Original Article

Road safety data collection systems in Iran: A comparison based on relevant organizations

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ABSTRACT

Purpose: Various organizations and institutions are involved in road traffic injury (RTI) and crash registration such as police, forensic medicine organization, hospitals and emergency medical services. But there is a substantial uncertainty in interpreting the data, duplicated data collection and missing data in relation to RTI in most systems. This study aims to identify data sources for RTI surveillance in Iran and to explore traffic safety data source domains, data elements and detailed information by each data source.

Methods: This is a qualitative study which was conducted in 2017 in Iran. Data were collected employing semi-structured interviews with informants in road safety organizations in relation to traffic safety including Police, Ministry of Health and Medical Education as well as Forensic Medicine Organization and other authorities-in-charge. For completing the preliminary extraction information, the minimum data set was used and compared in each system.

Results: Eight different organizations relevant to road traffic safety were identified. The main domain of data provided by each one consists of Emergency Medical System form, Police KAM114 form, Ministry of Transport and Road Administration, Red Crescent Organization/Disaster Management Information System, Ministry of Health and Medical Education, Forensic Medicine Organization, Insurance Company and Ministry of Justice. Each system has its own database, based upon its scope and mainly at crash and post-crash status and little on pre-crash circumstance.

Conclusion: All current registry systems are not surveillance systems for RTI prevention. Huge data have been collected in various registry systems in Iran, but most of the collected variables are duplicated in

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each system. On the other hand, some variables like alcohol and substance abuse, child seat belt, helmet use in relation to RTI prevention are missed in all systems. Accordingly, it is a critical need to integrate and establish a comprehensive surveillance system, with focus on the goal of each system and collection of minimum data in each organization, which currently is underway.

Introduction

Road traffic injuries (RTIs), being estimated 1.27 million deaths and between 20 and 50 million injuries per year, are a global health problem.[1—4] Based on World Health Organization (WHO), RTIs are the 9th cause of disease burden in the world, and it has been predicted that they will become the third cause of disease burden by 2030.[5] While industrial countries have around 60% of global vehicles, however, it is accounted for only 14% of all deaths due to traffic crashes.[6—8] Low and middle-income countries account for most of these deaths as it is the cause of approximately 85% of deaths.[9,10] This burden is anticipated to increase as high-income countries.[11,12]

Iran accounts for 1.9% of the global fatal RTIs with 20.5 road traffic death rate per 100,000 populations. Iran ranked the 53rd among all the countries in terms of their roads' mortality rates.[13,14] In Iran, road traffic crashes are the second cause of fatal RTI and also the largest cause of years of life lost (YLL).[15] YLL as a result of RTIs in Iran seems to be higher than many parts of Eastern Mediterranean and even in the other part of the world.[16] It is estimated to be one of the most serious country-prone problems.[17]

In order to provide a better road safety and its effective management, different countries report road safety data daily, but for having comparable data among the countries, they should be properly collected, processed and analyzed.[18—20] Although high-income countries rely on records of trauma registries and police databases, in low and middle-income countries, the data sources that provide data are not mature and surveillance systems are not well established.[21,22] Surveillance, as WHO definition is the process of ongoing data collection, data analysis and dissemination of health information to stakeholders.[23]

In order to address the burden of injury, one of the best strategies will be context-specific data to inform evidence-based policies.[24,25] High-income countries have invested in a fundamental and well-developed registry system like trauma registries and surveillance systems.[26—28] It is important to note that such system is not available in most low and middle-income countries and then the other source of RTIs patterns including police database as well as mortuary report and articles from newspapers are all explored in this study.[29—32] Data from police usually are collected in limited resource in this setting and accordingly have a potential for RTIs surveillance.[33] While police data source is an important RTIs document, however, it seems that as a registry system it could have limitation and even maybe a source of bias for RTIs reports.[31,32,34]

In Iran, various organizations and institutions are involved in road traffic injuries as well as its preventing programs, including Police, Forensic Medicine Organization, Ministry of Roads and Urban Development, Ministry of Health and Medical Education, National Terminal Board, and Emergency Medical Services. The main source of fatal RTIs is Forensic Medicine Organization and its injury records are mainly provided by police and hospital sources. But there is a substantial uncertainty in interpreting the data due to unknown sensitivity and specificity of the collected data. Some data are missed in all organizations. In addition, due to parallel data collection mechanism in various organizations, there is some level of ineffective overlapping data collection mechanism across these organizations. This registration is not effectively linked between each organization and even inside organization (such as Ministry of Health and Medical Education) that is not integrated in the routine system.[35]

Accordingly, this study aimed to explore data sources for RTIs systems in Iran in order to identify traffic safety data sources and to explore which domains, data elements and detailed information are provided by each data source and what data are missed. Authors maintain that results of this study have been used by policy makers to establish evidence-based traffic safety programs.

Methods

This is a descriptive qualitative study in which face-to-face interview and observational study were performed in 2017 in Tabriz, Iran and also at national level of Iran. Both observation and face-to-face interview were performed for data collection.

Study setting

According to the Statistical Center of Iran in 2016, this study was performed in Tabriz, in the west Azerbaijan province, which is located in north-west Iran. Tabriz landmass is 237.45 km². The population was about 1.7 million in 2016. There were 51% men and 49% women. This city is the 6th most populous city in Iran.

Data collection and analysis procedure

The main organizations which are highly engaged in traffic safety were identified through an expert panel with 16 participants, such as police, Ministry of Health and Medical Education and forensic medicine. We asked the authorities-in-charge in each organization to introduce the best informants based on our study aim. Participants were selected by purposive sampling. Finally, 16 interviews were conducted with the head of organizations and staff involved in collecting and analyzing traffic data from selected organizations. Data were collected based on interview guide as well as using a questionnaire with informants and asking for any forms and manual information of each organization. The questionnaire included the items of exploring data sources, certain systems and forms, linked organizations and other relevant organizations and explanations accessing to the information. Two extraction tables were identified for data extraction. The first table was based on process information within each organization including detected systems, forms and manuals, training and evaluation programs for data collection; and the second table was about components of data in each data source. The minimum data set covering their core variables were extracted from all data sources, of which the surveillance system introduced by WHO was usually used, covering the date of occurrence, place of occurrence, context, injury mechanism, road type, injury bodily location and then mortality.[36] For completing the preliminary extraction table, the minimum data set was expanded to a full one in order to cover any details.

Results

Eight different organizations relevant to road traffic safety were identified. This study showed that these systems are not linked with each other. The main domain of data provided by each one is as follows (Table 1).

Emergency Medical Services (EMS) form. The EMS form is taken from the emergency department includes patient's demographic information, dispatch data, crash information, patient's clinical status, the measures and services provided to the patient before arriving the health facilities. Moreover, various time intervals including notification, activation, response, on-scene and transport intervals are registered in EMS system.

Police KAM114 form. This form contains eight pages, which completed through the traffic police of NAJA, a name that is the Persian abbreviation for Law Enforcement Force of the Islamic Republic of Iran. Data are collected in two parts: general information and proprietary information which contain information about the

Table 1
Road safety data collection systems in Iran.

Organization	Department	Specific system	Specific forms	Manual	Training programs	Evaluation programs	Feedback
Ministry of Health and Medical Education	Emergency medical services	EMS recording system (Asaya system)	Emergency care report form	No	Once the ASAYA was first established (early 2016)	Not a clear one/mainly controlling the technician's mission time	Not on a clear process/often to technicians, if necessary
	Hospitals	HIS	Report forms of admission Outpatient clinic—hospitalization ICD10 coding Referral Fatalities	No	Once the HIS was first established (early 2015)/per case training for new staff	Not a certain one/mainly for physicians (often within every 6 months) and ward secretaries (often within every 3 months)	Not on a defined process/often to physicians and ward secretaries, if necessary
		In manual way	Corpse referral to forensic medicine form	No	No	No	No
	Treatment deputy	Treatment deputy's system of road traffic injuries	Legal matter NO.37 form	No	Once the system was first established (2013)	Not a specific one/mainly checking bills and crash sketch reports	Not on a specific process/often to registrars, financial departments if necessary
Police	Traffic police	Dataver house system	KAM 114 form	No	One time at Police University	Not a specific one/mainly checking crash sketch reports	Not on a specific process/often to officers, if necessary
		Traffic violations system	Traffic tickets	No	One time at Police University	Not a certain one/mainly checking traffic tickets by random	Not on a specific process/often to officers, if necessary
		Numbering system	—	Yes	Once the system was first established	Not a specific one	Not a specific one
		Issuing driving license system	Physician checkup form	No	Once the system was first established	Not a specific one	Not a specific one
	Road police	Crashes management system	KAM 114 form	Yes	Once the system was first established	Not a certain one/mainly checking accident sketch reports	Not on a certain process/often to officers, if necessary
	Criminal police	Incident system	—	No	Once the system was first established	Not a certain one	Not a certain one
Forensic Medicine Organization	Form number 2 related to traffic crash deaths	Fatal road traffic registry system	—	Yes	—	Not a regular one	Not on a certain process/often to forensic physicians, if necessary
Iranian Red Crescent Organization	No	Disaster management information system	Disaster and crash registration form	Yes	Once the HIS was first established/per case training for new staff	Not a certain one	Not on a clear process/often to red crescent agents, if necessary
Ministry of Justice	Overall	CMS	Judicial file	Yes	A training workshop once a year	Yes/The Informatics Deputy monthly check the registered data by branches and rate them. The branches get certain rewards or punishments based on their earned scores.	Yes/monthly feedbacks to all branches by Informatics Deputy
Ministry of Roads & Urban Development	—	National comprehensive transport accidents management system	Specific form of crashes	Yes	Once the HIS was first established	Not a certain one	Not on a certain process
Insurance Company	—	Expert information technologists system	Insurance file	Yes	Once the HIS was first established	Not a certain one	Not on a certain process

EMS: emergency medical services, HIS: health information system, CMS: case management system.

time and place of the crash, driver information, vehicle, pedestrian and passenger characteristics.

Ministry of Transport and Road Administration. Special form of road traffic injuries in the comprehensive system for managing road traffic crashes in the country that is completed through the Ministry of Transport and Road Administration includes information about a crash such as the location, the source of declaration, the traffic situation of the crash scene, and so on. It also contains information on climate conditions, the number of deaths and injuries, type of vehicle and external cause of the crashes.

Iranian Red Crescent (IRC) Organization/Disaster Management Information System. Crash registration form for the Red Crescent Organization, a subset of the Disaster Management System, includes information on the description of the incident and its time, the geographical location, the personnel and equipment used, the information of the injured and the services provided to the victims and the survivors.

Traffic Injured System of Health Treatment Deputy. Clause B of article 37 form includes demographic data of the injured person, description of the crash, the type of injury and treatment measures, and hospital billing.

Forensic Medicine Organization. It is related to dying due to road traffic crashes. It includes demographic information of fatalities, crash data and forensic information.

Insurance Company. This form includes insurance information, crash data, guilty person details, guilty vehicle details, and details of affected individuals.

Ministry of Justice. This form includes crash information, human information and some information related to the vehicles.

With regard to road traffic crash information such as location, time, etc., the Police and the Ministry of Road and Urban Development provided data. In the case of human information, the insurance form includes demographic information, accused driver, and driver's fault. But with regard to medical information and the type of injuries experienced by individuals, the forms of EMS, health information system, forensics and all measures according to the article 37 of the fifth National Economic, Social and Cultural Development Programs in Iran, provided information related to human and injuries.

Regarding vehicle specifications, police and insurance forms provided more information than other forms. In regard to the information on the location of the crash, the type of road user, the type of road, and climatic condition, the police form contains more information than the other systems. EMS and the Red Crescent provided much more information on rescue and medical services. In regard to information about judicial affairs and insurance, the Police provided the required data.

Discussion

This study, the first in its kind, did explore and compare various road traffic registry systems and their variables as well as its utilization in Iran. The exploration has been showed that none of them is surveillance system. Each system has its own database, based upon its scope and mainly at crash and post-crash status; and little on pre-crash circumstance. Various organizations including Ministry of Health and Medical Education registry systems, Police, Forensic Medicine Organization, Hospitals, Health Services System, Insurance Company, Iranian Red Crescent Organization, the Judiciary and Ministry of Road & Urban Development register various kinds of information about RTIs based on their own mission.[25−27]

The main role of IRC organization in road traffic crashes is response for victims' management at inter-city roads area.[28] However, the RTI registration is not the main scope of IRC organization. On the other hand, most of IRC information has overlapped with Ministry of Health and Medical Education registry system. The reason for that might be due to the fact that the major role of IRC is evacuation of victims from trapped vehicles at inter-urban road. In some other countries like Lebanon, also Red Crescent Organization has the role for victims' evacuation and their transportation, which is in line with IRC.[29] RTI registration is mainly as volunteer activities in IRC. It implies that focusing on registry data, it is better to rely on the Ministry of Health and Medical Education registry system.

Regarding insurance company, findings of this study indicated that the most focuses of the insurance company is on the information about the guilty of person and vehicle details as well as details of affected individuals. In most high-income countries, insurance company is as a supportive agent for safety promotion and injury prevention among various road users. In Iran, all health delivery services for victims of RTIs are free of charge. In recent years, this facility could help the society for prevention of RTIs consequence. However, the focus of insurance company in Iran is not on injury prevention circumstances. Insurance company mainly focuses on damage compensation. Surprisingly this facility may result in more crashes and collisions, which should be taken into account. Findings from other studies in high-income countries indicated that insurance company can help policy makers for RTIs prevention by relying on law restriction such as seat belt use and helmet use as well as other preventive measures. It indicates that additional variables in relation to injury prevention in insurance company are needed for RTIs prevention.

The focus of all current RTI registry systems in Iran is on registration, of which the main focus is on data collection and analysis. It is important to note that the other surveillance system components including interpretation, dissemination of health information as well as feedback to stakeholders are usually missed. Accordingly, these systems are still only registry systems. Based on WHO definition of surveillance system, the process usually is not considered in most low and middle-income countries and even high-income countries.[33−35] Since most current systems are only registry, the dissemination of health information, feedback and changing in act are ignored. Based on above concerns, the authors suggest that though each system is not surveillance, it can be a potential of surveillance if they try to collect and analyze on-time data and identify stakeholders for dissemination of road traffic data.[36] A system approach also is needed by more focus on information about speed management to develop both activities and surveillance system.[37,38]

Part of the information in each system is unique. For example, Ministry of Health and Medical Education information is mainly related to victims' health information, of which EMS delivery is provided. It includes different time intervals covering notification, activation, response, on-scene and transport time intervals as well as variables related to vital sign information.[39] On the other hand police information is regarded as the place, type, factor, and scene condition of crashes, demographic information and other crash circumstance information are mainly crash oriented.[40] The focus of Forensic Medicine Organization information is also about bodily damages and time of crash, time of death and information about crash circumstances.[37] Ministry of Road also collect date related to date and place of crashes, type and cause of crashes and some other information which is similar to police information.

Another important finding of this study is overlap of some information among organization as well as missing of some RTI

variables in all organizations. There is an overlap between Police and Forensic Medicine Organization information regarding the crash circumstances. However, some information is missed in all systems. The other concern is that in current registry systems the goal of data collection was not exactly clear, which should be taken in to account. This is why information about visibility of road users, alcohol consumption, helmet use, seat belt use for all car occupants, child restrain use, information about car circumstances, drug abuse and injury severity score are missed.[25,40] Despite the importance of visibility information and speed management, little focus is on these variables in all current registry systems. According to the findings, this study suggests that future research orientation should focus on Haddon matrix-based study and quantitative study.[39,40]

In this study all traffic data source was identified and observed. Face-to-face interview has been conducted with road safety experts in all Iranian organizations as well as checking their data sheet of each organization. Also, this study clarified all variables in road safety system and provided to do interventional and analytical research related to this field. One of the limitations of the study is the information gathering process, which is due to the wide and diverse organizations involved in RTIs, long-term data collection and different interview time as well as varied inter-organizational coordination.

All current registry systems are not surveillance system for RTI prevention. In Iran, a large number of data are usually collected but among them, most of collected variables are duplicated in each system. On the other hand, these systems are not linked with each other and some variables in relation to RTI prevention are missed or duplicated in all systems. In this study, the current situation of RTI data collection system has been clarified, which could be a very good guide for policy makers to plan and develop strategic solution regarding this identified problem. Accordingly, it is critical need for integration and establishment of a comprehensive surveillance system, with the focus on the goal of each system and collection of minimum data in each organization, which currently is underway.

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Ethical Statement

Not applicable.

Declaration of Competing Interest

There is no conflict of interest in this study.

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