



## Developing and preliminary evaluation of a general academic course on traffic health and safety

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### Abstract

**Background:** A Based on the World Health Organization's reporting, over 1.25 million people die annually in traffic accidents worldwide. Traffic accidents are the ninth main cause of death worldwide, with an average age range of victims of 15 to 29. Broadly speaking, 90% of traffic accidents happen in the low- and middle-income countries that comprise 82% of the global population, and these countries account for half of the world's vehicles. One of the goals of the National Road Traffic Knowledge Development Trustee is to plan and implement training courses (content design, design and implementation and evaluation) for target groups. To achieve this goal and due to the lack of academic programs on traffic safety in Iran, a single-credit course, "Safety and Traffic," was developed to be run as a compulsory academic course in all universities across the country.

**Methods:** This course was administered as a national pilot study in four phases and in 17 medical universities across the country. All experts and national authorities in the Ministry of Science and the Ministry of Health and Medical Education were requested to provide feedback. Afterwards, the results and comments were forwarded to the Supreme Council of Cultural Revolution for further investigation. Upon approval of the Council, the course will be implemented in all universities across the country.

**Results:** Results from the pre-test showed that the level of students' knowledge was low before attending the training courses. Surveys also revealed that the two items of "pedestrian safety" and "first aids in RTCs" were the most useful and applicable subjects. The percentage of wrong answers ranged from 61 to 98%.

**Conclusion:** Considering the importance of traffic accidents and people's role in traffic-related issues, it seems that it is necessary to provide university courses for traffic safety education.

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## Introduction

Based on the World Health Organization's reporting, over 1.25 million people die annually in traffic accidents worldwide. Traffic accidents are the ninth main cause of death worldwide, with an average age range of victims of 15 to 29. Overall, 90% of traffic accidents happen in low and middle-income countries that comprise 82% of the global population, and these countries account for half of the world's vehicles.<sup>1</sup>

The Iranian Legal Medicine Organization (ILMO) reported that over 14 000 mortalities and about 290 000 road traffic injuries (RTIs) occurred in 2016 in Iran.<sup>2</sup>

RTIs not only impose heavy financial burdens on national and global economies but also affect families. Families that lose their breadwinners in RTCs, or those having a breadwinner become disabled, gradually enter poverty.<sup>3</sup> Therefore, concentrating on RTCs and training safety promotion methods seems to be important. As studies suggest, RTIs originate from three main intervening factors: human, environmental and vehicular.

Human factors include age, sex, skill, sleepiness, driving focus, experience and drug influences; vehicular factors include design, production and maintenance; and road/environmental factors include road geometric features, traffic control tools, traffic signs, road friction, weather and visibility.<sup>4</sup>

Human errors play an important role in RTIs. Reports indicate that only 1% of RTIs are due to "technical problems of vehicles" or "road safety problems;" the remaining 99% of accidents happen because of human error.<sup>5,6</sup>

According to a report by the Iranian police, there are several highlighted factors – among which human errors are the most important – responsible for over 500 000 mortalities during the past 20 years in Iran. These highlighted factors included use of cell phones, eating and drinking while driving, driving at unsafe speeds, lack of concentration, unsafe following distance, sudden changes in lanes, running red lights, insufficient experience, driving after taking medications, and illegal passing. Meanwhile, slippery and freezing road surfaces along with rain or snow are among the most important environmental factors.<sup>7</sup>

The mortality rate of RTIs in Iran is 30 per 100 000 population. This rate, compared to the world statistics (23 per 100 000), ranks Iran first in the world.<sup>8</sup>

## Objectives

In Meeting 762 of the Supreme Cultural Revolution Council (SCRC), headed by President Hassan Rouhani, a preparation plan for higher education in health sciences was presented. After presenting the plan in a steering committee for a comprehensive scientific map of the country and doing some needed reformulations, the plan was approved by the SCRC. According to the preparation plan for higher education in health sciences, all medical universities of the country and affiliated centers were

clustered into 10 zones based on population, facilities and human indexes. As a result, some universities were classified as focal points for international missions and others for national missions.<sup>9</sup>

Developing traffic knowledge in the community was assigned to Zone #2. Initially, the requirements were announced by the Ministry of Health and Medical Education (MOHME) for Zone #2 with Tabriz University of Medical Sciences (TUOMS) as its focal point; the medical universities of Urmia, Ardabil and Maragheh were included as member universities that all met the needed criteria to undertake this responsibility. Finally, a memorandum of understanding (MoU) was signed between the National Road Traffic Knowledge Development Trustee (NRTKDT) and MOHME and the center formally began its activities. In a short period, the team conducted considerable educational and research plans with the participation and cooperation of Iranian medical universities and other related organizations. Accordingly, through developing a strategic plan, the NRTKDT continues to seek to achieve the important goals and objectives as its main priorities. The goals are promoting knowledge and awareness about RTIs nationwide and developing national and international ties for the development of knowledge about RTIs. The objectives are designing and holding educational programs for target groups, transferring, translating and implementing knowledge about RTIs, developing necessary infrastructure to train national and regional professional human resources etc.<sup>10</sup>

To reach the first objective, a one-credit educational course on safety and traffic knowledge was designed to be taught as a compulsory course at the university level.

## Materials and Methods

The one-credit course on safety and traffic will be presented as a general and obligatory course to all students once during their college years. This program will pass a trial period of 1-3 years in 20 universities and the final assessment of its implementation will be forwarded to SCRC for further development. The design and implementation process of this course are as follows (Table 1): after conducting a needs assessment, an educational curriculum was designed, reviewed and finalized by national experts. The main objective of developing this curriculum was to inform the affected groups, especially university students who are considered as intellectuals and potential managers of the country, and the public in general. Moreover, the ultimate goal of designing this course is to decrease the number of RTIs.

The educational objectives of the curriculum include:

1. Teaching the importance of epidemiology and status of traffic accidents and safety in Iran and the world,
2. Identifying risk factors of traffic accidents and injuries,
3. Understanding traffic safety norms and basic traffic

**Table 1.** Design and implementation phases of traffic safety course

▼	Needs assessment
▼	Designing curriculum draft
▼	Review
▼	Finalizing the curriculum
▼	Developing the unique educational and national textbook called "Safety and Traffic" book
▼	Sending announcement to target and interested universities
▼	Holding the first teacher training course
▼	Running the first phase of the pilot study through holding and presenting the course in three classes of the Faculty of Management and Medical Informatics and the Faculty of Health of TUOMS at the fall semester of 2016-2017
▼	Holding national teacher training course
▼	Assessment and issuing the certificates
▼	Running the second phase of the pilot study by presenting the course in 13 classes at the Spring semester of 2017
▼	Running the third phase of the pilot study by presenting the course at other national universities of medical sciences at the Spring semester of 2018
▼	Running the fourth phase of the pilot study by making decision on implementation of the course at all universities of medical sciences and several non-medical universities at the fall semester of 2017-2018
▼	Collecting the comments of the experts and authorities of both involved ministries
▼	Finalization
▼	Sending the package to the SCCR

laws at national and international levels,  
 4. Teaching safety measures and the requisite traffic-related skills to students.

Other elements of the curriculum include a teaching method, a student assessment method, teaching resources and learning opportunities.

Various universities were summoned to see if they were ready to participate in the program via presenting the course to the students. Meanwhile, they were requested to nominate teachers (Table 2) and students (Table 3) who were willing to teach the course and undertake to study the course, respectively. Since the scope of the program was very broad, it was difficult to find a sufficient number of traffic experts to teach the course. Therefore, it was decided to design a teacher training program for the trainers. Information on teachers and students is presented in Table 4. The teachers were trained in two 5-day courses and those who successfully passed received a certificate which enabled them to teach the traffic safety course in universities.

The traffic safety course was then administered as a pilot in four phases. In the first phase, the course was presented to three classes at BSc and MSc levels in the Faculty of Management and Medical Informatics as well as Health Faculty of TUOMS, Tabriz, Iran.

**Table 2.** Teacher's profile

No.	Name	Field/Grade	Employment type	Scientific degree
Teacher's information				

**Table 3.** Students' profile

No.	Field of study	Grade	No. of students	Details
Student's information				

In the second phase, the course was presented in the Faculty of Management and Medical Informatics, Health Faculty and some other faculties of TUOMS. The target group for this phase consisted of BSc, MSc and PhD students. A pre-test was given to students to assess their level of knowledge and establish a baseline for determining the course effectiveness. The students were divided into five groups and a workshop-like class was held for one week in May 2017. For each group, at least five teachers from different fields of study were used. At the end of the course, a post-test was given to the students. A survey questionnaire was also filled out by the student participants and the results will be presented in the near future. The final exam, with similar questions for all groups, was designed and graded by an expert in traffic knowledge development and the answer sheets were graded by the teachers. The content validity of the measure was assessed and confirmed by a

**Table 4.** Pretest results

Question	Wrong answers (%)
Knowledge about Haddon Matrix	60
Safe distance of the cars	91
Death from accidents	76
Knowledge about cars safety systems	86
Main preventive factors of accidents	98
Roads safety norms	91
Role of bumpers in accidents	83
Risk factors for the pedestrians	30
Riding motorbikes in rainy conditions	71
Crossing over street railways	86
Motorbike accidents	90
Knowledge about traffic rules	81
Knowledge about pro-environment driving	83

panel of experts. The internal consistency of the measure was assessed and confirmed by Cronbach's alpha (alpha >0.7)

In the third phase, the course was presented to nine other medical universities. This phase is currently in process.

In the fourth phase, the course will be presented at a number of non-medical universities. In addition, it will be presented at all medical universities in the country.

Finally, the comments of all national authorities and experts in the MOHME and the Ministry of Science will be collected and the results will be forwarded to the SCRC. Upon confirmation of the council, the course will also be presented to all Iranian universities.

### **Data analysis**

Statistical analysis was done using SPSS software (version 17, SPSS Inc. IL, Chicago, USA). The data are presented using frequencies (percent) for categorical variables.

### **Results**

The pre-test results (Table 4) show that the level of students' knowledge about the factors including the ways of preventing accidents, safe distance of the cars in different speed ranges and road safety norms was lower than other factors: almost 90% of the students provided incorrect answers to these items at the pre-test. Almost 80% of students provided incorrect answers to such items as car safety norms, the role of bumpers in accidents, crossing over street railways, knowledge about pro-environment driving, and traffic laws.

Surveys also revealed that two items, "safety of pedestrians" and "first aid in RTCs," were the most useful and applicable. The others were "road safety norms," "car safety norms," and "traffic rules."

### **Discussion**

Iran is ranked as the fifth country worldwide in fatal RTIs. Based on a report by the ILMO in 2016, almost 14000 people were killed due to RTIs and 290000 were injured in Iran. According to the World Health Organization, the global number of fatal RTIs is estimated to be 1.25 million people.<sup>2</sup> RTIs are the ninth leading cause of mortality worldwide, with an average age range of victims from 15 to 29. As mentioned earlier, 90% of mortalities happen in low to medium income countries, which account for 82% of the global population and 50% of global vehicles.<sup>3</sup> This indicates these countries need to devote more time and energy to develop knowledge about traffic safety, and Iran, with such a high rate of RTIs, is among these countries.

One of the responsibilities of public education systems is to promote public knowledge about different fields. Developing public knowledge on general issues, along with conducting specialized research studies, is very important at institutes of higher education. General courses in higher education curricula are a formal part of a BSc degree and students in all fields need to pass them.

At present, there are 23 credits in general courses at the BSc level provided by Iranian universities.<sup>11</sup> Considering the importance of RTIs and people's role in traffic issue, it seems that it is necessary to provide a university course for traffic safety education. General courses are not limited to one specific group of students; that is, all students are required to pass these courses at different universities. Hence, including this course as the general course in universities could promote traffic knowledge among families and the community.

One might say that people can learn traffic-related issues through time and normal social communications or while obtaining a driver's license. But it should also be noted that under the Iranian system of obtaining a driver's license, rules are not strictly followed and education does not happen in holistic terms. In addition, all age groups have to learn traffic rules because even if they are not going to drive a car, they have to encounter cars as pedestrians. Therefore, they should be informed about RTIs and other related subjects; and universities are one of the main places for accomplishing this aim. The results of the pre-tests in the pilot for the university students confirms this issue as well.

Unlike countries as Sweden and Russia, there are no traffic-related courses in Iranian universities at present. For example, a "Traffic Epidemiology" course is a general course in Swedish universities.

There are two main goals for developing traffic knowledge:

1. Establishing health and traffic knowledge at MSc and PhD levels
2. Teaching a course of traffic and safety as a one-credit general and compulsory course in all fields of study.

The aim of this course is to promote individual knowledge of the community. Consequently, getting this knowledge can increase people's demand from the responsible authorities to promote the quality of traffic-related settings.

Currently, the course is being implemented as a pilot study at ten universities of medical sciences nationwide; and after its approval by the SCRC, it will be taught at all universities. Based on the results of surveys, pre-tests, and comments of students who took this course, such topics as pedestrian safety, pro-environment driving and safety norms were the items with the highest priority. Accordingly, it seems that some changes could be made in the current curriculum. For instance, there could be some new material about RTIs and other topics could be centralized. According to student feedback, this course was more applicable compared to other general courses. This satisfaction may prove to be an advantage for expanding the course across universities.

### **Conclusion**

Considering the importance of RTIs and the human element in traffic-related issues, it seems that it is necessary to provide university courses with traffic safety education.

### **Ethical approval**

Ethical considerations were addressed by completing informed consent forms.

### **Competing interests**

The authors declare no conflict of interest.

### **Authors' contributions**

SBH and SMH designed the study. GM analyzed the data and contributed to draft the manuscript. Others contributed to, gather data and run project.

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