



Developing a national database for Iranian injury and safety literature: SafeLir

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General Note

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ABSTRACT

Introduction: Doing a comprehensive search in scientific databases is one of the primary inevitable steps for every scientific work. This study presents steps for developing a national database for Iranian injury and safety literature. **Materials and Methods:** A search strategy was built using injury-related keywords using Emtree database. Online databases were searched for retrieving injury related information in Persian and English languages. Potential documents were retrieved and imported to a temporary Microsoft Access database. After reviewing, the relevant documents were selected and imported to SafeLir database [SLD] by two trained reviewers. The SLD was designed with multilayer structure using several programming languages, and currently it is being run in beta version. **Results:** The performance assessment of the SLD along with PubMed, SafetyLit, SID and Scopus databases showed that it is well-suited for its goals. **Conclusion:** The SLD includes all features expected by researchers and it can be used both in injury research and community safety promotion.

Keywords: Injury literature; Safety; SafeLir database; Information retrieval; Injury prevention

1. INTRODUCTION

The database is a collection of information classified for the purpose of a simple and fast data search and retrieval (The American Heritage Dictionary 2012). Nowadays, medical databases are main sources of information and evidence gathering about health (Goldacre, Kurina et al. 2000; Simon, Unützer et al. 2000). Doing a comprehensive search in a scientific database is the primary inevitable step for every research work. It includes searching in published literature, either in past or present and related to research subject (Lawrence and Laflamme 2009). There are thousands of journals indexed in PubMed and Journal Citation Reports while its volume is rapidly increasing. Therefore, to search about related topics with high accuracy inside such a great amount of materials is a vitally important issue (Larsen and Von Ins 2010; Pautasso 2012). Several studies on academic staff and students showed that scholars often don't acquire enough online search knowledge or skill and most of the times they try to use general search engines (Thompson, Lewis et al. 2009; Lanning and Mallek 2017). Studies on Iranian scholars revealed their inadequate skills in the field of content search provided them with many problems (Kahouei, Firozeh et al. 2011; Hashemian, Janatikia et al. 2013; Didarloo and Khalkhali 2014; Farokhzadian, Khajouei et al. 2015).

Handling and preventing injuries has imposed high burden upon Low and Middle Income Countries (LMIC). Seemingly, one main determinant of the absence of any effective strategy to control and prevent mortalities and injuries in this countries is the deficiency in gathering useful, trusted, on-time and relevant information (Kipsaina, Ozanne-Smith et al. 2015). Furthermore, of main barriers to the activities of controlling and preventing road traffic injuries in LMIC is insufficient and inaccurate information to identify local risk factors (Rahman, Andersson et al. 2000). Iranian practitioners usually use databases for their research (Eslami and Keshavarz 2007) and they have low level of proficiency in searching. Establishing a national database with an acceptable level of coverage seems to be inevitable. On the other side, accessibility to the collected information on injuries is a national pivotal demand.

2. MATERIALS AND METHODS

The expected specifications

Coverage

SafeLir is a national database and should cover all Safety and Injuries [SI] documents about Iran, and it is available at www.SafeLir.com. This can be considered as appropriate geographical coverage. The SafeLir database [SLD] expected to be trusted and credible source in the field of SI; therefore, it must have ideal document coverage and fulfill users' expectations at its maximum levels. So, SLD must have an appropriate coverage of record types, subject coverage and subject-specific coverage (Sabovich 2002; Özsu and Valduriez 2011).

Databases use different sources with different formats. So, it is expected that SLD must have an ideal coverage in terms of the number and diversity of credible sources including books, statistical reports, congress abstracts, and others (records type). SI is a multidisciplinary field which covers different subject matters (Lawrence, Guard et al. 2006). SLD is expected to cover these categories. Furthermore, safety category is a comprehensive term and covers different concepts and applications but here; the database must include safety only and cover its concept in terms of injuries (subject coverage). It is about covering specific content under specific subject matter. For instance, not only SLD should cover documents about violence, but also it is expected to appropriately cover

those documents under the umbrella term of violence itself (subject-specific coverage). Published documents included in SLD must be classified according to whether they are scholarly, popular trade or a combination of both or more. This characteristic can be considered as coverage of publication types. In terms of subject coverage it is expected to clearly determine which disciplines does SLD cover? So it's necessary to define the coverage of disciplines.

Content

It is expected that SLD's content will include SI-related subjects and minimum irrelevant content. Only in this case we can call its content as appropriate. Ideal level of sensitivity of search in a database is a symbol for its content appropriateness (Kapp, Schütz et al. 2005). This characteristic can be considered as content relevancy.

The most of SLD sources concentrated on SI content; therefore it is expected to have an appropriate linkage between scholars and sources as well as other scholars (desired linkage of scholars and sources). Along with appropriate coverage of content, being up-to-date is a vital feature for every database. The SLD designers should consider the issue. These updates must be regularly notified to the users.

Technical issues

Getting an appropriate level of export from SLD is according to document's availability. This can include some or all categories like document types, title, authors' info, abstracts, Digital Object Identifier (DOI), publisher's info, publish time, and other relevant items. Exported file formats must be suited with research and citing software. These formats can include XLSX, RIS, and TXT. Exporting files by these formats can be a valuable feature for SLD as they have common and highlighted applications.

- *Feasibility and user friendliness*

The SLD users include a range of unsophisticated users in terms of search issues to professional researchers. This fact forces SLD to be more feasible and accessible. User friendliness is another important aspect of a database. It deserves special attention when designing SLD. The most expected items in terms of user friendliness were 1. The database should be easy to use and long process for simple tasks should be avoided 2. The user must be able to memorize in a simple way how to use the database and settings must be as much public as it is possible 3. An ordinary user must be instructed about how to use the database with a very little time to survey in database and to read the manual 4. Links should be placed on just position and with an appropriate font, size and etc., and 5. It should be able to fulfill users' demands in a desired and acceptable way.

- *Appropriate translation*

The database is bilingual with Persian and English languages and for integration of documents it is necessary to implement trusted and standard level of translation from the first language to the target.

Ethical issues

Ethical and publication issues are vitally important for databases. It is expected that these issues be followed and respected in SLD in its whole terms and all unethical content must be removed.

Introducing SafeLir database

SLD is available at <http://www.SafeLir.com>. The system is divided into two parts:

A: Authors database

B: Documents & publications database

Author's database: It is designed to have comprehensive information about active authors in the field of safety in Iran. The aims are to identify Iranian authors (especially the prestigious), to facilitate scientific connections and finally to benefit from these authors to promote the quality and coverage of sources of safety and injuries national database.

Documents & publications database: The abbreviated name of this section is SafeLir. The name was taken from Safety Literatures of Iran. It emphasizes safety and preventive aspects in the field of injuries. Different items including scientific papers of journals and congresses, books and thesis are at hand. They are classified based on specialties and compromise main fields of safety (traffic, burns, accidents and disasters, etc). This issue facilitates document search, saves time, facilitates search process, increase speed of literature review, helps professional and specialized authors and provides necessary information for probable policymaking. Overall, SLD thematically covers following fields: Amputation, Burn, Drowning, Fall, Suicide, Forensic medicine, Fracture, Occupational,

Pedestrian, Poisoning, Self-harm, PTSD, Disaster, Injury, Violence, Wound, Traffic, Trauma, Safety, Self-injury, Bite-sting and other unclassified subjects.

Link between databases of authors and sources: inside SLD these two databases are linked. Authors from different fields can observe their documents in their SLD profile and can be assured about documents verification or can change the documents and provide SLD with feedbacks. Obviously this link promotes coverage, validity, level of integration of documents and database performance.

SafeLir official language

Iranian scientific documents and texts are often published in Persian or English, therefore, while developing SLD, attention was been paid on the role of language in accessing or using documents. The design of this database is such that it supports both English and Persian, and users can use the database through each of these languages. It also has the capability to add other languages in the future.

Using SafeLir database

The SLD has provided a proportionate service to user demands. Software design was in a way that all researchers regardless of their search skill can easily search and retrieve information from SLD. Using basic search feature, every person can access to the documents by entering relevant keywords or selecting relevant search fields (Fig. 1).

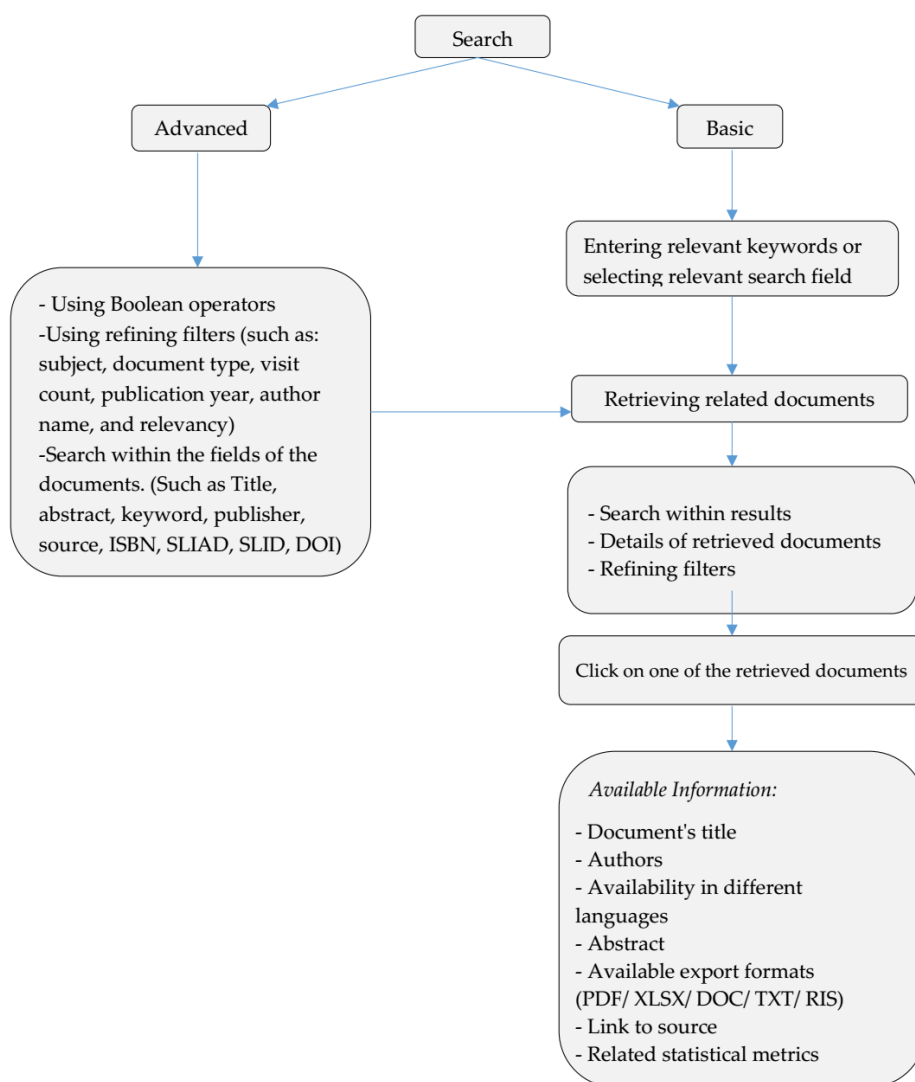


Figure 1 Basic and advanced search using SafeLir database

The SLD has provided three levels of user services: ordinary users (unregistered), members and privileged. Each group of users has a defined level of access to the database. The SLD adheres to all rights of publication and ethics and abandons content that contradicts standards of publication ethics.

The system

A multilayer structure was used in designing the SLD. All users can connect to the database by common browsers such as Internet Explorer, Firefox, Google Chrome, and Safari and enter the keyword(s) in basic or advanced search boxes. These keywords get translated to SQL (structured query language) statements and are sent to the target layer of the database. After processing data request and extraction, the results are sent to the user in the form of HTML pages. The SLD has adopted several programming languages including HTML for web page design, Java Script for data presentation, C# for data processing and SQL for data exchange.

Another feature of SLD is data security. Different access levels for different users are designed. Public users have minimum access to the system. They can only search keywords and retrieve search results. A user who wants to be a member should fill the forms of membership at first. Membership process is done automatically, and confirmation message is sent to the user's e-mail. They will still have minimum access until their membership is confirmed and accepted by the system administrator. Either after identification is confirmed, or the user sends the request of promotion to higher levels of accessibility, he/she will be able to enjoy from other features designed in the system. The third level of accessibility is for system admin which is the highest. Accepting or rejecting a membership, delegating authority to users, promoting a user from a member user to the confirmed author are the defined options handled by system administrator (Fig. 2).

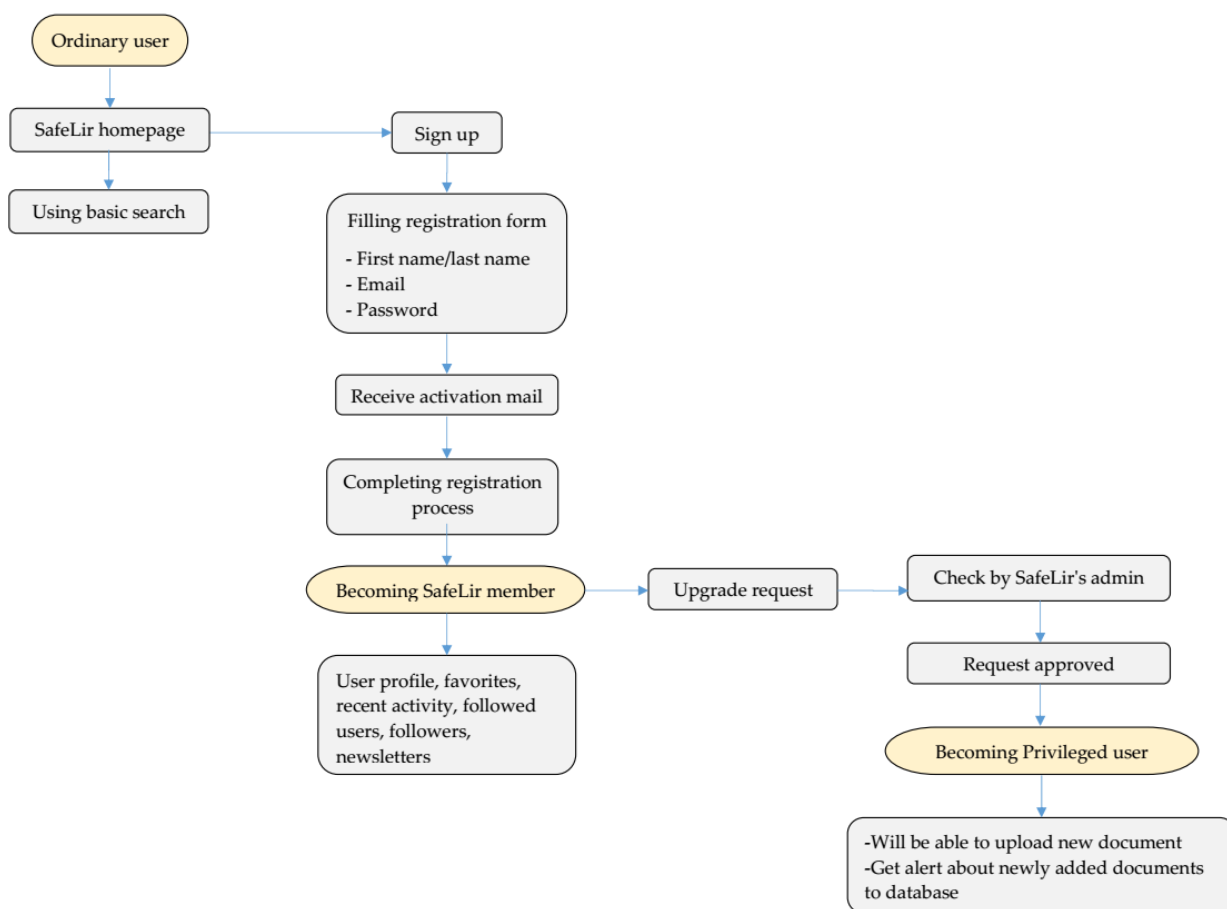


Figure 2 Defined level of access to the SafeLir's users

The last security layer is data encoding. All data are encrypted which adds another layer of security and prevents unauthorized access to the data. At the present SLD is being run in its beta version.

The document identification, selection and retrieve

Source of Information

Online databases in both Persian and English languages are selected by consulting with an expert panel. Persian databases that were used for information gathering are Iranmedex, Magiran, SID, and English databases were Scopus, Science Direct, PubMed, and web of Sciences. We actually retrieved all published documents about safety and injuries in Iran from the mentioned databases.

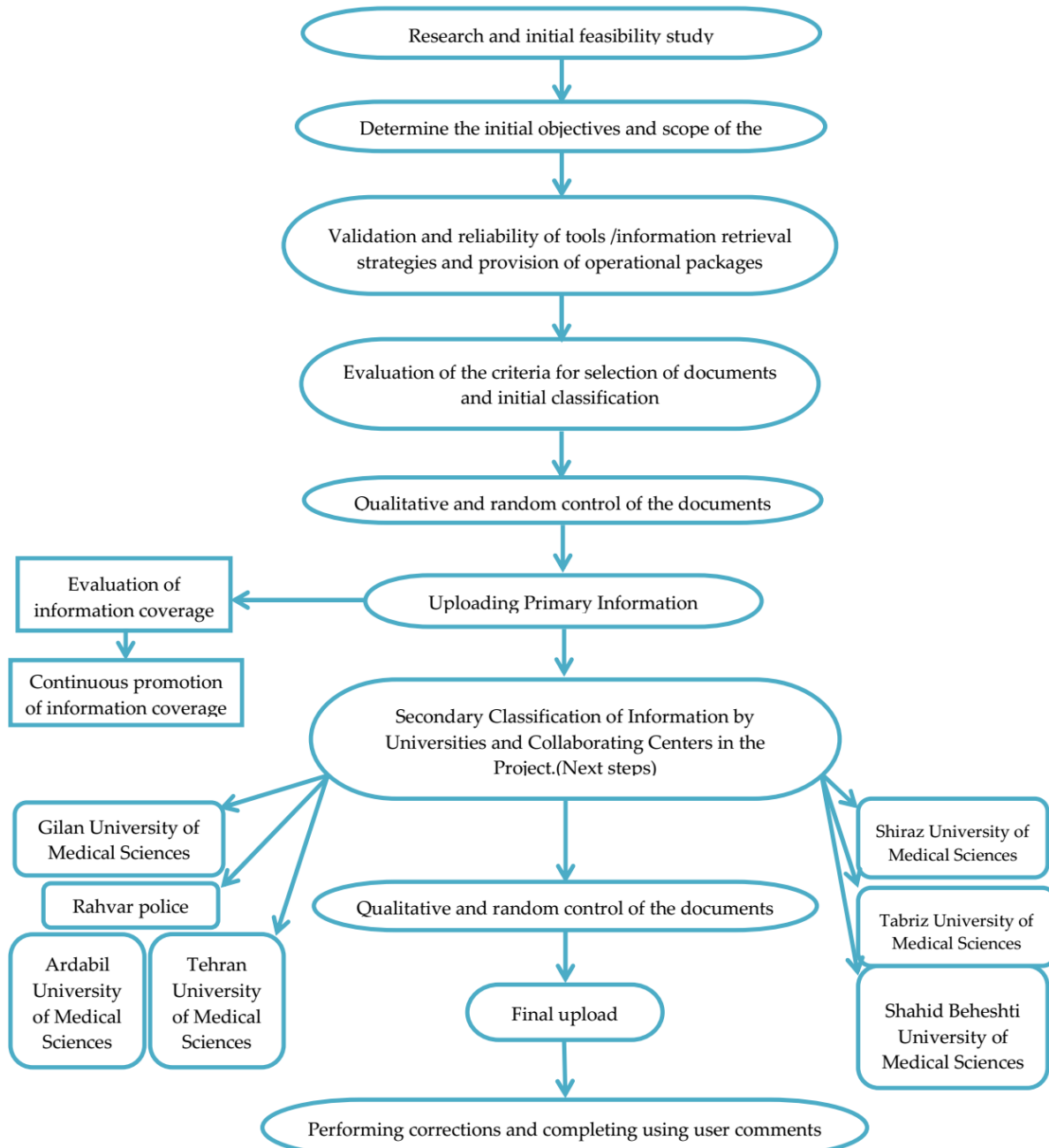


Figure 3 The process of document retrieval and content provision

Search Strategy

To initiate information search, first all subjects related to safety and injuries were extracted. The names of these subjects were used as keywords to build a search strategy. Instances of these subjects are: job accidents, falling, burns, suicide, disasters, and traffic and roads safety. To establish a search strategy for each field, the relevant keywords were matched in Emtree and search was carried out upon Emtree keywords. Then, by using OR, AND, NOT logical operators the search strategy was built. Due to the fact that search

query was different for each database, we fit the search strategy with each database, and they were saved exclusively and separately for each database. To increase accuracy and decrease probable mistakes, we sent strategies to the experts and received feedback.

Selection and primary classification

All potential documents were saved in CSV format. Then, they were imported a temporary access database (Microsoft Access Database, Version 2013). All duplicate documents were excluded. Retrieved documents were reviewed by two trained reviewers so that the documents are screened in terms of their relevance to safety and injuries. After screening, the relevant documents were extracted and irrelevant ones were excluded. The process of document retrieval and content provision was showed in Fig.3.

Grey literature

Some sources, such as theses, articles, and government reports that were exclusively available to their print edition, were manually added to the SLD.

Translated Documents

Those resources that were exclusively in Persian or English languages were translated into both languages and were published after confirmation of translation by the owners.

Authors Database Link

The privileged users in SLD can themselves edit, add, or remove documents through their profiles. This feature gives them the opportunity to add their documents that are not available in SLD. By doing this, the information coverage and quality of document retrieval from the database will increase.

Coverage of SI related documents

An efficient search strategy was designed and utilized during collection of the Iranian injury and safety literature. Then, the retrieved documents from searches were analyzed by experts and for each of the SLD topics, the documents coverage has been checked out. In checking the overall coverage of the SLD, we investigated to find out how many of the SI-related documents of the authors could be retrieved in the SLD. Three authors were chosen from all the authors in each field. These authors had the highest, average and 1-5 documents in their field of study, respectively. The names of these three authors were searched in online databases and their SI-related documents were retrieved. Also, these retrieved documents were re-searched in SLD. A coverage ratio was defined and calculated with its numerator being the documents identified by SLD and the total SI-related documents considered as the denominator. The average coverage ratio pertaining to the three selected authors of each field was considered as the document coverage ratio for that field. Since the SLD authors themselves can edit, add, or remove documents through their profiles, the number of lost documents will be very low, giving rise to higher coverage ratios.

3. RESULTS

Evaluation of the Safelir database

To evaluating and comparing the performance of the SLD in document retrieval, keywords related to the SI were used and SLD along with PubMed, SafetyLit, SID and Scopus databases were searched. Five keywords related to SI were used, including "Poisoning", "Disaster", "Burn", "Violence", and "Traffic". These keywords were chosen because they were related to SI core topics. Due to the fact that at the time of doing this, the SLD documents were about Iran and included a certain time period, so the search in the databases was filtered to documents including an Iranian affiliation and the year of the publication of documents (years 2008 to 2016). Only documents in Persian and English were retrieved. As shown in Table 1, the results of this search indicate a better performance of the SLD in the document covering and retrieval.

It should be noted that many English-language documents in the SLD are being translated into Persian. Therefore, we have exclusively mentioned number of the documents which both the title and the main text were in Persian.

Other issues

Database of authors and its linkage to the resources makes public and private organizations, universities and other relevant entities the main stakeholders of SLD. By searching a specific author they can easily gain knowledge about his/her profile and other info in

SLD. Identification of SI authors in SLD gives a chance to promote national scientific level in international scientific community and present national scientific products in global level.

Table 1 Evaluating and comparing of the SafeLir database performance in SI-related document retrieval

	Traffic		Violence		Burn		Disaster		Poisoning	
	English	Persian	English	Persian	English	Persian	English	Persian	English	Persian
PubMed	507	0	77	0	348	0	77	0	224	0
SafeLir	1102	73 ^a	249	350	513	49	407	87	425	41
SafetyLit	304	0	147	0	82	0	78	0	95	0
Scopus	477	40 ^b	169	21	619	43	218	19	457	72
SID	0	143	0	217	0	191	0	27	0	18

^a Both of the title and main text of SafeLir documents were in Persian.

^b The title and main text of Scopus documents were in English and Persian respectively.

Injuries and accidents are the main challenges of national health system as they are one of the main causes of mortalities. In this regard, stakeholders can include all authors in the fields of: accidents, other SI sub-disciplines, experts, administrative officials, health policy makers and other individuals. As mentioned, SLD documents are in Persian and English. The SLD is designed in a way that it provides the opportunity to show the content simultaneously in two or more languages. At the present, Persian documents are being translated into English and vice versa. By developing in SLD technical issues we will be able to change from manual translation into web translation. The SLD, presently, covers only published documents about Iran. They are separately available for each city. In the future, documents about other countries can be added to SLD. Another feature of the SLD is to send a copy of the new documents (which has been added to the database recently) to the registered users and authors.

Next expansion

National Center for Health Information & Traffic Safety (NCHITS) is a general and national project and comprises several ingredients that are being completed. NCHITS includes primary and secondary data and information. Primary data are provided from three sources: registries, client voice management system, and law enforcement and violence data. Traffic registry project is granted by World Health Organization (WHO) with recorded code of 2017/742294-0. As a part of NCHITS, SLD tries to improve NCHITS functions as an integrated system that provides SI related secondary data in a more structured and comprehensive way.

Materials

In addition to the presently covered sources by SLD, in the future, other educational materials including videos, pictures, and other resources will be added to SLD and can be retrieved accordingly.

Language variety

As mentioned earlier, the capacity has been built into SLD for future inclusion of other languages such as Turkish, Swedish, and Arabic.

Interventions and studies

Results of all investigations and interventions relevant to SI fields can be received and added to SLD sources as a new part.

Specific classification

At the present, SI sources are classified only for major subjects but the system has capability for adding further classifications and sub-classifications.

4. DISCUSSION

The SafetyLit, Scopus, PubMed and SID Databases are among the well-known databases on medical publications. In the SLD Coverage Check out, to assessing the specificity of the search and retrieval of the SI-related documents, all of the SafetyLit, Scopus, and SLD, PubMed, and SID databases were searched with same keywords. The results of search showed that SLD performance in

retrieving SI-related document is higher than other databases. The number and relevancy of the documents retrieved by SLD were better than others.

Most of Iran's published national documents were in Persian and excluding this rich source of information could severely affect the applicability and beneficence of SLD. Regarding the coverage of documents related to SI in Persian, it was found that, unlike SafeLir, the performance of the other databases in the coverage and retrieval of these documents are weak. The Scopus, PubMed, and SID databases were not expected to perform very well in retrieving SI-related documents due to the bulk of their content and the results showed the same. The SafetyLit database, known as one of the sources of SI documents, also did not perform even lower close to the SLD in document retrieval and coverage. The probable cause of poor performance of the SafetyLit database can be attributed to the fact that it has multiple and extensive document classifications and documents from a wide range of countries worldwide. On the other hand, considering that the classification of the SLD is very specialized and its documents are exclusively for the country of Iran.

Because of the SLD specific classification for SI topics, the process of searching and retrieving documents was more convenient and accurate. In other databases, some issues related to the non-classification of a specific topic for SI were observed. For example, when searching for "Burn", search results were infected with words from other unrelated topics such as "burn out". Medical databases often had a vital role in the field of health care. Making progresses in medical sciences strongly requires development of relevant, comprehensive and trusted databases (Martin 2008). An important feature of online databases is user friendliness which provides users with options to easily choose their preferences (Gheorghiu, Labrinidis et al. 2014). In a study showed that most of the university students were unfamiliar with reputed databases and their skills should be improved (Chu and Law 2007). This is also true about Iranian students (Farokhzadian, Khajouei et al. 2015). Indeed, an easy-to-use online database like SLD can not only promote their search skills but also improve the efficiency of their search (Ahmed, McKnight et al. 2005). Online databases are mostly adjusted to accessibility protocols and have defined functions. If they consider user's preferences, it might lower down their user friendliness aspects (Stewart, Narendra et al. 2005). Thus, it is necessary to have in mind users' skills when designing online databases. The SLD has a wide range of users include from ordinary users to SI experts, according to their online skills. Therefore, it has been tried to consider different accessibility and function norms and for other types of users it is also provided the defined levels of accessibility. Compared to MeSH (Medical Subject Headings), Emtree database is more comprehensive and it includes all keywords available in the MeSH database. Also using Emtree keywords, we can have stronger search strategy that has high level of sensitivity and specificity in retrieving information (Wilczynski and Haynes 2007). It is recommended that more efforts should be focused on the quality of the retrieval results, especially how much the retrieved results are corresponding to what the user wants (Djeraba, Bouet et al. 2000). At the level of collecting SI documents from online databases, it is tries to equalize keywords with that of Emtree and search done based on Emtree keywords. So the quality of retrieval is a positive feature of the SLD.

It is recommended that results retrieval should not be limited only to English language (Abdulla and Krishnamurthy 2016). SLD includes both English and Persian languages and users can work with the database either in one of the languages. It makes the SLD more broad and comprehensive and brings users' satisfaction as Iranian scientific documents are either in English or Persian. Another study showed that documents about more than one subject should be classified in more than one subject category so that different researchers of that subjects would be able to retrieve the document in their searches (Amba and Naresh 1994). Covering information of at least 30 specialties (Lawrence, Guard et al. 2006) and including 600 research journals about safety and injuries (Lawrence and Laflamme 2009) has turned SI to be a multidisciplinary filed that should be appropriately classified. As it was mentioned earlier in Coverage section, SLD has provided an appropriate classification of SI categories that each has its own separate classification in near future. This classification can make it easier for the searcher to access documents. For example, if we want to find the documents related to motorcycle crashes in Iran for a specified year, this classification will make our search simpler and more precise. Also, if we want to provide a report on the current situation or the process of conducting studies and publishing documents in a given field, the topic classification can be very useful. So users who do not even have enough familiarity with the basics of searching for information can also get their own documents with a few clicks and choices.

A comparative overview of some features of the SafeLir database has been done with Scopus, PubMed, SafetyLit and SID Databases, which is shown in Table 2.

It is vitally important for databases to have good quality. Some studies suggested that a national organization like that of Center for Information Quality Management (CIQM) must be established to watch over the quality of databases (Medawar 1995). Easy usage, language, the quality of retrieved information, and appropriate classification are among those important issues that were took into the consideration when designing SLD. Walters & Wilder, by accessing databases coverage, found that multidisciplinary

databases have more comprehensive coverage than a single-discipline case (Walters and Wilder 2003). It is hoped that SLD would assist researchers by its appropriate level of coverage and its other features.

Table 2 A comparative overview for some features of the SafeLir database with other databases

	SafetyLit	PubMed	SafeLir	SID	Scopus
Advance search for document type	Yes	Yes	Yes	No	Yes
Number of specialized Iranian journals covered ^a	17 (In English)	92 (In English)	827 ^b (Both)	197 (In Persian)	34 (In English)
Advance search for injury/safety specified topic type	No	No	Yes	No	No
Grey literature	Fair	Some	Most	Some	Some
Secondary classification of topics	No	No	Plan for the next expansions	No	No
Export to reference managing software	Yes	Yes	Yes	No	Yes
Link to source	Yes	Yes	Yes	No	
Original document in Persian	No	No	Yes	Yes	No
Ability to search in Persian / English languages	English	English	Both	Both	English
Free access	Yes	Yes	Yes	Yes	No
Non-medical documents	Yes	Yes	No	Yes	Yes
Content translation	No	No	Currently only for road traffic documents	No	No
Checking for inclusion eligibility (checking by authors/database staff)	By database staff	By database staff	Both	By database staff	By database staff

^aIncludes exclusively medical journals.

^b664 of the journals were in English and 163 in Persian.

Limitations

As any other database and search engine the currently running Beta version of SLD cannot fulfill all optimistic requirements in this field and may suffer some limitations the need to be taken into account in future versions. Few of potential future extensions not available at current edition include extension of material types such as educational materials videos, pictures, and safety related data collection tools and scales. The coverage ratio, although quite satisfying in current version, may even be improved after the time SLD reached its expected popularity for use in future.

5. CONCLUSION

The SLD has all basic and intermediate features that are expected from a national bibliographic database and it can be used both in injury research and community safety promotion. Nevertheless, SLD is a newly established database and more studies are being suggested for its improvement.

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Author Contributions

All authors were contributed in methodology, software development, writing – original draft and writing – review & editing.

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Conflicts of Interest

The authors declare no conflict of interest.

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