Medical Library and Information Sciences Educational Barriers: A Qualitative Study

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This study aims to identify the most important barriers in medical library and information sciences (medical LIS) education in Iran and to present suitable solutions to remove these barriers. In this qualitative study, data were gathered from semi-structured interviews with 18 medical LIS PhD students and then analyzed using a qualitative content analysis approach. Educational barriers in medical LIS divided into four categories: curriculum barriers, department and faculty member barriers, official education and professional needs barriers, and student and graduate barriers. Medical LIS education requires major changes, including changes in the current curriculum, quality evaluation of educational groups and faculty members, matching curriculum with current stakeholder needs, as well as addressing motivational and employment barriers for graduates.

Keywords: education and training, information science, librarianship, medical libraries, medical science

Background

Today, new roles such as clinical librarians and clinical informationists have been introduced in medical librarianship (Harrison, Creaser, & Greenwood, 2013; McMullen & Yeh, 2013; Murphy, 2011; Myers & Rodriguez, 2016). One of the factors contributing to these new roles for medical librarians and therefore their new educational needs is the spread of evidence-based medicine (EBM) (Booth & Brice, 2003; Philbrick, 2012). In this regard, attempts have been made to align education with new developments in, and the needs of, the labor market. One of the most important changes is the developing of medical librarian competencies by the Medical Library Association (MLA, 2017). Other studies have attempted to identify the competencies required for medical librarians in order to prepare students and graduates of this field for their new roles in the labor market (Ma, Stahl, & Knotts, 2018; Philbrick, 2012).

However, the higher education system has been slow to react to the need for these changes (Brittain & Norris, 2000), which has created a gap between official education and

KEY POINTS:

- The most important barriers in the medical library and information sciences education was the insufficient curriculum.
- Medical librarianship curricula should prepare librarians to play new roles.
- Identifying the necessary competencies for medical librarians can lead to the introduction of curriculum based on merit and the needs of stakeholders, thus removing a large challenge in this field.

professional needs in Medical LIS (Myers & Rodriguez, 2016). On the other hand, in many countries, there are no specific courses for medical librarians (Mumenthaler, 2016), and current librarianship and information curricula do not train eligible students to work in the health-care field. Although medical librarians need special training and skills to perform effectively, given the emerging roles in medical librarianship, the results of the study by Detlefsen (2012) showed that in North America, none of the courses offered in the library and information sciences specifically cover medical librarianship. In developing countries such as India, there is also the challenge of training medical librarians and a lack of specialized medical library training courses (Joshi, Ali Anwar, Ullah, & Kuruppu, 2014). There are not enough specialized educational opportunities for medical librarians in Pakistan either (Ullah, Ameen, & Bakhtar, 2011). And library schools in Kenya have not paid enough attention to the competencies and skills required of health librarians (Kasalu & Ojiambo, 2015).

Harrison et al. (2013), in their study of librarianship and medical libraries in Ireland, emphasized the new roles of medical librarians and their ever-changing educational needs. Lawton and Burns (2015) mentioned that the workplace of librarians is under constant change, which provides them with new opportunities and roles. They also suggested a major revision in the librarianship curriculum of the United Kingdom and Ireland in order to provide a competency-based curriculum. Emphasizing the rapidly changing needs of the health sector, Petrinic and Urquhart (2007) acknowledge that librarianship schools need to update their curricula.

Although the challenges of medical LIS may vary by context and location, a review of research shows that the discussion of medical librarians' education is of international concern. The most important of these concerns are the lack of sufficient training courses to prepare qualified medical librarians for new roles (Maden-Jenkins, 2011; Myers & Rodriguez, 2016) and concerns about the training of current librarians (Hanke & Benzer, 1979; Mumenthaler, 2016). Due to educational problems, librarians cannot acquire the necessary competencies to play new roles. Other studies also mention medical librarians' lack of necessary knowledge and skills as a challenge for them (Boykan & Jacobson, 2017; Cleveland, Holmes, & Philbrick, 2012; Crum & Cooper, 2013; Gómez-Sánchez et al., 2019; Hashemian, Zare-Farashbandi, Rahimi, Adibi, & Yamani, 2018; Myers & Rodriguez, 2016; Polger, 2010). Accordingly, if medical librarians want to survive, they must adapt to new changes and address existing challenges, and this requires necessary and effective training.

Context

Given that this study was conducted in Iran, considered one of the developing countries, here are some explanations for this context in order to better understand the results. Medical LIS was first introduced to Iranian medical science universities in 1977 at the master's level, with the bachelor's level starting in 1986 and Ph.D. courses beginning in 2015. Currently, in Iran, five universities offer medical LIS courses at the bachelor's level, nine universities at the master's level, and four universities at the Ph.D. level, which is the highest degree available in medical LIS in Iran (Daei, Rahimi, & Zare-Farashbandi, 2017; Zarea-Gavgani, Shokraneh, & Shiramin, 2011). Candidates must take an entrance exam to enter each course.

The bachelor's degree is offered in eight semesters and includes 130 credits, such as fundamentals of anatomy and physiology, medical terminology, fundamentals of epidemiology, health information literacy, clinical librarianship, statistics, health information retrieval, research methods, principles of indexing, and knowledge organization. In addition, the undergraduate degree includes 816 hours of internship in medical libraries and information centers. The master's degree is offered in four semesters and includes 32 credits. Also, a dissertation is required to earn a master's degree. Some of the master's degree courses include fundamentals of information science, fundamentals of computer coding, information retrieval and searching, management of libraries and information centers, and research methods. The doctoral program involves nine semesters and 23 credits, as well as a thesis. Some PhD courses are medical information systems, management and educational planning, statistics, information-seeking behaviors and information needs, information retrieval systems, health information management, communication skills, information economics, and database management.

In addition, the professional board of medical LIS in Iran (consisting of representative faculty members from different departments) was founded in the Ministry of Health, Medicine and Medical Education in 2015 in order to supervise education in medical LIS. Due to the changing trends in medical librarianship and new roles for medical librarians, this board has currently offered revisions to the bachelor's-level curriculum in this field. The new curriculum includes new courses such as basics of anatomy and physiology, epidemiology, history of medicine, philosophy of medicine, health knowledge management, health and media, health information counseling, health information literacy, clinical librarianship, health information retrieval, and design and management of medical library websites, all of which appear to be in line with new developments in this field (Ministry of Health and Medical Education, Iran, 2018).

Continuing education for medical librarians is provided by institutions that employ medical librarians. Institutions hold workshops and educational webinars based on the needs of medical librarians. In addition, the Iranian Library and Information Association organizes continuing education programs by holding workshops to empower faculty members, graduates, students, and librarians (Iranian Library and Information Association, 2021). Although these training programs are not specific to medical librarians, medical librarians can also participate in these workshops. The Iranian Medical Library and Information Association, which was dissolved several years ago, has resumed its activities since

2021; however, the Iranian Medical Library and Information Association has not yet started its educational activities.

Objectives

Although many efforts have been made to keep up with the changes and paradigms of medical LIS at the national and international levels, there are still obstacles to medical LIS education, and it seems that despite recent efforts, there is still a gap between education and new paradigms. On the other hand, it seems that due to the lack of formal medical LIS courses in many countries, there is no research that specifically addresses the challenges of medical LIS. Therefore, the aim of the current study was to identify the barriers existing in medical LIS education in Iran and offer suitable solutions for removing these barriers in order to better coordinate with new trends and the needs of the labor market.

Methods

This qualitative study was conducted using content analysis to identify barriers in medical LIS education in Iran and to offer suitable solutions. Participants included 18 PhD students in medical LIS from various Iranian medical science universities who were selected using purposeful sampling and voluntarily consented to participate in this study. PhD students were selected due to their experience with bachelor's, master's, and doctoral levels of education in this field, which offered them better insight into possible barriers. In addition, many of these students were employed and looked at barriers from the perspective of employed librarians too. In order to emphasize the barriers in medical librarianship education, participants were selected from students who had completed bachelor's and master's degrees in medical librarianship.

Data were gathered using semi-structured interviews with general, leading questions such as "In your opinion, what are the barriers and problems for medical LIS education? What are your suggested solutions for these barriers?" An interview guide was sent to participants before each interview (see Appendix A). Then, in coordination with the participant, the time of the interview was determined. Interviews were conducted by telephone. Interview lengths varied between 15 and 30 minutes based on conditions and the desire of the participants. In qualitative studies, the researcher continues the interview until they determine that the participants no longer have anything new to say and that the data actually reach the saturation level (Boswell & Cannon, 2018; Fusch & Ness, 2015; Wildemuth, 2017). In this study, interviews continued until saturation point. Interviews were recorded with the permission of the participants. After each interview, the text of the recorded interview was imported to qualitative data analysis software MAXQDA10. The data were collected and analyzed simultaneously; each interview was coded and analyzed before the next interview.

Conventional qualitative content analysis was used to analyze the data (Dongre, Deshmukh, Kalaiselvan, & Upadhyaya, 2010). For this purpose, the data were analyzed in the eight main steps recommended by Zhang and Wildemuth (2009), as follows:

Step 1: Prepare the data: In this step of the analysis, first the data from the interviews, which were audio files, were written and prepared with the researcher's notes for

Table 1: An example of how to extract codes from concepts

Participant	Participants' statements	Interpretive meanings	Conceptual code
P4	*All different departments in different universities have the same, shared curriculum.... Lessons and their textbooks are determined beforehand and everyone has to follow them. The professor can't offer other topics based on students' needs*	Lack of flexibility	Curriculum barriers
P14	*Only theoretical courses are thought.... I did no practical work regarding systematic reviews.... No workshops existed.... How can I work in this field?*	Not fostering the necessary skills and competencies in students	

analysis. This was done using MAXQDA10 software and a number was assigned to each participant (P1, P2, etc.). Then parts of the text that had a specific message, along with the concepts inferred from it, were identified in the software.

Step 2: Define the unit of analysis: In this study, we repeatedly reviewed the texts of the interviews. At this point, the sentences had been read and re-read several times to determine which sentences or phrases or paragraphs brought the main meanings to the researcher's mind. These sentences were then separated using the MAXQDA10 software features. Thus, according to the unit of analysis, texts of interviews were summarized and codes extracted.

Step 3: Develop categories and a coding scheme: In this part of the study, the researcher extracted conceptual codes directly from the main data as well as based on his insights and knowledge of the subject under study (Zhang & Wildemuth, 2009) and inductively coded them. The researcher used the constant comparative method. Thus, after the codes, formed inductively, similar codes were merged and then codes that had a similar meaning were grouped together, forming sub-categories. The sub-categories were also compared, and the sub-categories that related to a concept grouped together and formed the categories (see Table 1). In addition, we developed a coding manual consisting of properties and criteria related to the meaning of each sub-category, category, and content (Krippendorff, 2012) (an example of these criteria is shown in Table 2).

Step 4: Test the coding scheme on a sample of text: The coding sample performed by the researcher was presented to other researchers. Then, during the meetings they held, there was agreement on the validity of coding. This process of coding was repeated several times to ensure that the coding was performed in an inductive manner.

Step 5: Code all the text: At this point, the text of the interviews was read again carefully and the final codes for each piece of text were recorded alongside it. Then all common conceptual codes were identified and concepts were categorized and

Table 2: An example of coding manual

Sub-category	Sub-category properties
Lack of flexibility	All of the codes referring to the participants' statements that the curriculum and courses do not match the students' needs fall under this category.
Lack of necessary equipment	All of the codes referring to participants' statements about the lack of educational facilities in the training departments fall under this sub-category.
Lack of interest	All of the code referring to the participants' statements about the unwillingness of continuing their education in Medical LIS fall under this sub-category.

recoded. The concepts were re-reviewed by the participants and some overlapping or uncommon codes were deleted.

Step 6: Assess coding consistency: At this stage, the peer researchers first reviewed part of the transcripts of the interviews and a limited number of all written interviews, together with extracted codes and categories, to confirm the conceptual process of coding or coding. Re-coding was then performed in cases where there was no agreement between the researchers. This was repeated in several steps until agreement was reached between the researchers and the coding reliability was increased. To increase coding credibility, we measured intercoder agreement using MAXQDA10. The agreement between coders was 92%.

Step 7: Draw conclusions from the coded data: In this step of the research, the researcher read the data several times. Based on the coding performed and the characteristics and dimensions of the subcategories, the main categories and themes were discovered. In this section, four main categories of qualitative data and their subcategories were identified (Table 2).

Step 8: Report methods and findings: In this step, the researcher attempted to illustrate in detail the steps of the research. To illustrate the methods performed to ensure the accuracy of the results, four criteria (credibility, dependability, transferability, and confirmability) were used (Denzin & Lincoln, 2011). In order to ascertain credibility, interviews were read several times and opinions of different researchers were used. To ensure dependability, the extracted categories were shown to peers who were not part of the research team to see whether they had the same understanding of the themes. Transferability was achieved through the constant and full recording of research activities during data gathering and analysis. Finally, in order to improve confirmability, the text of a number of interviews, codes, and extracted themes was shown to researchers familiar with qualitative analytical studies but who were not part of the initial research team, and suitable agreement regarding the results was reached. Ethical considerations were satisfied by ensuring the confidentiality of information and gaining written and informed consent of the participants (see Appendix B). Full confidentiality and freedom of participants to leave the study at any time was also ensured.

Table 3: Medical LIS educational barriers

Category	Subcategory	Percent of respondents
Curriculum barriers	1- Not fostering the necessary skills and competencies in students	88.3%
	2- Lack of compatibility with labor market	66.7%
	3- Lack of flexibility	61%
Departments and faculty members barriers	1- Lack of suitable fields for internship	88.9%
	2- Lack of necessary equipment	77.8%
	3- Lack of up-to-date faculty members	72.2%
	4- A small number of skilled faculty members	72.2%
	5- Lack of sufficient continuing education for faculty members	55.5%
	6- Lack of concentration in one specialized area	50%
	7- Unsuitable teaching methods	44.4%
	8- Lack of constant evaluation of departments	38.9%
Official education and professional needs barriers	1- Lack of specialized education in the field of medicine	83.3%
	2- Lack of compatibility between education and workplace needs	72.2%
	3- Insufficient internship and lack of supervision	61.1%
	4- Lack of familiarity with new work environments	50%
Students and graduates barriers	1- Employment barriers	94.4%
	2- Lack of sufficient motivation	88.9%
	3- Lack of interest	66.7%
	4- Lack of continuing education for employed librarians	66.7%
	5- Lack of familiarity with the discipline	55.5%

Results

This study was carried out in order to determine the barriers in education in medical LIS. Participants were PhD students in medical LIS. Of the 18 participants, 12 (67.66%) were female and 6 (33.33%) were male. Eleven (61.1%) of the participants were employed and seven (38.9%) were unemployed. Of the employed, three (27.3%) were faculty members and eight (72.7%) were librarians in medical libraries and information centers.

After interview results were analyzed, four main categories for the barriers were identified: curriculum barriers; department and faculty member barriers; official education and professional needs barriers; and student and graduate barriers (see Table 3). The solutions suggested by participants for these barriers are presented in Table 4.

Curriculum barriers

According to all participants, weak and inefficient curriculum of medical LIS in all three levels—bachelor's, master's, and doctoral—was the most serious educational challenge in

Table 4: Suggested solutions for medical LIS educational barriers

Barriers (category)	Solutions (subcategory)	Percent of respondents
Curriculum barriers	1- Revision of curriculum	94.4%
	2- Addition of new courses compatible with health care, including evidence-based medicine, clinical librarianship, information therapy, systematic review, etc.	77.8%
	3- The flexibility of the curriculum for different departments	44.4
Department and faculty member barriers	1- The hiring of new faculty members	72.2%
	2- Development of faculty members through continuing education courses	66.7%
	3- Improving the equipment and facilities in different departments	61.1%
	4- Limiting the activities of faculty members to one or two specialized areas	50%
	5- Evaluation of departments	44.4%
Official education and professional needs barriers	1- Addition of courses related to the labor market and health care to the curriculum	94.4%
	2- Specialized internship in clinical and health-care settings	72.2%
	3- Constant monitoring and evaluation of internships	72.2%
Student and graduate barriers	1- Creating new positions in national health system including clinical librarian and hospital librarians	88.9%
	2- Using graduates of this field in health research including in journals office, scientometrics centers, and research centers	77.8%
	3- Holding continuing education courses for graduates	66.7%

this field. They stated that the main reason for this problem is that courses offered in medical LIS are not specialized. To solve this problem, they suggested adding a few semester-long courses such as evidence-based medicine, clinical librarianship, and health literacy, according to current trends in medical LIS and labor-market requirements.

Another problem mentioned by the participants was lack of flexibility of the offered curriculum. Along with the lack of compatibility with labor-market requirements, this curriculum is the same for all universities, and different departments are not allowed to change the curriculum based on their local needs:

> The curriculum lacks the necessary dynamism. All different departments in different universities have the same, shared curriculum. . . . Lessons and their textbooks are determined beforehand and everyone has to follow them. The professor can't offer other topics based on students' needs. [Participant 4]

Furthermore, participants believed that the majority of the curriculum is purely theoretical and they expected a revision of the curriculum to include topics that are more

practical. For example, despite the fact that one of the activities for graduates of medical LIS can be systematic reviews, university graduates rarely participate in doing these reviews. Participants also demanded the addition of practical and apprenticeship courses in hospital libraries and clinical settings:

> Only theoretical courses are thought. . . . I did no practical work regarding systematic reviews. . . . No workshops existed. . . . How can I work in this field? [Participant 14]

Department and faculty member barriers

Lack of competent and qualified faculty members for teaching, especially in newer topics added after curriculum revision, and their unsuitable teaching methods are among other barriers in this field. In this regard, participants offered suggestions such as the development of current faculty members and the hiring of new ones:

> The new courses added to the curriculum are good but who has to teach them? Our faculty members aren't up to date. They aren't able to teach many of the courses. . . . We don't have a good professor for a website design course. Something has to be done about this. [Participant 9]

Participants also mentioned the lack of suitable authority for evaluating medical LIS departments. They mentioned lack of necessary equipment, including laboratories and software, and lack of access to necessary educational resources as other barriers and stated that constant evaluation of departments can identify these needs while also helping the improvement of these departments.

> We didn't receive enough education about library software. Only theoretical courses; we can neither access these applications nor there is a place in the department where we can learn them. [Participant 2]

Official education and professional needs barriers

Participants believed that their education at the bachelor's and master's level is not compatible with the labor market's needs and that students are trained mostly to work in libraries. As a result, they suggested a more specialized education, with the addition of courses related to the professional labor market in order to prepare students for their new roles:

> Today's libraries are not the main workplace for graduates of Medical Library and Information Science, a medical librarianship graduate can work as a fulltime clinical librarian alongside the medical team. They can work in research and systematic review teams as research assistants and in many other places. But unfortunately, they don't receive these training during their education and we can't expect them to fulfill their role in new areas with this level of education. [Participant 18]
>
> When I graduated with a Bachelor's degree, I was looking for work only in libraries. I didn't even know that I could work elsewhere. I didn't know I can work as a research assistant to physicians. Well, I couldn't even work in these places because I hadn't been thought how to. . . . I didn't know what is a systematic review. . . . These courses should be added to the curriculum. [Participant 15]

Another problem mentioned in this field was the lack of supervision for internships and their ineffectiveness preventing students from learning necessary skills. To this end, participants suggested that new locations such as hospitals be used as sites for internship if possible.

Student and graduate barriers

According to the participants' opinions, students of medical LIS, especially at the bachelor's level, often select this field without full understanding or interest. This means that the majority of them are not motivated for their education in this discipline. According to the participants, lack of a suitable labor market for all three levels is another factor leading to a lack of motivation in students. They suggested improving job opportunities and also students' motivations.

> Many of the students entering this field don't even know what it is. The courses offered also can't create motivation in students. [Participant 6]
>
> There is also the employment problem. Even I as a Ph.D. student can't be sure what I will do after graduation. New labor markets in this field have to be identified; like in healthcare researches. Working in health research centers can be a good option for me as a Ph.D. student. [Participant 15]

Participants also mentioned that graduates who enter the workforce are removed from educational topics and can't receive the constant education necessary for keeping their knowledge and skills up to date while preparing for new roles. Therefore, they suggested that the needs of working librarians should be identified in order to offer them continuing education courses.

Discussion

The current study aimed to identify the educational barriers in medical LIS and offer solutions for these barriers. Findings showed that the most important barrier in medical LIS education was the insufficient curriculum. Participants believed that the current curriculum lacks the quality needed to achieve the aims of medical LIS education. They emphasized the need for revision of the curriculum at all three levels, that is, bachelor's, master's, and doctoral levels, while suggesting the addition of courses such as clinical librarianship, evidence-based medicine, evidence-based librarianship, and information therapy. Comparative studies on the curriculum of medical LIS and information and knowledge science in Iran by Daei et al. (2017) showed that there is a great deal of similarity and overlap between topics in these two fields. This is despite the fact that the medical LIS requires specialized education in order to meet the needs of the labor market in medical fields. Lack of this type of specialized curriculum can even damage the standing of this field in the labor market. In another study, Zare-Farashbandi and Daei (2019) showed that the master's-level curriculum of medical LIS in Iran cannot meet the various needs of the medical field. They suggested a revision of curriculum and addition of specializations such as clinical librarianship, hospital librarianship, and evidence-based librarianship at the master's level. Mokhtari (2005) also

investigated the master's curriculum of medical LIS in Iran and suggested the addition of courses such as health information management and health information behaviors.

A review of literature at the international level also showed that insufficient attention was paid to medical library and information education programs, and training has not been able to develop the skills librarians need to play new roles (Kasalu & Ojiambo, 2015; Lewis et al., 2011; Mumenthaler, 2016; Myers & Rodriguez, 2016; Xue, Wu, Zhu, & Chu, 2019). In this regard, the lack of specific training courses for medical librarians (Detlefsen, 2012; Joshi et al., 2014) as well as librarians' low knowledge of EBM (Boykan & Jacobson, 2017) and of health and medicine in general (Myers & Rodriguez, 2016; Polger, 2010) are among the most important challenges. Accordingly, the need to modify existing curricula has been raised (Groen & Xiong, 1994; Ma, Stahl, & Price, 2020; Rankin, Grefsheim, & Canto, 2008).

Identifying the necessary competencies for medical librarians can lead to the introduction of curriculum based on merit and the needs of stakeholders, thus removing a large challenge in this field. The Medical Library Association (2017) has published a list of competencies for health librarians. Other studies have also attempted to identify the necessary competencies for health information experts (Ma et al., 2018). The results of these studies can be used to develop a suitable curriculum for medical LIS. In order to create a competency-based curriculum, it is necessary to carry out a needs assessment among various stakeholders. According to Kern, Thomas, and Hughes (1998), developing a curriculum requires two needs-assessment steps: problem identification and general needs assessment, and targeted needs assessment. It appears that in the field of medical LIS, these needs assessments should be carried out periodically due to constant changes in this field while also revising the current curriculum based on the needs of experts in the health-care area.

In addition, due to the expansion of the use of evidence-based medicine and the role of medical librarians in it, new roles such as clinical librarian and clinical informationist have emerged (Zare-Farashbandi, Zare-Farashbandi, Adibi, & Rahimi, 2020). Therefore, medical librarianship curricula should prepare librarians to play these new roles. Research conducted to identify the educational needs (Hashemian, Rahimi, Yamani, Adibi, & Zare-Farashbandi, 2020) and competencies of clinical informationist (Hashemian, Zare-Farashbandi, Yamani, Rahimi, & Adibi, 2021) can be used in the development of medical librarianship curricula to create the necessary competencies to play these new roles.

One of the roles that participants emphasized was the role of medical librarians in systematic reviews. The skill of participating in systematic reviews should be considered as one of the competencies required by medical librarians in their curriculum. Medical librarianship students, especially master's and PhD students, are recommended to actively participate in a systematic review project. This can be in the form of an internship.

On the other hand, departments of medical LIS in Iran suffer from a lack of competent and effective faculty members. Marcella and Oppenheim (2020) also consider the lack of librarianship educators as one of the challenges of librarianship education in the United Kingdom. This leads to faculty members being forced to teach in several fields, which results in a lack of specialization and a general decline in quality. Heydari (2011) has shown that teaching different and varied courses by the same faculty members is one of the barriers

of educational quality and specialization. Therefore, departments of medical LIS should offer continuing education courses for their current faculty members while hiring new and competent individuals in order to improve the quality of education. Furthermore, due to the interdisciplinary nature of medical LIS and its close relationship with medicine and health care, it is necessary to make use of faculty members in medical and paramedical fields.

Lack of educational equipment and facilities, including skill labs where students can improve their practical skills, is another one of the barriers in medical LIS education in Iran. As mentioned by McMullen and Yeh (2013), medical librarians' job descriptions today are based on technological advances, electronic environments, the internet, and social networks. Given the fact that even during internships, students often fail to learn various practical skills such as working with library applications and databases, the existence of these skill labs in educational departments is necessary to help familiarize students with skills necessary while working with novel technologies and in electronic environments. In this regard, Maden-Jenkins (2011) identifies the lack of educational facilities as a challenge.

One of the other barriers mentioned by the participants is the gap between official education and the professional skills needed by the students. Marcella and Oppenheim (2020) also mention the growing gap between education, research, and practice as one of the challenges of librarianship education. This problem is especially important in the health and medical fields, which are in constant change (Murphy, 2011) and is one of the reasons for the inefficiency of the curriculum. The main goal of education should be to produce a skilled workforce (Lewis et al., 2011), and today, due to changes in the labor market in the area of medical LIS and the introduction of new roles such as clinical librarians, health research librarians, health information experts, and clinical informationists, the need for specialized education of medical librarians has become even more prominent (Murphy, 2011). Therefore, these gaps in specialized education cannot be fixed unless through revision of curriculum, strengthening of educational departments, and cooperation between different medical LIS departments at the national and international levels and other related departments, especially departments of medicine and health care.

Internships can enhance the professional skills of librarianship students, something that is emphasized in librarianship and information curricula in the world (Krtalić & Mandl, 2019; McGuinness & Shankar, 2019). In this regard, in medical librarianship and information science, in addition to internships in medical libraries and information centers, it is recommended that opportunities for internships in clinical and medical settings be created. On the one hand, internships empower librarianship students and familiarize them with the information needs of health professionals, and on the other hand, they lead to the marketing of medical librarianship services and introduce physicians to new librarians' services.

Another solution for filling this gap is the identification of new job opportunities. Widespread needs assessment from stakeholders in health and medicine can help identify places in need of services from medical librarians, which can help in creating new job opportunities. According to Hörzer and Schlögl (2018), close communication with employers enables the curriculum to be adapted to their needs. Therefore, we suggest that departments of medical LIS cooperate with departments of medicine and other clinical settings to identify the needs in the area of health and medicine and use these needs in developing a new and

improved curriculum for medical LIS. This can help to expand interprofessional education in health science education, which is one of the developing fields in Iran.

Another factor mentioned by the participants as a barrier for the quality of education in medical LIS is lack of motivation and interest among new students in this field. This is mainly due to barriers within the Iranian educational system and the centralized method of selecting university students, meaning that universities and educational departments have no control over the selection of their students. This is also the case in other countries where the education system is concentrated. Referring to the centralized education system in Greece, Moniarou-Papaconstantinou, Tsatsaroni, Katsis, and Koulaidis (2010) acknowledge that librarianship is not the first choice of students in Greece. Furthermore, many students select this field without previous knowledge in order to simply get a university degree, and some will give up on their studies after several semesters. The results of a study by Bighdeli and Abam (2003) showed that the majority of librarianship students have selected this field without interest or previous knowledge. According to Ard et al. (2006), only two percent of high-school students in the United States consider librarianship as a goal to continue their education. In this regard, changes in the curriculum to better mirror the needs of the labor market, the creation of new job opportunities, and the introduction of new specializations at the master's level, including clinical librarianship (to support evidence-based medicine) and research librarianship (to support systematic reviews), can help improve interest and motivation among students. In addition, because public image is one of the major concerns of librarians around the world (Alansari, 2011), more marketing or outreach is needed to show students that having a specialization in medical librarianship is a realistic career option.

Certainly, library and information science education around the world faces challenges. Some challenges vary from country to country depending on cultural and social characteristics (Xue et al., 2019). However, challenges such as curriculum issues are common to all countries. Accordingly, global partnerships in curriculum development, accreditation standards, and competencies required can pave the way for the globalization of medical librarianship and address some of the challenges. Južnič, Renon, and Heco (2018) believe that the scope of the LIS profession has become more international and that LIS graduates find job opportunities beyond their borders. However, there does not currently appear to be a standard for incorporating international issues into LIS curricula. Therefore, it is necessary to conduct studies in the field of internationalization of medical librarianship and information science education.

Recommendations

As the MLA (2020) mentions, medical librarians "have a direct impact on the quality of patient care, helping physicians, allied health professionals, administrators, students, faculty, and researchers stay abreast of and learn about new developments in their fields." If Medical librarians gain necessary competencies, they can play their roles effectively. Formal education is one of the ways that medical librarians take to gain competencies.

Therefore, given the importance of the curriculum, researchers offer the following suggestions and recommendations for the curriculum development of medical LIS:

1. Professional competencies can be used as an indicator for educational needs assessment, curriculum development, and evaluation. In the field of medical LIS, we can use MLA competencies to develop competency-based curricula.
2. Curriculum models outline the steps of the syllabus. In the field of medical LIS, a curriculum model can be used in order to develop the curriculum. On the other hand, one of the important steps in curriculum development based on curriculum models is the identification of stakeholder needs. We need to determine what the community needs in relation to the curriculum being developed. In the area of curriculum development of medical LIS, it seems that a team of medical LIS professionals, medical and health professionals as key stakeholders, and curriculum specialists should work together to develop a comprehensive, effective, and forward-looking curriculum and identify the needs of all stakeholders.
3. Curriculum development should be tailored to future changes and developments. Predicting the future is one of the things that can help formulate an effective curriculum. If we know what is going to happen in the future, we can definitely influence and plan for it. Therefore, we need future studies in medical LIS education.
4. Medical LIS is multidisciplinary and interdisciplinary, so the evolution of the medical and health sciences will also lead to an evolution in this field. Therefore, medical LIS competencies and the curricula should be constantly reviewed and revised.

Limitations

This was the first study to address the barriers in medical LIS in Iran. In this study, we tried to identify the most important barriers in this field to analyze the current situation of medical LIS education. One of the main limitations of the current study was that the sample of the study was limited to PhD students, which can skew the results. Therefore, it is necessary for future studies to include students from all three levels of education as well as faculty members in medical LIS, practitioners, and employers and compare their results to the results of the current study. Another limitation of this study was that it used only students' opinions to assess departments and the teaching performance of faculty. Therefore, it is necessary to conduct further research using other methods for assessment and compare the results with the current study. The lack of professional competencies for librarians in Iran was another limitation of this study. Therefore, researchers had to rely solely on students' views on the curriculum and quality of teaching performance. Furthermore, because barriers to medical LIS education in one country are likely to be different from those in other countries, the barrier solutions presented in this study may not be generalizable to other environments.

Conclusion

The barriers identified in the current study show that this field requires major changes, including revision of the current curriculum, evaluating the quality of departments and faculty members, increasing the compatibility between the curriculum and target labor market, and attention to motivational and employment barriers among its students. Furthermore,

identification of new trends, competency-based education, better communication and interaction with departments of medicine and clinical settings, as well as specialization of studies, especially at the master's and PhD levels, can help improve the quality of education in this field.

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Appendix A: Semi-structured interview guide for medical library and information sciences educational problems

Hello and thank you for participating in this interview.

My name is _____ and I am interviewing to identify the most important barriers of Medical Library and Information Science education and to present suitable solutions to remove these barriers.

Written consent was obtained from you. The interview takes about 15–30 minutes.

Let's start.

- Please introduce yourself.
- In your opinion, what are the barriers and problems for the Medical Library and Information Science education?
- What are your suggested solutions to these problems?
- Is there any other information you want to explain?

Thank you very much

Appendix B: Consent form for interview

Thank you for participating in this interview. If you are satisfied to participate, please read and sign the form below:

I have had the purpose and nature of the study explained to me in writing and I have had the opportunity to ask questions about the study.

I understand that I can withdraw at any time or refuse to answer any question without any consequences of any kind.

I understand that my response will be kept strictly confidential.

I understand that in any report on the results of this research my identity will remain anonymous. This will be done by changing my name and disguising any details of my interview, which may reveal my identity or the identity of people I speak about.

I agree for my interview to be audio-recorded. I understand that the audio recording made of this interview will be used only for analysis.

I agree to take part in this interview.

Name of participant Date Signature

Name of researcher Date Signature