



## INFORMATION SYSTEMS AS A TOOL FOR DECISION MAKING IN HEALTH CARE: AN INTEGRATIVE REVIEW

### SISTEMAS DE INFORMAÇÃO COMO INSTRUMENTO PARA TOMADA DE DECISÃO EM SAÚDE: REVISÃO INTEGRATIVA

### SISTEMAS DE INFORMACIÓN COMO UNA HERRAMIENTA PARA LA TOMA DE DECISIONES EN SALUD: UNA REVISIÓN INTEGRADORA

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#### ABSTRACT

**Objective:** to identify the applicability of information systems as a tool for decision making in health. **Method:** an integrative review from the question << What are the current trends in the applicability of information systems as a tool in decision-making in health? >> We conducted a search of scientific literature between 2009 and 2016, in the databases LILACS, MEDLINE, ColecionaSUS and virtual libraries Cochrane and SciELO, using the descriptors information systems, decision making and information technology. **Results:** the health information systems are presented as important tools for the production of information, directing the decision-making process of health professionals, assisting in the planning and execution of actions according to the context and specificity of service. **Conclusion:** the health information systems, organized and updated, assist in the planning of actions and decision making of health professionals and increase the quality of care of the Unified Health System. **Descriptors:** Information Systems; Decision Making; Information Technology.

#### RESUMO

**Objetivo:** identificar a aplicabilidade dos sistemas de informações como instrumento para tomada de decisão na saúde. **Método:** revisão Integrativa a partir da questão << Quais são as tendências atuais na aplicabilidade dos sistemas de informações como instrumento de tomada de decisão na saúde? >> Realizou-se busca da produção científica, entre 2009 e 2016, bases de dados LILACS, MEDLINE, ColecionaSUS e bibliotecas virtuais Cochrane e SciELO, empregando os descritores *sistemas de informação, tomada de decisão e tecnologia da informação*. **Resultados:** os sistemas de informação em saúde apresentam-se como instrumentos importantes para a produção de informações, direcionando o processo decisório dos profissionais da saúde, auxiliando no planejamento e execução de ações de acordo com o contexto e especificidade do serviço. **Conclusão:** os sistemas de informação em saúde, organizados e atualizados, auxiliam no planejamento das ações e tomada de decisão dos profissionais da saúde e aumenta a qualidade de assistência do Sistema Único de Saúde. **Descritores:** Sistemas de Informação; Tomada de Decisões; Tecnologia da Informação.

#### RESUMEN

**Objetivo:** identificar la aplicabilidad de los sistemas de información como herramienta para la toma de decisiones en materia de salud. **Método:** esta es una revisión integradora de la pregunta << ¿Cuáles son las tendencias actuales en la aplicabilidad de los sistemas de información como herramientas de toma de decisiones en salud? >> Se realizó la búsqueda de la literatura científica entre 2009 y 2016, en las bases de datos LILACS, MEDLINE, ColecionaSUS y bibliotecas virtuales Cochrane y SciELO, usando los sistemas de información de descriptors, toma de decisiones y la tecnología de la información. **Resultados:** los sistemas de información sanitaria se presentan como herramientas importantes para la producción de información, dirigiendo el proceso de toma de decisiones de los profesionales de la salud, la asistencia en la planificación y ejecución de acciones de acuerdo con el contexto y la especificidad de servicio. **Conclusión:** los sistemas de información sanitaria, organizados y actualizados, ayudan en la planificación de las acciones y decisiones profesionales de la salud y la toma aumenta la calidad de la atención del Sistema Único de Salud. **Descriptor:** Sistemas de Información; Toma de Decisiones; Tecnología de la Información.

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## INTRODUCTION

Arising in the mid-1950s, information systems gave their first steps in business and later in hospital, more focused on statistical controls than for information and assistance in care. In the 1990s geared care systems with the patient in order to instrumentalize management and assistance, stating the reasons for management decisions.<sup>1</sup> Thus, the Information Systems in Health (SIS) have been defined by the World Health Organization (WHO) as tools that integrate the collection, processing, storage, communication and use of fundamental information to improve the effectiveness and efficiency of services through better management at all levels of health.

The product of these systems (information) is relevant to support the management and planning of health programs that promote the improvement of care and the health service. Thus, in addition to collect, process, store and disseminate information, the SIS also contributes to the identification of specific needs, with the production of indicators and the organization of health actions<sup>2</sup>, with a modern technology that integrates the means of communication, improves the functioning of the labor process and care, provides safety and knowledge of demands and needs.<sup>3</sup> It is noteworthy that for the health sector as well as for other sectors, information is critical to power and continuous rational processes that promote decision-making and lead to the development of actions and activities to impact the health situation.<sup>4</sup>

This study aims to identify the applicability of information systems as a tool for decision making in health.

## METHOD

We conducted a resource of Evidence-Based Practice (EBP)<sup>5</sup>, Integrative Review of Scientific Literature<sup>6-7</sup>, which consists of the following steps: 1 - issue identification and selection of the hypothesis or research question to elaborate the integrative review; 2 - establishment of criteria for inclusion and exclusion of studies, sampling and literature search; 3 - definition of the information to be extracted from selected studies and categorization of studies; 4 - assessment of the studies included in the integrative review; 5 - interpretation of results; 6 - presentation of the review; 7 - synthesis of knowledge.

The guiding question of the study was: What are the current trends in the applicability of the information systems as a decision-making tool in health? For the initial composition of this study there were used as inclusion criteria available scientific works in complete texts, and online subsequently held a filtering material to form found possible responses and more direct explanation on the matter/event search. Among all the 17 works there were selected and analyzed, namely: all are scientific articles from national and international journals (English, Portuguese and Spanish). The bibliographic material found from the previously mentioned technical descriptors was selected according to the following criteria: relevance of the theme and content, technical quality of research, timeliness of bibliographic material - 2009-2016 - method and reliability of the results and conclusions of search. Thesis were excluded, dissertations, monographs, articles that do not converge as the object of study and doubly indexed publications.

The search was carried out by three reviewers, ensuring rigor in the selection process of the articles of databases Latin American and Caribbean Health Sciences (LILACS), Medical Literature Analysis and Retrieval System Online (MEDLINE), National Sources for Information Collection of the Unified Health System (ColecionaSUS) and virtual libraries Cochrane and Scientific Electronic Library Online (SciELO). The descriptors were selected due to greater compliance with the study, namely: information systems, decision making and information technology. Descriptors in Health Sciences (DECS) were: "information system" [and] "decision-making" [and] "information technology".

The selected articles were analyzed using a validated instrument, evaluating data relating to the identification of the original article, methodological characteristics of the study, assessment of the methodological rigor of measured interventions and the results found in the articles to the journal, author, study and level of evidence: level 1, systematic reviews or meta-analysis; level 2, at least one clinical trial randomized controlled well defined; level 3, well-designed clinical trials without randomization; level 4, cutting and well-designed case-control studies; level 5, systematic review of descriptive and qualitative studies; level 6, evidence derived from a single descriptive or qualitative study; level 7, opinions of authorities or

report of expert committees.<sup>6-7</sup> Through thematic or categorical analysis type of content analysis technique, operated Text break in units (categories), according analog systematic regroupings.<sup>6-7</sup>

RESULTS

The studies that make up this integrative review interrelate when discussing potential or limitations as professional training, continuing education, strategic planning, technical limitations of the systems, territorial diagnosis and integration of sectors and services of the health system. Often, also, the concept of the Information Systems in Health are essential to the process of health decision-making, serving as theoretical support for evidence-based practice. However, there were some limitations that make this whole process not only beneficial but difficult to implement and develop for several reasons. All this will be discussed below, and it is

necessary to recognize the above items based on this study. At this point, then, it is to recognize the technical structure of each article so that later all are worked together, thus building a complete discussion of the Information Systems in Health and decision making in the world of information technology.

Articles are categorized so that you comply with the publications of the studies related to the theme, journals used by the authors and the dynamic between professional practice, service and scientific production, in order to quantify and mostly qualify what has been researched and published and what can still be seen as encouragement and / or barrier for other professionals to engage not only in the search for scientific evidence, but become protagonists of their own work and to do science with what is being deployed as a professional practice in health.

Author	Title	Databases / Virtual Libraries	Journal Publication Year	Outline of the study	Evidence Level
Cavalcante RB, Ferreira MN, Silva PC Marin HF	Health information systems: possibilities and challenges	LILACS	Nursing Magazine UFSM, 2011	Critical reading	VII
	Health information systems: General considerations	LILACS	Journal Health Inform, 2010	Literature Review	V
Benito GAV, Licheski AP	Information systems supporting the management of work in health	MEDLINE	Brazilian Nursing Magazine, 2009	Theoretical-Reflexive	VII
Queiroga RM, Andrade NA, Abrantes KSM, Costa TS, Sobreira MV, Casimiro GS	Applicability of the information system of the basic attention in the daily life of Nurses.	COCHRANE	Northeast Nursing Magazine Network, 2011	Exploratory-Descriptive	VI
Barreto JOM, Souza NM	Advancing the use of health policy and practice informed by evidence: the experience of Piripiri-Piauí	LILACS	Science & Collective Health, 2013	Exploratory-Descriptive	VI
Catalan VM, Silveira DT, Neutzling AL, Martinato LHM, Borges GCM	System NAS: Nursing Activities Score in mobile technology	LILACS	USP Nursing School Magazine, 2011	Case Studies	VI
Almeida GBS, Freire MR, Leonel M	Basic care information system: the perception of nurses	MEDLINE	Nursing Magazine of Minas Gerais, 2012	Qualitative-Descriptive	VI
Duarte MLC, Tedesco JR, Parcianello RR	The use of the information system in the family health strategy: perceptions of nurses	SciELO	Nursing Magazine of Rio Grande do Sul, 2012	Exploratory-Descriptive	V
Santos AF, Ferreira JM, Queiroz NR, Magalhães Júnior HM	Structuring the health information area from informational resources management: analysis of experience	LILACS	Panamerican Nursing Magazine, 2011	Case Studies	VI

Patrício CM, Maia MM, Machiavelli JL, Novaes MA	The electronic patient record in the Brazilian health system: a reality for the doctors?	LILACS	Scientia Medica, 2011	Literature Review	V
Cavalcante RB, Cunha SGS, Bernardes MFVG, Gontijo TL, Guimarães EAA, Oliveira VC	Hospital information system: use in the decision-making process	LILACS	Journal Health Informatics, 2012	Case Studies	VI
Pinochet LHC	Information technology trends in the management of health	LILACS	World of Health, printed. 2011	Descriptive	V
Lemos C, Chaves LP, Azevedo ALCS	Hospital information systems within the SUS: integrative research review	COCHRANE	Nursing Electronic Magazine, 2010	Literature Review	V
Guedes ACCM, Síndico SRF	Implementation of telehealth in the high complexity hospital: the challenge of building dialogue between the field of technological development and the qualification in health	ColecionaSUS SUS	TeleHealth Brazilian Journal, 2014	Literature Review	V
Senna MH, Andrade SR	Indicators and information on local health planning: vision of nurses of family health strategy	LILACS	Text & Context Nursing, 2015	Multiple Case Studies	VI
Dias RISC, Barreto JOM, Vanni T, Candido AMSC, Moraes LH, Gomes MAR	Strategies to stimulate the use of scientific evidence in decision-making	LILACS	Collective Health Records	Literature Review	V
Montenegro LC, Brito MJM, Cavalcante RB, Caram CS, Cunha GAM	Information system as a management tool: prospects and challenges in a charitable hospital	LILACS	Journal of Health Informatics, 2013	Case study	VI

Figure 1. Distribution of studies according to articles, databases and journals. Brasília, 2016.

DISCUSSION

The revolution in contemporary management starts from the manner in which the information<sup>1</sup> is treated, so the systems are electronic tools that contribute to the health sector, in order to computerize the work, increase dialogue, promote integration and service sectors and, streamline and qualify the management actions.<sup>8</sup> Thus, the information systems of health information are instruments of production, which directs both the decision-making process of the professional services of the different levels of health care as the managers of such services that have access to real-time information, assisting in the planning and execution of actions.<sup>9</sup>

Among the articles analyzed, there are the approaches in common as the difficulty

about understanding of the functionality of the systems<sup>10</sup>, correct completion and updating of data, gaps / limitations of systems and lack of technical support<sup>11</sup> and professional disqualification with information technology in health. With this, there are some points to be improved, such as the change of professional attitude that instead of worrying about filling out reports and records should pay attention to food systems, information analysis and decision making regarding the best strategy intervention; continuing education should be offered to professional and accepts / held by them, including this is the main obstacle to the implementation of electronic medical record system in Brazil<sup>12</sup>, since it is not feasible filing of such amount of paper<sup>13</sup> and admission systems as an initial source of information for managers and other



professionals and not just as an obligation to fill forms and to produce unreal data, but to produce qualitative and structured knowledge.<sup>14</sup> An example of (bad) system functionality is when teams group information and send to the database without any analysis, assembly and/or discussion in team explore what was collected not only quantitatively, but mostly qualitatively, ie the information that do not contribute as they should in decision making and intervention in the process of work, because it does not deal with real information, and influence in other related areas. According Pinochet “technological advances, especially in IT, in various sectors, require a high investment, have a high operating and maintenance costs and obsolete quickly become”<sup>15</sup>, and one more reason to get organized and use technologies in the work process as an investment in service and professionals.

The decision-making process in health still hegemonically has a biomedical character, but the current law, the principles and guidelines of SUS proposing universality, decentralization, territorial and integrity, among others, combined with Information Systems in Health are already changing this scenario; because, from the access to information, it is possible to build the territorial diagnosis that enables the planning and intervention geared to the specific needs and demands of each community and an example is the Basic Care Information System that is already being used by service this health care level and producing intervention outcomes.<sup>11</sup> So is being modified biomedical vision to one that values all human dimensions, aims not only at the individual intervention, but your whole family, consider the biological, psychological, mental, social, cultural and economic factors, in a multidisciplinary and transdisciplinary way, in addition to innovative to promote health ideas, prevent diseases and injuries, control the environment, treat and rehabilitate, giving visibility to the care and raising the level of care and quality of individual lives and collectively.<sup>16</sup>

Modernity follows expanding by various public and private sectors, coordinating and involving all administrative levels. In health, specifically, it has demonstrated its value and its advantages and disadvantages, as follows presenting their relationship with the possibility of analysis of the health situation of a city with the various influences that the life situation imposes on the process health

and disease, the organization of work in the identification of more or less vulnerable social groups, difficulty and/or ease of access to health services and the direction and subsidy to the work process.<sup>3</sup> So, we go to build a favorable scenario the qualitative emphasis on decision-making and which then becomes modified because not only is based on disease situations, but in health situations and all that evolves this broad and complex term.

Decision making becomes built by a team and not just one person who previously analyzes all biopsicosociocultural context of the individual and the family, raise data and questions, demands and needs, discuss and plan to later intervene efficiently and assertiveness, guided by the analysis of the situation, considering the influences and the process situational health and disease. A health information system, to be regionalized, provides population indicators, health diagnosis, subsidizes reviews, projects and plans of actions in health and assists in the search for effective alternatives, agile, coherent and consistent with the situational reality.<sup>17</sup> However, so you make good use of all that the tool provides is necessary that health professionals rely on information being produced by the information Systems in Health; however, there are low reliability reports on the data because these are generated by different professional categories<sup>18</sup>, ie, professionals need to be trained with this tool to build that trust and thus can be applied in full.

The Ministry of Health coordinates the Informed Policy Network for Evidence that precisely has the objective of promoting the use of scientific evidence in decision-making in health and to either build formulation processes, implementation and evaluation of policies at all levels of care.<sup>19</sup> This relates directly to the individual subjectivity of the guarantee, collective well-being, increased quality of service and professional work<sup>20</sup>, because builds structured practice of constitutional health system, strengthening of existing laws, and generally improves both the professional capacity of instigating their abilities and limitations not allowing the professional freezing as the participation of the population in the care of their own health and community.<sup>8</sup>

It is appropriate, therefore, to promote further discussion of these phenomena aimed at updating the knowledge of the subject and the assumption of spaces legally related to nursing, but just assumed because of the precariousness of the tools available. The promotion of these discussions in line with

the requirements of current health care model (SUS) can bring benefits to health services.<sup>21</sup>

## CONCLUSION

From the theoretical reflection achieved with this integrative review, it was found that the information systems of well prepared and organized health are crucial to the process of health decision-making, by providing data and knowledge of the real needs of the assisted population, assisting in the planning of management actions and decision-making of health professionals.

Information systems are tools that contribute to increasing the quality of care and comprehensive care to the user, as provided for in the principles and guidelines of SUS. Therefore, it is necessary to implement these systems in an integrated manner, enabling professionals, stimulating adherence and use of them in order to provide a service that strengthens the health actions and processes.

It was noticed that the information systems alone will not give aid account in decision making as to which data and factual information have use value is key to acceptance, use and careful analysis by managers and health professionals and this requires ongoing training of all servers, regardless of their professional category, to achieve better strategic planning in the health service.

Finally, it is necessary to unite researchers, health system and citizens in a balance in making public policies in order to improve the Brazilian health system, as well as causing changes in the organization and operation of health care, seeking the improvement and development of critical thinking skills, understanding to know the information systems and their importance is not the same as applying them in the work process.

With this study, it is considered that one of the contributions is the possibility of building a material to assist in reflection, systematization and organization of the work process by managers and health professionals in relation to the Health Information Systems as a tool of decision-making. It finds necessary to carry out research to collaborate with the subject, as, for example, that in 2015 few studies related to information systems for decision-making and in 2016, the database Virtual Learning Library, were not found published studies. Soon, it is necessary to produce evidence in this area, as well as new methodological

approaches chosen by researchers who, in most cases, has a preference for case study or literature review. However, all sorts of scientific production are important and this study sought to encourage new productions from what has already been studied.

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