

Designing a Guideline for Emergency Medical Communication Center Staff to Help Road Traffic Crash Patients: A Delphi Study

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Abstract

Background: Injuries and deaths from road traffic crash (RTC) are a critical health problem of societies and one of the main causes of death especially among the young

Objectives: This study aimed to design and compile a guideline for emergency medical communication centers (EMCC) staff to provide direct assistance offered by RTC bystanders.

Methods: Based on prior literature, the RTC bystanders initial draft guideline contained 20 domains and 28 items. As a validation step, the draft guideline was reviewed by content experts (one emergency medicine and two disaster specialists) and modified based on their recommendations. The subsequent draft guideline was then reviewed in three Delphi rounds by 67 participants, including health professionals in emergencies and disasters, emergency medicine, nurses, emergency medical experts, and EMCC staff. The accepted agreement coefficient was set at $\geq 70\%$. As the final step, an expert consensus meeting was held to review the guideline.

Results: The participants agreed on 56 items regarding 20 domains, including scene safety, hand precautions and personal protection, alertness assessment, respiration, cardiopulmonary resuscitation (CPR), bleeding control, recovery position, splinting, rapid evacuation, scene management, patient transfer, triage, spinal cord injury prevention and immobilization, injured transportation, psychological support, hypothermia prevention, water and food, amputated limb protection, and support of deceased people. Two items in relation to airway opening maneuvers were added to the guideline during the expert consensus meeting.

Conclusion: EMCC staff can provide guidance to be performed by RTC bystanders. RTC bystanders can play important roles at crash scenes, including preventing secondary injury, supporting scene management, and providing first aid for the injured people. This guideline can be used to help direct appropriate care and behavior by RTC bystanders

Keywords: Road Traffic Crash (RTC), Emergency Medical Communication Centers (EMCC), Disaster.

Introduction

Annual deaths from Road Traffic Crash (RTC) have reached 1.35 million globally, and are still increasing.¹ Injuries and deaths from RTC are a critical health problem of societies and one of the main causes of death especially among the young.²⁻⁵ It has been estimated that annual costs of RTCs is \$ 518 billion globally, roughly equivalent to 1.5% of countries' gross domestic product.^{6,7} In Iran, the death rate of RTC is very high compared to other developed countries.⁸⁻
¹⁰ In 2017, the number of traffic-related deaths in Iran was 16,201 cases and the number of injured people was 335,995 cases.¹¹

Most deaths occur at the crash scene and often before the arrival of health care providers.^{12,13} The first hour after a crash has been termed "the golden hour" for caring patients with traumatic injuries. In this regard, appropriate care of injured patients can greatly improves the patients' outcomes.¹⁴ Providing first aid to the traumatic patients increases their survival probability.¹⁵⁻¹⁷ However, there are significant delays for ambulances to arrive at the scene for many reasons.^{18,19}

RTC bystanders can be the first providers in the trauma chain of survival.²⁰⁻²² Previous studies have highlighted the importance of bystanders' role in acute life-threatening emergencies.²³⁻²⁵ At RTC scenes, bystanders can play

important roles, such as helping with population (crowd) control and initiating first aid to injured individuals.²⁶⁻²⁹ RTC bystanders can save patients' lives by performing simple measures, such as placing patient into the recovery position (coma position), jaw thrust maneuvers (chin lift) and bleeding control. The World Health Organization (WHO) have defined bystanders' roles, including emergency call, fire extinguishing, scene safety (secondary injury prevention), population control, injury prevention to rescuers and other bystanders, and first aid.³⁰ Although, first aid by bystanders can reduce mortality and morbidity rates caused by RTCs, while, little attention has been paid to it in previous studies.^{26,31} Many of the existing first aid methods are based on unreliable scientific basis information.³² Moreover, first aid offered by RTC bystanders varies in terms of the amount and quality.³³ First aid for injured individuals is done incorrectly in about 83.7% of the cases.^{34,35}

In order to direct bystanders during various incidents, two tools, including criteria-based dispatch and medical dispatch priority system are often used by staff in EMCCs.^{36,37} In these centers, bystanders are directed using available instructions and guidelines.³⁸⁻⁴³ Studies conducted on EMCC protocols and guidelines have shown that these guidelines increase the rate and quality of bystander CPR⁴⁴⁻⁴⁸ as well as their assistance to traumatic patients.⁴⁹

Until now, no study has been conducted on designing a traffic crash guideline for EMCCs in Iran. However, studies have reported that the guidelines in EMCCs in other countries require significant changes. The effectiveness and implementation speed of the guidelines are low in practice and in real conditions. These guidelines need to be simple, comprehensive, and accepted by the community. Moreover, it is required to conduct further studies in this regard.^{37,50-52} The studies should examine the type and amount of first aid provided by RTC bystanders.⁴⁹

Objectives

Due to the importance of having a guideline for RTC bystanders, this study was conducted with the aim of designing and compiling a guideline for the EMCC to direct RTC bystanders.

Materials and Methods

The study was conducted from November 26, 2019 to April 19, 2020. Based on the findings of the previous systematic review studies, potential domains and measures performed

by RTC bystanders were identified. Preliminary guideline containing the 20 domains and 28 items were then drafted by the two main authors. Each guideline item was written as an instruction which could help the EMCC dispatcher to direct RTC bystanders pending ambulance arrival. After designing the initial guideline, they were reviewed for language and content by three experienced specialists (including an emergency medicine specialist and two health professionals in emergencies and disasters). The draft guidelines were then modified and edited based on their opinions. Subsequently, in order to examine the qualitative validity of the guideline, the Delphi method was held in three subsequent rounds with the last stage as an expert consensus meeting (Figure-1).

Ethical considerations

This study is part of a PhD dissertation of Health in Emergencies and Disasters, approved by the Ethics Committee of Teheran University of Medical Sciences, Tehran, Iran, with the ethics code: IR.TUMS.SPH.REC.1398.101. The participants were not known to each other, and the confidentiality of the study was guaranteed. Participants identify (except for the expert agreement panel) were known only to the main researcher. The individual participants' judgments and opinions, was completely unknown to the others. Their consent to participate in the study was assured orally or by e-mail, and they could leave the study at any time, and the results of each stage were provided to the participants.

Sampling and selecting the participants

The Delphi technique is a process composed of a number of rounds of content review in which experts review and agree (or disagree) on the reviewed material.⁵³ Given that there is no agreement on the number of participants required in a Delphi study, the number of participants in most studies conducted in the health sector was in the range 10-100 participants.⁵⁴

The selection of experts and the inclusion criteria for this study included four categories: 1. Emergency medical personnel with more than one year of experience 2. EMCC technicians with more than one year of experience 3. Specialists in the field of medical emergencies, trauma, and traffic crashes, and 4. Health professionals in emergencies and disasters. Willingness to participate in the study was also an inclusion criterion. Participation in the study was

voluntary. First, convenience sampling was used to identify potential participants, and then snowball sampling was applied to allow the potential participants to identify appropriately experienced colleagues for entering the study. Using e-mail and messaging media (e.g. WhatsApp and

Telegram), initial communication was established with 67 individuals from all over Iran and were invited to participate in the study. The participants included disaster health professionals, emergency medicine, nurses, emergency medical paramedics, and EMCC staff.

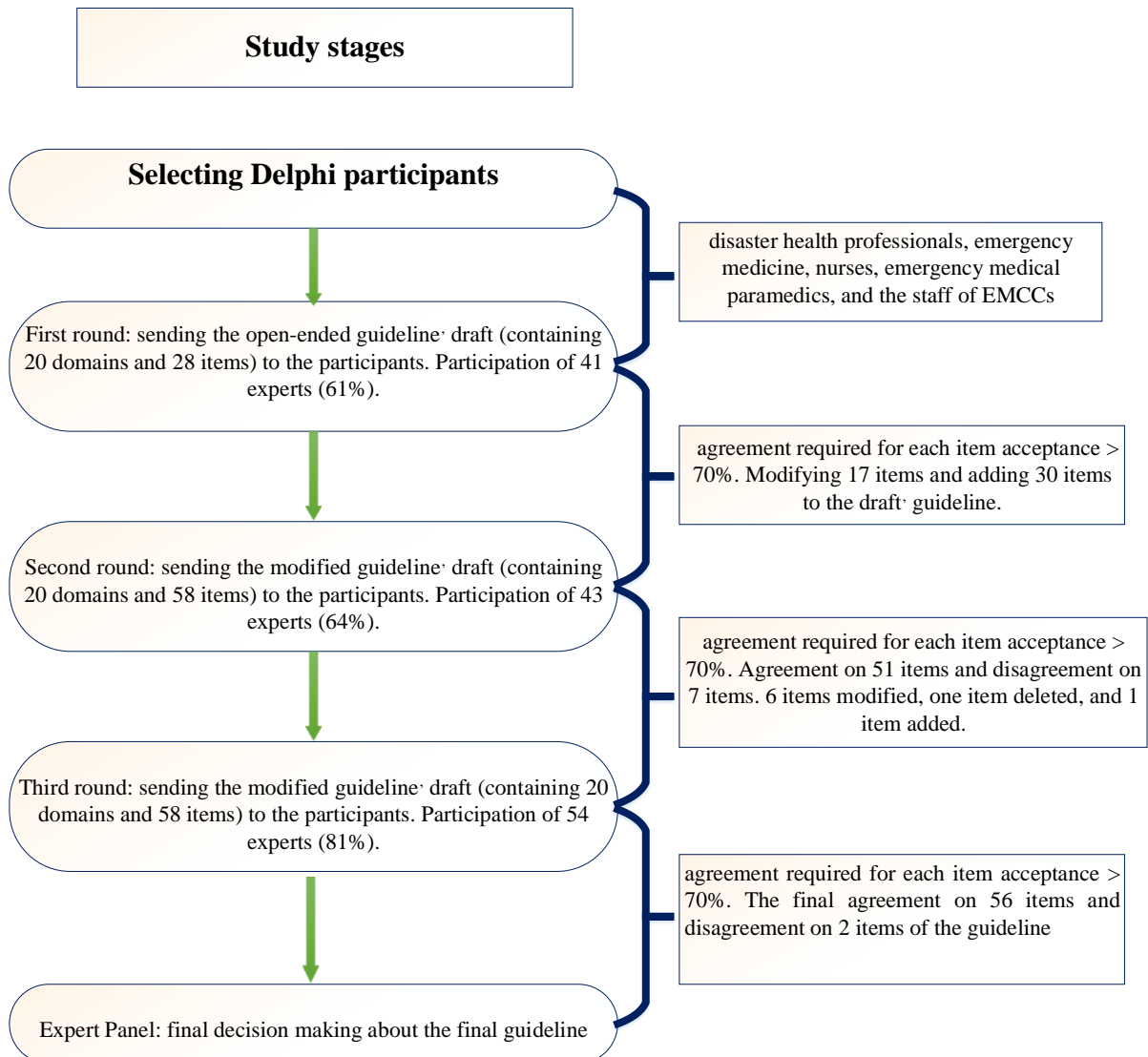


Figure-1. Flow chart of Delphi rounds process and guideline development

Participation method in the study

The draft guidelines were sent electronically to the participants, and they were asked to write down their impression of each item. They also could edit or replace the items with new ones, and delete or add an item to the questionnaire. As a part of their guideline review, they could choose one of three options for each item: 1. Measures must be performed by bystanders, 2. Measures must not be performed by bystanders, or 3. Under certain conditions, measures can be performed by bystanders. Selecting the first option (measures must be performed) indicated the

participant's agreement with the guideline item. The second option (measures must not be performed) indicated that the item should not be included in the guideline, and finally the third option (can be performed under certain conditions) indicated that the performance agreement was based on circumstances that considered by the experts. In this case, the participant had to state his/her considered conditions. After completing each review round, and the results were analyzed and, agreement percentage was calculated separately for each guideline item. The data were analyzed with descriptive statistics using SPSS software IBM (Version 21).

Delphi first round

The initial draft guideline was designed as an online questionnaire, which was open-ended, including 20 different domains and 28 items. Domains included scene safety, hand precautions and personal protection, alertness assessment, respiration, cardiopulmonary resuscitation (CPR), bleeding control, recovery position, splinting, rapid evacuation, scene management, patient transfer, triage, spinal cord injury prevention and immobilization, casualty transportation, psychological support, hypothermia prevention, water and food, amputated limb protection, and support of deceased people. At the beginning of the online questionnaire, the aims of the research, instructions for the participants, scenario of bystanders' performance and guidance by an EMCC technician were sent to the participants. The guideline link, along with instruction materials and brief scenario descriptions, were sent to 67 participants via email or social media, such as Telegram and WhatsApp messaging software on February 3, 2020. In this stage, the participants were given 2 weeks to complete the questionnaire. At the end of the first week, a reminder message was sent to the participants.

Delphi second round

A link to the results from the Delphi first round, containing 20 domains and 58 items, along with information related the results, including percentage of agreement from the first stage and modified/added items was then sent to the participants via email and virtual messaging media. As in the previous stage, the participants were asked to provide their opinions for implementing each domain/item by writing their comments or responding to three options (do the action, not do the action, or do the action under certain conditions). A 2-week period was determined for this stage; as previously, at the end of the first week, a reminder message was sent to the participants.

Delphi third round

A link to the results from the Delphi second round, including 20 domains and 58 items, was sent to the participants via email. A 2-week period was determined for this stage; as previously, at the end of the first week, a reminder message was sent to the participants. (It has been exactly repeated)

Expert Panel Review and Guideline Finalization

For the last stage, an expert panel was formed for the final

review of the guideline. The expert panel consisted of one of the authors, six emergency medicine specialists and one neurosurgeon (with experience in emergency dispatch). Guideline items with a final agreement coefficient of more than 70% in all three Delphi rounds, were retained in the final guideline. Panel members also decided on two controversial items from the third round (jaw thrust maneuvers).

Results

The majority of the participants were emergency medical paramedics (31%) and nurses from EMCCs (29%). [Table-1](#) presents the characteristics of the participants.

Out of 67 invited participants, 41 individuals (61%) completed the first round of reviews. At the end of the first round, the experts' responses and feedback were reviewed and analyzed by the members of the research team. By applying the participants' comments and editing the initial 28 guideline items, 17 items were modified and, 30 new items were added, resulting in 58 guideline items at the end of the first round. The modified items after the first round included: scene safety, airway maneuver, bleeding control, recovery position (Haines), splinting, rapid evacuation, patient transfer, and support of deceased people. The resulting items after the first round included: CPR, recovery position (Haines), scene safety, hand precautions and personal protection, alertness assessment, respiration, bleeding control, splinting, rapid evacuation, patient transfer, water and food, and amputated limb protection ([Table-2](#)).

Out of 67 invited participants, 43 individuals (64%) completed the second round of review. At the end of the second round, the experts' responses and feedback were reviewed and analyzed by the members of the research team, and the updated guideline items were provided. Out of 58 guideline items, 51 items obtained more than 70% agreement. The participants had less than 70% agreement on other 7 items, which included: alertness assessment, airway maneuvers, splinting, patient transfer, water and food, amputated limb protection, and support of deceased people. Based on the participants' comments and conditions, the research team modified 6 items, deleted one item regarding giving water and food to the injured patients with a history of diabetes, and added one item of giving water and food. At the end of second round, there were 58 guideline items.

Table-1. Demographic of participants in Delphi, process to: design a guideline for road traffic crash bystanders, 2019-2020

	First round Delphi panel (n=41)	Second round Delphi panel (n=43)	Third round Delphi panel (n=54)
	(number) %	(number) %	(number) %
Health in Emergencies and Disasters	6(15)	6(14)	6(11)
Emergency Medicine	3(7)	3(7)	4(7)
Nurse	11(27)	13(30)	10(19)
Emergency medical paramedic	9(22)	7(16)	16(30)
Nurse of the EMCC	12(29)	14(32)	15(28)
Gender, %			
Male	28(68)	27(63)	35(65)
Female	13(32)	16(37)	16(30)
Work experience, (number) %			
Less than 5 years	15(35)	13(30)	16(30)
5-10 years	17(41)	19(44)	24(44)
More than 10 years	9(30)	11(26)	11(20)
Education level, (number) %			
Bachelor's degree	24(59)	27(63)	35(65)
M.S	7(17)	6(14)	8(15)
PhD	10(24)	10(23)	11(20)

The participants had less than 70% agreement on other 7 items, which included: alertness assessment, airway maneuvers, splinting, patient transfer, water and food, amputated limb protection, and support of deceased people. Based on the participants' comments and conditions, the research team modified 6 items, deleted one item regarding giving water and food to the injured patients with a history of diabetes, and added one item of giving water and food. At the end of second round, there were 58 guideline items.

Out of 67 invited participants, 54 individuals (81%) completed the second round of reviews. At the end of third round, the experts' response and feedback were reviewed and analyzed by the members of research team. Out of 58 guideline items, 56 items obtained more than 70% agreement. However, two items in relation to airway opening maneuvers were not agreed upon (Table-2). After the three Delphi rounds, the items were re-examined by the expert panel to review the findings. At this stage, panel members agreed to conduct jaw thrust maneuvers in unresponsive and breathless patients. Appendix 1 provides the processes of modifying, editing, and adding guideline items in Delphi and expert panel stages. Table-2 shows the participants' agreement level in conducting each of the guideline items, after performing three rounds of Delphi and one stage of experts.

Discussion

In the present study, the Delphi method was applied to design and compile a guideline for the EMCC staff to provide guidance and assistance offered by RTC bystanders. Given the limited available evidence regarding the measures and performance of RTC bystanders, these guideline measures were defined in 20 different domains. According to the participant's opinion, this study showed that the RTC bystanders can play significant roles in the initial evacuation and management of RTC patients. In addition to contacting the EMCC and requesting an ambulance, RTC bystanders can perform protective measures designed to prevent secondary injuries, help with scene management, and provide first aid and psychological support for the injured person. Previous studies regarding the measures performed by bystanders have reported few items developed in this guideline, such as scene safety, evacuation, bleeding control, and hypothermia prevention.⁵⁵⁻⁵⁶ However, the developed guideline appears to be more comprehensive, because it increased the items obtained from previous systematic reviews ranging from 28 to 58 items. Thus, 30 new items that can potentially be performed by bystanders have been added. However, in complex domains, any single item may not convey enough information to adequately direct bystanders.⁵⁷ In this study, the participants had more than 70% agreement regarding these 58 items, and hence they could be performed by RTC bystanders.

Table-2. Final guideline domains and items with percentage of final agreement

Guideline domain	Guideline description	Final agreement percentage
Scene safety	1. Make sure the scene is safe for you and the others and there is no danger.	98
	2. In case of fire and gasoline spillage on the ground, the car should be turned off.	79
	3. If there is a cigarette, turn it off.	94
	4. Avoid electric cables on the ground.	98
hand precautions and personal protection	5. Wear plastic gloves or a plastic bag to prevent infection with the patient's blood.	86
	6. Be careful not to touch the injured secretions (such as blood).	91
	7. When helping, take care of your hands to prevent injuries with sharp objects.	98
Alertness assessment	8. Call the injured person and touch his/her shoulder with your both hands and ask him/her what wrong is with him/her? Does he/she answer you?	88
	9. Ask the injured person to tell if he/she has a headache, dizziness, nausea, and vomiting	78
Respiration	10. Look at the patient's chest for 10 seconds to see if it goes up and down? Put your cheek in front of the patient's mouth and nose. Do you feel the air flow?	79
	11. In case of vomiting, protect the patient's head and neck and put him/her to sleep on the left side immediately.	80
	12. If the injured person does not breathe or vomits later; call again.	84
	13. In case of vomiting in the patient, wear gloves and wipe the vomit from the patient's mouth and nose with a cloth.	84
Airway maneuvers	14. Do not put anything under the injured person's head.	77
	15. Head tilt/chin lift maneuver: Stand next to the injured person's head and put one hand on the forehead and the other hand under the injured chin and bring the head to the side.	41*
	16. Jaw thrust maneuver: Stand at the top of the injured person's head and place your two thumbs on the chin and the rest of the fingers at the angle of the lower jaw and move the jaw forward to open the injured person's airway.	51*
CPR	17. Keep calm.	100
	18. I help you to resuscitate the patient.	96
	19. By protecting the neck, put the injured person to sleep on his back. There should be nothing under the injured person's head.	96
	20. Kneel next to the injured person's chest.	98
	21. Put your hand in the middle of the injured person's chest and put your other hand on the other hand and hold your fingers together.	98
	22. Your shoulders should be perpendicular to your hands and your elbows should be straight and firmly press down.	100
	23. Allow the chest to rise as it goes down	98
	24. Try to press down on the patient's chest twice a second.	98
	25. Continue until the ambulance arrives or the patient reacts. If you are tired, ask someone else to continue.	100
Bleeding control	26. If possible, wear gloves and put a piece of clean cloth on the bleeding site and press firmly to stop the bleeding.	98
	27. Do not take out the impaled object that has punctured the body	98
Recovery position (Haines)	28. If the injured person is on the side; do not move him/her.	86
	29. Kneel on the right side of the patient's back. (If you can't sit on the right side, sit on the left side and do the maneuver.	79
	30. Keep the patient's left hand straight upwards.	84
	31. Bend the other hand on the chest and place it under the right ear.	84
	32. Bend the right knee to the left side.	86
	33. Put one hand on the patient's back of and also hold the patient's head and neck.	86

	34. Move him/her to the left side while protecting his/her head and neck and bending his/her knee.	94
	35. The injured person's head should be on the left arm.	91
	36. The knees should be bent to keep the patient stable.	88
Splinting	37. If the patient has severe pain in hands or feet, do not move them and do not pull or straighten his/her arms and legs.	91
	38. In case of immediate danger (such as the passage of vehicles and the need for rapid movement) based on the technician's opinion: slowly and with the least movement, place a wooden board or cartoon under the limb and tie it up and down with a piece of cloth.	84
Rapid evacuation	39. Always prioritize your safety.	98
	40. Hold the injured person's armpit with one hand and under the chin with the other hand.	96
	41. Keep your body behind the injured person's back and protect his/her head and neck, and get him/her out quickly.	93
Scene management	42. At night, if you have dark clothes, do not stand on the side of the road. It is better to have scotch lite jacket. Ask people to stay away from the crash scene.	95
	43. Ask passing cars not to stop, so that ambulances can reach the scene sooner.	86
	44. Place the warning triangle and warning signs behind the car, 70 meters away from the scene in the road and 150 meters away in the highway.	93
Patient transfer	45. Avoid bending and moving the injured person's neck.	98
	46. To transfer the injured person, use a device, such as a board on which the injured is placed.	86
Triage	47. If there are several injured people and they are awake and walking, ask them to gather in a safe place.	98
spinal cord injury prevention and immobilization	48. Avoid moving the injured.	86
	49. Do not move or bend the injured person's head and neck.	98
injured transportation	50. Take the injured person who is walking and is conscious out of vehicles passage to the side of the street.	96
	51. In case of an immediate danger, such as a fire or a re-crash (the technician is decision maker), protect the injured person's head and neck while you position yourself at the top of the his/her head; pull the patient's shoulders and move him/her to a safe place.	98
psychological support	52. Keep the injured person calm and support him/her.	98
hypothermia prevention	53. In case of cold weather, cover the injured person with a suitable blanket or cover.	98
Water and food	54. Do not give water or food to the injured person.	86
Amputated limb protection	55. Put the amputated limb in a clean plastic bag, remove the plastic air, and then place the plastic in an ice container and a small amount of water to accompany the injured. person	98
	56. Be careful, in case of melting the ice, water should be drained and ice should be put in the container again.	84
	57. The amputated limb should not come into direct contact with ice.	100
Support of deceased people	58. Put a cloth on deceased people without moving them.	84

• Items 15 and 16 were agreed upon in the expert panel, despite the agreement of less than 70%.

Our previous systematic review found only one study on the guidance of trauma scene bystanders in 2017.⁴⁹ This may be due to the underappreciated nature of the EMCC and its potential to direct RTC bystanders in order to reduce preventable mortality, as well as the lack of EMCC specialists.⁴⁹ In Bakke et al., study, the effect and accuracy of the guideline on recognition level of dispatchers to identify

essential first aid measures were evaluated.⁴⁹ The European First Aid Rehabilitation Guideline (2015) stated that their guideline did not assess first aid under the guidance of the emergency medical center dispatcher.⁵⁸ As a next step, the efficiency and effectiveness of these items should be measured by quantitative studies to determine whether or not these measures can be appropriately performed by

bystanders.

Existing guidelines for EMCCs have shortcomings and weaknesses. This study showed that the participants believed that bystanders could perform many measures using the right guidance from the EMCC. It seems that more attention should be paid to the role of RTC bystanders. Previous studies have shown that bystanders could be effective in CPR and reducing traumatic injuries. For instance, in Bakke et al., study, it was found that the bystanders were able to perform CPR, airway opening maneuvers, and hypothermia prevention.⁴⁹ Although hypothermia has adverse effects on trauma outcome, little attention has been paid to this issue in available guidelines.⁴⁹⁻⁵² Prior guidelines in criteria based dispatch (CBD) centers³⁶ have included domains related to scene safety, injured transportation, hypothermia prevention, water and food, bleeding control, amputated limb protection, spinal cord injury prevention, CPR, and recovery position. However, some domains have not been mentioned, including hand precautions and personal protection, respiration, airway opening maneuvers, splinting, scene management, mental and psychological support, and support of deceased people. Moreover, all domains mentioned in the developed guideline from this study have at least one item. For example, in recovery position, initially is recommended to place the trauma patient on one side. However, in the final developed guideline from this study, all steps of the Haines recovery position required for traumatic injuries were recommended to be performed by bystanders under the guidance of the EMCC. Paying attention to hand precautions and personal protection prevents the transmission of pollution and disease to RTC bystanders,⁵⁹ which are mentioned in the present guideline; however, it was not mentioned in the prior EMCC guidelines. In the developed guideline, other important domains and specific items were included or discarded. For example, a domain was also dedicated to scene management and secondary injury prevention due to their important role in RTCs. Scene management in RTCs can reduce the delay in the arrival of rescue technicians to the scene. However, this important domain had not been mentioned in other guidelines.^{36,60} On the other hand, an item deleted at the end of the first Delphi round related to giving sweet liquids to patients with a history of diabetes and with potential hypoglycemia. This was deleted due to the low level of agreement (46%) among the expert panel. According to the

participants, it is not possible to examine the injured hypoglycemia using a phone call, and giving sweet liquids to the patient may cause aspiration by individual a reduced level of consciousness. Additionally, due to the lack of skill of bystanders in performing START triage, only the first stage (separation of low acuity “green” casualties), was included in the guideline.⁶¹

The participants did not agree during the first three rounds regarding airway opening maneuvers such as the jaw thrust. Although the items were selected based on the trauma first aid guideline of the International Committee of the Red Cross (ICRC)⁶² no agreement was reached. The participants’ disagreement could be due to doubt about bystanders’ skills to properly perform maneuvers under EMCC staff guidance. However, during the fourth (final) stage of the study, the expert panel came to this conclusion that in non-conscious, non-breathing injured patient, the following items should be performed: 1) first, a jaw-thrust maneuver, and if this does not open the airway, 2) the head tilt/chin lift maneuver (in a patient without neck trauma), if this does not open the airway, 3) telephone CPR can be started with the help of bystanders.

In the dispatch guideline from New Jersey, USA (2020), only scene safety, CPR, and injured transportation were mentioned. It is noteworthy that the New Jersey guidelines recommend that for amputated limbs protection, the limb should be placed in a single clean plastic and not be placed directly into a bag of ice. The US national curriculum of emergency medical dispatch⁶³ addresses bleeding control, recovery position, injured transportation, hypothermia prevention, water and food, alertness assessment, respiration, splinting, and spinal cord injury prevention. Another point concerning the development of EMCCs guidelines, they should be modified according to local needs, characteristics, and texture.⁶³ Therefore, in designing this guideline, the intent was to write the specific items in as simple and fluent language, so that it would be immediately understandable by RTC bystanders over the phone. The next steps for further guideline development is to measure its validity through implementation of this Delphi developed guideline in a simulated RTC scene environment. This could be followed by field evaluation stage to investigate its field applicability and effectiveness through direction of RTC bystanders.

The main limitation of the present study was the limited number of conducted studies and the available evidence

related to the performance and measures of RTC bystanders. It was probably due to difficulty in direct and online assessment of RTC bystanders' performance. Another limitation was the failure to review multiple non-English-language guidelines of EMCCs. However, the non-English language guideline of the communication center in Norway was examined, which was similar to the guideline of criteria-based dispatch centers.

Conclusions

Although road traffic crash bystanders are the first link in the response to a traumatic event, little attention has been paid to the importance of their potential role in caring for the injured people. This study aimed to design an EMCC guideline to help guide RTC bystanders in scene management and patient care. Through the use of the Delphi method, this guideline has been developed and designed to help bystanders take the right steps with the guidance of EMCC staff, to avoid further harm to and potentially help injured people. According to the guideline, RTC bystanders, in addition to contacting the EMCC and requesting an ambulance, can play protective roles (such as scene safety, amputated limb protection, and injured psychological support), help prevent secondary injury (such as hypothermia prevention, spinal cord injury prevention, and rapid evacuation), support scene management, and provide appropriate first aid (such as respiratory support, CPR, bleeding control, recovery position and triage mass casualty incidences). Paying attention to the potentially important role of RTC bystanders can strengthen the community-based approach in helping the injured people and preventing secondary injuries. While an important step forward, further validations of this guideline are required to confirm its effectiveness.

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None.

Authors' Contribution

All authors pass the four criteria for authorship contribution based on the International Committee of Medical Journal Editors (ICMJE) recommendations.

Conflict of Interests

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