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Theoretical issues in medical library and information sciences' articles published in scopus and web of science databases: A scoping review

Mohammadhiwa Abdekhoda, Hasan Ashrafi-Rizi[1], Fatemeh Ranjbaran[2]

Department of Medical Library and Information Sciences, School of Health Management and Medical Informatics, Tabriz University of Medical Sciences, Tabriz, Iran, [1]Medical Library and Information Science Department, Health Information Technology Research Center, Isfahan University of Medical Sciences, Isfahan, Iran, [2]Department English Language Center, University of Technology and Applied Sciences, Nizwa, Oman

Address for correspondence:
Prof. Hasan Ashrafi-Rizi, Professor, Medical Library and Information Science Department, Health Information Technology Research Center, Isfahan University of Medical Sciences, Isfahan, Iran.
E-mail: hassanashrafi@mng.mui.ac.ir

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Abstract:

Nowadays, professions with stronger theoretical background usually have a better standing among other academic fields. The field of Medical Library and Information Science (MLIS) also requires developments in theoretical issues to increase its ranking and provide more effective support services and higher quality research. The aim of this study was to conduct a scoping review of publications in MLIS in Scopus and Web of Sciences databases to identify the underlying theoretical issues in this field. The research method was a scoping review conducted in February 2022. Articles published in the field of MLIS for which the main theme or research outcomes were based on theoretical foundations, patterns, frameworks, theories and models, and without limitation on time were retrieved from Web of Science and Scopus databases. The retrieved articles were analyzed after necessary screening and evaluation. Based on the determined criteria, 49 articles were eventually analyzed. Patterns, theories, frameworks, and models used in the articles have been categorized into six general groups: (1) information (general) and information literacy; (2) models of evaluation and support services in libraries and information centers; (3) clinical, embedded librarianship, and professional librarianship; (4) scientometrics, selection and evaluation of articles, journals, and serials; (5) open access content; and (6) psychological and sociological models. The results indicate that published articles in the field of MLIS have used a considerable range of models, theories, and frameworks as the most important elements of theoretical concepts. These models, theories, and frameworks have been categorized into six main groups, a number of which have been involving collection development, organization of material, and most have been overseeing the distribution of information and support services in libraries and information centers. Whereas MLIS is an interdisciplinary field with specific applications for access to and distribution of information, it still has considerable potential for presenting models, frameworks, and theories.

Keywords:

Conceptual framework, medical library and information science (MLIS), models, patterns, theories

Introduction

Nowadays, professions with stronger theoretical background are usually at a better standing among other academic fields. They are also more effective when it comes to performance and support services to beneficiaries, while also publishing higher quality research. With the start of education in the field of Medical Library and Information Science (MLIS) in Iran in 1967, "this weakness in theoretical foundations has always been an opportunity for scientific discussion"[1,2]; however, the result of these discussions has not been considerably effective in the realm of MLIS. Nevertheless, this deficiency has various reasons, one of which is lack of attention to education in this field and researchers such as Rahadoost.[1]

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and Ashrafi-Rizi *et al*.[2] have confirmed this deficiency both nationally and internationally.

The existential philosophy of MLIS is to facilitate access to reliable health and medical information for health professionals and the general public. When the health user faces a knowledge gap, if an adequate response is not obtained in the shortest time and with appropriate means, the existential philosophy of MLIS will be under question. In fact, the field of MLIS can become successful in the realm of research, education, and health information services, when it can develop its theoretical foundations in accordance with new conditions, and use these theoretical issues to resolve problems and enhance healthcare information services. Meanwhile, as per some theorists such as Detlefsen (1993), Saracevic (2007), Pettigrew and McKechnie (2001), and Lopatovska and Arapakis (2011), the interdisciplinary nature of MLIS has resulted in this field to become the recipient of models and theories of other fields and thus not to have the necessary freedom to present theoretical concerns of its own.[3-6] However, this freedom cannot be an accurate response to this problem. Although MLIS makes use of theories and models in other fields to facilitate public access to information, it holds specific theories itself and has the necessary freedom to present theoretical concerns; therefore, such an argument is not acceptable. In fact, this type of criticism should be seriously considered in educational programs in the field and become grounds for enhancing theoretical issues in various dimensions by educational groups and specialists in the field.

A summary of previous works shows that either theoretical issues have not been the focus of librarians and health librarian or the speed of publication in this field is very slow; therefore, the aim of this research is a scoping review of theoretical issues in published articles in this field in Scopus and Web of Science (WOS), so that fundamental theories can be evaluated and constructive proposals be made to raise the level of these publications.

Materials and Methods

Study design and setting

This research was a scoping review which conducted in February 2022. Scoping reviews (also known as mapping reviews) are exploratory research projects that systematically map the literature on a topic by identifying key concepts, theories, and sources of evidence that inform practice in the field.

Study participants and sampling

All published articles in the field of MLIS with the main theme or research outcomes based on theoretical foundations, patterns, frameworks, theories and models, and without limitation on time were retrieved from WOS and Scopus databases.

Data collection tool and technique

Considering that WOS and Scopus databases are the most comprehensive databases in the world, research articles published in the field of MLIS and those related to the research objectives were retrieved from these two databases. All published articles were entered into EndNote software without limitation on publication date and type of publication. The articles were retrieved from these databases using the search strategies below [Table 1]. The inclusion criteria include English language, peer-reviewed, primary, empirical research articles contacting theoretical foundations, patterns, frameworks, theories, and models.

By conducting the above search strategy, a total of 1,326 articles were retrieved. Three hundred fifty four articles were eliminated from the search results due to duplication between the two databases. From the 972 remaining articles, 35 articles were eliminated because they had only bibliographical data and did have other sections such as abstract. The 937 remaining articles were evaluated by two experts in the field of MLIS. After precise evaluation of the abstract and full texts, 852 articles were eliminated due to irrelevance of the specific topic. In a re-evaluation of the articles, 10 articles were eliminated due to unavailability of full text. The 86 remaining articles were evaluated by an expert in the field and ultimately 50 articles were included for final evaluation and analysis. Thirty five articles were eliminated by medical library and information sciences expert due to having no patterns, models, or theory. Bibliographical data of the articles are provided in Table 2 along with other information related to study objectives. Figure 1 shows the diagram of the search strategy.

Ethical consideration

The authors considered all ethical issues in the process of searching and retrieving information and evaluating articles. At the same time, the authors used a detailed and deep search strategy in information retrieval.

Results

Table 2 shows the bibliographic information and summary of articles evaluated. As the results of this table show, in addition to the bibliographic data of the selected articles, type of publication/article, objective of evaluation, model, pattern, framework, and theory and finally, study outcomes were extracted.

Table 3 categorizes patterns, theories, frameworks, and models extracted from the evaluated articles into

Table 1: Search strategy in related databases

Database	Search Strategy
Web of Science	"Medical Librarian" (In Topic) AND (Model*/Pattern/ Theory/Framework) (In Topic)
	"Health Librarian" (In Topic) AND (Model*/Pattern/ Theory/Framework) (In Topic)
	"Medical library" (In Topic) AND (Model*/Pattern/ Theory/Framework) (In Topic)
	"Health Library" (In Topic) AND (Model*/Pattern/ Theory/Framework) (In Topic)
	"Medical Library and Information Sciences" (In Topic) AND (Model*/Pattern/Theory/Framework) (In Topic)
	"librarianship" (In Topic) AND (Model*/Pattern/ Theory/Framework) (In Topic)
	"Medical Librarianship" (In Topic) AND (Model*/ Pattern/Theory/Framework) (In Topic)
	"Health librarianship" (In Topic) AND (Model*/ Pattern/Theory/Framework) (In Topic)
Scopus	"Medical Librarian" (In Topic) AND (Model*/Pattern/ Theory/Framework) (In Topic)
	"Health Librarian" (In Topic) AND (Model*/Pattern/ Theory/Framework) (In Topic)
	"Medical library" (In Topic) AND (Model*/Pattern/ Theory/Framework) (In Topic)
	"Health Library" (In Topic) AND (Model*/Pattern/ Theory/Framework) (In Topic)
	"Medical Library and Information Sciences" (In Topic) AND (Model*/Pattern/Theory/Framework) (In Topic)
	"librarianship" (In Topic) AND (Model*/Pattern/ Theory/Framework) (In Topic)
	"Medical Librarianship" (In Topic) AND (Model*/ Pattern/Theory/Framework) (In Topic)
	"Health librarianship" (In Topic) AND (Model*/ Pattern/Theory/Framework) (In Topic)

six general groups, including (1) information and information literacy; (2) models on evaluation and support services in libraries and information centers; (3) Clinical, embedded librarianship, and professional librarianship; (4) scientometrics, selection, and evaluation of articles, journals, and serials; (5) open access content; and (6) psychological and sociological models.

In addition, the results of this table indicate that most studies were on information and information literacy, followed by models on evaluation and support services in libraries and information centers. Using models, patterns, and frameworks for evaluation of users' information literacy at different levels is the main aim of studies conducted in this realm, which has become the focus of attention for many researchers. Evaluating the library support services and using innovative approaches to provide support in different areas such as collection development of library content or providing support for virtual resources or using an innovative technology such as natural language processing techniques for information retrieval is a pivotal issue that researchers have turned to in a considerable number of studies.

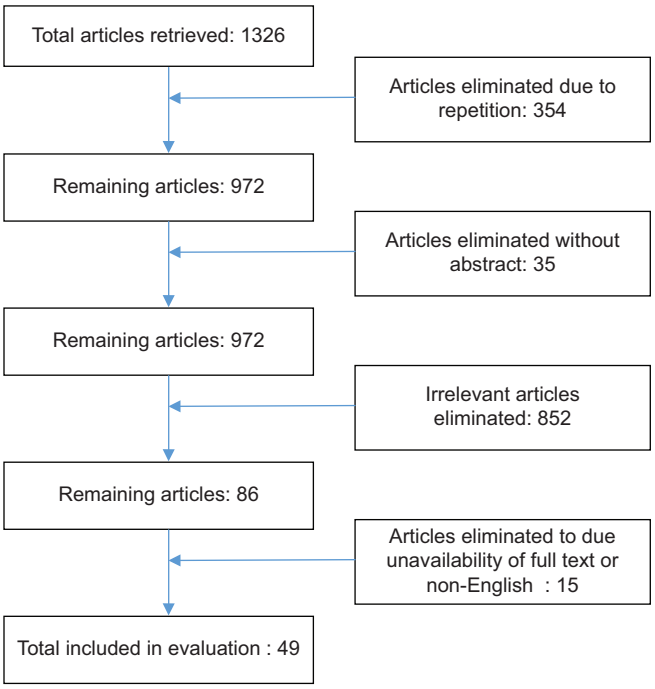

Figure 1: Process of search, retrieval, and inclusion of articles

Models in librarian collaboration in clinical sciences or embedded librarianship and professional library science also are among other fields addressed recently. Issues related to open access, self-archive, self-publication, etc. have been the focus of attention for researchers in MLIS in the form of models, patterns, and frameworks for the better distribution of information. The next key issue is the use of psychological and sociological models and theoretical patterns and frameworks of these fields in studies related to MLIS.

Discussion

This scoping review was conducted with the aim of evaluating theoretical issues in publications of medical librarianship and information sciences in Scopus and WOS databases. In addition to evaluating the theoretical aspects of the articles in this field, identifying models, patterns, conceptual frameworks, and theories is the main objective of this study. After conducting a search with different strategies in Scopus and WOS databases, and evaluating and reviewing the articles, 49 articles were eventually selected for the final evaluation, the bibliographic data of which are given in Table 2. As it is observed from the findings of Table 2, these articles are divided into six different categories.

In the first category topics related to "information and information literacy" including issues pertaining to the model, pattern, framework, and specific theories in the realm of information or related to information literacy were proposed. The majority of articles fall under this

Table 2: Summary of bibliographic information of the articles in models of Medical library and information Sciences

No	Title	Authors	Year of Pub	Journal	Type of study/ article	Objective	Model/theory/approach/ Theoretical, conceptual framework	Result/Outcome
1	A computational model of information retrieval with UMLS	Robert, J. J. Joubert, M. Nal, L. Fieschi, M.	1994	Proceedings/the . Annual Symposium on Computer Application [sic] in Medical Care. Symposium on Computer Applications in Medical Care	Developmental	Presenting a conceptual model for display of data structure , and the possibility for question answering bots in information databases	United Medical Language System (UMLS)	The presented model based on United Medical Language system is adequate for displaying data structures and makes it possible to have question answering bots in information databases
2	Wikipedia: an unexplored resource for understanding consumer health information behaviour in library and information science scholarship	Smith, D. A.	2021	Journal of Documentation	Original research/ qualitative	Identifying approaches to evaluate the role of Wikipedia in users health information behavior	Expanded conceptual model Longo, Health Information Behavior Models (HIB)	Expanded conceptual model Longo from the search on Health Information Behavior (ECMHISB) can be valuable for the discovery of CHIB related to health and medical information in Wikipedia
3	Identifying the roles of medical librarians in COVID-19 crisis in Iran	Kazempour, Z. Soleymani, M. R. Najafi, N. S. S. Ashrafi-Rizi, H	2021	Journal of Education and Health Promotion	Qualitative	Identifying the role of medical librarians during COVID-19 pandemic in Iran	Providing effective health information services to managers, health care specialists and the public	7 main topics and 24 sub-topics related to the role of librarians during COVID-19 was identified
4	Adapting to Remote Library Services during COVID-19	Howes, L. Ferrell, L. Pettys, G. Roloff, A.	2021	Medical Reference Services Quarterly	Developmental	Using new technology and implementing new virtual support models in order to enhance internal relations and continue to provide support services and resources to consumers online	New virtual service models	Using new technology, service models and virtual resources have been very effective
5	A core competency model for clinical informationists	Hashemian, M. Zare-Farashbandi, F. Yamani, N. Rahimi, A. Adibi, P	2021	Journal of the Medical Library Association	Qualitative	Identifying clinical information specialists merits in order to effectively play their role in clinical teams	CREDIT model, as a criterion for clinical informationists performance evaluation and also for developing and evaluating clinical information training programs	Six merits were identified including relation, research, education, knowledge of the field, technical and information support
6	Impact of embedded librarianship on undergraduate nursing students' information skills	Franzen, S. R. Sharkey, J.	2021	Journal of the Medical Library Association	quantitative	Evaluating the effect of embedded librarianship model on students retrieval and search skills	Embedded Librarianship Model	The study results are evidence of benefits of designated librarianship model in enhancing the information retrieval and search skills of students

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Table 2: Contd...

No	Title	Authors	Year of Pub	Journal	Type of study/ article	Objective	Model/theory/approach/ Theoretical, conceptual framework	Result/Outcome
7	Application of Bradford's law of scattering and Leimkuhler model to information science literature	Borgohain, D. J. Verma, M. K. Nazim, M. Sarkar, M.	2021	Collnet Journal of Scientometrics and Information Management	quantitative	Evaluating Bradford's Law and Leimkuhler Model in information science literature	Bradford's Law and Leimkuhler Model	Distribution Pattern of journals, articles and documents related to information science literature did not conform to Bradford's distribution pattern
8	The Use of Open Access by Medical Librarians in Nigeria: A Survey of Knowledge and Practices	Anyaoku, E. N. Anike, A. N.	2021	African Journal of Library Archives and Information Science	quantitative	Evaluating knowledge of open access models, types of license, resources and methods in medical libraries in Nigeria	Open Access Model	Medical librarians should enhance their knowledge and skills related to managing open access
9	Formulating a structural model of self-compassion based on the spiritual intelligence of the students of medical library and information sciences in Iranian Universities of Medical Sciences	Zarrinabadi, Z. Isfandyari-Moghaddam, A. Erfani, N. Soltani, M.	2020	Journal of Education and Health Promotion	Quantitative	Creating a self-compassion model based on spiritual intelligence (SQ) in students of medical library and information sciences	Spiritual Intelligence Model (SQ), Self-Compassion Model	The results showed that there is significant relationship between spiritual intelligence and self - compassion
10	The educational role of clinical informationist on improving clinical education among medical students: Based on kirkpatrick model	Tahmasebi, M. Adibi, P. Zare-Farashbandi, F. Papi, A. Rahimi, A.	2020	Journal of Education and Health Promotion	Quantitative	Evaluating the educational role of clinical informationists (CI) on enhancing medical students clinical education based on the KirkPatrick (KP) Model	KirkPatrick Model (KP)	CIs present and training during the clinical period results in improved satisfaction, views, knowledge, information seeking skills and also improving information seeking behavior and clinical skills of medical students
11	Designing a model of professional ethics excellence for clinical librarians	Ashrafi-rizi, H. Kazempour, Z. Sheikhshoaei, F. Ghazavi, Z.	2020	Journal of the Medical Library Association	Qualitative	Designing a model of professional ethics excellence for clinical librarians	Clinical Librarian Professional Ethics Excellence Model	Identifying and utilizing professional ethics principles among clinical librarians can enhance their professionalism and result in better information support for physicians
12	Needs assessment for improving library support for dentistry researchers	Yueping, H. Gerbig, M. Kirby, S.	2019	Journal of the Medical Library Association	Quantitative	Assessing research support needs of dentistry faculty members	Open Access Publishing Models, Self-Archiving and Altmetrics	Further endeavors are needed for enhancing and developing services for financial assistance programs

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No	Title	Authors	Year of Pub	Journal	Type of study/ article	Objective	Model/theory/approach/ Theoretical, conceptual framework	Result/Outcome
13	Service quality assessment of hospital libraries: A LibQUAL+ Survey	Nasibi-Sis, H. Valizadeh-Haghi, S. Zare, S. Orazi, A.	2019	Library Philosophy and Practice	Quantitative	Evaluating the quality of hospital library support at Shahid Beheshti University of Medical Sciences from users perspective based on LibQUAL+	LibQUAL+ Model	Hospital libraries from two perspectives of information and library control as a location have not been able to meet minimum standards of their users
14	Building capacity for librarian support and addressing collaboration challenges by formalizing library systematic review services	McKeown, S. Ross-White, A.	2019	Journal of the Medical Library Association	Developmental	Creating a formalized systematic review service in the medical library	Two-tiered service model for supporting systematic review activities	Two-tiered service model developed for consultation and cooperation provided a framework for support of systematic review activities
15	The codification of spiritual intelligence measurement model in librarianship and medical information science students of medical universities in Iran	Zarrinabadi, Z. Isfandyari-Moghaddam, A. Erfani, N. Soltani, M. A. T.	2018	Journal of Education and Health Promotion	Quantitative	Adapting a spiritual intelligence measurement model for students of informatics and librarianship	Spiritual Intelligence Measurement Model	The spiritual intelligence measurement model was evaluated and the results show that the model has good fit
16	Leveraging accreditation to integrate sustainable information literacy instruction into the medical school curriculum	Tagge, N.	2018	Journal of the Medical Library Association	Developmental	Creating an efficient flipped classroom model for teaching information literacy skills freshman medical students	Flipped classroom model for teaching information literacy skills	This model provides students the opportunity to learn information literacy, critical thinking and teamwork skills
17	Interventions to assist pet owners in online health information seeking behaviour: a qualitative content analysis literature review and proposed model	Solhjoo, N. Naghshineh, N. Fahimnia, F. Ameri-naeini, A. R	2018	Health Information and Libraries Journal	developmental	Suggesting a model for Health Information Seeking Behavior (HISB) for pet owners	Health Information Seeking Behavior (HISB) for pet owners	This model is the first step in engaging veterinarians and health librarians to plan giving health information to pet owners
18	Mapping the Association of College and Research Libraries information literacy framework and nursing professional standards onto an assessment rubric	Willson, G. Angell, K.	2017	Journal of the Medical Library Association	Developmental	Developing a rubric for assessing students information literacy skills	Rubric for assessing information literacy skills	This study was a model for a rubric adapted from the ACRL framework and standards

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No	Title	Authors	Year of Pub	Journal	Type of study/ article	Objective	Model/theory/approach/ Theoretical, conceptual framework	Result/Outcome
19	Delivering information skills training at a continuous professional development conference: an evaluation	Lawton, A. Manning, P. Lawler, F.	2017	Health Information and Libraries Journal	developmental	Studying the evaluation of perceptions on the effectiveness of information literacy workshops at CPD conferences for specialists in healthcare and social welfare	KirkPatrick Evaluation Model (KP)	This study provides details on how to present a workshop through participant cooperation
20	Designing and applying library game website software and investigating its impact on self-determination factors of library users	BasirianJahromi, R. Bigdeli, Z. Haidari, G. HajiYakhchali, A.	2017	Iranian Journal of Information Processing Management	Practical	Designing a library game website and investigating its impact on self-determination factors of library users at Boushehr University of Medical Sciences	Gamifying the Library Services	The library's main website is at a low level of compatibility with user's self-determination factors. On the contrary, this library game website has shown high compatibility with users self-determination factors
21	Establishing a university library-based health information literacy service model in the age of big data	Jianyu, L. Juzhi, Z. Huanli, R. Guichai, L.	2016	Journal of Medical Imaging and Health Informatics	Developmental	Analyzing health information services in order to improve health information literacy among the Chinese	Big Data Innovative Health Information Services Model	It is suggested that a big data innovative health information service model be created at university libraries by changing their traditional roles
22	Flipping the classroom to teach systematic reviews: the development of a continuing education course for librarians	Conte, M. L. MacEachern, M. P. Mani, N. S. Townsend, W. A. Smith, J. E. Masters, C. Kelley, C.	2015	Journal of the Medical Library Association		Using a flipped classroom model to develop and implement a systematic review course for librarians	Flipped classroom model	The flipped classroom model can be successful in lesson planning and has received good ranking by students
23	The Flipped Classroom: Practices and Opportunities for Health Sciences Librarians	Youngkin, C. A.	2014	Medical Reference Services Quarterly	Developmental	How librarians use flipped classroom at health and medical science universities	Flipped Classroom Model	This study discusses how flipped classroom is used by librarians at health and medical sciences universities
24	Quality assessment of Persian mental disorders websites using the webmedqual scale	Shahrzadi, L. Mojiri, S. Janatian, S. Taheri, B. Ashrafi-rizi, H. Shahrzadi, Z. Zahedi, R.	2014	Acta Informatica Medica	Quantitative	Guiding patients to select reliable websites for mental disorders and determining quality of related Persian websites	WebMedQual Scale	It is necessary that users evaluate the websites beforehand as not all websites are reliable

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No	Title	Authors	Year of Pub	Journal	Type of study/ article	Objective	Model/theory/approach/ Theoretical, conceptual framework	Result/Outcome
25	Developing a long-term condition's information service in collaboration with third sector organisations	McShane, L. Greenwell, K. Corbett, S. Walker, R.	2014	Health Information and Libraries Journal	developmental	Developing and implementing service for people with chronic disease	Long-term Conditions Information Services	An advanced information service was well received by health specialist and service providers
26	Quality of Persian addiction websites: A survey based on silberg, discern and WQET instruments (2011)	Zahedi, R. Taheri, B. Shahrzadi, L. Tazhibi, M. Ashrafi-Rizi, H.	2013	Acta Informatica Medica	Quantitative	Determining the quality of Persian addiction websites and recommendations to improve them	Silberg, Discern and WQET	Quality of Persian websites were ranked based on Silberg, DISCERN and WQET instruments as "low", "less than average" and "very high", respectively.
27	Sustaining Librarian Vitality: Embedded Librarianship Model for Health Sciences Libraries	Wu, L. Mi, M.	2013	Medical Reference Services Quarterly	Developmental	Presenting a five-level model of embedded librarianship	Five-level model of embedded librarianship	This article discusses a five-level model of embedded librarianship developed in the context of Health Sciences libraries
28	Using the ADDIE Model in Designing Library Instruction	Reinbold, S.	2013	Medical Reference Services Quarterly	Developmental	Designing an educational model by librarians for evidence-based medical courses	Evidence-based (ADDIE)	Design, development implementation and evaluation
29	The Clinical Relevance of Information Index (CRII): Assessing the relevance of health information to the clinical practice	Galvao, M. C. B. Ricarte, I. L. M. Grad, R. M. Pluye, P.	2013	Health Information and Libraries Journal	Developmental	Presenting the clinical relevance information index (CRII)	Clinical Relevance of Information Index (CRII)	The Clinical Relevance Information Index (CRII) encompasses aspects of information that have not been considered by other indices
30	The effect of a clinical medical librarian on in-patient care outcomes	Esparza, J. M. Shi, R. H. McLarty, J. Comegys, M. Banks, D. E.	2013	Journal of the Medical Library Association	Quantitative	Determining the effect of clinical medical librarian (CML) on in-patient care outcomes	Clinical Medical Librarian (CML)	There was no difference in clinical outcomes between the experimental group (those with access to clinical medical librarian) and control group
31	Know your RO from your AE? Learning styles in practice	Woods, H.B.	2012	Health Information and Libraries Journal	Developmental	Evaluating Kolb's Cycle of Learning as a beneficial theory for consultation while planning for information literacy	Kolb's Cycle of Learning in information literacy education	Using planning instruments when planning for educational and learning activities for information consultation is recommended
32	Evaluating educational interventions for information literacy	Stevenson, P. Spring, H.	2012	Health Information and Libraries Journal	Quantitative	Investigating how information literacy education designs presented by healthcare support libraries are evaluated	KirkPatrick Evaluation Model (KP)	By using the presented models, evaluation methods of information literacy educational designs are improved

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No	Title	Authors	Year of Pub	Journal	Type of study/ article	Objective	Model/theory/approach/ Theoretical, conceptual framework	Result/Outcome
33	Time to rethink the role of the library in educating doctors: driving information literacy in the clinical environment	Simons, M. R. Morgan, M. K. Davidson, A. S.	2012	Journal of the Medical Library Association	Quantitative	Feasibility of incorporating information literacy in the curriculum and clinic in order to facilitate patient care and continuous education	Outcomes-based Educational Theory	By using this method, physicians search skills have improved over time
34	Information Literacy for Users at the National Medical Library of Cuba: Cochrane Library Course for the Search of Best Evidence for Clinical Decisions	Santana Arroyo, S. del Carmen González Rivero, M.	2012	Community and Junior College Libraries	Developmental	Presenting experience of the course "Cochrane Library: Evidence-based medicine" with the aim of teaching how to make optimum use of Cochrane database and the concept of evidence-based medicine	Big 6TM Model	Using the Big 6TM Model in information literacy education and evidence-based medicine is beneficial
35	Developing a model for information services based on a librarian-user partnership in medical clinics in Bucharest	Madge, O.L.P.	2012	Qualitative and Quantitative Methods in Libraries	Developmental	Presenting a new model of information support services for users in medical clinics	Librarian-User Partnership Model in clinical team activities	With the support of medical specialists, Librarian and informationist specialists can have a fundamental role in improving healthcare and health service quality by searching and retrieving information and providing access to related knowledge at the right time
36	Health librarians: Developing professional competence through a 'legitimate peripheral participation' model	Clarke, S. Thomas, Z.	2011	Health Information and Libraries Journal	developmental	Developing professional competencies model in health librarianship	Model in Developing Professional Competencies In Health Librarianship	Model In Developing Professional Competencies In Health Librarianship has been presented
37	Theories of learning: Models of good practice for evidence-based information skills teaching	Spring, H.	2010	Health Information and Libraries Journal	Developmental	Focus on two key models for educational development and practice in evidence-based search	The SCONUL model for information literacy Bloom's taxonomy	Using a combination of these two models was effective in teaching evidence-based search
38	Beyond citation analysis: a model for assessment of research impact	Sarli, C. C. Dubinsky, E. K. Holmes, K. L.	2010	Journal of the Medical Library Association	Developmental	Presenting a model for assessing research impact model beyond citation analysis	The Becker Model (assessment research impact model)	The Becker Model (assessment research impact model) can be used by researchers and librarians for citing the impact of research and completing citation analysis

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No	Title	Authors	Year of Pub	Journal	Type of study/ article	Objective	Model/theory/approach/ Theoretical, conceptual framework	Result/Outcome
39	Exploiting personalized information access within an online digital library for medicine: the BIBLIOMED project	Omero, P. Polesello, N. Tasso, C.	2007	10th DELOS Thematic Workshop on Personalized Access, Profile Management, and Context Awareness in Digital Libraries, PersDL 2007	Developmental	Introducing the BiblioMed project, a new open access model for managing services provided by a digital library	BiblioMed Project, a new open access model for managing services provided by a digital library	BiblioMed Project, is a new open access model for managing services provided by a digital library with the aim of more efficient access to information
40	The proposition of information literacy competency standards for users of Polish Medical Libraries	Grygorowicz, A. Kraszewska, E.	2007	Annales Academiae Medicae Gedanensis	Developmental	Finding the best educational model for developing users information literacy skills	Educational model for developing users information literacy skills	This article proposes the prepared standards for the development of users information literacy skills
41	Internet Websites evaluation: Proposals for the assessment of Websites of public and health libraries	Robert Barrera, C. Núñez Amaro, S. Motola Pedroso, D.	2006	ACIMED	Developmental	Developing new designs for assessment websites of public and health libraries	Model to assess websites of public and health libraries	Collection of reliable parameters and indices for assessing websites
42	Team effectiveness in academic medical libraries: a multiple case study	Martin, E. R.	2006	Journal of the Medical Library Association	Quantitative	Utilizing the J Richard Hackman framework on team effectiveness in academic medical libraries	J Richard Hackman framework on team effectiveness	Hackman's effectiveness model has outcomes for successful design of library teams
43	Open access: implications for scholarly publishing and medical libraries	Albert, K. M.	2006	Journal of the Medical Library Association	Developmental	Investigating the development of Open Access publication and its impact on traditional scientific publications	Open Access (OA) Self-Archiving Articles	Changes in the outlook on publication are inevitable. The most common solution for current problematic systems are self-archiving articles published in non-open-access journals or published in open access journals
44	Modeling public health interventions for improved access to the gray literature	Turner, A. M. Liddy, E. D. Bradley, J. Wheatley, J. A.	2005	Journal of the Medical Library Association	Developmental	Improving access to gray literature reports in public health through natural language processing techniques (NLP)	Natural Language Processing Techniques (NLP)	This model is a framework for developing methods to identify and save important features of documents (metadata) as a substitute document
45	A power information user (PIU) model to promote information integration in Tennessee's public health community	Sathe, N. A. Lee, P. Giuse, N. B.	2004	Journal of the Medical Library Association	Developmental	Proposing an educational model focused on developing power Information Users (PIUs)	Power Information User (PIUs) Models	This model is efficient to promote the use of information in work group of power information users

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Table 2: Contd...

No	Title	Authors	Year of Pub	Journal	Type of study/ article	Objective	Model/theory/approach/ Theoretical, conceptual framework	Result/Outcome
46	Creating a Web-accessible, point-of-care, team-based information system (PoinTIS): the librarian as publisher	Burrows, S. C. Moore, K. M. Lemkau, H. L.	2001	Bulletin of the Medical Library Association	Developmental	Presenting a point-of-care team based information system of	Point-of-care team based information system	The presented model is success for librarians as publishers of information
47	Use of fuzzy set theory to extend Dhawan's journal selection model: ranking the biomedical informatics serials	Sittig, D. F.	1999	Bulletin of the Medical Library Association	Developmental	Developing a selection model for journal ranking in each disciple	Fuzzy Set Theory	Using the Fuzzy Set Theory for allocation of membership and combining data in selection model of the journal is effective
48	Theories for practitioners: two frameworks for studying consumer health information-seeking behavior	Baker, L. M. Pettigrew, K. E.	1999	Bulletin of the Medical Library Association	Developmental	Using theories from other disciplines to study the information seeking behavior of health information users	Miller's Psychological Theory Granovetter's Sociological Theory	These theories can be used by researchers to evaluate a range of research problems
49	Costing medical libraries: the feasibility of functional cost analysis	Jones, L. Nicholas, D.	1993	Health libraries review	Developmental	Feasibility and suitability of functional cost analysis for libraries	Functional Cost Analysis	Using the functional cost analysis model for libraries is possible but has limitations such as data collection, etc.

Table 3: Patterns, theories, frameworks and models obtained from the studied articles

No	Topic	Sub-topic including model, theory, approach, framework, …	Number of study in Table 1
1	Information and Information Literacy	• Misinformation, tsunami of information	1
		• Evidence-based information	1
		• Evidence-based medical course model Analyze, Design, Develop, Implement, and Evaluate (ADDIE)	28
		• Longo's expanded conceptual model of health information seeking behaviors	2
		• Health information behavior models (HIB)	2
		• Providing effective health information support services to managers, health care specialists, and the general public in various health related fields	3
		• Kirkpatrick Model (KP)	32, 19, 10
		• Two- tier support services model from scoping review activities	14
		• Flipped classroom model	23, 22, 16
		• Health Information Search Behavior model (HISB) of pet owners	17
		• Dual rubric of information literacy skills assessment	18
		• Kolb's Cycle of Learning in Information Literacy Training	31
		• Outcomes-based Educational Theory in Information literacy Training	33
		• Big 6™ Model	34
		• SCONUL Model regarding information literacy	37
		• Bloom's Taxonomy	37
		• Educational model for developing users' information literacy skills	40
		• Power Information Users Model (PIU)	45
2	Models for Evaluation and Support Services in Libraries and Information Centers	• New Virtual Service Models	4
		• LibQUAL+ Model	13
		• Gamifying the Library Services	20
		• Innovation and big data based health information services model	21
		• WebMedQual scale	24
		• Information services for people with chronic disease	25
		• Silberg, discern and WQET	26
		• BiblioMed Project, a new open model for organization	39
		• J Richard Hackman's framework on team effectiveness	42
		• Natural Language Processing (NLP) techniques	44
		• Point of care team-based information system	46
		• Functional Cost Analysis	49
		• Unified Medical Language System (UMLS)	50
3	Clinical, embedded and professional librarianship	• CREDIT Model, as a criterion for evaluating clinical informationist performance and developing and evaluating clinical informatics education programs	5
		• Clinical Medical Librarian (CML)	30
		• Model of participation for medical librarian in clinical team activity	35
		• Development model of professional competencies in clinical librarianship	36
		• Embedded Librarianship Model	6
		• Five-level Embedded Librarianship Model	27
		• Model of professional ethics excellence for clinical librarians	11
4	Scientometric, selection and evaluation of articles, journals and serials	• Bradford's law	7
		• Leimkuhler Model	7
		• Altmetrics	12
		• Clinical Relevance of Information Index (CRII)	29
		• Baker Model (research impact evaluation model)	38
		• Evaluation model for public and medical library websites	41
		• Fuzzy Set Theory	47
5	Open Access Information	• Open Access Information Model	8, 43
		• Open Access Publishing Models	12
		• Self-Archiving	12, 43
6	Psychological and Sociological Models	• Spiritual Intelligence Model	9
		• Self-compassion Structural Model	9
		• Spiritual Intelligence Measurement Model	15
		• Miller's Psychological Theory	48
		• Granovetter's Sociological Theory	48

group. The articles in this group can be divided into three subcategories. The first is a specific subgroup of studies related to theoretical issues on information such as information pollution, information tsunami, and evidence-based information.[7] A considerable number of studies in this group (second subgroup) have focused on information literacy models and analyzing user's information seeking behaviors[8-10] or the expanded conceptual model, Longo, related to information seeking behavior presented in one of the articles.[11] Finally, the third subgroup is related to the use of models, theories, and various frameworks for education and user's information literacy evaluation. For example, the Big 6TM Model, SCONUL Model, and Bloom's Taxonomy are among the most prevalent models used for teaching information literacy skills.[12-16]

The field of MLIS is interdisciplinary oriented and therefore is based on working with information and information management in the field of medicine. Increasing the information literacy skills of users and finding evidence-based information based on users' needs as per the second principle of Rangananthan's fundamental law in the field of MLIS. That is, "each person his/her own book," is one of the ultimate aims of this field. Therefore, it is comprehensible that the majority of studies conducted in this field are related to evaluating the models, patterns, frameworks, and theoretical foundations related to information and information literacy.

The second category includes articles related to "Models of evaluation and support services in libraries and information centers." The articles in this section can be divided into four subgroups. The first group present a framework and scale for evaluating library and website support services, such as LibQUAL+, WebMedQual scale, Silberg, Discern, and WQET scales that have been used in the studies.[17-19] Another group provides models and frameworks for library support services. "New virtual service models," "information service models for individuals with chronic disease," "BiblioMed Project, a new open model for organization," is among these studies.[20-24] The third group has attempted to use support service models and management evaluation in library services. For example, "evaluating cost performance," "J Richard Hackman's framework on team effectiveness," and "point of care team-based information system" are included in this group.[25-27] The fourth group of this category uses Natural Language Processing techniques and the Unified Medical Language System in organizing and retrieving information.[28,29]

Providing adequate services based on users' needs has always been one of the medical information center and library's main goals. Using support service evaluation methods and using new models and patterns for collection development, organizing and spreading information is a necessary element of a user-friendly information support system, a goal which libraries and information centers are achieving. As it was shown from the information provided in this section, a considerable number of studies have been conducted on evaluating library support services and using new models, frameworks, and patterns for providing adequate services to users, which indicates that libraries and information centers are following the endeavor to achieve their mission and move toward efficient service support for users.

The third category of articles included those on "clinical, embedded, and professional librarianship." Clinical librarianship is interwoven with the essence of MLIS and is one of the boldest of its functional aspects. The clinical librarianship developmental model, medical librarian cooperation in clinical team activities model, and CREDIT model are criteria for evaluating the performance of clinical informationists and also for developing and evaluating clinical information education programs and are among the most important models that researchers have studied in this field.[30-34] Another model given attention to in this profession which has more supervision of the professional performance of medical informationists and librarians is the embedding librarianship model, in which its mission, feature, objectives, and performance are discussed in two articles.[33,35] Embedded librarianship supervises the potentials of librarians in educational, research, and developmental activities such that they are considered the main motivating factor in education, research, and development.

The fourth category includes articles evaluated in the field of "scientometrics, selection, and evaluation of articles, journals, and serials." Selection and evaluation of journal articles and serials is related to one of the most fundamental pillars of MLIS, that is, collection development. Collection development is the main foundation of many activities and services in libraries and medical information centers and without using this comprehensive and complete collection, efficient support services to users would be far-fetched. Scientometrics is also a subcategory of bibliometrics, supervising the assessment of scientific and research activities by using descriptive and analytical statistical methods. As the findings of Table 2 indicate, a number of articles written in MLIS are related to providing models, patterns, theoretical and foundational principles in the field of scientometric, selection, and evaluation of journals and serials. Bradford's Law, Leimkuhler's Model, Altmetrics, Clinical Relevance of Information Index, Baker Model (research impact evaluation model), Evaluation

model for public and medical library websites, and Fuzzy Set Theory are among the models and patterns referred to in these studies.[36,37]

The fifth category includes articles related to "open access information." The open access information model, open access publication models, and self-access archives are among the most important models and patterns studied in this field.[38-40] The open access information movement began in 2005 with the aim of providing accurate information without intermediaries in support services/care, and with regard to its efficient performance, has been accepted by librarians and researchers alike.

The sixth and final category of articles included studies in which psychological and sociological models and patterns were added to the field of MLIS, in two groups of "psychological and sociological models." The Spiritual Intelligence Model, Self-compassion Structural Model, Spiritual Intelligence Measurement Model, Miller's Psychological Theory, and Granovetter's Sociological Theory[41,42] are among the most important. MLIS is an interdisciplinary field and when it focuses on identifying the users information needs or evaluating their information seeking behavior, it turns to the use of psychological and sociological patterns and models and attempts to use them to discover the hidden dimensions of user behavior and intention in seeking for and retrieving information to provide the user with the best information, in the best way, and in the shortest duration of time. Therefore, it is possible to use psychological and sociological models in the field of MLIS.

The most positive strengths of the current research were three-fold, that is, there was no limitation on time in searching for articles; all related articles were retrieved based on search strategies discussed in the methodology section and there were multiple revisions by experts in the field to identify the articles' relevance and scope of the subject being searched. Limiting the search to articles only in Scopus and WOS databases can be considered among the limitations of this study, an issue that can be considered in future research.

Conclusion

Theoretical issues, patterns, models, conceptual frameworks, and theories are the main foundations of any profession. MLIS, with the mission of collecting, organizing, saving, retrieving, and spreading information, is a profession with a long history, which has roots in theoretical and fundamental topics. The results of the present study show that articles published in MLIS have made use of a considerable range of models, theories, patterns, and frameworks as the most important components of theoretical and fundamental topics. These models, theories, and frameworks were divided into six categories, a number of which supervised collection development, organization of material, and most of which supervised the dissemination and support services in information centers and libraries. It seems that the modern MLIS will gradually separate itself from traditional issues in collection development and organization or might focus more on the function of information dissemination due to the emergence of innovative technologies in this field.

Whereas MLIS is a profession with interdisciplinary orientations, and with a specific purpose of accessibility and information dissemination, it still has considerable potentials for providing models, patterns, frameworks, and theories in itself. The modern MLIS needs the support and reinforcement of theoretical and fundamental issues more than anything else, whereas yielding effective performance to support science and researchers is not possible without the fundamental and theoretical support needed. For example, elements that have placed bibliometrics and scientometrics indices at the center of attention for policy makers, managers, universities, and scientific communities are not merely a number of scientometric indices such as an impact factor or h-index rather the strong fundamental and theoretical bases that support this field.

Therefore, due regard to theoretical issues in the MLIS curriculum and also faculty member's attention given to these issues in developing lesson plans and workshops can compensate weaknesses in theoretical issues to a certain extent in this field. At the same time, we can propose a course entitled "Modeling and theorizing in MLIS" to be added to the curriculum or sections of Research Methodology or Research Seminar courses can be assigned to this topic.

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Conflicts of interest

There are no conflicts of interest.

References

1. Rahadoust F. The Fundamental Concepts in Library and Information Science. Tehran: Ketabdar Publishing Co.; 2005.
2. Ashrafi-Rizi H, Hodhodinejad N, Shahrzadi L, R SM. The New Librarians Services in the Health System. Hamedan:

Seperdanesh; 2017.
3. Detlefsen EG. Library and information science education for the new medical environment and the age of integrated information. 1993.
4. Lopatovska I, Arapakis I. Theories, methods and current research on emotions in library and information science, information retrieval and human–computer interaction. Inf Process Manag 2011;47:575-92.
5. Pettigrew KE, McKechnie L. The use of theory in information science research. J Am Soc Inf Sci Technol 2001;52:62-73.
6. Saracevic T. Relevance: A review of the literature and a framework for thinking on the notion in information science. Part III: Behavior and effects of relevance. J Am Soc Inf Sci Technol 2007;58:2126-44.
7. Taghipour F, Ashrafi-Rizi H, Soleymani MR. Dissemination and acceptance of COVID-19 misinformation in Iran: A qualitative study. Int Q Community Health Educ 2021. doi: 10.1177/0272684X211022155.
8. Tahmasebi M, Adibi P, Zare-Farashbandi F, Papi A, Rahimi A. The educational role of clinical informationist on improving clinical education among medical students: Based on kirkpatrick model. J Edu Health Promot 2020;9:7. doi: 10.4103/jehp.jehp_439_19.
9. Lawton A, Manning P, Lawler F. Delivering information skills training at a health professionals continuing professional development conference: An evaluation. Health Info Lib J 2017;34:95-101.
10. Stevenson P, Spring H. Evaluating educational interventions for information literacy. Health Info Lib J 2012;29:81-6.
11. Smith DA. Wikipedia: An unexplored resource for understanding consumer health information behaviour in library and information science scholarship. J Doc 2021. doi: 10.1108/JD-03-2021-0049.
12. Santana Arroyo S, del Carmen González Rivero M. Information literacy for users at the National Medical Library of Cuba: Cochrane library course for the search of best evidence for clinical decisions. Community Jr Coll Lib 2012;18:89-98.
13. Spring H. Theories of learning: Models of good practice for evidence-based information skills teaching. Health Info Lib J 2010;27:327-31.
14. Sathe NA, Lee P, Giuse NB. A power information user (PIU) model to promote information integration in Tennessee's public health community. J Med Lib Assoc 2004;92:459-64.
15. Grygorowicz A, Kraszewska E. The proposition of information literacy competency standards for users of Polish Medical Libraries. Ann Acad Med Gedanensis 2007;37:167-73.
16. Willson G, Angell K. Mapping the association of college and research libraries information literacy framework and nursing professional standards onto an assessment rubric. J Med Lib Assoc 2017;105:150-4.
17. Nasibi-Sis H, Valizadeh-Haghi S, Zare S, Orazi A. Service quality assessment of hospital libraries: A LibQUAL+ survey. Library Philosophy and Practice. 2019;2019. Available from: https://digitalcommons.unl.edu/libphilprac/2828.
18. Shahrzadi L, Mojiri S, Janatian S, Taheri B, Ashrafi-rizi H, Shahrzadi Z, *et al*. Quality assessment of persian mental disorders websites using the webmedqual scale. Acta Inform Med 2014;22:183-8.
19. Zahedi R, Taheri B, Shahrzadi L, Tazhibi M. Ashrafi-rizi H. Quality of persian addiction websites: A survey based on silberg, discern and wqet instruments (2011). Acta Informatica Medica 2013;21:46-50.
20. Howes L, Ferrell L, Pettys G, Roloff A. Adapting to remote library services during COVID-19. Med Ref Serv Q 2021;40:35-47.
21. BasirianJahromi R, Bigdeli Z, Haidari G, HajiYakhchali A. Designing and applying librarygame website software and investigating its impact on self-determination factors of library users. Iran J Information Process Manag 2017;33:361-86.
22. Jianyu L, Juzhi Z, Huanli R, Guichai L. Establishing a university library-based health information literacy service model inthe age of big data. J Med Imag Health Inform 2016;6:260-3.
23. McShane L, Greenwell K, Corbett S, Walker R. Developing a long-term condition's information service in collaboration with third sector organisations. Health Info Lib J 2014;31:106-15.
24. Omero P, Polesello N, Tasso C, editors. Exploiting personalized information access within an online digital library for medicine: The BIBLIOMED project. 10th DELOS Thematic Workshop on Personalized Access, Profile Management, and Context Awareness in Digital Libraries, PersDL 2007; 2007; Corfu. Padova, Italy, 29-30 January 2009.
25. Jones L, Nicholas D. Costing medical libraries: The feasibility of functional cost analysis. Health Lib Rev 1993;10:169-201.
26. Martin ER. Team effectiveness in academic medical libraries: A multiple case study. J Med Lib Assoc 2006;94:271-8.
27. Burrows SC, Moore KM, Lemkau HL. Creating a Web-accessible, point-of-care, team-based information system (PoinTIS): The librarian as publisher. Bull Med Lib Assoc 2001;89:154-64.
28. Turner AM, Liddy ED, Bradley J, Wheatley JA. Modeling public health interventions for improved access to the gray literature. J Med Lib Assoc 2005;93:487-94.
29. Robert JJ, Joubert M, Nal L, Fieschi M. A computational model of information retrieval with UMLS. Proceedings/the Annual Symposium on Computer Application [sic] in Medical Care Symposium on Computer Applications in Medical Care, Marseille, France. 1994. p. 167-71.
30. Hashemian M, Zare-Farashbandi F, Yamani N, Rahimi A, Adibi P. A core competency model for clinical informationists. J Med Lib Assoc 2021;109:33-43.
31. Esparza JM, Shi RH, McLarty J, Comegys M, Banks DE. The effect of a clinical medical librarian on in-patient care outcomes. J Med Lib Assoc 2013;101:185-91.
32. Madge OLP. Developing a model for information services based on a librarian-user partnership in medical clinics in Bucharest. Qualitative & Quantitative Methods in Libraries. 2017. p. 83-8.
33. Clarke S, Thomas Z. Health librarians: Developing professional competence through a 'legitimate peripheral participation' model. Health Info Lib J 2011;28:326-30.
34. Ashrafi-Rizi H, Kazempour Z, Sheikhshoaei F, Ghazavi Z. Designing a model of professional ethics excellence for clinical librarians. J Med Lib Assoc 2020;108:574-83.
35. Franzen SR, Sharkey J. Impact of embedded librarianship on undergraduate nursing students' information skills. J Med Lib Assoc 2021;109:311-6.
36. Borgohain DJ, Verma MK, Nazim M, Sarkar M. Application of Bradford's law of scattering and Leimkuhler model to information science literature. Collnet J Scientometrics Info Manag 2021;15:197-212.
37. Sittig DF. Use of fuzzy set theory to extend Dhawan's journal selection model: Ranking the biomedical informatics serials. Bull Med Lib Assoc 1999;87:43-9.
38. Yueping H, Gerbig M, Kirby S. Needs assessment for improving library support for dentistry researchers. J Med Lib Assoc 2019;107:352-63.
39. Anyaoku EN, Anike AN. The use of open access by medical librarians in Nigeria: A survey of knowledge and practices. Afr J Lib Archives Info Sci 2021;31:75-86.
40. Albert KM. Open access: Implications for scholarly publishing and medical libraries. J Med Lib Assoc 2006;94:253-62.
41. Zarrinabadi Z, Isfandyari-Moghaddam A, Erfani N, Soltani M. Formulating a structural model of self-compassion based on the spiritual intelligence of the students of medical library and information sciences in Iranian Universities of Medical Sciences. J Edu Health Promot 2020;9:7.
42. Baker LM, Pettigrew KE. Theories for practitioners: Two frameworks for studying consumer health information-seeking behavior. Bull Med Lib Assoc 1999;87:444-50.