Pilot Design and Set up of Babol Emergency Data Bank (BEDB), North of Iran

Soraya Khafri¹, Shayan Alijanpour²,³*, Abolghasem Lali¹, Samaneh Fathi³, Mostafa Mostafazadeh-Bora³,⁴, Mohadeseh Salehi³, Nafiseh Najafi³, Narges Hossein Gholipour³, Naghmeh Ramzani³, Zeinab Adrang³, Reza Ekhtiyari⁴ and Mehdi Aghagol Abastabar⁴

¹Assistant Professor of Biostatistic, Department of Epidemiology and Biostatistics, Babol University of Medical Sciences, Babol, Iran
²MSc Student of Critical Care Nursing, Student Research Committee, Isfahan University of Medical Science, Isfahan, Iran
³Education, Research and Planning Unite, Pre-hospital Emergency Organization and Emergency Medical Service Center, Babol University of Medical Sciences, Babol, Iran
⁴MSc of Medical-Surgical Nursing, North Khorasan University of Medical Sciences, Bojnurd, Iran

*Corresponding Author: Shayan Alijanpour, MSc Student of Critical Care Nursing, Education, Research and Planning Unite, Pre-hospital Emergency Organization, Babol University of Medical Sciences, Babol, Iran.

Received: February 26, 2019; Published: March 25, 2019

Abstract

Background: Electronic Health Record is one of key ways for decline expenditure associated health care system. Due to Babol pre-hospital emergency organization did not have any electronic health record, this study was conducted.

Methods: This descriptive cross-sectional study on 5,453 missions of Babol pre-hospital emergency, which lead to outpatient treatment or transfer to hospital between 2015 to 2016 was conducted. The data was gathered through designed data sheet by access software. Babol Emergency Data Bank (BEDB) was included demographic data, trauma data, treatment intervention, chief complain and the prehospital time interval. Activation time (AT), Time (rT), Response Time (RT), On-scene time (OST), Transport time (TT), Total Pre Hospital time (TPHT), In hospital time (HT), Return Time (RT), Total Mission Time (TMT) defined. Data was analyzed by SPSS 23. T test, chi square was used and the significance level was set at 0.05.

Results: The 5,453 missions that entered in BEDB. Most of patients (42.4%) aged between 18 to 45 years old. Of 11 Babol Emergency code, Distribution the type of mission was 2206 (40.5%) urban vs. 1773 (32.5%) rural. Most chief complaint 1583 (29.03%) was trauma. The difference in mean-time according Base type were all statistically significant except OST and HT (p > 0.05). In addition, the mean-time according traffic pass way rT (0.001), RT, TT, TPHT (< 0.0001), OST (0.009), RT (0.04) and TMT (0.002) and location AT (0.009), rT (0.001), RT, TT, TPHT, RT, TMT (< 0.0001) and HT (0.04) were statistically significant. the highest missing was seen first in drug history (91%), second sign and symptom (69%) and third in temperature (55%). The lowest missing was seen in code type of Babol Ambulance (0.01%) and mission conclusion.

Conclusion: Missing data in emergency organization form was high in several parameters. It suggests that the application with obligatory filling and alarm is used to reduce the missing problem. Also, providing of Infrastructures by health care manager such as suitable equipment is important.

Keywords: Medical Informatics; Pre-Hospital; Emergency; Electronic Health Record

Citation: Shayan Alijanpour., et al. "Pilot Design and Set up of Babol Emergency Data Bank (BEDB), North of Iran". EC Emergency Medicine and Critical Care 3.4 (2019): 153-163.
Introduction

Information technology has changed various aspects of lives. Also, the healthcare system is affected by information technology that directed to the better delivery of care and basic changes [1]. The internal changes in health systems and the evolution of a disease-based attitude to health-based and personal-based attitude to community-based recently and adventurous advancement in information technology in the world have led to the use of this technology in improving the quality of health services. Different countries have contributed to the evolution of this idea, and each has designed and implemented a comprehensive plan according to national circumstances and requirements [2].

One of the important methods in information technology is Electronic Health Records (EHR). That is an electronic version included various aspects of health data of patients managed, used, and created by organization health and only healthcare providers can use for treatment and care of patients [3]. EHR systems use different levels and forms in health care systems include hospitals, pharmacies, general practitioner surgeries, and other health care providers [4-6]. The use of an electronic system requires the preparation of various aspects of organizational and technical factors that created complex challenges because of lack of knowledge about information technology, safety data, complexity of medical data, multi-purpose of the hospital, being various units of the hospital, and many health care personnel [7-10].

In Iran as developing countries need more attention to information technology. Developing countries are countries with low socio-economic and poor information technology and health information technology. Most of these countries have poor development indexes and careful expenditure limited financial incomes [11]. EHR is one of the key ways for decline expenditure associated health care system. Today, EHRs can direct to decreasing the charge of healthcare services, decreasing the medical errors, and raising the patient's satisfaction [12].

EHR is important because of special condition of structural of Iran's health system. This character include variation of disease in reprobated areas and concentration of resources in large cities, dramatic effect of awareness in improving health and reducing the disease incidence, the necessity of immediate access to patients' health records by physician, access to information and disease statistics in medical research, medical cooperation as the essential requirement for synergy, the need of professional counseling without the physical presence of patients, the necessity of increasing treatment efficiency, patients' reverence and providing the best service with the least concern for patients and relatives and also providing the necessary equipment for physician [13].

Compared to the other countries, Iran has the lowest the standard. Also, there is non-compliance between determined standard and registered points. The lack of a control organization for preparation the relevant standards in the system, easy access and security, and on the other hand going some information, indicating the Ministry's deficiencies Health and Care of Iran to establish the necessary standards information recording system [14]. Attention to importance of EHR in decline cost of treatment and benefits for health care system, the aim of present study to Design and set up of electronic data bases of emergency patients in Babol for first time in north of Iran.

Material and Methods

This descriptive cross-sectional study was conducted on all missions of Babol medical emergency, which lead to outpatient treatment or transfer of patient. Sampling method was Census and the inclusion criteria were all of patient that lead to outpatient treatment or transfer to the hospital between 2015 to 2016. Exclusion criteria include of forms which not filled any item or operators not can read what technician fill.

Ethic

This study was approved by the Ethics Committee of Babol University of Medical Sciences (Ethics Code No. MUBABOL.REC.1396.13).

Design and set up software

In this study data was gathered through designed data sheet. First, the initial data sheet for recording information in Access software (Microsoft Office Version 2016) is designed by the emergency personnel of 115 Babol, and after confirmation by an expert on the medical emergency department and Statistics Consultant after a month is used.
Data collection

After ethics approval and permission from the universities, the information is initially recorded with the corresponding coordination and training personnel for recording the patient information at the same time when contacting the operator 115 in the relevant software. A staff member is also responsible for completing the case if the file is incomplete.

The personnel participating in the project, all of them are emergency staff, are divided into several categories. These categories include Operator staff, Completing personnel, statics consultant and Personnel responsible for software and training. After the call, the operator personnel import the demographic information into the application „Access“ in the patient record. Initial information of the patient's record, including chief complain, history of disease, type of emergency, the condition of the injured person, past medical history, shall be recorded first. Data bank complete based on sign and symptom type. Then the end of each month, the compellation staff edits the patient records and According to the patient’s records, the previous information is edited. After completing the information and updating the monthly information of the emergency missions in 2015, the final file will be completed by the Dispatch Officer that was shown in figure 1. Before completing the data bank, general information will be released with the licensees of the project executives.

Figure 1
Variable definition
In this study data was gathered through an „Access“ file. This file including several variables.

Demographic data
The first part included demographic characteristics (age, sex, type of emergency station, Emergency location, hospital acceptance, mission result, drug history, past medical history).

Trauma data
This part of access file was registered accident road and injured person status. Fracture type, dressing type of trauma, kind of injury, having bleeding, traffic Pass way, injured condition, injured number, type of vehicle, type of machine, and trauma place).

Treatment intervention
In this part recorded treatment intervention for the patients. Suction, distal pulse, serum therapy, o2 therapy, respiration rhythm, heart rate, blood pressure)

Chief complaint
This variable is the main cause of emergency contact for patient. This part was included vision weakness, gynecology, endocrine, Infectious, poising, trauma, Nervous, heat exhaustion, abdominal pain, cardiac, cerebral, Digestive, Kidney, and pulmonary.

Prehospital time definitions:
1. Activation time (AT): Time required for EMS to deploy after emergency call.
2. Reaction Time (rT): The amount of time that the technician takes the mission from dispatch and move from the base.
3. Response Time (RT): The amount of time spent from calling to ems until the ems code reach to patient location.
4. On-scene time (OST): Time spent on scene by EMS.
5. Transport time (TT): Time from departing scene to arrival at the hospital.
6. Total Pre Hospital time (TPHT): Spent time from calling to EMS to arrive patients to hospital
7. In hospital time (HT): Delivery time to the hospital.
8. Return Time (RT): Time spent to return to emergency base after delivery to hospital.
9. Total Mission Time (TMT): Total time from calling to EMS until return to base.

Data analysis
Eventually gathered data was analyzed by SPSS 23. T test, chi square was used and the significance level was set at 0.05.

Result
Demographic
Of 5453 missions that entered in BEDB, 2924 cases (53.1%) male and 2011 cases were (36.9%) female. The age of the patients (42.4%) was between 18 to 45 years old. Of 11 Babol Emergency code, Distribution the type of mission was 2206 (40.5%) urban vs. 1773 (32.5%) rural. Most chief complaint 1583 (29.03%) was trauma. Other Demographic characteristics were shown in table 1.
### Table 1: Demographic characteristics of Babol Emergency Data Bank, Babol, Iran.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Category</th>
<th>Frequency (N)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Male</td>
<td>2924</td>
<td>53.6</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>2011</td>
<td>36.9</td>
</tr>
<tr>
<td>Age</td>
<td>Under 8</td>
<td>330</td>
<td>6.4</td>
</tr>
<tr>
<td></td>
<td>8 to 18</td>
<td>316</td>
<td>6.1</td>
</tr>
<tr>
<td></td>
<td>18 to 45</td>
<td>2198</td>
<td>42.4</td>
</tr>
<tr>
<td></td>
<td>45 to 60</td>
<td>942</td>
<td>18.2</td>
</tr>
<tr>
<td></td>
<td>Upper 60</td>
<td>1402</td>
<td>27</td>
</tr>
<tr>
<td>Emergency base</td>
<td>Urban</td>
<td>2206</td>
<td>40.5</td>
</tr>
<tr>
<td></td>
<td>Road</td>
<td>1773</td>
<td>32.5</td>
</tr>
<tr>
<td></td>
<td>Rural</td>
<td>1473</td>
<td>27</td>
</tr>
<tr>
<td>Traffic Pass way</td>
<td>High-way</td>
<td>26</td>
<td>0.5</td>
</tr>
<tr>
<td></td>
<td>Main Road</td>
<td>1876</td>
<td>34.4</td>
</tr>
<tr>
<td></td>
<td>By-way</td>
<td>773</td>
<td>14.2</td>
</tr>
<tr>
<td></td>
<td>Rural Road</td>
<td>555</td>
<td>10.2</td>
</tr>
<tr>
<td>Chief complain</td>
<td>Vision Weakness</td>
<td>631</td>
<td>11.6</td>
</tr>
<tr>
<td></td>
<td>Gynecology</td>
<td>12</td>
<td>0.2</td>
</tr>
<tr>
<td></td>
<td>Endocrine</td>
<td>53</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Infectious</td>
<td>15</td>
<td>0.3</td>
</tr>
<tr>
<td></td>
<td>Poisoning</td>
<td>6</td>
<td>0.1</td>
</tr>
<tr>
<td></td>
<td>Heat Exhaustion</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Trauma</td>
<td>14</td>
<td>0.3</td>
</tr>
<tr>
<td></td>
<td>Nervous</td>
<td>184</td>
<td>3.4</td>
</tr>
<tr>
<td></td>
<td>Abdominal Pain</td>
<td>3</td>
<td>0.1</td>
</tr>
<tr>
<td></td>
<td>Cardiac</td>
<td>303</td>
<td>5.6</td>
</tr>
<tr>
<td></td>
<td>Cerebral</td>
<td>149</td>
<td>2.7</td>
</tr>
<tr>
<td></td>
<td>Digestive</td>
<td>57</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Kidney</td>
<td>15</td>
<td>0.3</td>
</tr>
<tr>
<td></td>
<td>Pulmonary</td>
<td>187</td>
<td>3.4</td>
</tr>
<tr>
<td></td>
<td>Trauma</td>
<td>1583</td>
<td>29.03</td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>1022</td>
<td>18.7</td>
</tr>
</tbody>
</table>

**Arrivals times**

The result showed that the mean time of arrival according parameters. The difference in mean-time according Base type were all statistically significant except OST and HT (p > 0.05) (Table 2). In addition, the mean-time according traffic pass way rT (0.001), RT, TT, TPHT (< 0.0001), OST (0.009), RT (0.04) and TMT (0.002) and location AT (0.009), rT (0.001), RT, TT, TPHT, RT, TMT (< 0.0001) and HT (0.04) were statistically significant (Table 3).
Variable Category AT rT RT OST TT TPHT HT RT TMT
Base Urban 0.75 ± 1.44* 5.44 ± 3.14 6.19 ± 3.45 9.89 ± 3.95 9.68 ± 4.76 27.34 ± 8.29 11.36 ± 7.62 10.06 ± 6.86 47.58 ± 14.45
Road 0.71 ± 1.17 6.68 ± 3.86 7.39 ± 4.05 9.72 ± 3.68 12.17 ± 4.82 31.03 ± 8.12 12.08 ± 7.76 11.91 ± 7.17 55.53 ± 13.52
Rural 1.03 ± 1.87 7.07 ± 4.28 8.11 ± 3.88 9.97 ± 7.59 14.61 ± 27.93 37.18 ± 11.91 ± 12.55 ± 64.35 ± 15.83

p-value < 0.0001* < 0.0001 < 0.0001 0.15 < 0.0001 < 0.0001 0.16 < 0.0001 < 0.0001

Total 0.82 ± 1.5 6.28 ± 3.7 7.12 ± 4.10 9.91 ± 3.91 12.82 ± 6.65 31.52 ± 9.64 11.71 ± 7.68 11.25 ± 7.54 55.21 ± 16.59

Table 2: Assessment the times of Babol pre-hospital emergency mission according bases.

Anova test used in spss 24 between different parameter.

Abbreviations: Activation time (AT), Reaction Time (rT), Response Time (RT), On-scene time (OST), Transport time (TT), Total Pre Hospital time (TPHT), In hospital time (HT) and Return Time (RT) and Total Mission Time (TMT).

Variable Category AT rT RT OST TT TPHT HT RT TMT
Main 0.78 ± 1.56 6.07 ± 3.53 6.86 ± 3.93 9.70 ± 3.51 12.70 ± 6.86 30.67 ± 9.58 12.26 ± 8.06 11.14 ± 7.46 54.78 ± 16.96
Traffic Pass way Alternative 0.75 ± 1.16 6.61 ± 4.10 7.36 ± 4.24 10.22 ± 4.28 13.06 ± 6.54 32.26 ± 9.72 11.78 ± 7.31 11.15 ± 7.50 56.71 ± 15.83
Rural 0.92 ± 1.59 6.73 ± 4.17 7.66 ± 4.35 10.18 ± 3.96 14.38 ± 6.26 34.20 ± 8.57 11.49 ± 6.61 12.09 ± 7.98 59.83 ± 14.93

p-value 0.27 0.001 < 0.0001 0.009 < 0.0001 < 0.0001 0.16 < 0.0001 < 0.0001

Total 0.82 ± 1.5 6.28 ± 3.7 7.12 ± 4.10 9.91 ± 3.91 12.82 ± 6.65 31.52 ± 9.64 11.71 ± 7.68 11.25 ± 7.54 55.21 ± 16.59

Table 3: Assessment the times of Babol pre-hospital emergency mission according Traffic Pass way and location

Anova test used in spss 24 between different parameter.

Abbreviations: Activation time (AT), Reaction Time (rT), Response Time (RT), On-scene time (OST), Transport time (TT), Total Pre Hospital time (TPHT), In hospital time (HT) and Return Time (RT) and Total Mission Time (TMT).

Missing

Assessment of correctness of filling the data sheet showed that missing data in several parameters of emergency organization Form. As shown in figure 2, the highest missing was seen first in drug history (91%), second sign and symptom (69%) and third in temperature (55%). The lowest missing was seen in code type of Babol Ambulance (0.01%) and mission conclusion.

Citation: Shayan Alijanpour., et al. "Pilot Design and Set up of Babol Emergency Data Bank (BEDB), North of Iran". EC Emergency Medicine and Critical Care 3.4 (2019): 153-163.
Discussion

Current study due to importance of design and setup the data bank for official work and research was conducted. In emergency mission sheet, missing data was high that similar with Agrawal, et al. study, many important data were missed. The most frequency of missing was drug history and sign and symptom. Maybe, the patients in accident scene was not alert correctly. Also, it might ignore by emergency personal because of especially condition of the patients (loss of conscious) that cannot take information or lack of consideration of emergency personal. Also, emergency personal consider treatment intervention usually [15].

There is significant relation between the response time, base type, traffic pass way, and location. Also, the most times were in rural base, rural pass way, and extra-city location. The result of study of Breen, et al. study, indicates response time within nine minutes in rural and urban region was 29% and 44% respectively. Also, ambulance station was effective factor in response time. On other hand, 46% response the within nine minutes was in distance of five miles in ambulance base, while only 5% within nine minutes within a six to ten miles then ambulance station [16]. The Lam, et al. study in Singapore indicated that ambulance response times in the traumatic patients is relation to place of the incident. Long ambulance response times were in “Home” or “Commercial” locations more than “Road” incidents [17].

According of our finding study, OST was higher in the rural base and intra-city location, but they were no significant. In traffic pass way variable, alternative pass way was higher than Rural and main pass way significantly. Similar to our study, the result of Paravar, et al. study in kashan indicates on scene time was in roads out of the city longer than city street significantly [18]. Similar to finding of our study, Gonzalez, et al. [19] report similar OST for survivors and non-survivors in an urban setting. However, in the rural setting they report that OST was significantly longer for non-survivors. Though Petri, et al. [20] reported that mean OST was significantly lower among decedents, they stratify patients into groups on the basis of international service system. Four studies report on patients suffering penetrating injuries. Eachmpati., et al. [21], Funder, et al. [22] and Honigman, et al. [23] report that the OST did not differ significantly between survivors and non-survivors. In the study of Nagata, et al. in japan, the finding indicate that Geographical area can effect on OST significantly [24].

The other finding of our study, results indicate that base type, traffic pass way, and location were significant. Transport time was longer rural base, rural pass way, and extra-city location. In the studied in kashan, the aim of study prehospital trauma care in road traffic accidents, result indicate that roads out of the city were long transportation time [18]. Feero, et al. [25] show no significant difference between unexpected survivors versus unexpected deaths, Newgard., et al. [26] also fail to show a significant association between mortality and TT in minutes. However, Gonzalez., et al. [19] and Petri, et al. [20] show that non-survivors have a significant shorter TT. McGuffie, et
al. [27] divided the included patients into urban or rural groups for analysis, they report no association in both rural and urban settings between mortality and TT. However, they did show TT to be a significant factor when total length of the hospital stay was modelled, longer TT was associated with a longer hospital stay. Three studies report on patients suffering penetrating trauma. Eachempati, et al. [21] and McCoy, et al. [28] show no increased odds of mortality for longer TT. However, Swaroop, et al. [29] show significantly shorter TT for hypotensive patients versus normotensive patients. No correlation is made with mortality. Kidher, et al. [30] report no statistically significant effect of TT on mortality for thoracic trauma. McCoy, et al. [28] also report on blunt injury, they were unable to find an association between TT and mortality.

The other finding of current study indicates Total pre hospital time was higher in the rural bases, rural pass way, and Extra-city location significantly. The study of Nilsson, et al. in northern Swedish population in 2016 showed that the median of Total prehospital delay was 5.1 hours. Also, Distance to hospital was effective factor in Total pre-hospital delay. When Total pre-hospital delay was under 2 hours, median of Distance to hospital was 7 kilometers, but in Total pre-hospital delay higher 2 hours, the distance of the hospital was 49.8 kilometer. The Association between Total pre-hospital delay and Distance to hospital was significant [31].

Tien, et al. showed a non-significant trend using multivariate logistic regression analysis, suggesting that patients who arrived within the ‘golden hour’ had a lower mortality than those outside of the ‘golden hour’. Dinh, et al. [32] report a rise in mortality with increasing TPT. They fail to show an association between mortality and the ‘golden hour’ or arrival < 30 minutes. They report survival benefit for patients arriving < 90 minutes. Gonzalez, et al. [19], Petri, et al. [20] and McGuffie, et al. [33] showed TT to be a significant factor of influence on mortality as well as on length of hospital stay in undifferentiated trauma patients. Possibly because it is expected to lead to more effective care sooner.

Total Mission Time (TMT) is related to Total time from calling to EMS until return to base that in the current study 55.21 ± 16.59. Similar to our finding study, the result of study of Zeraatchi, et al. in the Zanjan indicate that the most frequency round trip time was between 36 - 70 minutes and lower 35 minute to 26.4 and 19.7% respectively [34].

In the other study of Esmaeiliranjbar, et al. in kerman, the mean (SD) for total out of hospital time was 31.3 (8.3) minutes. Also, the other result of current study show that total out of hospital time increases by 1 minute, the 24-hour mortality rate will rise by 3% [35].

Time of arrival is an important factor in emergency medical system that can help the mortality rate of patient prehospital time intervals in trauma patient transportation by emergency medical service: association with the first 24-hour mortality [36].

Similar all health technologies, the electronic medical record (EMR) have benefits and disadvantages. The benefit of EMR including medical errors reduction, instant and immediately access to patient information by all of health care worker; the existence of a legible and accurate record, improving efficacy of the hospital in providing care. But this system has big challenge especially trained personal for using of it and excess expenditure of these [37].

This challenge is more complicated in the developing countries because of existence health technology substructure in a country, internet penetration, Information and communications technology skills amongst the stakeholders particularly the clinicians, users’ perceptions on ICT, and voluntariness in the use of technology. It is necessary cooperation between various organizations in this countries and providing funds for electronic records infrastructures [38]. The review of the article between developing countries and developed countries indicate that developing countries need proper system for Emergency care for the increase of treatment standard and reduction mortality rate [39].

Conclusion

According to the results, it can be concluded that the Missing data in Emergency Organization Form was high in several parameters. Also, education and training for completing forms are important legally. For the development of this system need trained personnel, proper funding by health care manager, suitable equipment, and correct communication system. It suggests that the application with
obligatory filling and alarm, to reducing missing problem. also, Time of arrival is an important factor in emergency medical system that can help the decline of the mortality rate of patients [36]. Role of ems in emergency management developed worldwide and specialized for leadership, education and response. Attention to ems role in management of time can help patient management and decline pre hospital time. Decrease of pre hospital time depends on various factors. It needs to provide more infrastructures and structure of emergency medical.

Acknowledgements

We appreciate and thank the department of research and technology Babol University of Medical Sciences that approve and support this work and personnel of Babol emergency organization for cooperation and assistance in this study.

Conflict of Interest

There was no conflict of interest.

Authors’ Contributions

Dr Soraya Khafri, designed the study, supervised the study and approved the final version. Shayan Alijanpour, designed the study, data analysis and prepared the manuscript. Dr AhmadMohamad Pour and Mostafa Mostafazadeh-bora participated in data analysis and the writing manuscript. Samaneh Fathi, Mohadeseh Salehi, Nasimeh Najafi, Narges Hossein Gholipour, Naghmeh Ramzani, Zeinab Adrang, Reza Ekhliatry and Mehdi Aghagol Abastabar participated in collecting the data.

Funding

This study was funded by Babol University of Medical Science (proposal, 1951).

Bibliography


Citation: Shayan Alijanpour., et al. "Pilot Design and Set up of Babol Emergency Data Bank (BEDB), North of Iran". EC Emergency Medicine and Critical Care 3.4 (2019): 153-163.


