recent literature to collect necessary data from the drivers and include the following parts: **Part one**: driver's characteristics including; age, marital status, educational level, years of experiences, vehicle type, and license class. P**art two** included: driver's health status which includes presence of any health problems as liver diseases, kidney diseases, hypertension, diabetes mellitus, eye and vision problem, previous surgical operation, smoking habits, and use of stimulants.

Tool II: Commercial Drivers' Knowledge Regarding Road Safety and First Aid Measures Assessment Tool:

This tool was developed by the researchers after reviewing the recent related literature [21,22]. It included two main parts. **Part one** used to collect data about driver's knowledge regarding road safety practices such as, acceptable speed limits on different roads and the meaning of different road traffic signs either warning or regulatory signs and **part two** used to collect data about driver's knowledge regarding first aid measures such as emergency call number, rescue member qualities, classification of victims, order of first aid according to its priorities, correct victim's position, first aid measures applied in case of burn, major injuries and control of external bleeding, and finally, first aid measures for head and vertebral column injuries either before and after implementing the educational program. This tool was used before and after implementing the educational program.

Tool III: Commercial Drivers' Road Safety and First Aid Related Practices Assessment Checklist:

It was developed by the researchers after reviewing the recent literature [23-25]**.** In order to collect data about previous exposure to road traffic accidents, the driver's road safety and first aid experiences and related practice both before and after implementing the educational program**.**

Method: The study was conducted through four phases:

1. Assessment phase:

- After the Ethical approval has been obtained from Ethics Committee, Faculty of Nursing Alexandria University. Approval of the responsible authorities was obtained through

official letter from the Faculty of Nursing to the director of the Port Authority in Alexandria to collect the necessary data.

- Tools were developed by the researchers after reviewing recent related literature and were tested for content validity by 5 experts in the fields of Community Health Nursing, community medicine and Nursing Education. Their suggestions and recommendations were taken into consideration.
- A pilot study was conducted on 4 commercial drivers those numbers of drivers were excluded from the studied sample; the purpose of this pilot study was to test the clarity of the study questions and to evaluate the feasibility and applicability and to estimate time required for the interview. Accordingly, the necessary modifications were done, and the sheets were put in the final form.
- The researchers had met the commercial drivers besides the coffee places where the drivers meet at the Containers Handling Yards and Charge and Discharge Yards. The researchers provided an appropriate explanation about the purpose of the study and nature of the research and they asked for the drivers willing if they want to participate in the research. A list of the accepted drivers had been received by their phone numbers to arrange an appropriate time to them to join the study.
- Forty drivers who accepted to participate in the study were selected (20 out of 35 drivers from Alexandria port and 20 out of 44 from Dekhila port).
- Informed written consent was obtained from all selected commercial drivers.
- Final version of the tools was used to collect the data from all drivers by using tool I, II and III.
- Pre-test was done to assess commercial drivers' knowledge and practices regarding road safety and first aid by using Tool II and tool III.

2. Developing phase:

An educational program regarding road safety and first aid was carried out according to the following steps:

Step I- Stating clear objectives;

A- General objective:

At the end of the road safety and first aid educational program application the commercial driver's knowledge and practices of road safety will be improved.

B- Specific objectives:

- Identify the causes of road crashes.
- List measures to reduce road crashes.
- Differentiate between agriculture and desert road speed limits.
- Define different road traffic signs.
- Differentiate between warning and regulatory traffic signs.
- State the rescue qualities.
- Classify the victim according to the priority of care.
- Define the correct victim's position.
- Apply correct first aid measures for different types of injuries and trauma.

Step II- preparation and organization of the program media;

A- Preparation of media used in the program application:

- Printed materials were developed by the researchers in order to enhancing the driver's memorization about the meaning of different road traffic signs and first aid measures.
- Select suitable and culture related videos regarding first aid and road accidents prevention.
- Power point presentation was developed by the researchers to facilitate the concepts clarifications.

- Preparation of different scenario that can be used in providing simple first aid measures such as fracture management, splint, CPR interactive situation.

B- Preparation of the environment for conducting the program (Port yard):

- Suitable comfortable place was arranged using U-shape to facilitate communication.
- Suitable numbers of sits were arranged.
- Electricity power source, laptop, and CPR doll was prepared.

3. Implementation phase:

This phase included the implementation of the planned program's sessions according to the following;

- The researchers were introducing themselves to the drivers and ask them to share one little known fact about themselves (Ice breaking process).
- The road safety and first aid program was implemented for the drivers in the form of ten sessions, one session per week, each session takes around 45 minutes and it was including the following:

Session (1,2): Introduction about the magnitude and significant of road crashes, definition, causes of road crashes, acceptable speed limits for different roads and meaning of different road traffic signs.

Session (3,4): Definition of first aid, criteria that should be available in person who provide first aid (rescue), goals of first aid, and triage tag / coding system.

Session (5,6): Primary assessment, sorting and prioritizing injured victims for treatment and transport, principles of first aid, and the contents of first aid kit.

Session (7,8): CPR (cardiopulmonary resuscitation) procedure for children and adults.

Session (9,10): First aid procedure for different types of injuries (bleeding, fractures, burn, and vertebral column injuries).

- The researchers used different teaching methods as discussion, demonstration and re-demonstration and simulation and role play.

4. Evaluation phase:

- After the implementation of the road safety and first aid educational program, the evaluation phase was performed.
- Post program evaluation was done to determine the effect of the program on the driver's road safety and first aid related knowledge and regarding road safety and first aid related practices after 3 months by using Tool II and tool III.
- Data were collected by the researchers over a period of six months from February 2019 to July 2019.

Ethical considerations:

- Informed written consent was obtained from all drivers after providing an appropriate explanation about the purpose of the study and nature of the research. Volunteer participation and right to refuse participating in the study were emphasized to the drivers.
- The confidentiality and anonymity of individual responses was maintained.

Statistical analysis

- The collected data were coded and analyzed using PC with the IBM Statistical Package for Social Sciences (IBM SPSS version 25) and tabulated frequency and percentages were calculated.
- Count and percentage: Used for describing and summarizing quantitative data.
- Minimum, Maximum, Arithmetic mean ($\bar{X}$), Standard deviation (SD), Median were used as measures of central tendency and dispersion respectively for normally distributed quantitative data. Median was used for ranked or scored data as it is not affected by outliers or extreme values.

- Chi square: (χ^2) was used to determine whether there is a significant difference between the expected frequencies and the observed frequencies in one or more categories.
- Fisher exact and Monte Carlo test were used whenever the expected frequency of any cells of 2×2 table falls below 5.
- Student t-test Student's' t Test was used to compares the actual difference between two means in relation to the variation in the data.
- The level of significance selected for this study was p value equal to or less than 0.05.

Knowledge scoring system:

In relation to the commercial driver's knowledge a score of two was given to complete correct answer, while a score of one was given to incomplete answers and a score of zero was given to incorrect or don't know response. The total knowledge score on road safety practices and first aid was calculated and transferred to percentage and classified into:

- Poor knowledge scores are less than 50 % of scores.
- Fair knowledge scores are ranged from 50 to less than 75% of scores.
- Good knowledge scores are equal to or greater than 75% of scores.

RESULTS

Table (1) describes the personal characteristics of the studied drivers and their driving experiences, it was found that less than three quarters (72.5%) of the drivers aged 30 to less than 40 years with a mean of 39.7±6.5 years and less than three quarters of them (70.0%) were married. Around two third (62.5%) of the drivers had basic education and two fifth (40%) of them had more than 15 years of experience in driving. Regarding the commercial driver main travel line it was observed that around two third of the drivers were using heavy truck and had long distance journey (67.5%, 62.5% respectively), and majority of them (82.5) reported that they drive 6 hours and more daily, the mean daily driving hours was 9.2±2.0 hour. Three quarters of them had first class driving license. Unfortunately, it was found that only 15% of them received first aid training.

Table (1): Distribution of the Studied Commercial Drivers According to Their Personal Characteristics and Driving and Training Experiences

Personal characteristics and Driving and training experiences	Frequency (n. 40)	
	No.	%
Age (Years)		
30 to less than 40 years	29	72.5
40 years and more	11	27.5
Mean ±SD	39.7±6.5	
Marital status		
Married	28	70.0
Single	8	20.0
Widow	2	5.0
Divorced	2	5.0
Level of education		
Preparatory level (Basic education)	25	62.5
Secondary level (Technical diploma)	7	17.5
Bachelor	8	20.0
Years of experience in driving		
<5 years	10	25.0
5 to <10 years	5	12.5

Personal characteristics and Driving and training experiences	Frequency (n. 40)	
	No.	%
10 <15 years	9	22.5
15 years and more	16	40.0
Mean ±SD	11.2±5.7	
Travel line/ pathway		
Inside city	5	12.5
Short distance	10	25.0
Long distance	25	62.5
Vehicle type		
Light truck	15	32.5
Heavy truck	25	67.5
License class		
First	30	75.0
Second	10	25.0
Daily driving hours		
Less than 6 hours	7	17.5
6 hours and more	33	82.5
Mean±SD	9.2±2.0 hours	
First Aid Training Experiences		
Not received training	34	85
Once	3	7.5
Twice	3	7.5

Table (2) illustrates the distribution of the studied drivers according to their health status, it was observed that half (50%) of the studied drivers did not complain from any health problem, while around one third of them reported different complaints as backache and headache (35% and 32.5% respectively). Moreover, around one quarter of them were suffering from hypertension and liver disorder (25% and 22.5% respectively) while less than one fifth were complaining from renal disorder and diabetes (17.5% and 15% respectively). In relation to risk taking behavior it was found that more than half (55%) of them were smokers, it was horrible to found that, one fifth of the studied drivers using stimulants such as different caffeine source or strong stimulants as tramadol. Finally, it was observed that the mean daily total sleep hours were 6.4±1.3 hours.

Table (2): Distribution of the Studied Commercial Drivers According to Their Health Status

Health status	Frequency (n.40)	
	No.	%
Health complaints #		
No complaints	20	50.0
Backache	14	35.0
Headache	13	32.5
Hypertension	10	25.0
Liver disorders	9	22.5
Renal disorders	7	17.5
DM	6	15.0
Risk taking behaviors		

Health status	Frequency (n.40)	
	No.	%
A-Smoking		
No	18	45.0
Yes	22	55.0
B-Use of stimulants		
No	32	80.0
Yes	8	20.0
Daily total sleep hours		
Less than 6 hours	19	47.5
6 hours and more	21	52.5
Mean ± SD	6.4±1.3 hours	

 # More than one answer

From Figure (1) it can be observed that about one quarter (25%) of the commercial drivers had previous exposure to RTA one year prior to the study.

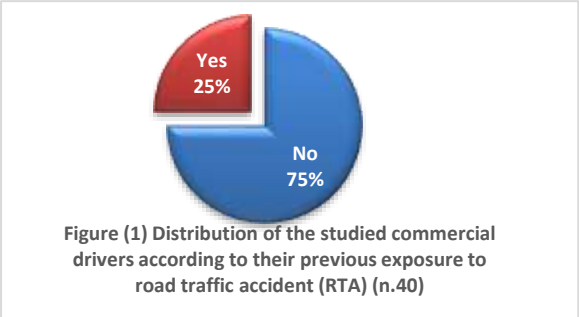

Figure (1) Distribution of the studied commercial drivers according to their previous exposure to road traffic accident (RTA) (n.40)

Table (3) portrays the relation between commercial drivers' previous exposure to RTA and other variables such as their health complaints and use of stimulants. It is observed that there are significant relations between drivers' health complaints, use of stimulants, daily total sleep hours ,vehicle type ,license class and driving speed on desert road and their previous exposure to RTA with P value 0.028,<0.001,0.002,0.38,0.35 and 0.011 respectively.

Table (3): The Relation between the Commercial Drivers' Previous Exposure to Road Traffic Accidents and Their Health Complaints, Use of Stimulants, and Driving Related Experiences

Variables	Previous Exposure to Road Traffic Accidents				Test of significance (P Value)
	Not exposed (n.30)		Exposed (n.10)		
	No.	%	No.	%	
Health complaints					
No	12	60.0	8	40.0	X^2: 4.800 (0.028*)
Yes	18	90.0	2	10.0	
Use of stimulants					
No	28	87.5	4	12.5	X^2: 13.333 (<0.001*)
Yes	2	25.0	6	75.0	
Daily total sleep hours					
Less than 6 hours	10	52.6	9	47.4	X^2: 9.657 (0.002*)
6 hours and more	20	95.2	1	4.8	
Travel line/					

Variables	Previous Exposure to Road Traffic Accidents				Test of significance (P Value)
	Not exposed (n.30)		Exposed (n.10)		
	No.	%	No.	%	
pathway					
Inside city	5	100.0	0	0.0	X^2: 4.480 (0.106)
Short distance	16	64.0	9	36.0	
Long distance	9	90.0	1	10.0	
Vehicle type					
Light truck	14	93.3	1	6.7	X^2: 4.302 (0.038*)
Heavy truck	16	64.0	9	36.0	
License class					
First	20	66.7	10	33.3	X^2: 4.444 (0.035*)
Second	10	100.0	0	0.0	
Daily total driving hours					
Less than 6 hours	7	100.0	0	0.0	X^2: 2.828 (0.093)
6 hours and more	23	69.7	10	30.3	
Driving speed limits practices on agricultural road					
Wrong/High speed	26	72.2	10	27.8	X^2: 1.481 (0.224)
Right/acceptable	4	100.0	0	0.0	
Driving speed on the desert roads					
Wrong/High speed	28	82.4	6	17.6	X^2: 6.536 (0.011*)
Right/acceptable	2	33.3	4	66.7	

X^2: Chi square test **FET: Fisher Exact Test**
P: P value of the test of significance ***Significance at p value ≤0.05**

Table (4) elaborates to how extent the drivers were knowledgeable with the meaning of road traffic signs both before and after program implementation it was observed that all the commercial drivers knew the sign of No entry, No right turn, No cellular phone and the sign of Road work either pre or post the educational program application. Moreover, there was a significant improvement in the commercial drivers knowledge regarding the sign of pedestrian crossing ahead, no stopping/no waiting, hump, children pedestrian crossing ahead, and the sign of road narrows on both sides pre and post the educational program application with p value 0.058, 0.002, <0.001, 0.002, and 0.016 respectively.

Table (4): Distribution of the Studied Commercial Drivers According to Their Knowledge Regarding to the Meaning of Road Traffic Signs Pre and Post Implementing The Educational Program

The Meaning of Road Traffic Signs		Pre-program Correct answer (n.40)		Post- program Correct Answer (n.40)		Test of significance (P value)
		No.	%	No.	%	
	**No entry**	40	100.0	40	100.0	-----
	**No right turn**	40	100.0	40	100.0	-----
	**No cellular phone**	40	100.0	40	100.0	-----
	**Road work**	40	100.0	40	100.0	-----
	**Pedestrian crossing ahead**	30	75.0	38	95.0	X^2:6.316 (0.058*)
	**No Stopping/ No waiting**	36	90.0	39	97.5	X^2:9.231 (0.002*)
	**Hump**	38	95.0	39	97.5	X^2:19.487 (<0.001*)
	**Danger elevation**	12	30.0	30	75.0	X^2:0.635 (0.426)
	**Roundabout**	17	42.5	33	82.5	X^2:2.004 (0.157)
	**Danger**	5	12.5	33	82.5	X^2:2.801 (0.094)
	**Children pedestrian crossing ahead**	36	90.0	39	97.5	X^2:9.231 (0.002*)
	**Road narrows on both sides**	34	85.0	39	97.5	X^2:5.812 (0.016*)

X^2: Chi-square test P: P value of the test of significance * Significant at p value ≤ 0.05

Table (5) represents the distribution of the studied commercial drivers according to their knowledge about speed limits on agriculture and desert roads. Before the program implementation, it was noticed that majority of the commercial drivers had incorrect answers about allowed speed for different vehicles on both agriculture and desert roads, however significant improvements in the commercial drivers' knowledge regarding correct speed limits to different vehicles such as trailer, truck, taxi and van speed on the agriculture and desert roads were noticed after implementation of the educational program for example near one fifth of the drivers had correct knowledge about trailer speed limits on agriculture and desert road (22.5%, 20% respectively) before program to reach (90%, 87.5 respectively) after program implementation.

Table (5): Distribution of the Studied Drivers According to Their Knowledge about Speed Limits on Agriculture and Desert Roads Pre and Post Implementing The Educational Program

Speed limit	Pre-program Correct answer (n.40)	Post- program Correct answer (n.40)	Test of significance (P value)

		No.	%	No.	%	
Trailer speed limit 	Desert road	8	20.0	35	87.5	X^2:36.65 (<0.001*)
	Agricultural road	9	22.5	36	90.0	X^2:37.02 (<0.001*)
Truck speed limit 	Desert road	13	32.5	36	90.0	X^2:27.80 (<0.001*)
	Agricultural road	13	32.5	35	87.5	X^2:25.20 (<0.001*)
Taxi speed limit 	Desert road	6	15.0	33	82.5	X^2:36.40 (<0.001*)
	Agricultural road	6	15.0	38	95.0	X^2:51.7 (<0.001*)
Van speed limit 	Desert road	12	30.0	38	95.0	X^2:36.05 (<0.001*)
	Agricultural road	7	17.5	35	87.5	X^2:39.29 (<0.001*)

X^2: Chi-square test P: P value of the test of significance * Significant at p value ≤ 0.05

Regarding Commercial Drivers' first aid related knowledge it is observed from **Table (6)** that, there is a significant improvement in commercial drivers knowledge regarding to emergency call number, definition of first aid, qualities of rescue member, classification of victims according to priorities ,correct victim position after the educational program application with p value (0.007,0.040,0.011,0.017, and 0.030 respectively). The table shows that, the majority of the commercial drivers had incorrect answers about first aid definition, rescue member qualities, classification of victims, order of first aid according to its priorities, correct victim's position before the program however significant improvements in their knowledge regarding firs aid related knowledge had evident after the program implementation as the majority (95%) of commercial drivers had known the emergency call number versus77.5% before the program and more than half of them (57.5%) became able to define first aid correctly after the program as compared to 12.5% before program implementation. Concerning the qualities of rescue member less than three quarters (70%) of drivers correctly mentioned the qualities of rescue member as compared to 27.5% before the program. On the other hand, less than two third (60%) of them were able to classify the victim according to first aid priorities versus 17.5%. before the program. All drivers had the ability to put first aid procedure in a correct order versus 27.5% before the program. In addition, sixty percent of them had known the correct position for victims after the program compared to 15% before the program.

Table (6) Distribution of The Studied Commercial Drivers According to Their Knowledge Regarding First Aid Measures Pre and Post Implementing The Educational Program

Driver's knowledge regarding first aid measures	**Pre-program (n.40)**		**Post-program (n.40)**		**Test of significance (P value)**
	No.	**%**	**No.**	**%**	
Emergency call number					
Incorrect answer	9	22.5	2	5.0	X^2:7.251

Driver's knowledge regarding first aid measures	Pre- program (n.40)		Post-program (n.40)		Test of significance (P value)
	No.	%	No.	%	
Correct answer	31	77.5	38	95.0	(0.007*)
Definition of First aid					
Incorrect answer	35	87.5	17	42.5	X^2:4.224
Correct answer	5	12.5	23	57.5	(0.040*)
Qualities of rescue member					
Incorrect answer	29	72.5	12	30.0	X^2:6.502
Correct answer	11	27.5	28	70.0	(0.011*)
Classification of victim according to first aid priorities					
Incorrect answer	33	82.5	16	40	X^2:5.657
Correct answer	7	17.5	24	60.0	(0.017*)
Orders of first aid procedure (CAB-Compression, Air way, Breathing)					
Incorrect answer	29	72.5	0	0.0	----------
Correct answer	11	27.5	40	100.0	
Correct victim position					
Incorrect answer	34	85.0	16	40	X^2:4.706
Correct answer	6	15.0	24	60.0	(0.030*)

X^2: Chi-square test P: P value of the test of significance * Significant at p value ≤ 0.05

Table (7) presents the distribution of commercial drivers according to their knowledge regarding triage tag coding. A significant improvement was observed after the educational program in the commercial drivers' knowledge regarding black, red, green tag with a p value 0.017, 0.016, 0.053 respectively. It is clearly observable that more than half of the studied drivers had got correct knowledge after the educational program regarding the coding of red, yellow, and green tag representing 55%,52%,55% respectively, as compared to15%,25%,32.5 respectively before the program.

Table (7) Distribution of the Studied Drivers According to Their Knowledge Regarding Triage Tag Coding System Pre and Post Implementing the Educational Program

Triage Tag / coding system	Pre-program (n.40)		Post-program (n.40)		Test of significance (P value)
	No.	%	No.	%	
Black Tag					
Incorrect answer	33	82.5	16	40.0	X^2: 5.657
Correct answer	7	17.5	24	60.0	(0.017*)
Red Tag					
Incorrect answer	34	85.0	18	45.0	X^2: 5.775
Correct answer	6	15.0	22	55.0	(0.016*)

Yellow Tag					
Incorrect answer	30	75.0	19	47.5	X^2: 1.637 (0.201)
Correct answer	10	25.0	21	52.5	
Green Tag					
Incorrect answer	27	67.5	18	45.0	X^2: 3.740 (0.053*)
Correct answer	13	32.5	22	55.0	

X^2: Chi-square test P: P value of the test of significance * Significant at p value ≤ 0.05

Table (8) portrays the distribution of the studied commercial drivers according to road safety and first aid experiences related practices. It is observed that there is a significant improvement in commercial drivers practices regarding their response/action taken in accident, availability of car emergency kit, using seatbelt ,ask others in car to use seatbelt, driving speed limits on desert road ,agriculture road ,first aid measures for control external bleeding ,first aid measures for head and vertebral column injuries ,first aid measures for burn pre and post the educational program application with p value (0.004, 0.040, 0.008, 0.030, <0.001, 0.001, <0.001, 0.002, <0.001 respectively). It is clearly that all drivers had witnessed the road traffic crashes and about two third (65%) of them had involved in helping and providing first aid much more before the educational program (17.5%). Moreover, three quarters (75%) of them had complete emergency kit especially compared to that about two third of them (67.5%) reported have no kit before the program, also three quarters of the drivers reported that, they always use seatbelt and ask others in car to use seatbelt as compared to 20% and 15% before the program respectively.

Table (8): Distribution of Commercial Drivers According to Their Road Safety and First Aid Experiences and Related Practice Pre and Post Implementing the Educational Program

Commercial driver's road safety and first aid experiences and related practices	Pre- program (n.40)		Post- program (n.40)		Test of significance (P value)
	No.	%	No.	%	
Witnessed road traffic crashes					
Yes	40	100.0	40	100.0	--------
A- Road safety experiences and related practices					
Driver response/action taken in accident					
Nothing	13	32.5	2	5.0	FET:28.9 (0.004*)
Call ambulance	8	20.0	10	25.0	
Help in first aid	7	17.5	26	65.0	
Stop on Beside road	7	17.5	2	5.0	
Change pathway	5	12.5	0	0.0	
Availability of car emergency kit					
Didn't have	27	67.5	0	0.0	FET:6.420 (0.040*)
Incomplete kit content	10	25.0	10	25.0	
Complete kit content	3	7.5	30	75.0	
Driver's use of Seat belt					
No	6	15.0	0	0.0	FET:17.467 (0.008*)
Always	8	20.0	30	75.0	
Sometimes (during long journey)	11	27.5	7	17.5	

Commercial driver's road safety and first aid experiences and related practices	Pre- program (n.40)		Post- program (n.40)		Test of significance (P value)
	No.	%	No.	%	
Sometimes (in case of Trap)	15	37.5	3	7.5	
Ask others in the car to use Set belt					
No	11	27.5	0	0.0	FET:13.930 (0.030*)
Always	6	15.0	30	75.0	
Sometimes (in long journey)	4	10.0	7	17.5	
Sometimes (in case of Trap)	19	47.5	3	7.5	
Driving speed limits practices on desert road					
Wrong/High speed	34	85.0	28	70.0	X^2: 16.471 (<0.001*)
Right/acceptable	6	15.0	12	30.0	
Driving speed limits practices on agricultural road					
Wrong/High speed	36	90	29	72.5	X^2: 11.717 (0.001*)
Right/acceptable	4	10	11	27.5	
B- First aid experience and related practices					
First aid measures for Major Injuries (control of external bleeding) #					
Use (Coffee powder) to stop bleeding	30	75.0	6	15.0	X^2: 12.810 (<0.001*)
Put dressing over the wound directly	22	55.0	34	85.0	X^2: 4.191 (0.041*)
Use bandage for pressure	22	55.0	34	85.0	X^2: 4.191 (0.041*)
Elevate the arm over the level of the heart	8	20.0	30	75.0	X^2: 13.333 (<0.001*)
In case of more bleeding remove the dressing and put new one	30	75.0	7	17.5	X^2: 16.681 (<0.001*)
First aid measures for Head and Vertebral column injuries (Spinal injuries)#					
Transfer the client away from the site of injury	20	50.0	35	87.5	X^2: 0.229 (0.633)
Support head and neck	7	17.5	30	75.0	X^2: 9.755 (0.002*)
Try to help client to sit-down	23	57.5	34	85.0	X^2: 4.816 (0.028*)
Don't roll the victim alone	3	7.5	40	100.0	----------
First aid measures for burn#					
Using cool water	30	75.0	6	15.0	X^2: 12.810 (<0.001*)
Using cream or greasy substance	24	60.0	34	85.0	X^2: 5.523 (0.019*)
Stop, drop, cover and roll	7	17.5	40	100.0	----------

X^2: Chi-square test FET: Fisher Exact Test P: P value of the test of significance
 # More than one answer √ correct practices * Significant at p value ≤ 0.05

Table (9) Portrays the distribution of studied drivers according to their total knowledge and practices scores on road safety and first aid pre and post the educational program. It is clear from the table that there is a significant improvement in drivers total knowledge score regarding road safety and first aid as well as driver's road safety and first aid practice total score before and post education program with p value<0.001 ,0.001 respectively**.**

Table (9): Distribution of The Studied Drivers According to Their Total Knowledge and Practices Scores on Road Safety and First aid (Pre and Post the educational program)

Variables	Pre-Program (n.40)		Post-Program (n.40)		Test of significance (P value)
	No	%	No	%	
Drivers total knowledge scores regarding Road Safety and first aid					
Poor	11	27.5	5	12.5	X^2: 21.917 (<0.001*)
Fair	12	30	12	30.0	
Good	17	42.5	23	57.5	
Mean % score ±SD	24.6±6.1		61.5±15.3		t: 30.643 (<0.001*)
Driver's total practice scores regarding road safety and first aid practices					
Poor	11	27.5	4	10	X^2: 18.446 (0.001*)
Fair	15	37.5	13	32.5	
Good	14	35.0	23	57.5	
Mean % score ±SD	28.8±5.9		68.6±14.0		t: 30.897 (<0.001*)

X^2: Chi-square test t: Student t-test
P: P value of the test of significance *Significant at P value ≤0.05

Table (10) shows the relation between commercial drivers' knowledge and practices regarding road safety and first aid. There is a significant relation between Commercial Drivers total knowledge scores regarding road safety and first aid and driver's total practice score in road safety and first aid pre and post program implementation where P value was <0.001*.

Table (10) The Relation between Commercial Drivers' Knowledge and Practices Scores Regarding Road Safety and First aid.

Commercial driver's total practice scores	Commercial Drivers total knowledge scores regarding road safety													
	Pre (n.40)							Post (n.40)						
	Poor		Fair		Good		Test of significance	Poor		Fair		Good		Test of significance
	No.	%	No.	%	No.	%		No.	%	No.	%	No.	%	
Poor	11	100.0	0	0.0	0	0.0	X^2: 66.353	4	100.0	0	0.0	0	0.0	X^2: 69.538

Commercial driver's total practice scores	Commercial Drivers total knowledge scores regarding road safety													
	Pre (n.40)							Post (n.40)						
	Poor		Fair		Good		Test of significance	Poor		Fair		Good		Test of significance
	No.	%	No.	%	No.	%		No.	%	No.	%	No.	%	
Fair	0	0.0	12	80.0	3	20.0	(<0.001*)	1	7.7	12	92.3	0	0.0	(<0.001*)
Good	0	0.0	0	0.0	14	100.0		0	0.0	0	0.0	23	100.0	

X^2: Chi square test P: P value of the test of significance *Significance at p value ≤0.05

Figure (2) illustrates the drivers' recommendations in order to maintain road safety. It is clear from the figure that less than two third (65%) of the commercial drivers highlighted the importance of infrastructure improvement and early first aid measures at the site of accident, while more than half (55%) of them added" there was a need to implement a penalty for disorderly behavior/ actions, while less than half (45%) of them recommend the need for disseminate of traffic safety instructions.

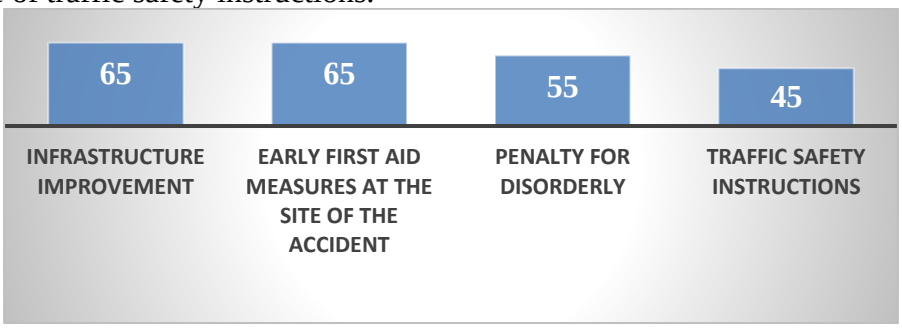

Figure (2) Commercial Drivers' Recommendations to Maintain Road Safety (n.40)

DISCUSSION

First aid is an application of skills to preserve life, prevent deterioration and promote recovery. It is a vital skill that requires learning of the golden rules of first aid which highlight that safety issues must come first. Prompt prehospital care is essential for improving outcomes of road crash victims. Training of lay responders in first aid has been suggested as a means of achieve the goal of lifesaving. Commercial driver considered one of the most important lay people who can assess victims early at the site of accidents and can save their life. Thus, commercial driver should be equipped through training in both road safety rules in order to prevent the occurrence of accidents and for immediate action through applying first aid measures [26].

It is important to deal with the incidence of Road Traffic Crashes (RTCs) which is rising world-wide. Since each year 1.35 million people die as a result of RTCs. They are the leading cause of death among people aged 15-29 years. Egypt is ranked the third country in the world with highest mortality rates due to road traffic crashes **(WHO, 2017)** [27]. In this regard, commercial drivers are blamed most of the time to accidents occurrence as they drive a heavy truck that mainly make trouble road and tend to lead to accidents, so they play a vital role in preventing such crashes. They can prevent accidents through knowing the rules of the road safety, practicing good driving skills and demonstrate a positive and considerate attitude toward other road users. Additionally, they have an active role in implementing of first aid measure which considered as a lifesaving practice. Untrained individual attending accident and deals improperly with victims may sometimes lead to further injuries (unintended) with grievous consequences. The drivers need to be aware of the importance of gaining a good knowledge regarding first aid measures; as they can save life of others [28].

Therefore, the current study aimed to assess the knowledge regarding road safety and first aid measures among Alexandria port commercial drivers and measure the effect of road safety and first aid educational program on Alexandria port commercial drivers' knowledge and practices.

Primarily**,** driving experience plays an important role in the development of a number of cognitive and behavioral skills, like hazard recognition, information processing and vehicle maneuvering. Lack of experience is linked to a higher probability of being involved in road accidents as well as in being fined for a traffic violation. It is recognized by several studies as a major risk factor for novice drivers, especially young drivers, that the effects of the risk factor are influenced by age, especially in young drivers who have a tendency to overestimate their own ability and to underestimate traffic hazards [29].

In this regard, the current study found that the mean age of the studied commercial drivers was 39.7±6.5 years, two fifth of them had more than 15 years of experience in driving, and around two third of them had basic education. These findings were similar to **Awasthi et al. (2019)** [30], **Okafor et al. (2013)** [23] and **Salaudeen et al. (2019)** [31]. All of these findings considered as a strength point of applying safety and first aid educational program to them. Furthermore, around two third of them were using heavy truck and had long distance journey, so they probably at risk to exposed or become accident witness and equip them with safety and first aid measures will be highly valuable. As the current study confirmed that only 15% of the drivers received first aid training, so they in need to have such training.

Regarding the mean daily driving hours, the majority of the commercial drivers in the current study reported that they drive 6 hours and more daily, with a mean of 9.2±2.0 hours. In this regard, the **National Academies of Sciences, Engineering, and Medicine (2016)** [32] write a special reference entitled "Commercial motor vehicle driver fatigue, long-term health, and highway safety: research needs" that mainly shed the light on the stressors facing commercial motor vehicle drivers. The commercial drivers work is characterized by irregular schedules, multiple source of pressures and interrupted lifestyle of the drivers that may put them at substantial risk for insufficient sleep and the development of short and long-term health problems. So, they must be trained to schedule their work effectively so they can receive a period of rest especially during long journeys. **The National Academies of Sciences, Engineering, and Medicine (2016)** [32] declared that, 10 to 20 percent of crashes may have involved fatigued drivers, also **Centers for Disease Control and Prevention (CDC) (2019)**[33] added that sleepiness at driving is one of the major reasons for highway accidents and fatal crashes. These findings were supported by the current study since the mean daily total sleep hours among the studied drivers were 6.4±1**.**3 hours only and there is a significant association observed between daily sleeping hours of the drivers and their history of previous exposure to accidents. Similar findings were reported by **Badawy A et al. (2016)** [18]. These findings may be attributed to what reported by **The National Highway Traffic Safety Administration (2019)** [34] as they added that, although sleepiness can affect all types of crashes during the entire day and night, drowsy-driving crashes most frequently occur between midnight and 6 a.m., or in the late-afternoon – both times when there are dips in your circadian rhythm (the internal human body clock that regulates sleep).

In relation to fatigue management strategies, in Australia **the National Transport Commission (2008)** [35] **and vicRoad Agency in UK (2009)** [36] put a strategy to subside commercial and heavy vehicle drivers fatigue namely "two-up driving" instead of "solo driving" in addition to providing a period of rest "break time" for a15 minutes after each 5 hours of driving. This strategy is applied in Egypt since the commercial drivers always have an assistant who available with the drivers all the time during long journey.

Regarding history of previous exposure to accidents it was observed that one quarter of the commercial drivers had previous exposure to road traffic accidents one year prior to the study and it was horrible to found that, one fifth of the studied commercial drivers using stimulants such as different caffeine source or strong stimulants as tramadol with a significant association between drivers' health complaints, use of stimulants, and their previous exposure to accidents. This finding goes in line with **Mohan et al. (2006)** [37] who documented that alcohol consumption by drivers puts pedestrians and riders of motorized two-wheelers at risk. Also, drunk driving has a high probability to lead to serious accidents. Even with a small amount of alcohol consumption, commercial drivers are twice likely to be involved in traffic accidents than other drivers [38,39]. Although there are laws in Egypt on speed, blood alcohol concentration for the general population, seatbelt and helmet wearing, they are poorly enforced. Sustained and highly visible policing, coupled with public education and infrastructural improvements are the key challenges which need to be addressed in order to reduce the road crushes and death in Egypt's roads [27].

Drunk drivers not only are responsible for the accidents, but their risk is multiplied if they violate the road safety when they exceed the acceptable speed limits either on desert or agriculture road. Over speeding and poor enforcement of traffic regulations are some of the major reasons for the high burden of RTCs. Speed limits are also essential to reduce road crash related deaths, especially among young pedestrians, who account for 50 percent of road crash casualties in low- and middle-income countries [40]. A 5% cut in average speed can result in a 30% reduction in the number of fatal road traffic crashes [27].

In this regard, the current study documented that there is an observed association between commercial drivers' previous exposure to RTA and their driving speed especially on desert road. This finding may be attributed to driver's age as they overestimate their own ability especially with those who have first class driving license which documented among three quarters of the drivers and they may tend to underestimate traffic hazards especially on desert road as they stated that they cannot decrease their speed since other have high speed on the same road. The same findings reported by **McHugh (2011)**[41].

So, it is essential to provide a focused training on the speed limit as one of the preventive strategies for accidents. In fact, speed limit is one of the challenges in Egypt. In this regard, a study done in Egypt by **El-Sharkasy et al. (2015)** [42] who studied the impact of first aid training program for car drivers about road traffic injuries in Port Said and found that the implemented program had a significant impact on car-drivers' knowledge and practice.

The current study also elaborate that, before the program implementation, it was noticed that majority of the commercial drivers had incorrect answers about allowed speed for different vehicles on both agriculture and desert roads, however significant improvements in the commercial drivers' knowledge regarding correct speed limits to different vehicles such as trailer, truck, taxi and van speed on the agriculture and desert roads were noticed after implementation of the educational program. Additionally, it is worthy to note that these knowledges actually affect their practice of speed limit since there is improvement in their driving speed limits on desert road and agriculture road after implementing the program.

Good knowledge of road signs and speed limits by drivers is imperative for safer roads. Therefore, assessing commercial drivers' knowledge of safety measures is an indicator of their proficiency [23]. **The International Federation of Red Cross and Red Crescent Societies (2018)** [40] also added that speed humps are one of the most effective and cost-effective road safety measures. So clear understanding of traffic signs highly important. Road or traffic signs are extremely important while driving. They can warn the driver of possible hazards, inform them of speed limits or road changes, guide them while driving, or inform others of what the driver doing. There are three distinct categories: ***regulatory***, such

as speed limit signs; ***warning***, such as a lane merging sign; and ***informative***, such as the type that lets you know there is a hospital ahead, which also includes pavement markings, traffic lights, and even vehicle turn signals [22].

The current study elaborates to how extent the drivers were knowledgeable with the meaning of road traffic signs both before and after program implementation. In the current study the researchers focused on regulatory signs as well as warning signs, since these traffic signs regulate the roadways and give advance warning of hazards to allow the drivers to follow road safety rules and preventing RTCs. In this regard it was observed that all the commercial drivers knew the sign of no entry, no right turn, no cellular phone and the sign of road work either pre or post the educational program application. Moreover, there was a significant improvement in their knowledge regarding the sign of pedestrian crossing ahead, no stopping/no waiting, hump, children pedestrian crossing ahead, and the sign of road narrows on both sides pre and post the educational program application.

Emergency call centers serve as the first point of contact between the caller and the emergency site, it is vital that these call centers operate quickly while providing good quality of service. Access time is the time taken from a caller dials an emergency number until gets access to the emergency operator. When someone calls an emergency number, they would want to be answered as quickly as possible and the problem apparent if the person doesn't know the emergency call number [43]. In this regard the current study revealed that there is a significant improvement in commercial driver's knowledge regarding to emergency call number after the program implementation as the majority of them had known the emergency call number versus around three quarters of them before the program. Nearly the same finding reported by **Awasthi et al. (2019)** [30] as they declared that emergency helpline number was known to 98.4% of the drivers. It considered a worthy finding since it leads to affirm the rapid response of emergency service arrival time. Emergency services' response time is clearly crucial. Their speedy response to an accident to avoid complications from injuries is critical [44].

Another alarming issue regarding aiding in emergency is linked to availability of emergency care providers or rescue member. In this regard a study done in **Iran (2017)** documented that the response time of the emergency services arrival was longer than the standardized time. Moreover, there is an observed shortcoming in manpower who acts as a rescue member [45].

Delaying in arrival of paramedic help may linked to over-congested road or due to bad weather condition. That was documented by **Fleischman et al. (2013)** [46] as they stated that an estimate of transport time based only on a street network significantly. So, the culture of improving the skills of everyone to help in causalities must be emphasized, their selection must be based up on a standardized criteria or qualities. It worthy to found that less than three quarters of the commercial drivers in the current study correctly mentioned the qualities of rescue member after the program implementation as compared to around one quarter of them before the program. This finding support **Pajonk et al. (2011)** [47] findings as they studied "Personality traits of emergency physicians and paramedics" and found that these traits or qualities affecting their decision in emergency situations so they must be selected based on their traits or qualities.

After proper selection of the rescue members based on their qualities, training them regarding their step of actions or the priorities of victim care must be clearly understood. In this regard, the current study found that, less than two third of the studied commercial drivers were able to classify the victim according to first aid priorities after the program versus 17.5% who do before. All drivers had the ability to put first aid procedure in a correct order versus 27.5% before the program. In addition, sixty percent of them had known the correct

position for victims versus 15%. These findings supported by **Adenike et al. (2012)** [13] findings since they declared that a majority of participants correctly prioritized airway management first, while only around one third identified the correct order for all the three care areas (Air way, Breathing, and Circulation) [13]**.** Also, **Awasthi et al. (2019)** [30] reported that 38.9% and 22.2% of the drivers prioritized breathing maintenance and chest compression respectively.

From another perspective, prioritizing patients in a mass casualty incident setting often combined with limited resources, lack of information, and work under extreme pressure, so it is highly important to understand the triage system, which is defined by color coding in the form of four internationally defined triage tag color (Red, Yellow, Green and Black) which help in rapidly discriminate the most severely injured patients and evacuate them from the immediate hazard zone [48]**.** In this regard, **Lampi study (2017)** [25] aimed to evaluate the triage skills of physicians, prehospital personnel, and rescue services personnel by testing their performance before and after an educational intervention and found that their performance was improved which goes in line with the current study findings that also revealed a significant improvement that was observed after the educational program in the commercial drivers' knowledge regarding black, red, green tag, and it is clearly observable that more than half of the studied drivers had got correct knowledge after the educational program regarding the coding of red, yellow ,and green tag as compared to before the program.

Proper practicing of first aid and application of gained knowledge related to safety practices is outweigh just being knowledgeable. Since application leads to more internalization of self-worth and believing one's abilities regarding assisting other and save other life. In this regard, the current study shed the light on important findings related to the commercial drivers' road safety and first aid experience and related practices before or after implementing the educational program, where there is a significant improvement in commercial drivers practices regarding their response/action taken in accident, availability of car emergency kit, using seatbelt, ask others in car to use seatbelt pre and post the educational program application. These findings go in line with **Chakrabarty et al. (2013)** [9] who found that the drivers were much aware about the seat belts usage while driving. On the other hand study done by **Awasthi et al. (2019)** [30] found that first aid kit was available in the vehicles of 84.9% participants and 69% used its contents at least once in the past. Additionally, **Kleisen (2011)**[49] stated that majority of the respondents practiced safety measures which include obeying speed limit, obeying traffic light, observing road signs, using belts, resting when fatigued, maintaining the vehicle in good condition, and not ingesting alcohol while driving.

Furthermore, the current study revealed that, there is a significant improvement in commercial drivers' practices regarding first aid measures application in some critical situations like control external bleeding, first aid measures for head and vertebral column injuries, and first aid measures in case of burn pre and post the educational program application. The same findings confirmed by **Zhou et al. (2010)** [50] **and O'Dowd (2010)** [51] in their studies.

Severe or uncontrolled bleeding is the major cause of death in traumatic conditions and appropriate management to stop it and attain hemodynamic stability is crucial. One of the methods to counter this problem is the use of hemostatic dressings as a first line of treatment before further interventions are sought **Spahn et al. (2019)** [52], the hemodynamic stability goal must be implemented at prehospital level of care. So, it is important finding in the current study that the commercial drivers doing good in this point. In contrast, **Awasthi et al. (2019)** [30] reported that only two-fifth of their study subjects applied pressure and stop the

bleeding. Additionally, injury mechanisms of the cervical spine soft tissues during motor vehicle collisions remain alarming issue affecting the general condition of the victim, so it is important to address it properly [50,51] addressing these issues is one of the aims of the current study.

To sum up, one of the most noteworthy findings in the current study is that, it is clearly that all drivers had witnessed the road traffic accidents and about two third of them had involved in helping and providing first aid much more before the educational program. Moreover, three quarters of them had complete emergency kit especially that about two third of them reported have no kit before the program, also three quarters of the drivers reported that, they always use seatbelt and ask others in car to use seatbelt as compared to 20% and 15% before the program respectively.

In relation to the total knowledge and practices scores on road safety and first aid pre and post the educational program, it is clear from the current study that there is a significant improvement in drivers total knowledge score regarding road safety and first aid, as well as driver's road safety and first aid practice total score before and after the educational program**,** and there is a significant relation between the commercial drivers total knowledge scores regarding road safety and first aid and driver's total practice score in road safety and first aid pre and post program implementation. These findings support **Kureckova1 et al. (2017)** [53] findings who study **"**First aid as an important traffic safety factor – evaluation of the experience–based training" and found that there is a significant change occur as a result of the applied training. Additionally, **Hoekstra and Wegman (2011)** [54] added that, road safety campaigns are used as a means of influencing the public to behave more safely in traffic and to change their attitudes using organized communications involving specific media channels within a given time period. **Sial and Chattaraj (2013)** [55] stated that, road safety refers to measures and methods for reducing the risk of a person using the road network being killed or seriously injured, each driver has to learn road safety measures in order to decrease or at least take a rapid action to control.

Finally, the commercial drivers' suggestions to maintain road safety in the current study highlight that, less than two third of the commercial drivers highlighted the importance of infrastructure improvement and early first aid measures at the site of accident, while more than half of them added " there was a need to implement a penalty for disorderly behavior". These suggestions revealed that the studied driver believe in their role in maintaining a safe road as well as carry out an active role. In addition to that they concerned with the community and governmental road to maintain a safe road and protect human being life.

Community health nurse has a significant role in carrying discussions with stakeholders on road traffic crashes (RTCs) related issues regarding the speeding as a major cause of accidents, importance of encourage young people to be more careful on roads, be involved in planning for traffic campaigns to raise the community awareness regarding road safety as well as first aid measures [56, 57]. In general, preparing the drivers especially commercial drivers who drive truck and equipping them with adequate and correct knowledge regarding road safety and first aid measures are mandatory. Consequently, conducting periodic refresher trainings for them in order to maintain their knowledge and skills is essential [26, 58-60].

CONCLUSION

The findings of the present study revealed that, firstly commercial drivers had poor knowledge and practices regarding road safety and first aid measures that had exposed them to road traffic crashes. These road crashes were related to their health complaints, smoking, and use of stimulants, daily sleep hours, vehicle type and driving speed on the desert road.

Moreover, the implementation of the educational program related to road safety and first aid awareness leads to improvement in both the total knowledge score and total practice score regarding road safety and first aid among the studied commercial drivers.

RECOMMENDATIONS

Based on the results of the present study, the following recommendations are suggested:

1- Developing comprehensive coordination and cooperation protocol between Alexandria Health Directorate, Alexandria University, Ministry of Interior Affairs and ministry of transportation and General Directorate of Traffic Police, NGOs, and other different sectors of the community to raise community awareness including drivers about traffic accidents and its consequences.
2- As the Drivers are not formally taught a wide array of safe driving and first aid practices, thus the traffic unit should put legislation for obligatory first aid training and safe driving for every driver who looking for driving license issue.
3- Collaboration between the Egyptian ambulance organization in the form of first aid training, special hot line for commercial cars in case of accidents.
4- Encouraging the mass media to highlight road traffic accidents consequences especially among young commercial drivers.
5- Where ambulances are unavailable or unaffordable, system planners should explore the feasibility of recruiting and training drivers and other public service drivers to stop, give first aid and transport the victim to the nearest hospital and some level of compensation should be provided to encourage and support these activities.
6- Alteration of the infrastructure and roads in order to maintain safety everywhere and Install weather stations along the route. Provide accurate and timely information about the status of the weather, in addition to enhancing the use of safety warning signs in slippery places.
7- Coordination and continuous communication between the police Meteorological Organization, Egyptian Red Crescent, Emergency Transportation for crisis situations and establish rescue centers across the highways and desert roads.
8- Enforcement of laws supportive of road safety and penalty must be intensified among those who didn't follow speed limit or didn't have emergency kits in the care. Prohibit and control of Tok-Tok use especially on the highway.
9- Further researches on driver's addiction and sleeping patterns are needed. Moreover, another research is needed to measure how extent the commercial drivers who get the training will affect their peer's knowledge (will it increase their peers' awareness regarding road safety and first aid or not).

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Conflict of interest

The authors declared that they have no conflict of interest.

Author contribution

All authors were part of the initial design of the research. They shared in collected and analyzed the data, wrote and edited the final version the text of the manuscript and formatted it and submitted it for publication.

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