Original Article

A minimum data set of user profile or electronic health record for chemical warfare victims' recommender system

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ABSTRACT

Background: There are many people who are suffering from a variety of physical and mental illnesses due to the chemical attacks. There are various technologies such as recommender systems that can identify the main concerns related to health and make efforts to address them. To design and develop a recommender system, preparation of data source of this system should be considered. The aim of this study was to determine the minimum data set for user profile or user's electronic health record in chemical warfare victims' recommender system. **Methods:** This applied descriptive, cross-sectional study which was conducted in 2017. A questionnaire was developed by the authors from the data elements that were collected using the data extraction form from the studied sources. Content validity of the questionnaire was confirmed by using the experts. Test–retest method was used to determine the reliability of the questionnaire. The reliability of the questionnaire with Cronbach's alpha coefficient was confirmed as 84%. The questionnaire were submitted for related experts based on Delphi method by email or in person. Data resulting from the Delphi technique with descriptive statistics methods in SPSS software were analyzed. **Results:** Forty-seven nonclinical data elements and 181 clinical data elements were classified. **Conclusion:** Determining minimum data set of user profile or electronic health record in the recommender system for chemical warfare victims helps the health authorities to implement the recommender system which demonstrates chemical warfare victims' needs.

Keywords: Chemical warfare victim, minimum data set, recommender system

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Introduction

Using toxic and chemical substances as an effective weapon to succumb the enemy in wars has a long history. Some species of these weapons were used in ancient wars for hundreds of years BC.[1-3] More than 90,000 people were killed and almost 1,300,000 ones were wounded in chemical operations based on

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new ways in the World War I (1914–1918).[4,5] Italy used chemical agents in the war against Ethiopia from 1935 to 1936.[1,6] The Japanese dropped chemical bombs on Chinese soldiers around 1937–1943.[2,6,7] In the Vietnam War in 1960s and the early years of 1970s, the Americans inflicted irreparable damages to Vietnam rangelands, forests, and the environment as well as its people through the use of hazardous chemical agents, especially Agent Orange, that despite major restoration plans, its ominous effects were not resolved after decades later.[8,9]

However, the most widespread and heinous event is the use of chemical agents recorded after World War I against the human race used by the Saddam's Baathist regime against Iran in the 1980s.[10,11] There are many people in Iran who are suffering from a variety of physical and mental illnesses due to the chemical attacks that followed the 8-year war between Iran and Iraq.[12] Based on the study by Taebi *et al.* in 2015, it was found that about 63,417 chemical veterans have records in the Foundation of Martyrs and Veterans Affairs in Iran.[13]

Mustard gas was one of the main chemical agents used in the war imposed by Iraq against Iran, which its late-onset toxic effects occur several months to a few years later. Mustard gas causes many complications in the tissues of the gastrointestinal tract, endocrine, bone marrow, nervous, immune, especially respiratory, skin and eye. In addition, it has mutagenic and carcinogenic effects, the severity of these complications depends on the type of the exposure, the amount of exposure to mustard gas, the age of the individual, and the degree of one's immunity and resistance.[14,15]

Further, chemical bombardment had adverse psychological and social consequences on its victims.[16] Psychological symptoms such as anxiety and depression among chemical warfare victims are highly prevalent.[17] These victims need benefiting from certain services due to their special conditions. Chronic diseases affect all economic, social, financial, and emotional aspects of the individual, their family and society then only the pharmacological treatment and periodic control of the disease among these individuals are not enough.[18]

Today, there are various technologies that can identify the main concerns related to health and make efforts to address them. Recommender system is software that its user preferences can be determined by data analysis and give the best recommendation to the user based on his/her status.[19] Components of a recommender system such as data source, recommendations database, filtering techniques, and data analysis can mention.[20]

Different data are daily produced at healthcare centers to show the status of the clients. Using all these data is time-consuming and is not cost-effective. Thus, the issue of preparing, adjusting, and standardizing a minimum dataset are propounded. Providing a minimum dataset in a manual or computer-based system can be the basis for unifying and integrating documented data from different institutions and systems for easy data comparison.[21,22]

The mandatory collection and reporting of integrated, standardized data as well as data exchange between organizations and individuals at national and even international level are among the objectives of minimum dataset. Providing a minimum data set helps to collect an appropriate and relevant data based on related goals of a wealth of data, and these standardized, key and core data allow comparability between the data needed to report and present the results of various organizations, institutions, and systems.[23,24]

Recommender systems are among the technologies that, if properly designed and implemented, can help health authorities manage physical and mental health of chemical warfare victims. To design and develop a recommender system for chemical warfare victims, preparation of data source of this system should be considered. In this research, data source is actually the user profile, which is considered as the user's electronic health record in the recommender system. The present collection points to the formation of minimum data set for user profile or user's electronic health record in health recommender system for chemical warfare victims.

Methods

This applied descriptive, cross-sectional study was conducted in 2017. In the first step, the print sources available and the websites of organizations and associations related to the health and general status of chemical warfare victims and war survivors were reviewed. In the second step, the articles in the SID, Magiran, PubMed, Google Scholar, ScienceDirect, Web of Science, Scopus databases were searched using chemical warfare victims or chemical war veterans or chemical war survivors and health recommender system or medical recommender system or medicine recommender system or healthcare recommender system and electronic health record or profile user and minimum data set or core data set or core data elements or essential data set keywords as well as the equivalent Persian words were searched without time limit. At this step, sampling was not performed and the retrieved sources were considered based on the inclusion criteria that the valid sources should be Farsi and English full text.

In the third step, the chemical warfare victims' records at Chemical Warfare Victims Affairs Center and Janbazan Medical and Engineering Research Center of Foundation of Martyrs and Veterans Affairs in Tehran were reviewed. In the fourth step, a questionnaire was developed by the authors from the data elements that were collected using the data extraction form from the studied sources. The questionnaire included a section on the identity information of the person completing the questionnaire and a section on questions about the importance of existing data elements in a five-point Likert scale (very high, high, medium, low, very low). Data elements are divided into two main sections, nonclinical and clinical. The nonclinical data elements section consisted of 47 data elements and the clinical data elements section contained of 181 data elements with 16 subclasses. The questionnaire also contained an open-ended question in the

nonclinical and clinical data elements sections for data elements proposed by experts.

In the fifth step, content validity of the questionnaire was confirmed by using the opinions of available 4 health information management experts, 4 pulmonologists, 4 dermatologists, and 4 ophthalmologists. The pulmonologists, dermatologists, and ophthalmologists were selected because chemical warfare victims suffered from the most damage in their lung, skin, and eye based on the reliable sources.[12,13,25] All available physicians were experienced in the treatment chemical warfare victims. In the sixth step, test–retest method was used to determine the reliability of the questionnaire and in fact the stability of tool. Thus, 10 homogeneous professionals with the ones who performed content validity were asked to review the questionnaire and after 10 days, the questionnaire was returned to them to review. The reliability of the questionnaire with Cronbach's alpha coefficient to determine internal consistency was confirmed as 84%. Chi-square test at a significance level of 5% was used to examine the significance of the data elements by experts in different disciplines, and no significant opinion difference was observed between experts.

In the seventh step, the questionnaire were submitted for faculty members with master degree in health information technology, medical record, and Ph.D. degree in health information management available in health information technology and management departments of the universities of medical sciences in Iran based on Delphi method by email or in person in Tehran to determine and approve the required minimum dataset of user profile or electronic health record of the recommender system for chemical warfare victims. The reason for selecting the faculty members was their skills in selecting the medical records data elements. In addition, the health authorities and physicians who had the most contact with chemical warfare victims were introduced by Chemical Warfare Victims Affairs Center of Foundation of Martyrs and Veterans Affairs in Tehran were polled in person.

It was decided that if 75% or more of the respondents (mean of 3.75 to 5) chose very high and high options for the importance of any data element in the electronic health record, this data element would be considered. If 50–75% of respondents (mean of 2.5–3.75) chose very high and high options, the proposed data element to be considered as the Delphi second step for the survey. If less of 50% of respondents (mean below 2.5 of 5), chose very high and high options for the data element, removing that data element. In the eighth step, analysis of the data resulting from the Delphi technique with descriptive statistics methods in SPSS version 25 was performed. In the ninth step, the information was presented in tables.

Results

Of 70 faculty members, only 52 filled questionnaires were returned. Of the total number of 13 health authorities and 19 physicians, 13 and 18 completed questionnaires were received, respectively, whose demographic characteristics are shown in Table 1.

None of the data elements in the nonclinical class and clinical class were not entered the second round of Delphi polls and were not removed. The mean of the research population's views on the nonclinical and clinical data elements are shown in Tables 2 and 3, respectively.

According to Table 2, among 47 nonclinical data elements, the highest mean was for the cell phone number (5) and the lowest mean for ethnicity (3.79), religion (3.79), and sect (3.79). According to Table 3, 181 clinical data elements were classified into 16 subclasses. Among clinical data elements in health status records, the highest mean is related to drug history (4.9) and the lowest mean belongs to address (3.8) and phone number of healthcare centers (3.8). Among the total body examinations data elements, the highest mean is related to the chief complaint (4.8), current disease history (4.8) and the lowest mean belongs to endocrine (4.2) and urinary tract system (4.2).

Table 1: Participants' characteristics in Delphi technique				
Participants	**No**	**Gender**	**Frequency for each age group**	**Average work experience(year)**
Faculty member	52	Female: 36 Male: 16	20-30: 7 30-40: 21 40-50: 16 50-60: 8 60-70: 0	14
Health authority	13	Female: 4 Male: 9	20-30: 0 30-40: 3 40-50: 5 50-60: 5 60-70: 0	18
Physician	18	Female: 2 Male: 16	20-30: 0 30-40: 0 40-50: 6 50-60: 9 60-70: 3	23

Main class	No	Data element	Average	Main class	No	Data element	Average
		Table 2: Nonclinical data elements of profile user or electronic health record in chemical warfare victims' recommender system					
	1	National code	4.7		25	Cell phone number	5
	2	First name	4.9		26	Postal code of residence	4
	3	Last name	4.8		27	Type of insurance	4.4
	4	Father's name	4.5		28	Insurance number	4.1
	5	ID No	3.8		29	Total health spending	4.1
	6	Date of birth	4.7		30	Existence of consent	4.2
	7	Place of birth	4.2		31	Job status	4.3
	8	Sex	4.6		32	Work experience	3.8
	9	Blood type	4.3		33	Workplace address	3.8
	10	Marital status	4.3		34	Workplace phone number	3.8
	11	Number of child	3.8		35	Victim's companion first name	3.8
	12	Level of education	3.8		36	Victim's companion last name	3.8
Nonclinical	13	Field of study	3.8	Nonclinical	37	Victim's companion cell phone number	3.8
	14	Ethnicity	3.79		38	Victim's companion residence address	3.8
	15	Religion	3.79		39	Victim's companion workplace Address	3.8
	16	Sect	3.79		40	Victim's companion workplace phone number	3.8
	17	Language	3.8		41	Military category	3.8
	18	Nationality	3.8		42	Captivity history	4.3
	19	Record No	4.3		43	Percentage of sacrifice	4.7
	20	Country of residence	4.2		44	Type of sacrifice	4.7
	21	Province of residence	4.2		45	Duration of sacrifice	4.4
	22	City of residence	4.2		46	Duration of presence in war	4.1
	23	Residence address	4.3		47	Sacrifice code	3.8
	24	Landline phone number of residence	4.5				

Among specialized dermatological examinations data elements, the highest mean is related to the chief complaint (4.8), treatment plan (4.8), dermatologist's final diagnosis (4.8), and the lowest mean belongs to the dermatologist's medical council number (4). Among the specialized ophthalmological examinations data elements, the highest mean is related to treatment plan (4.8), ophthalmologist's final diagnosis (4.8) and the lowest mean belongs to ophthalmologist's medical council number (4.1). Among the specialized pulmonary examinations data elements, the highest mean is related to chief complaint (4.9) and the lowest mean belongs to pulmonologist's medical council number (4.1).

Among the specialized cardiac examinations data elements, the highest mean is related to chief complaint (4.8), primary diagnosis (4.8), treatment plan (4.8), cardiologist's final diagnosis (4.8) and the lowest mean belongs to cardiologist's medical council number (4.1) and signature (4.1). Among the specialized psychiatric examinations data elements, the highest mean is related to chief complaint (4.8), treatment plan (4.8), psychiatrist's final diagnosis (4.8) and the lowest mean belongs to psychiatrist's medical council number (4.1) and signature (4.1). Among the specialized dental examinations data elements, the highest mean is related to the specialized dentist's final diagnosis (4.8) and the lowest mean belongs to the specialized dentist's signature (3.97). Among the specialized sports medical examinations data elements, the highest mean is related to chief complaint (4.7), primary diagnosis (4.7), treatment plan (4.7), sports medicine specialist's final diagnosis (4.7), and the lowest

mean belongs to sports medicine specialist's medical council number (3.96).

Among specialized rehabilitation examinations data elements, the highest mean is related to chief complaint (4.8), primary diagnosis (4.8), treatment plan (4.8), rehabilitation specialist's final diagnosis (4.8), and the lowest mean belongs to rehabilitation specialist's medical council number (4.1) and signature (4.1). Among the nutrition counseling data elements, the highest mean is related to the main nutritional complaint (4.4), weight (4.4), body mass index (4.4), nutritional sensitivity record (4.4), final nutritional diagnosis (4.4), nutritional advice (4.4), and the lowest mean belongs to nutrition counselor's full name (3.97) and signature (3.97).

Among the medications data elements, the highest mean is related to the medication name of prescribed (4.8), and the lowest mean belongs to medication form (4.5) and the time of medication use (4.5). Among the laboratory tests data elements, the highest mean is related to the test name (4.7) and the test result (4.7), and the lowest mean belongs to date of the test run (4.6). Among the surgeries data elements, the highest mean is related to postoperative diagnosis (4.9) while the lowest mean belongs to the surgeon assistant's medical council number (3.79), signature (3.79), and operating room nurse's nursing council number (3.79). Among the injuries data elements, the highest mean is related to the type of injury (4.8), the nature of the injury (4.8), the severity of the injury (4.8), and the lowest

Main class	Subclass	No	Data element	Average
			Table 3: Clinical data elements of profile user or electronic health record in chemical warfare victims' recommender system	
Clinical	Health status records	1	Type of chemical injury	4.8
		2	Time of chemical injury	4.3
		3	Place of chemical injury	4.3
		4	Contact time with chemical gases	4.7
		5	Frequency of contact with chemical gases	4.7
		6	Type of protective instrument against chemical attacks	4.5
		7	Time of use of chemical protective equipment when chemical attacks	4.5
		8	Hospitalization history of chemical injury	4.6
		9	Emergency referral history of chemical injury	4.4
		10	Healthcare center name	3.9
		11	Healthcare center address	3.8
		12	Healthcare center phone number	3.8
		13	Smoking history	4.8
		14	Opium history	4.8
		15	Drug history	4.9
		16	Drug allergy	4.6
		17	Taking medication use	4.6
		18	Examination history	4.4
		19	Past disease history	4.8
		20	Family disease history	4.6
		21	Surgical history	4.7
		22	Consult history	4.6
		23	Laboratory test history	4.7
		24	Other paraclinical record	4.7
		25	Admission record in healthcare centers	4.3
		26	Discharge record from health centers	4.3
		27	Use of assistive device	4.7
	Total body examinations	28	Chief complaint	4.8
		29	Current disease history	4.8
		30	Head and neck	4.4
		31	Eye	4.6

Table 3: Continued...

Main class	Subclass	No	Data element	Average
Clinical	Total body examinations	32	Ear	4.3
		33	Throat	4.5
		34	Nose	4.5
		35	Heart	4.5
		36	Respiratory system	4.6
		37	Lymph node	4.5
		38	Abdomen	4.4
		39	Musculoskeletal system	4.3
		40	Whole body skin	4.6
		41	Digestive system	4.3
		42	Genital system	4.4
		43	Nervous system	4.6
		44	Circulatory system	4.4
		45	Endocrine system	4.2
		46	Urinary tract system	4.2
		47	Main diagnosis code	4.5
		48	Other medical diagnosis code	4.3
	Specialized dermatological examinations	49	Chief complaint	4.8
		50	Primary diagnosis	4.7
		51	Treatment plan	4.8
		52	Referral status	4.6
		53	Dermatologist's full name	4.2
		54	Dermatologist's medical council number	4
		55	Dermatologist's signature	4.1
		56	Dermatologist's final diagnosis	4.8
	Specialized ophthalmological examinations	57	Chief complaint	4.7
		58	Primary diagnosis	4.7
		59	Treatment plan	4.8
		60	Referral status	4.6
		61	Ophthalmologist's full name	4.2
		62	Ophthalmologist's medical council number	4.1
		63	Ophthalmologist's signature	4.2
		64	Ophthalmologist's final diagnosis	4.8

Contd....

Main class	Subclass	No	Data element	Average
	Specialized pulmonary examinations	65	Chief complaint	4.9
		66	Primary diagnosis	4.8
		67	Treatment plan	4.8
		68	Referral status	4.7
		69	Pulmonologist's full name	4.4
		70	Pulmonologist's medical council number	4.1
		71	Pulmonologist's signature	4.2
		72	Pulmonologist's final diagnosis	4.7
	Specialized cardiac examinations	73	Chief complaint	4.8
		74	Primary diagnosis	4.8
		75	Treatment plan	4.8
		76	Referral status	4.6
		77	Cardiologist's full name	4.3
		78	Cardiologist's medical council number	4.1
		79	Cardiologist's signature	4.1
Clinical		80	Cardiologist's final diagnosis	4.8
	Specialized psychiatric examinations	81	Chief complaint	4.8
		82	Primary diagnosis	4.7
		83	Treatment plan	4.8
		84	Referral status	4.6
		85	Psychiatrist's full name	4.3
		86	Psychiatrist's medical council number	4.1
		87	Psychiatrist's signature	4.1
		88	Psychiatrist's final diagnosis	4.8
	Specialized dental examinations	89	Chief complaint	4.7
		90	Primary diagnosis	4.6
		91	Treatment plan	4.6
		92	Referral status	4.4
		93	Dentist's full name	4.1
		94	Dentist's medical council number	4
		95	Dentist's signature	3.97
		96	Dentist's final diagnosis	4.8

Main class	Subclass	No	Data element	Average
	Specialized sports medicine examinations	97	Chief complaint	4.7
		98	Primary diagnosis	4.7
		99	Treatment plan	4.7
		100	Referral status	4.5
		101	Sports medicine specialist's full name	4.2
		102	Sports medicine specialist's medical council number	3.96
		103	Sports medicine specialist's signature	4
		104	Sports medicine specialist's final diagnosis	4.7
	Specialized rehabilitation examinations	105	Chief complaint	4.8
		106	Primary diagnosis	4.8
		107	Treatment plan	4.8
		108	Referral status	4.6
		109	Rehabilitation specialist' full name	4.2
		110	Rehabilitation specialist's medical council number	4.1
Clinical		111	Rehabilitation specialist's signature	4.1
		112	Rehabilitation specialist's final diagnosis	4.8
	Nutrition counseling	113	Main nutritional complaint	4.4
		114	Primary diagnosis of nutritional status	4.3
		115	Nutritional disease history	4.3
		116	Height	4.3
		117	Weight	4.4
		118	Body mass index	4.4
		119	History of diet	4.2
		120	Nutritional sensitivity record	4.4
		121	History of nutritional supplements use	4.1
		122	Final nutritional diagnosis	4.4
		123	Nutritional advice	4.4
		124	Nutrition counselor's full name	3.97
		125	Nutrition counselor's signature	3.97

Contd....

Main class	Subclass	No	Data element	Average
			Table 3: Continued...	
	Medications	126	medication name of prescribed	4.8
		127	Medication form	4.5
		128	Start date of medication use	4.79
		129	Cause of medication use	4.79
		130	Dosage of medication use	4.7
		131	Frequency of Medication use	4.7
		132	Time to take Medication	4.5
		133	Time to discontinue Medication	4.7
		134	Side effect of Medication use	4.7
	Laboratory tests	135	Test name	4.7
		136	Date of test run	4.6
		137	Test result	4.7
	Surgeries	138	Preoperative diagnosis	4.8
		139	Name of the surgery	4.8
Clinical		140	Date of surgery	4.6
		141	Hour of surgery	3.97
		142	Duration of surgery	4.3
		143	Surgery report	4.7
		144	Postoperative diagnosis	4.9
		145	Other medical procedure	4.6
		146	Surgeon's full name	4.1
		147	Surgeon's medical council number	4
		148	Surgeon's signature	3.95
		149	Surgeon assistant's full name	3.84
		150	Surgeon assistant's medical council number	3.79
		151	Surgeon assistant's signature	3.79
		152	Anesthesiologist's full name	4
		153	Anesthesiologist's medical council number	3.9

Main class	Subclass	No	Data element	Average
			Table 3: Continued...	
	Surgeries	154	Anesthesiologist's signature	3.8
		155	Operating room nurse's full name	3.8
		156	Operating room nurse's nursing council number	3.79
		157	Operating room nurse' signature	3.84
		158	Main medical procedure code	4.5
		159	Other medical procedure code	4.4
	Injuries	160	Type of injury	4.8
		161	Date of injury	4.7
		162	Hour of injury	4.2
		163	Person's activity when incident	4.4
		164	Injured limb	4.7
		165	Nature of injury	4.8
		166	Severity of injury	4.8
Clinical		167	Cause of injury	4.7
		168	Primary diagnosis	4.7
		169	Description of incident	4.5
		170	Agent of participant in incident	4.3
		171	Person's protective equipment when incident	4.3
		172	Treatment plan for injury	4.6
		173	Medical advice	4.6
		174	Referral status	4.5
	Vaccinations	175	Name of vaccine	4.7
		176	Date of injection	4.5
		177	Hour of injection	3.8
		178	Reason of injection	4.2
		179	Site of injection	3.8
		180	Injector person's full name	3.79
		181	Injector person's signature	3.79

mean belongs to the hour of injury occurred (4.2). Among the vaccinations data elements, the highest mean is related to the vaccine name (4.7) and the lowest mean belongs to injector person's name (3.79) and signature (3.79).

Discussion

The late effects of chemical warfare on the militaries and civilians' bodies and souls were confirmed.[26] Electronic technologies have

emerged in the health domain, for example, recommender systems can be used to monitor the health status of people instantly. Recommender systems are in fact electronic systems containing filtering techniques along with other components like data source, recommendations database, and data analysis techniques that offer recommendations according to the users' needs.[27-29] Recommender systems also model users' preferences, needs, and behaviors to predict future users' preferences, needs, and behaviors in order to recommend useful and appropriate services to users based on it. Recommender systems can be divided into different types based on the techniques and approaches used, the most popular of which are content-based, collaborative, knowledge-based, and hybrid. In a content-based recommender system, when a particular user is working with the system, his or her activity history is stored in a part of the system called the user profile. Then, the system uses these records in its knowledge repositories to find items which are similar to items in the user profile and recommends them to a specific user. But, in the collaborative filtering recommender system, the system provides recommendations to a given user based on interests, needs, and behaviors of other users that are similar to those of the given user. The knowledge-based recommender system provides recommendations based on the perception they have of the needs, interests, and behaviors of the particular user and the characteristics of the specific user's items features. Knowledge-based systems use a variety of methods that are applicable to knowledge analysis such as genetic, fuzzy, neural network algorithms. Finally, hybrid recommender systems use a combination of various types of techniques mentioned above and offer recommendations.[30-33]

The authors could not find a study to determine the essential data for a user profile or electronic health record for chemical warfare victims' health recommender system. Therefore, the authors compared the data elements of health information systems intended for war victims or military affairs as well as the recommender systems designed and developed for the health field with the results of this study.

In the studies by Kraft MR, Hynes DM, and Bouhaddou O, *et al.*, VistA (veterans health information systems and technology architecture) was introduced that maintains records of the outpatient and inpatient services of US military personnel and war veterans. In this study, pointed to data elements such as demographic characteristics, test result, radiology report, admission, discharge, transfer, visit, and medication that were similar with the results of the present study.[34,35]

In the studies by Perlin JB, Kolodner RM, Roswell RH., and Rajeevan N, *et al.*, a portion of the American survivors' electronic health record of health management system, CPRS (Computerized patient record system), was introduced that enables health care providers to view and update war survivors' medical records. In the study pointed to data elements such as test, radiology, medication, and medical order that were similar with the results of the current study.[36,37] In a study, MiCARE (Military Care) was introduced as a portal to manage of the US military electronic personal health record. In this study referred to data elements such as test results, allergies, medications, radiology reports, appointments, medical practice, medical problems lists, counseling reports, hospitalizations, and outpatient reporting which were similar with the results of the present study.[38]

In another study, AHLTA (Armed Forces Health Longitudinal Technology Application) was introduced as an US military electronic health record for outpatient clinics. The study referred to data elements such as test results, radiology and medication reports, physician orders, client acceptance registrations that were similar with the results of the current study.[39] In a study, Graber *et al.* pointed to data elements such as date of birth, gender, and weight, which were similar with the results of the present study, but Graber *et al.*' recommender system was for the treatment of psoriasis.[40] Agapito *et al.* in a study referred to data elements such as age, sex, race, and weight that were similar with the results of the current study. But Agapito *et al.*' recommender system was to monitor nutrients for healthy people and patients with chronic diseases.[41]

Conclusion

In the present world of electronic technologies, the presence of a recommender system may be useful for continuous monitoring of chemical warfare victims' health status and timely reflection of their needs to health authorities to plan for supplying chemical warfare victims' demands in less time and cost. Hence, determination of essential data for user profile or electronic health record of the recommender system is a starting point to achieve this importance. The basis of an efficient and effective health recommender system is the existence of appropriate and accurate essential data that can be used to design user profile.

Conflicts of interest

There are no conflicts of interest.

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