

# Surgical map panel as patient safety and communication tool

*Painel do mapa cirúrgico como ferramenta de comunicação e segurança do paciente*

*Panel de mapa quirúrgico como herramienta de comunicación y seguridad del paciente*

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**ABSTRACT: Objective:** To report the development and implementation of a surgical map panel with automated view of information about the surgery, team, status, risks and preoperative preparation. **Method:** Experience report on the development and implementation of a visual panel for surgical map, status, risks and patient preparation that aims to improve multiprofessional communication and follow-up of patient preparation workflow, in a large charity hospital in the city of São Paulo, from August 2021 to February 2022. **Results:** The process took place in four stages: understanding the business rules; identifying iconograms that would compose the panel; product development and feature testing; implementation in a productive environment, presenting the technology to the medical and nursing staff. **Conclusion:** The new surgical panel is colored, where iconograms are quickly identified and help in the communication, safety and assistance by the multidisciplinary team, facilitating workflows and allowing early intervention to potential risks. **Keywords:** Information technology. Health information management. Perioperative nursing. Risk management.

**RESUMO: Objetivo:** Relatar o desenvolvimento e a implementação de um painel de mapa cirúrgico com automação para visualização de informações da cirurgia, equipe, status, riscos e preparo pré-operatório. **Método:** Relato de experiência sobre o desenvolvimento e a implementação de um painel de visualização do mapa cirúrgico, status, riscos e preparo do paciente que visa melhorar a comunicação multiprofissional e o acompanhamento do workflow de preparo do paciente, em um hospital de grande porte e filantrópico, no município de São Paulo, de agosto de 2021 a fevereiro de 2022. **Resultados:** Foram quatro fases no processo. Primeira, o entendimento das regras de negócio. Segunda, a identificação dos iconogramas que vão compor o painel. Terceira, o desenvolvimento do produto e o teste de funcionalidades. Quarta, a implementação em ambiente produtivo, com apresentação da tecnologia para equipe médica e enfermagem. **Conclusão:** O novo painel cirúrgico é colorido, os iconogramas são rapidamente identificados e auxiliam o processo de comunicação, a segurança e a assistência da equipe multiprofissional, facilitando processos de trabalho e intervindo com antecedência em potenciais riscos. **Palavras-chave:** Tecnologia da informação. Gestão da informação em saúde. Enfermagem perioperatória. Gestão de riscos.

**RESUMEN: Objetivo:** informar el desarrollo e implementación de un panel de mapa quirúrgico de automatización para ver información sobre la cirugía, el equipo, el estado, los riesgos y la preparación preoperatoria. **Método:** Informe de experiencia sobre el desarrollo e implementación de un panel de visualización de mapa quirúrgico, estado, riesgos y preparación del paciente destinado a mejorar la comunicación multiprofesional y el monitoreo del flujo de trabajo de preparación del paciente, y su implementación en el área en un grande hospital, filantrópico en el municipio del municipio de São Paulo desde agosto de 2021 hasta febrero de 2022. **Resultados:** Hubo cuatro fases en el proceso, primero la comprensión de las reglas comerciales, la segunda identificación de los iconogramas que compondrán el panel, el tercer el desarrollo de productos y las pruebas de funcionalidad y la última implementación en el entorno productivo, la presentación de la tecnología al equipo médico y enfermería. **Conclusión:** El nuevo panel quirúrgico está coloreado, los iconogramas se identifican rápidamente, ayudan al proceso de comunicación, seguridad y asistencia del equipo multiprofesional, facilitando los procesos de trabajo e interviniendo de antemano con riesgos potenciales.

**Palabras clave:** Tecnología de la información. Gestión de la información en salud. Enfermería perioperatoria. Gestión de riesgos.

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## INTRODUCTION

The use of software and computer systems has expanded in different activities in society in recent years. In hospital units, professionals are faced with the use of technologies in different tasks, care and unit management.

According to the World Health Organization (WHO), information and communication technologies (ICT) have great potential to improve health in developed and developing countries, increasing access to health information and making health services more efficient<sup>1</sup>.

The discussion on the use of ICT in health is addressed in the report series *Health at a Glance: Europe 2018* as an emerging topic and priority for government organizations<sup>2</sup>.

Patient safety aims to prevent harm to patients resulting from health care. Currently, ICTs have enabled improvements in these services, insofar as they provide accurate, fast and reliable information that support decision-making by managers and the care team<sup>3</sup>.

Overall, ICTs contribute to the improvement of patient safety actions by optimizing communication processes. They reduce errors and adverse events in requests and electronic data entry, traceability and coding of products and medicines, electronic prescriptions, access to manuals and protocols and results management systems<sup>4</sup>.

In this human-machine relationship, people are required to have skills, while quality of products demands technology. Inserting technology in the care process has contributed to the improvement and effectiveness of care while supporting the patient safety culture.

In addition to these technological resources aimed at assistance or management, innovative ICTs such as electronic panels that centralize data from electronic health records have been developed to solve problems, facilitate patient management by health teams and mitigate safety problems<sup>5</sup>.

Electronic panels are TV-sized screens directed at spaces such as hallways, nurses' stations, medical facilities and receptions that present updated information in real time. They usually import information from the hospital system with some automation.

In this model of innovation and patient safety, we propose the transformation of the surgical map, previously represented only by the day's schedule at the surgical center, into a new map visualization resource showing information on staff, precautions, status, assistance risks, and procedure preparation workflow.

## OBJECTIVES

To report the development and implementation of a surgical map panel with automated view of information about the surgery, team, status, risks and preoperative preparation.

## METHOD

Experience report on the development and implementation of a screen panel of the surgical map, risks and patient preparation that aims to improve multiprofessional communication and follow-up of the patient preparation workflow. Conducted in a large philanthropic hospital in the city of São Paulo from August 2021 to February 2022.

The first phase of the project consisted of understanding the business rules for building the panel, determining the fields of the electronic information query system, the layout in card format, the order in which the information would be presented, the number of cards per screen, the screen change time, information update time, icons that should be erased after performed, colors to be used, and necessary signs. In this first stage, the nurse participating in the project, the nursing manager (product owner) of the automation project along with the information technology business analyst and the systems developer aligned the information.

The second phase encompassed the search for iconograms for quick identification of signs on the panel. Some icons were suggested by the nurse, as they were already known to the staff, and others were developed by information technology designing.

The third phase consisted in the preparation of the panel by the system developer using the Philips electronic system for information consultation and immediate reproduction on the panel. User access is done through a URL without the need to input data in the panel, only in the system. The panel is just an information display in a 43-inch monitor.

The last phase was the implementation of the new panel and its presentation at the surgeons' meeting and to the nursing staff, and mapping of the URL link on computers in the operating room.

## RESULTS

The first meeting of the automation project team defined the new surgical map panel as an idea of not only visualizing

scheduled surgeries, but also identify nursing staff, allergy to latex or malignant hyperthermia, patient and material status, procedure duration and time elapsed, reservations, patients with pre-defined risks (such as positioning injury and difficult airway), different types of precautions and signaling of patient preparation to reduce telephone contact with the unit of origin. The new screen format was established to follow the same layout pattern of the multiprofessional panel of the inpatient, anesthetic recovery and preoperative units.

In this phase, we revisited each field of the Philips' electronic system and identified where to look for information. Three fields required information (such as latex allergy) at surgical scheduling, since it usually comes with the surgery plan, before patient's admission, and insertion of the nursing team in the surgical schedule.

We were aided by Philips support to enable the fields to enter professionals and allergies in the surgery scheduling. We also used the special needs field in the surgery scheduling to insert information about latex allergy and malignant hyperthermia. We had a presentation of the functionality of the surgical and anesthetic terms in a meeting with Philips' nurses.

With the new functionalities for inserting information and aligning areas' needs available, we developed the business rules to operate the new surgical panel.

The icons are automatically erased from the panel as patient preparation procedures are performed by professionals. They were determined by the same model of the unit's panel, which presents icons for pending activities that are erased when these are carried out.

For the second phase, which consisted of iconograms, the blood drop icon was suggested for blood typing, the blood bag for blood products reserve, while the status of the patient was described and colored, and the material status was described in purple, with the information on allergy centralized and highlighted in yellow; the preparation of the patient was identified with characters representing the anesthesiologist in green and the nurses in pink; the consent forms were represented by papers with a checkbox and description below, being blue for surgical and green for anesthetic; a target symbol was chosen for laterality demarcation, and precaution items followed the institution's standard of layout and coloring; the risks determined were difficult airway (represented by the acronym VAD in the standard coloring of the institution), and the Munro risk scale<sup>6</sup> for positioning injury described and colored according to risk potential.

In the third phase, the developer programmed the system according to the previous alignment. Functionality tests were performed on the simulation platform, possible failures were identified by the business analyst, and corrections were performed by the developer.

The development and delivery process was divided into two stages: the first phase, encompassing delivery of panel (the surgical map) with signs (nursing professionals, allergies, blood typing and blood bag reservation iconograms), was carried out from August to October and implemented in November 2021. The second phase, encompassing iconograms of patient preparation and risks, was carried out in January and implemented in February 2022.

With the delivery of each phase approaching, the new panel was presented to the surgeons' committee by the operating room's nursing manager. For the nursing team and support areas, the icons were presented by the project nurse.

The project implementation in both phases was monitored by the project team and its functionality was verified at the time of delivery in production environment.

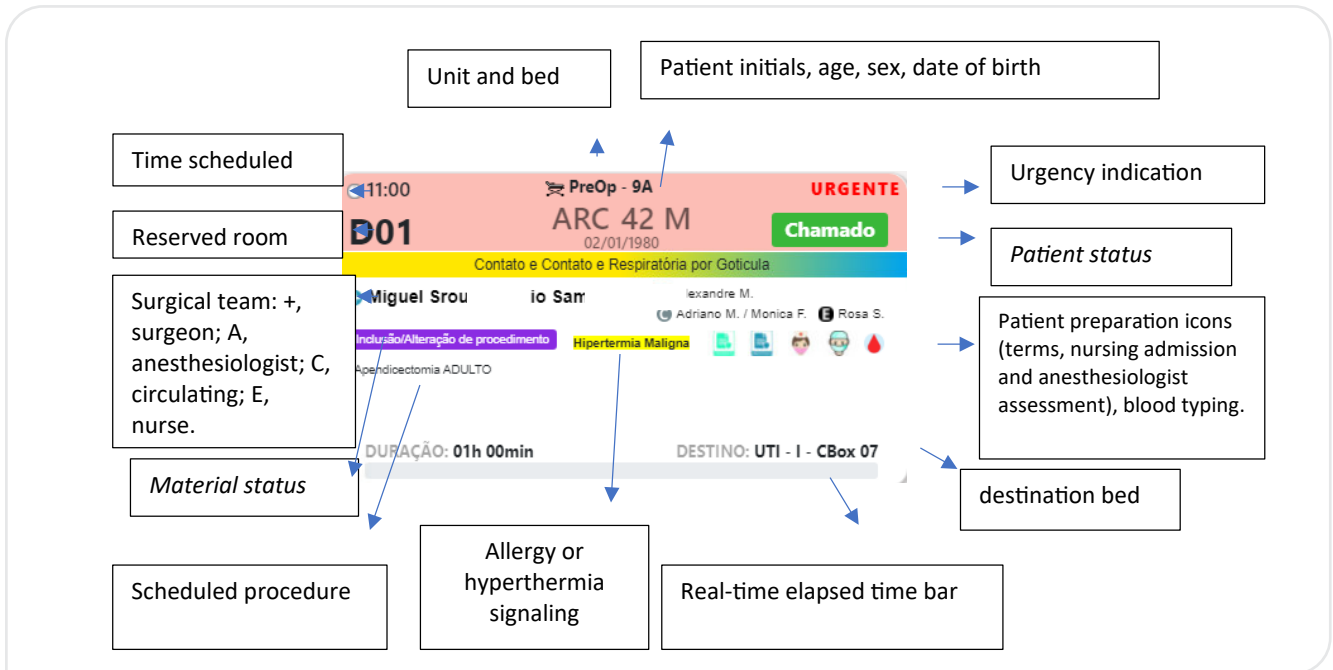
As a final result, the new surgical panel includes data from the surgical map, risks, and patient preparation, and has become a communication tool with optimization of care and management processes (Figures 1, 2 and 3).

## DISCUSSION

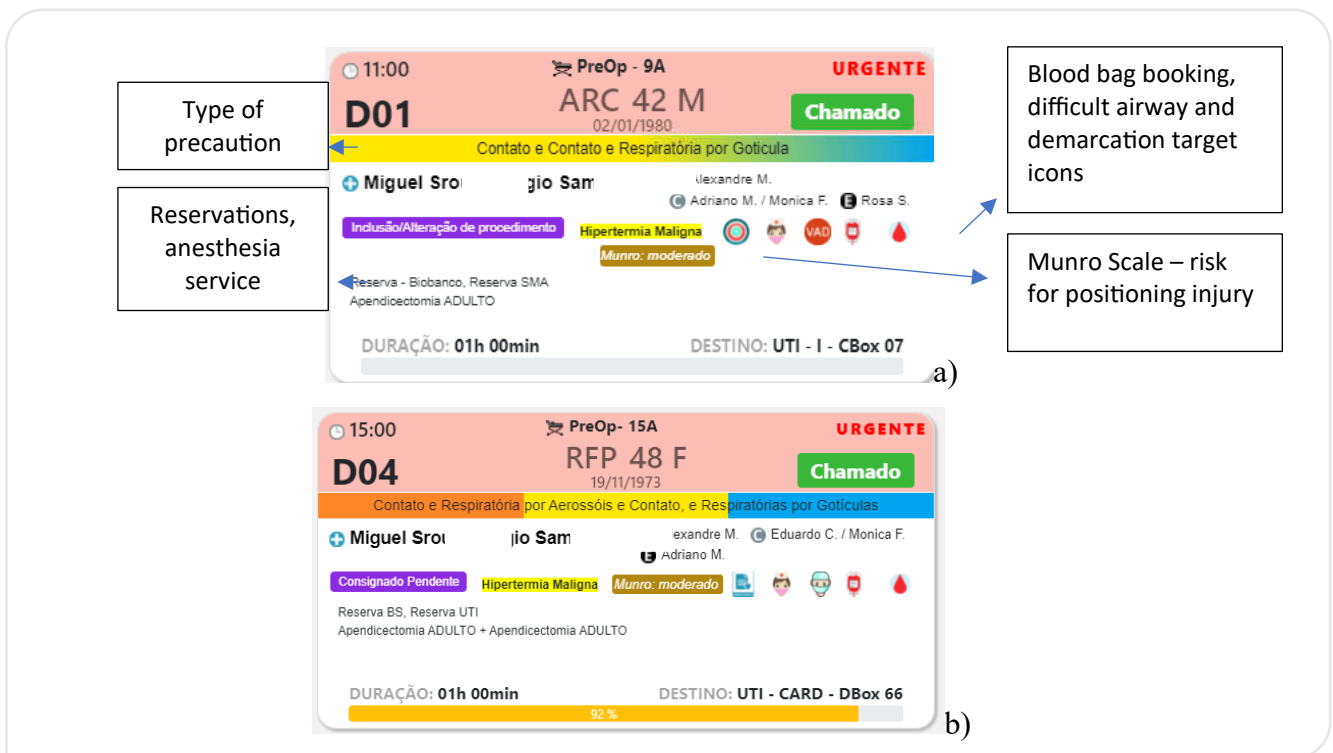
The process of building the system, from its idealization to its implementation, was carried out in a partnership between the nursing and information technology teams, which led to processes more aligned with care practice. After the implementation, the patient's workflow information for the operating room was available to any member of the team, without the need for excessive calls to obtain the information; risks and precautions were available for prior preparation of the nursing team, so they could anticipate resources for patient admission.

ICT based on safety culture are fundamental to the improvement and effectiveness of care. The impacts on the implementation and use of electronic health records are directly proportional to the specific needs of each organization<sup>7,8</sup>. For our scope, we inserted information relevant to our workflow and considered facilitators in the perioperative patient process.

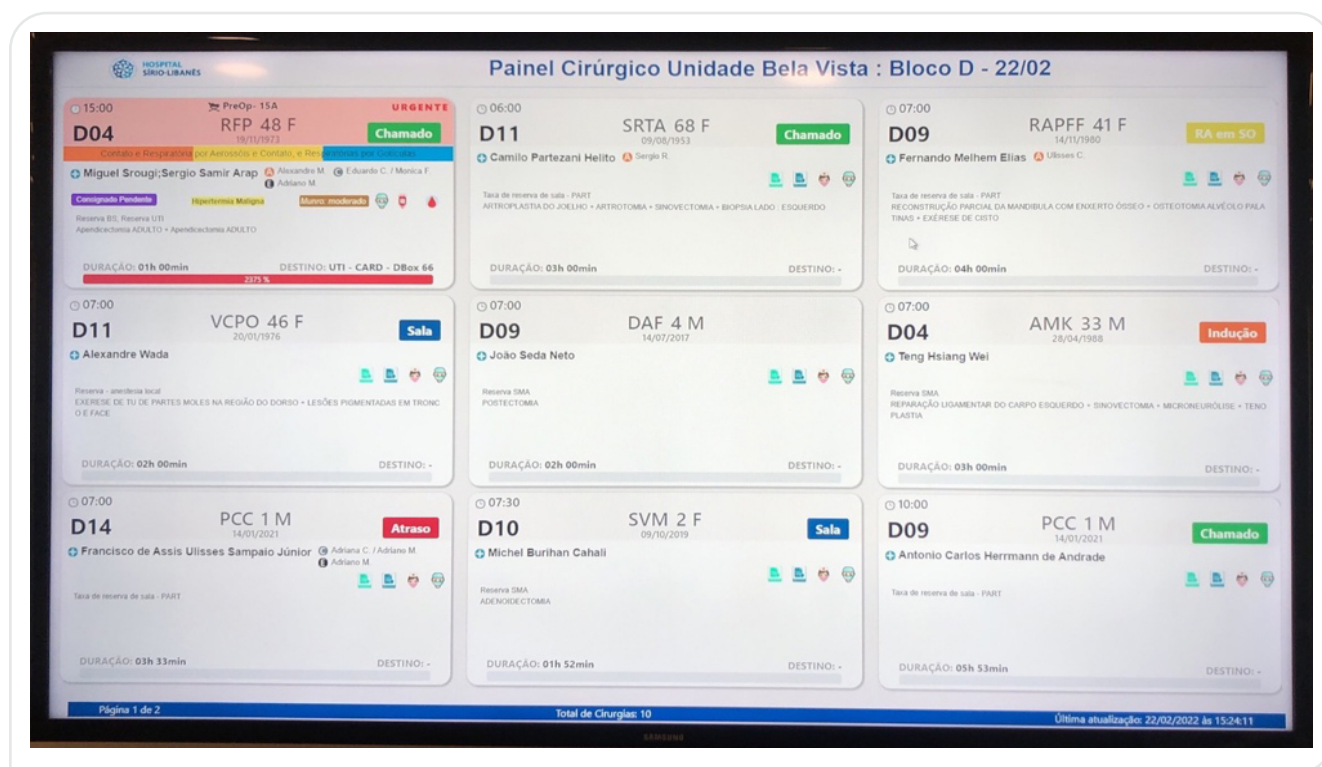
Studies claim that nursing practice demands quality, systems design, software usability, flexibility and speed.



**Figure 1.** Operating room screen and identification of map with risks, status, patient preparation (fictitious data from the simulation system).simulação).



**Figure 2.** a) Screen of the same room, now showing that the pre-anesthetic visit and identification of risk of difficult airway have already been carried out by the physician under evaluation; a nurse signals the need for filling in the System of Nursing Care, and the Munro scale shows the risk for surgical positioning injury; b) Another patient, real time bar shows 92% of predicted surgical time already elapsed; when reaching 100%, it turns red (fictitious data from the simulation system).



**Figure 3.** Surgical panel with nine cards representing operating rooms, following the order of appointment and patient status (fictitious data from the simulation system).

ICTs contribute to different aspects of this practice, including documentation, communication, treatment quality and management, nursing care tasks, and resource management<sup>9</sup>.

An integrative review on technology and patient safety retrieved three studies pointing out ICT innovations as a contributor factor to safe patient care. In one of them, a decrease between 17 and 30% of the risk of the patient acquiring adverse events was reported when the registration system was completely electronic in hospitals, compared to partial implementation or conventional means<sup>5</sup>.

The surgical map panel provides immediate visualization for the management of operating room situation with the incorporation of new functionalities, facilitating the process of room and resource management, and ensuring patient safety with automation.

Disruptive technological innovation provides leading nurses with better management of their area while balancing costs, quality and providing a positive experience for clients and care providers<sup>10</sup>.

Our satisfactory results are similar to those of other studies on the construction of electronic panels, which showed this resource as a tool that could add value in care, improve

communication, and promote agility in the dissemination of clinical and administrative information to multidisciplinary teams<sup>11,12</sup>.

For the support areas such as blood bank, the views of blood typing and bag reserves on the surgical panel was a gain. The URL was made available in the blood bank and could speed up the visualization of patients in need of reservations.

For the medical team, the visualization of the nursing team accompanying their procedure, as well as the patient's preparation status reduces the demand for questions at the nursing station and provides clarity of information in real time.

A study associated the use of ICT with organization and improvement of the work process of a multidisciplinary team<sup>13</sup>. Thus, when well used, technologies can positively influence the practice environments, achieving safety and quality goals in the care process<sup>14</sup>.

This result stemmed from the collaboration between areas, including the continuous improvement initiatives. The assistance teams noticed the improvement of information in real time, the reduction of the need to make telephone calls and of possible communication failures, and the quality gain of the new tool.

The comparison with other studies is a limitation of this study, since ICTs are still little explored by professionals, and, despite being available in some institutions, the literature lacks publications on electronic panels.

The need for health professionals to insert themselves in the technological environment is evident, as it allows the dissemination of knowledge and the use of technological strategies that facilitate care and unit management processes while supporting decision-making.

## CONCLUSION

The new surgical panel project was successfully completed: it is colorful, the iconograms are quickly identified and help the multiprofessional team in communication and assistance, in identifying risks and in patient's preparation, allowing quick understanding and action-taking by any member of the team, facilitating work processes and early interventions for patient safety.

This project led to the achievement of the objective of a surgical map that shows beyond the daily schedule, with

quick and clear views and communication about other items that help in managing care and patient safety.

## FUNDING

None.

## CONFLICT OF INTEREST

The authors declare no conflict of interest.

## AUTHORS' CONTRIBUTIONS

CSS: project management, formal analysis, conceptualization, data curation, investigation, methodology, writing — original draft, writing — review and editing, validation, visualization. AAA: writing — original draft, writing — review and editing, validation, visualization.

## REFERENCES

1. World Health Organization. Management of patient information: trends and challenges in member states. Based on the findings of the second global survey on eHealth. Global Observatory for eHealth series [Internet]. 2012 [cited on Feb 28, 2022]. Available at: [https://apps.who.int/iris/bitstream/handle/10665/76794/9789241504645\\_eng.pdf?sequence=1&isAllowed=y](https://apps.who.int/iris/bitstream/handle/10665/76794/9789241504645_eng.pdf?sequence=1&isAllowed=y)
2. Organization for Economic Cooperation and Development Europe. Health at a Glance: Europe 2018: state of health in the EU cycle. Paris: OECD Publishing; 2018. [https://doi.org/10.1787/health\\_glance\\_eur-2018-en](https://doi.org/10.1787/health_glance_eur-2018-en)
3. Lopes JE, Heimann C. Uso das tecnologias da informação e comunicação nas ações médicas a distância: um caminho promissor a ser investido na saúde pública. *J Health Inform.* 2016;8(1):26-30.
4. Sorra J, Famolaro T, Yount N, Smith S, Behm J. Results From the 2014 Pilot Study of the AHRQ SOPS™ Value and Efficiency Supplemental Items for the Hospital Survey. Rockville: Agency for Healthcare Research and Quality [Internet]. 2017 [cited on Feb 28, 2022]. Available at: <https://www.ahrq.gov/sites/default/files/wysiwyg/sops/quality-patient-safety/patientsafetyculture/hospitalvaluepiloreport.pdf>
5. Moraes AFSPL, Wolff LDG, Silvestre AL, Gonçalves LS, Rosa SCS. Tecnologias da informação e comunicação em saúde e a segurança do paciente. *J Health Inform.* 2020;esp.:300-6.
6. Sousa CS. Tradução, adaptação cultural e validação da Munro scale para português do Brasil. *REME Rev Min Enferm.* 2021;25:e1404. <http://doi.org/10.5935/1415-2762-20210052>
7. Martins L, Sartor GD, Silva MP. Prontuário eletrônico do paciente: adoção de novas tecnologias de acesso. *J Health Inform.* 2019;11(3):67-73.
8. Soares CR, Peres HHC, Oliveira NB. Processo de enfermagem: revisão integrativa sobre as contribuições da informática. *J Health Inform.* 2018;10(4):112-8.
9. Furukawa MF, Eldridge N, Wang Y, Metersky M. Electronic health record adoption and rates of in-hospital adverse events. *J Patient Saf.* 2020;16(2):137-42. <http://doi.org/10.1097/PTS.0000000000000257>
10. Fuller R, Hansen A. Disruption ahead navigating and leading the future of nursing. *Nurs Adm Q.* 2019;43(3):212-21. <http://doi.org/10.1097/NAQ.0000000000000354>
11. Vaz TA, Ávila AM, Pasin SS, Lucena AF, Goerk GC, Valente CZDP, et al. Informatização dos painéis de pacientes em unidades de internação no HCPA. *Clinical and Biomedical Research.* 2018;38(supl):150.

12. Ribeiro NT, Biancolino CA. Implantação de painel eletrônico de *status* de cirurgias na sala de espera de centro cirúrgico como ferramenta de comunicação *just in time*. In: XVII SEMEAD [Internet]. 2014 [cited on Mar 2, 2022]. Available at: <http://sistema.semead.com.br/17semead/resultado/trabalhosPDF/410.pdf>
13. Mota DN, Torres RAM, Guimarães JMX, Marinho MNASB, Araújo AF. Tecnologias da informação e comunicação: influências no trabalho da estratégia Saúde da Família. *J Health Inform.* 2018;10(2):45-9.
14. Ferreira AMD, Oliveira JLC, Camillo NRS, Reis GAX, Évora YDM, Matsuda LM. Perceptions of nursing professionals about the use of patient safety computerization. *Rev Gaucha Enferm.* 2019;40(spe):e20180140. <https://doi.org/10.1590/1983-1447.2019.20180140>

