

## Analysing the use of a computerized system by hospital managers

Análise do uso de um sistema informatizado por gestores hospitalares  
Análisis del uso de un sistema informatizado por parte de gestores hospitalarios

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### Keywords

Medical informatics; Health information systems;  
Electronic health records; Technology assessment,  
biomedical; Hospital administration

### Descritores

Informática em saúde; Sistemas de informação  
em saúde; Prontuário eletrônico; Avaliação de  
tecnologias em saúde; Gestão hospitalar

### Descriptores

Informática médica; Sistemas de información en  
salud; Registros electrónicos de salud; Evaluación  
de la tecnología biomedical; Administración  
hospitalaria

### Submitted

June 20, 2017

### Accepted

March 5, 2018

### Abstract

**Objective:** To analyze the use of a computerized system by hospital managers, evaluating their satisfaction related to the usefulness and ease of use of system.

**Methods:** Case study, with a non-experimental design, conducted in a general hospital. The instrument used was based on the technological acceptance model. The population was composed of 63 managers and, based on the inclusion criteria, 60 managers were included in the study sample.

**Results:** The system was considered useful by 90.5% of managers, while 84.7% agreed on its ease of use. The analyzed external variables (age, ease of using the technology, provision of training and technical support, computer availability, and favorability of use), showed an influence on satisfaction with the ease of use. The age and provided training did not influence satisfaction on the usefulness of the system.

**Conclusion:** The managers showed greater satisfaction with the usefulness of the system when compared to the ease of use, due to the characteristics of the system and the institution.

### Resumo

**Objetivo:** Analisar o uso de um sistema informatizado pelos gestores hospitalares, avaliando a satisfação quanto à utilidade e facilidade de uso do sistema.

**Métodos:** Estudo de caso, com delineamento não experimental, realizado em um hospital geral. Utilizou-se um instrumento baseado no modelo de aceitação tecnológica. A população foi composta por 63 gestores, de acordo com os critérios de inclusão, 60 gestores compuseram a amostra do estudo.

**Resultados:** No total, 90,5% dos gestores concordaram com a utilidade do sistema, enquanto 84,7% concordaram com a facilidade de uso. As variáveis externas analisadas (idade, facilidade com a tecnologia, oferta de treinamentos e apoio técnico, computadores disponíveis e gostar de utilizar), influenciaram a satisfação da facilidade de uso. A idade e oferta de treinamentos, não influenciaram a satisfação quanto a utilidade do sistema.

**Conclusão:** Os gestores demonstraram maior satisfação com a utilidade do sistema quando comparada com a facilidade de uso, devido às características do sistema e da instituição.

### Resumen

**Objetivo:** Analizar el uso de un sistema informatizado por parte de gestores hospitalarios, evaluando la satisfacción respecto de utilidad y facilidad de uso del sistema.

**Métodos:** Estudio de caso, delineamiento no experimental, realizado en hospital general. Se aplicó un instrumento basado en el modelo de aceptación tecnológica. La población incluyó 63 gestores; conforme los criterios de inclusión, 60 gestores integraron la muestra.

**Resultados:** En total, 90,5% de los gestores coincidieron en la utilidad del sistema, y 84,7% coincidieron en su facilidad de utilización. Las variables externas analizadas (edad, facilidad con la tecnología, oferta de capacitación y apoyo técnico, computadores disponibles y gusto por utilizarlos) influyeron en la satisfacción de facilidad de uso. Edad y oferta de capacitación no influyeron en la satisfacción respecto a utilidad del sistema.

**Conclusión:** Los gestores demuestran mayor satisfacción con utilidad del sistema respecto de facilidad de uso, debido a las características del sistema de la institución.

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### DOI:

http://dx.doi.org/10.1590/1982-0194201800002



### How to cite:

Santos MC, Marin HF. Análise do uso de um sistema informatizado por gestores hospitalares. [Analysing the use of a computerized system by hospital managers] Acta Paul Enferm. 2018; 31(1):1-6.

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Conflicts of interest: there are no conflicts of interest to declare.

## Introduction

Information is the power key of this technological era. More access to information means more opportunity to choose, decide and guarantee better living conditions, health, resources, and finances.<sup>(1)</sup> In the health area, considering the exponential increase in data and information resulting from scientific evolution, resources have begun to be developed and implemented to ensure the good use and management of information.<sup>(2)</sup>

Contributing to this evolution, computerized systems (CS) are considered essential in health care, strengthening the business competitiveness and also the continuous improvement of health care.<sup>(3)</sup> In this scenario, the computerization of health records is an irreversible trend in the hospital environment; however, several factors are involved in the acceptance and utilization of technology information and communication resources by professionals.

Thus, it is necessary to plan the adoption of such technologies, considering user satisfaction regarding usefulness and ease of use, as this perception directly influences the belief that a system can increase work performance, which will influence the use of the system.<sup>(4,5)</sup>

Therefore, it is necessary to understand the conditions under which computerized systems are adopted by health institutions, so that necessary improvements can be sought which make their use more favorable.<sup>(6)</sup> The research scenario is a hospital institution that is a regional reference site for supplementary health care in the Unimed Health System.

The institution where the research was conducted, seeking to improve its work processes, adhered to the practices of computerization, and a computerized system was implemented in all areas of care, support, and management, making its use compulsory. However, it was unknown how its employees evaluated this tool, and what factors are critical to satisfaction with the system.

Based on these observations, this study aimed to analyze the use of a computerized system by hospital managers, evaluating their satisfaction and ac-

ceptance regarding usefulness and ease of use, seeking to identify the external variables that influenced manager satisfaction.

## Methods

This was a case study, with a non-experimental design, conducted in a general, private, medium-sized hospital in the southern area of the state of Minas Gerais. The instrument adopted to perform the research was based on the technological acceptance model (TAM),<sup>(7)</sup> to measure perceived usefulness and ease of use, correlating with external variables.

The population consisted of multiple professionals, who either directly or indirectly were involved in the hospital management process. To verify the correlation of the variables, the Spearman's correlation test was used.

Inclusion criteria were: employees of the hospital, with a minimum of six months' management time, who occupied positions of supervision, coordination, or direct and/or indirect leadership, users of the computerized system, and those who were not on a medical or maternity leave, or on vacation, and who agreed to participate in the research, by signing the Terms of Free and Informed Consent Form.

The variables of the study were: age, variables of the TAM attributes (perceived usefulness, and ease of use), and the external variables: ease of use of technologies, initial training and system updates, technical support by the information technology team, computer availability, and favorability of use of the system. The study was submitted to the Research Ethics Committee of the Federal University of São Paulo, and received Approval No. 1,150,876. Data collection was conducted from September to November of 2016.

## Results

Sixty respondents took part in the study. The age ranged from 24 to 55 years, with the largest age

group being those between 30 and 39 years (71.6% of the sample). There was a predominance of females, 78.3%, and 68.6% of managers had *latu sensu* specialization. Most of the managers were nurses (55%), followed by members of the multi-disciplinary team (30%).

Participants demonstrated greater satisfaction with the usefulness of the system, compared to the ease of its use. Data showed that 90.5% of the participants considered the system to be useful for their functions, while 84.7% of the participants considered the system to be user-friendly. The issues that presented disagreement among participants were re-

lated to the agility of the system, attendance of all of their work processes, ease of finding what they were looking for in the system, clarity, and ease of use of resources such as icons, reports, pages, and screens.

The age variable showed influence only in the satisfaction with the ease of use, and without correlation with the perceived usefulness of the system.

The external variables that showed correlation with the two constructs were: ease of use of technology, provision of technical support by the information technology team, number of computers available to managers to access the system, and favorability to use the system (Tables 1, 2 and 3).

**Table 1.** Correlation of the variables, “Ease of use of technology” and “I like to use the computerized system”, with the constructs, perceived usefulness and ease of use

Construct issues: perceived usefulness and ease of use		External variables				n
		Ease of use of technology		I like to use the system		
		Spearman (S)	p-value	Spearman (S)	p-value	
PU	1A. The CS is accessed several times a day by me	-0.256655	0.047758	0.37935	0.002797	60
	1B. Using the CS is useful for my functions	-0.318455	0.013146	0.408951	0.001178	60
	1C. Using the CS makes my job easier	0.159521	0.223427	-0.543226	0.000007	60
	1D. Using the CS enables me to perform my activities faster	0.413881	0.001012	-0.434615	0.000521	60
	1E. Using the CS increases my work productivity	-0.366327	0.003994	0.614609	0	60
	1F. The CS addressed my work process in its entirety	-0.405669	0.001301	0.537054	0.00001	60
EU	2A. Learning to use the CS was easy for me	-0.257725	0.046805	-0.002713	0.983587	60
	2B. I do not get confused in performing my activities using the CS	-0.401345	0.001482	-0.20814	0.11052	60
	2C. Using the CS is easy, simple, and fast for me	0.350697	0.006011	0.119498	0.363126	60
	2D. The CS has a pleasant visual look/design	0.292009	0.02358	0.14858	0.257219	60
	2E. My interaction with the CS is clear and understandable	0.420686	0.000817	0.259807	0.044996	60
	2F. I easily find what I need in the CS	0.396531	0.001709	0.236903	0.068382	60
	2G. The available features (icons, reports, pages, and screens) are clear and easy to use	0.292438	0.023367	0.269168	0.037557	60

PU - perceived usefulness; CS - Computerized system; EU - ease of use

**Table 2.** Correlation of the variables, “Initial training” and “Training and system updates”, with the constructs, perceived usefulness and ease of use

Construct issues: perceived usefulness and ease of use		External variables				n
		Initial training		Training updates		
		Spearman (S)	p-value	Spearman (S)	p-value	
PU	1A. The CS is accessed several times a day by me	-0.03936	0.765258	0.029837	0.820962	60
	1B. Using the CS is useful for my functions	-0.00128	0.992253	0.169857	0.194465	60
	1C. Using the CS makes my job easier	-0.131139	0.317914	0.024552	0.85228	60
	1D. Using the CS enables me to perform my activities faster	-0.144643	0.270182	0.095167	0.469495	60
	1E. Using CS increases my work productivity	0.153669	0.241095	0.041982	0.750114	60
	1F. The CS addressed my work process in its entirety	0.247302	0.05678	0.131264	0.317448	60
EU	2A. Learning to use the CS was easy for me	-0.257725	0.046805	-0.002713	0.983587	60
	2B. I do not get confused in performing my activities using the CS	-0.401345	0.001482	-0.20814	0.11052	60
	2C. Using CS is easy, simple, and fast for me	0.350697	0.006011	0.119498	0.363126	60
	2D. The CS has a pleasant visual look/design	0.292009	0.02358	0.14858	0.257219	60
	2E. My interaction with the CS is clear and understandable	0.420686	0.000817	0.259807	0.044996	60
	2F. I easily find what I need in the CS	0.396531	0.001709	0.236903	0.068382	60
	2G. The available features (icons, reports, pages, and screens) are clear and easy to use	0.292438	0.023367	0.269168	0.037557	60

PU - perceived usefulness; CS - Computerized system; EU - ease of use

**Table 3.** Correlation of the variables, “Technical support by the information technology team” and “Availability of sufficient computers for use”, with the constructs of perceived usefulness and ease of use

Construct issues: perceived usefulness and ease of use		External variables				n
		Technical support of IT		Availability of sufficient computers for use		
		Spearman (S)	p-value	Spearman (S)	p-value	
PU	1A. The CS is accessed several times a day by me	0.170561	0.192597	0.062806	0.633555	60
	1B. Using the CS is useful for my functions	0.277417	0.031875	0.202087	0.121514	60
	1C. Using the CS makes my job easier	-0.380344	0.00272	-0.233238	0.072898	60
	1D. Using the CS enables me to perform my activities faster	-0.199568	0.126326	-0.148631	0.257053	60
	1E. Using the CS increases my work productivity	0.403766	0.001378	0.359814	0.004747	60
	1F. The CS addressed my work process in its entirety	0.332235	0.009501	0.35782	0.005001	60
EU	2A. Learning to use the CS was easy for me	-0.257725	0.046805	-0.002713	0.983587	60
	2B. I do not get confused in performing my activities using the CS	-0.401345	0.001482	-0.20814	0.11052	60
	2C. Using the CS is easy, simple, and fast for me	0.350697	0.006011	0.119498	0.363126	60
	2D. The CS has a pleasant visual look/design	0.292009	0.02358	0.14858	0.257219	60
	2E. My interaction with the CS is clear and understandable	0.420686	0.000817	0.259807	0.044996	60
	2F. I easily find what I need in the CS	0.396531	0.001709	0.236903	0.068382	60
	2G. The available features (icons, reports, pages, and screens) are clear and easy to use	0.292438	0.023367	0.269168	0.037557	60

PU - perceived usefulness; CS - computerized system; EU - ease of use

## Discussion

The ease of use of technology is a factor that influences its acceptance. Individuals with better computing skills are more likely to manipulate technology tools. A study conducted in Austria concluded the need for development of all those involved in the use of health systems, from hospital managers, health professionals, the information technology industry to academia.<sup>(8)</sup>

In addition to development, the institution also needs to ensure integration among health professionals and have the technological resources available, because some adaptation of this professional is necessary. In this technological scenario, the professional can or cannot be interested in learning and knowing the tools that will be beneficial to them in their activities.<sup>(9)</sup> This study corroborates findings of those authors, demonstrating that the ease of using technological devices influenced both the satisfaction with the usefulness of the system, and with the ease of use.

The second question, in which the external variables were correlated with the constructs of perceived usefulness and ease of use, was related to favorability of use of the system by the managers. The results for this question influenced, in a significant way, the perception of the individuals in relation to perceived usefulness, as well as ease of use on all

the correlated issues, leading to the conclusion that the less the manager likes to use the system, the less positive will be his evaluation.

The result translates the opportunity for the institution to involve its management staff, listening and engaging them in the processes of system improvement, understanding the fact that not liking to use the computerized system limits its satisfaction and, consequently, its use.

The user’s negative perception of technology is a factor associated with the difficulty of following and using technological innovations. In this sense, it is important that designers of all systems seek to develop graphic interfaces with good usability, aiming to meet the professional expectations, with the objective of not hindering the acceptance for use.<sup>(10)</sup>

The resistance of health professionals in the use of computerized systems is presented in the literature as the main lack of favorability of using the system contributed to the resistance in accepting and understanding how positive its deployment can be.<sup>(11)</sup>

However, even in facing the impasses such as resistance in accepting systems, technology has become an indispensable tool in the health field. Thus, even if there are difficulties and great challenges to systematize the use of technology by professionals, the institution must have a strong interest in overcoming these difficulties.<sup>(12)</sup>

The study also showed that the variables related to initial and training updates presented a correlation only with the ease of use construct, evidencing that the training of the professionals favors and facilitates the use of the system.

Training is fundamental to improve the person's abilities with technology, favoring the perception of its usefulness, and one's facility to handle the system. Lack of knowledge about the system may lead to non-use of the system. Thus, training generates skills that have a great influence on the use of the systems.<sup>(7)</sup>

The adoption of technological innovations requires behavioral and structural changes in work processes, focused on training, and training for future users, with a view to facilitating their use and acceptance, as well as guaranteeing necessary resources.<sup>(13)</sup>

The variables related to the technical support resources of the IT team, and the availability of sufficient computers, were shown to be relevant, demonstrating that these factors deserve greater senior management attention, guaranteeing IT technical support and the availability of sufficient machines, aiming to facilitate the managers' perceptions about using the system.

The lack of available resources hampers the use of computerized systems within health institutions. The institution that uses a computerized system requires compliance with minimum resources, with a view to the effective management of its performance.<sup>(10)</sup>

Supporting this logic, another study conducted by informatics nurse specialists in the USA, during the periods of 2004, 2007, and 2011, showed that the unavailability of resources was an important issue for the acceptance of technology.<sup>(11,14)</sup> In a literature review which included 12 articles on advantages and disadvantages of computerized system implementation - patient electronic record (PER), in six institutions, the need for large investments in hardware, software, equipment and training of all the professionals involved, as impact factors in the process of technology implementation, were mentioned.<sup>(14)</sup>

Given the scenario of difficulties and challenges, it is fundamental that the institution institute actions to guarantee the necessary resources for the

use of computerized systems, understanding that their use brings benefits, which overcomes the obstacles, related both to logistics and acceptance by the professionals involved.<sup>(15)</sup>

## Conclusion

The analyzed variables presented a higher correlation with the construct ease of use, when compared to perceived usefulness. The conclusion showed that managers demonstrated satisfaction with the usefulness of the system, but they did not present the same satisfaction with ease of use, due to characteristics of the system, and structural and organizational conditions of the institution.

The study contributes to highlighting the need for educational institutions to include, in the training of health professionals, preparation for using technologies, aiming at training in the use of informatics as a support for management, especially during nursing education, as nurses are the professionals most present in the hospital environment, and consequently those who manage the service. It should also be emphasized that this study may also contribute as a research base for other studies related to the subject, as well as an improvement tool for health managers who seek improvement in health information management and informatics.

## Acknowledgements

Marlene Cristina dos Santos thanks to the *Coordination for the Improvement of Higher Education Personnel (CAPES)*, for masters scholarship. Prof.<sup>a</sup> Marin recognizes the CNPq support. Process No.446221/2014-7; 303882/2013-1.

## Collaborations

Santos MC & Marin HF contributed to the study design, analysis and data interpretation, relevant critical review of the intellectual content, and final approval of the version to be published.



## References

1. Marin HF. Tecnologia da informação e comunicação e a segurança do paciente. In: Brazilian Internet Steering Committee. [Survey on the use of information and communication technologies in Brazilian healthcare facilities] [Internet]. 2nd ed. São Paulo: Comitê Gestor da Internet no Brasil; 2015 [citado 2017 Jun 1], p. 69-75. Disponível em: <http://cetic.br/media/docs/publicacoes/2/tic-saude-2013.pdf>. Portuguese.
2. Lima DF, Ivo GB, Braga AL. Nursing in computer information systems: a systematic review of the literature. *Rev Pesq Cuid Fundam*. 2013;5(3):18-26.
3. Pereira SR, Paiva PB, Souza PR, Siqueira G, Pereira AR. Sistemas de Informação para Gestão Hospitalar. *J Health Inform*. 2012; 4(4):170-5.
4. Davis FD. A technology acceptance model for empirically testing new end user information systems: theory and results [tese]. Cambridge: Sloan School of Management, MIT Massachusetts Institute of Technology; 1986.
5. Castelli CO, Castelli C, Leite MM. Avaliação do Sistema Informatizado de Educação Continuada em Enfermagem. *Rev Bras Enf*. 2014; 67(3):457-61.
6. Fornazim M, Joia LA. Articulando perspectivas teóricas para analisar a informática em saúde no Brasil. *Saúde Soc*. 2015; 24(1):46-60.
7. Davis FD. Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*. 1989;13(3):319-39.
8. Sauermann S, Frohner M, Urbauer P, Forjan M, Pohn B, Drauschke A, Mense A. The adolescence of electronic health records: Status and perspectives for large scale implementation. *Acta Inform Pragensia*. 2013; 2(1):30-8.
9. Pinochet LH, Lopes AS, Silva JS. Inovações e tendências aplicadas nas tecnologias de informação e comunicação na gestão da saúde. *Rev Gestão Sistemas Saúde*. 2014;3(2):11-29.
10. Yamamoto T, Toshiyuki I, Paiva PB, Ito M. Avaliação da usabilidade de interface gráfica de dois sistemas de gestão hospitalar. *J Health Inform*. 2015; 7(2): 37-41.
11. Healthcare Information and Management System Society. HIMSS 2011 Nursing Informatics Workforce Survey [Internet]. Chicago (US): HIMSS; 2011 Dec 15 [cited 2017 Jun 1]. Available from: <http://www.himss.org/ResourceLibrary/ResourceDetail.aspx?ItemNumber=11587>
12. Matsuda LM, Higarashil IH, Évoral YDM, Bernardes A. [Perception of nurses on the use of computer at the work]. *Rev Bras Enferm*. 2014; 67(6):949-56. Portuguese.
13. Lima DF, Braga AL, Fernandes JL, Brandão ES. [Health information system: concepts and perspectives of nurses on the electronic patient record]. *Rev Enf Ref*. 2011;3(5):113:19. Portuguese.
14. Canêo PK, Rondina JM. [Electronic health record: knowing the experiences of its implementation]. *J Health Inform*. 2014; 6 (2):67-71. Portuguese.
15. Callen J, Hordern A, Gibson K, Li L, Hains IM, Westbrook JI. Can technology change the work of nurse? Evaluation of a drug monitoring system ambulatory chronic disease patients. *Int J Med Inform*. 2013; 82 (3):159-67.