

COST MANAGEMENT AT THE OPERATING ROOM: FINANCIAL IMPACT AND LOSS OF REVENUE

Gestão de custos no centro cirúrgico: impacto financeiro e perda de receita

Gestión de costos en el quirófano: impacto financiero y pérdida de ingresos

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ABSTRACT: Objective: To list the materials of greatest financial impact in the operating room and to estimate the loss of revenue they represented for the institution. **Method:** Retrospective and quantitative research, with collection in the database and spreadsheets of the surgical center and revenue guarantee for the years 2015 and 2018 of a private and large institution in São Paulo. **Results:** The materials that had the greatest financial impact were: Sevorane[®], Plasma Lyte[®], thermal blanket, bispectral monitor sensor, anesthesia mask, electric scalpel pen, Sequel[®] leg protector, and electro-surgical plate. They represented a financial loss of BRL 342,473.00 in 2015, when there was still no on-site audit practice, compared with the amount of BRL 114,157.00, in 2018, after implementing checking initiatives in the operating room. **Conclusion:** There was a financial benefit achieved with the practice of on-site audit, with a 66.6% decline in the amount of materials and medicines excluded by the audit due to the enhancement in the quality of the notes found in medical records.

Keywords: Operating room nursing. Hospital records. Costs and cost analysis. Organization and administration.

RESUMO: Objetivo: Elencar os materiais de maior impacto financeiro no centro cirúrgico e estimar a perda de receita que representaram para a instituição. **Método:** Pesquisa retrospectiva e quantitativa, com coleta em banco de dados e planilhas do centro cirúrgico e garantia da receita dos anos de 2015 e 2018 de uma instituição privada de extra porte de São Paulo. **Resultados:** Os materiais que causaram maior impacto financeiro foram: Sevorane[®], Plasma Lyte[®], manta térmica, sensor de monitor bispectral, máscara de anestesia, caneta para bisturi, perneira Sequel[®] e placa para bisturi. Representaram perda financeira de R\$ 342.473,00 em 2015, quando ainda não havia a prática de auditoria *in loco*, comparada ao valor de R\$ 114.157,00, em 2018, após ação de conferências em sala operatória. **Conclusão:** Houve benefício financeiro alcançado com a prática da auditoria *in loco*, com declínio de 66,6% na quantidade de materiais e medicamentos excluídos pela auditoria em razão da elevação da qualidade das anotações em prontuário.

Palavras-chave: Enfermagem de centro cirúrgico. Registros hospitalares. Custos e análise de custo. Organização e administração.

RESUMEN: Objetivo: Enumerar los materiales con mayor impacto financiero en el Centro Quirúrgico y estimar la pérdida de ingresos que representaron para la institución. **Método:** Investigación retrospectiva y cuantitativa, con recolección en la base de datos y hojas de cálculo del Centro Quirúrgico y garantía de los ingresos para los años 2015 y 2018, de una institución privada extra grande de São Paulo. **Resultados:** Los materiales que causaron mayor impacto económico fueron: Sevorane[®], Plasma Lyte[®], Manta térmica, Sensor monitor bispectral, Máscara de anestesia, Pluma para bisturí, Perneira Sequel[®] y Placa para bisturí. Representaron una pérdida económica de R\$ 342.473,00 en 2015, cuando aún no existía la práctica de auditoría *in situ*, frente al valor de R\$ 114.157, en 2018, tras la acción de conferencias en el quirófano. **Conclusión:** Se logró un beneficio económico con la práctica de la auditoría *in situ*, con una disminución del 66,6% en la cantidad de materiales y medicamentos excluidos por la auditoría, debido al aumento en la calidad de las notas en las historias clínicas.

Palabras clave: Enfermería de quirófano. Registros de hospitales. Costos y análisis de costo. Organización y administración.

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INTRODUCTION

In the midst of a business scenario in which health economy has been gaining an extremely relevant role, it is evident that the increase in costs has been calling the attention of hospital managers and the sources of payment of care practices. Hospital institutions invest in the auditing of accounts aiming at adequate remuneration of the provided care and at the invoicing of accounts in a reliable way according to what has been used by the patient¹.

In the context of hospital institutions, the surgical center (SC) is one of the sectors that most uses material resources, which generates high consumption and, therefore, makes this space a great producer of waste. Hence, this sector represents a major challenge for the management of excessive spending^{2,3}. This waste can also result in ineffective production of processes, procedures, and/or services aimed at providing care⁴.

The accounting audit processes at the SC are intended to check the performed procedures, materials used in anesthesia and surgeries, administered medications and exams, in comparison with the hospital bill, to be sent to sources of payment⁴.

Following a worldwide trend to reduce hospital costs through new cost management models⁵, the central hospital of this study performs an on-site and prior analysis of intra-operative hospital records inside the operating rooms (OR). This practice occurs during the surgical procedure and at its completion. Subsequently, the nurse auditors check all items in the hospital bills related to the patient, in addition to the respective clinical record, in order to make corrections with a much broader perspective, as they were present at the time of the anesthetic-surgical act. These practices also enable to develop a constant educational activity with the entire team that provides direct care to the patient and is responsible for filling out the institutional forms.

Such corrections, positive (inclusions of materials/equipment) or negative (exclusions of materials/equipment) adjustments, justify the collection of procedures and prevent the occurrence of disallowances. "Disallowances" are defined as the cancellation or partial or total refusal of the budget, bill, account, for being considered illegal or improper, concerning items that the auditors of health insurance plans do not consider suitable for payment⁶.

Healthcare processes generate revenue through the records of the actions taken. It is noteworthy that a significant part

of the payment for materials, medicines, and procedures is linked to the records of healthcare professionals, which are generally inconsistent, illegible, and subjective, causing disallowance of invoicing items, errors in collections and, consequently, loss of revenue⁷. A study carried out in the state of Rio Grande do Sul, Brazil, pointed out that 90% of disallowances occur due to inadequate and/or incomplete fulfillment of medical record data: clinical and nursing evolution, medical prescription, nursing report, surgical description, and anesthesia record. Among the 218 records analyzed by the authors, 77% were not properly filled in⁸.

Thus, inadequate completion affects the economic support and the controllership of the hospital, as it results in undue payments related to the hospital bill⁹. In the accounting and financial perspective of the institution, the audit contributes to mitigate the generation of unnecessary expenses, as it is a tool that allows identifying focuses of cost generation and proposes intervention measures with future evaluation criteria¹⁰.

In order to measure the magnitude of the financial loss that can be generated by the lack of information in medical records, in addition to the inexistence of the on-site checking practices, the authors listed the materials that, due to the absence of medical records, may represent an offense to the invoicing of accounts and the financial sustainability of the institution.

OBJECTIVES

To list which materials have the greatest financial impact on the SC of a private hospital in the state of São Paulo, Brazil;

To estimate the annual loss of revenue of the SC due to the absence of records of the actions taken by the healthcare team.

METHOD

This is a retrospective study, based on primary documentation, with quantitative data analysis. The study was carried out in a general hospital of the private network, of large size, with about 720 active beds, located in the South Region of the city of São Paulo, which has two SCs. One of them has 14 OR and 10 beds for Post-Anesthetic Recovery (PAR), and the other has 21 OR and 36 beds for PAR, where about 3 thousand anesthetic-surgical procedures are performed per month.

Results from the SC database and sectorial spreadsheets were used, which have been recorded for the purpose of revenue guarantee, based on the records for the years 2015 and 2018. In 2015, at the central institution of the research, data analysis on financial losses resulting from the lack of evidence in medical records started being analyzed. The results of such analyses gave rise to an educational project for promoting changes in the culture of collections for the team providing direct care to patients. In 2018, there was already a sector in the institution responsible for on-site checking practices and for the survey of financial data. For these reasons, the years 2015 and 2018 were chosen for the survey of this study.

The data collection instrument was used in the form of a spreadsheet, in which information on the materials with the highest dispensing volume by the pharmacy and the highest percentage of exclusion by the internal audit of the hospital were inserted for each of the months of 2015 and 2018, i.e., from January 1st to December 31, 2015 and from January 1st to December 31, 2018. It is noteworthy that the spreadsheet was created by a statistical professional, master in mathematics and statistics.

Data were collected between the months of May and August 2019, after approval of the research project by the Scientific Committee, and after authorization by the SC management and the manager of the Revenue Guarantee sector of the central institution of the study. Considering that this is a cost-related research, which does not involve human beings, the project did not need approval from the Research Ethics Committee.

The collected data were transferred to an Excel spreadsheet, in which they underwent quantitative treatment, according to statistical guidance, and are presented in absolute numbers

and percentages in the form of tables and graphs/figures. Databases of materials and medicines dispensed by the pharmacy were analyzed and subtracted from those invoiced by the audit, thus representing the amount of financial loss for each item. The percentage variation of the items dispensed, used, and excluded by the audit was considered for lack of evidence, as well as the financial values based on the cost of each item, preestablished by the institution.

RESULTS

Results are presented in line with the study purposes, i.e., the financial benefit that the on-site audit has brought to the SC since the beginning of this activity, in 2015. For data analysis, materials with a higher volume of dispensation by the pharmacy and a higher percentage of exclusion by the internal audit of the hospital were considered, due to lack of evidence in the medical records (Table 1 and Figure 1).

As for the impact generated by the waste of medical devices on the financial health of the institution, the calculation was done through the cost of the materials dispensed by the pharmacy and used in surgical procedures. The Brazilian currency (*real*, BRL) was used for the calculation.

In 2015, when there was still no on-site auditing activity, 54,441 excluded units were identified due to lack of medical and nursing evidence in the medical records. Three years after implementing the activities, the evaluation of the same database showed a decline of 66.6%, represented by the 18,147 units excluded in 2018. The sum of the materials represented an effective financial cost for the institution of BRL 342,473.00 in 2015, compared with BRL 114,157.00 in 2018.

Table 1. Materials and medicines dispensed by the pharmacy, used and excluded by the internal audit due to lack of evidence of use in the medical records, 2018.

Materials/medicines	Dispensed	Excluded due to lack of evidence	%
Sevorane® 250-mL bottle	55,673	10,528	18.9
Plasma Lyte® 500 mL	7,518	1,157	15.3
Upper-body thermal blanket	8,181	623	7.6
Bispectral monitor sensor	10,887	619	5.6
Adult-size anesthesia mask	23,199	1,069	4.6
Electric scalpel pen	21,195	744	3.5
Medium Sequel® Leg protector	5,591	137	2.4
Electrosurgical plate	23,395	565	2.4

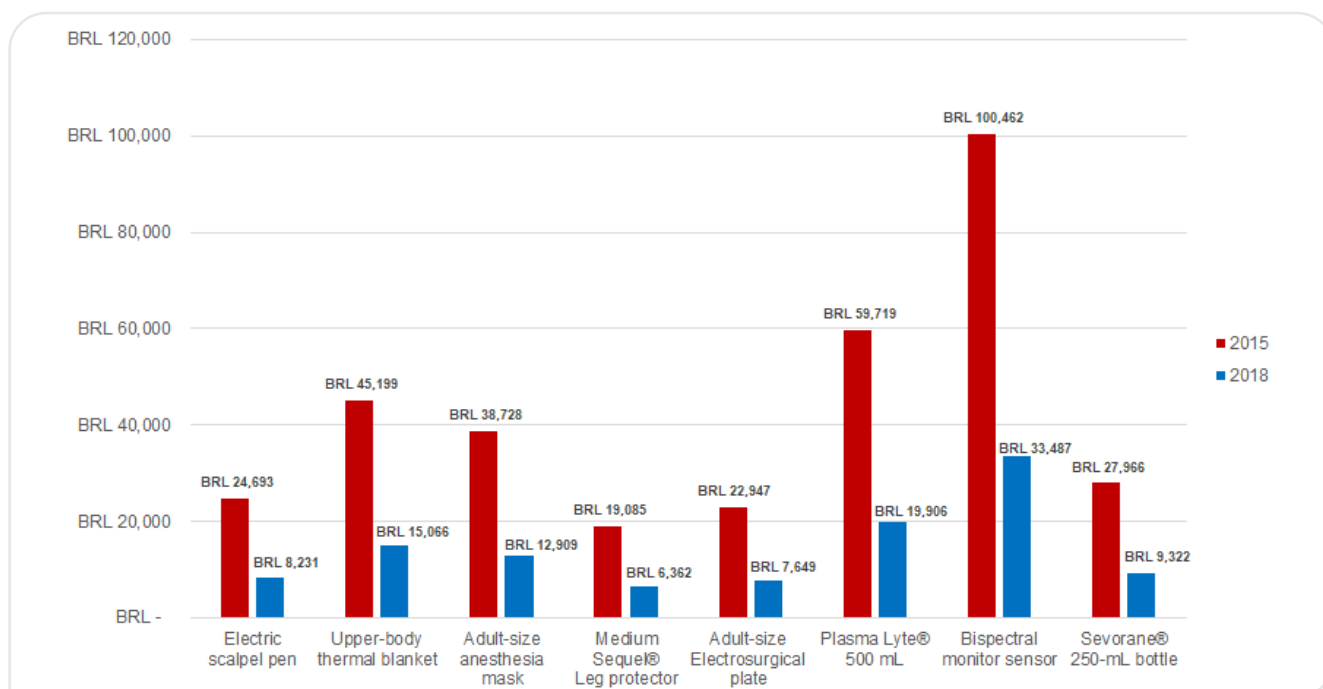


Figure 1. Annual loss of revenue, per material, after internal audit, due to lack of evidence in medical records. Comparative between 2015 and 2018. Amounts expressed in Brazilian currency (real, BRL).

When there was no local initiative, the financial loss ranged from BRL 100,462.00 to BRL 19,085.00 over the year, compared with a much lower amount, ranging from BRL 33,487.00 to BRL 6,362.00 after implementing the actions in the OR.

The month that represented the highest cost due to lack of evidence was January 2015, when the evaluated items totaled BRL 47,779.00. In April 2015, there was a fall in the values due to the implementation of local actions aimed at educating and changing the culture of waste of materials by the medical and assistance team. Months of lowest financial loss were registered as of April 2018, when the institution had already consolidated the action and, mainly, the interaction of the assistance team with the on-site audit team. The percentage of improvement in the notes from medical records reached 86.1% when compared with the worst month, without on-site audit, and with the best month, with the presence of competing actions in the OR.

From the implementation of the on-site auditing practice to the current period, there was a decrease in the lack of evidence in the nursing and medical notes in patients' records, which also provided a reduction in the time interval between hospital discharge and forwarding the invoice to the source of payment, especially to health insurance plans.

DISCUSSION

The practice of nurse auditors is part of an educational process, and although knowledge of this activity can still be considered recent, it is able to significantly contribute to the profession by creating circumstances for the management of a quality nursing care¹¹. The audit function must go beyond purely financial issues, as there is also great potential for changing the culture of waste of materials and flawed notes.

The bispectral monitor sensor was the item representing the greatest financial impact in 2015. The bispectral index is a multifactorial parameter derived from the electroencephalogram, which allows monitoring of the hypnotic component of anesthesia¹². Some studies demonstrate that adequate monitoring of anesthesia depth could reduce the excessive administration of anesthetic agents, decrease the time for recovery from anesthesia, nausea and vomiting, headache and cognitive dysfunctions¹³, factors that also benefit the cost management of the SC. The high value of the sensor, in addition to the lack of evidence of its use, culminated in an annual loss value of BRL 100,462.00. This item, which exclusively depends on medical notes for correct invoicing, dropped to BRL 33,487.00 after actions taken to raise awareness of its correct use,

note of parameters in the anesthesia record, and training for proper positioning, avoiding waste and indication for surgeries with duration longer than two hours.

Another item with a high percentage value of exclusion was Sevorane[®], in a 250-mL bottle. It is a general inhalational anesthetic, for hospital use, whose administration has been associated with induction of anesthesia with rapid and mild loss of consciousness and rapid recovery after suspension of anesthesia. It is widely used, as it covers adult and pediatric patients and is only restricted to cases of malignant hyperthermia or known sensitivity¹⁴. Considering that it is an inhalation agent, the extent of its use in each surgical procedure has become a process difficult to control, causing an annual loss of BRL 27,966.00. The improvement action for this indicator was to enter into a commercial agreement with the sources of payment according to which, for each hour of Sevorane[®] use in the OR, an amount equivalent to 30 mL of the drug would be charged. Guidance was also given to the entire medical staff of anesthesiologists on the new way for charging the medicine. The improvement process reduced the cost to BRL 9,322.00, achieving savings of more than BRL 18,000.00 per year.

Among the materials listed by the study, the upper-body thermal blanket also represented a great financial impact. It is used due to decrease in body temperature that occurs immediately after induction of general or local anesthesia, due to the redistribution of heat from the central compartment to the peripheral compartment of the body. In surgical interventions in which body cavities are exposed, heat loss is even greater, making its use with heated air flow even more necessary¹⁵. Its percentage loss value reduced from 12.9 to 1.1% after taking educational initiatives aiming at the quality of the records of nurses and technicians who work as circulators.

The role of nurse auditors is unknown to most nursing professionals. Research shows that the nursing audit is basically related to hospital costs, checking practices, and the control of medical records⁶. However, as this professional approaches nursing assistants and the medical team, they become aware of their roles and perceive them as a source of educational influences and improvement in the quality of care provided to the patient¹⁶.

This statement is confirmed with data shown in Figure 2, which demonstrates high values of financial

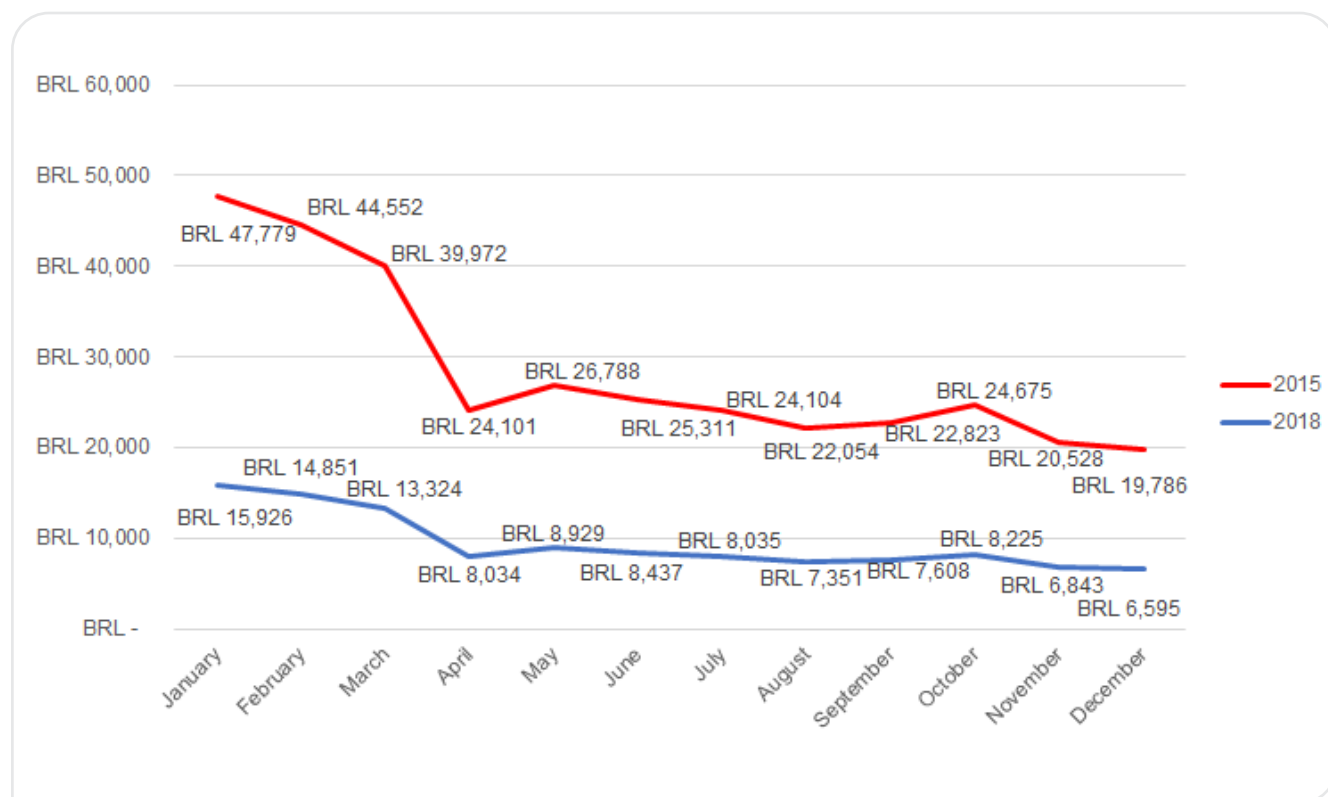


Figure 2. Monthly cost of the lack of evidence in medical records. Change in the quality of notes between the years 2015 and 2018. Amounts expressed in Brazilian currency (*real*, BRL).

loss when there was no on-site audit (BRL 100,462.00 to BRL 19,085.00) and much lower values after implementing the action and merging both teams (BRL 33,487.00 to BRL 6,362.00), when everyone could understand the actual role of the audit, the importance of the action for the financial profitability of the institution, and the impact that the culture of waste could bring in the long-term. Bearing these points in mind, the awareness of professionals becomes essential aiming at a reformulation in the way of carrying out the audit process.

Another aspect to be observed concerns the sustainability of healthcare institutions, which must economically develop through the efficient management of their numerous processes. In Brazil, there are still few scientific investigations on the costs of nursing care, although the team's role in controlling hospital costs contributes to the efficiency of the institutions. The lack of knowledge of the relationship between the cost of procedures and the productivity of services favors waste and hinders the emergence of numerous possibilities for improving management in nursing¹⁷.

The lack of managerial control has been identified as a cause of inefficiency of healthcare services, both public and private, and it is essential to adopt strategies that assist in the faster discovery of waste and failures that increase spending in organizations¹. Such failures portray a high cost for the institution, represented, in this study, by the amount of BRL 342,473.00 per year. If the opportunity for improvement had not been identified and this amount had persisted until 2018, this period would have represented an estimated financial loss of BRL 1,027,419.00 for the institution.

In this sense, the implementation of on-site audit can contribute and support quality parameters, thus being perceived as an effective form of cost management not only by notes in the patients' records, but also by daily observing the practice and supporting the actions taken by the team.

The incorporation of several professionals seeking to reduce costs has transformed the financial goal into a commitment for all involved employees¹⁸.

The evaluation of the effectiveness and economy of healthcare-related initiatives finds in the audit an effective management tool, and this, in turn, is able to contribute to the complex planning of healthcare services. It can instrumentalize the nursing team and reinforce the importance of the nurse auditor in this process through actions and

guidelines, in addition to the creation of instruments that facilitate healthcare records¹⁹.

CONCLUSION

The performance of this study, through the quantitative analysis of database, sectorial spreadsheets of the SC, and revenue guarantee for the years 2015 and 2018, allowed the authors to conclude that the materials that caused the greatest financial impact for the institution were Sevorane[®], 250-mL bottle (18.9%), Plasma Lyte[®] 500 mL (15.3%), upper-body thermal blanket (7.6%), bispectral monitor sensor (5.6%), adult-size anesthesia mask (4.6%), electric scalpel pen (3.5%), medium Sequel[®] leg protector (2.4%), and adult-size electrosurgical plate (2.4%). The materials represented a financial loss of BRL 342,473.00 in 2015, when there was no on-site audit practice, compared with the amount of BRL 114,157.00 in 2018, after implementing checking practices at the OR.

The experience of the evolution of the retrospective audit model to the on-site model proved to be positive, as it was possible to perceive the financial benefits obtained in just three years of operation, in addition to an intangible gain as for culture-related change in the attitude of healthcare professionals with regard to the quality of medical records.

Benefits for the nursing field

By adopting a critical and reflective thinking, it is possible to implement new ways of thinking about nursing auditing in the hospital context, assuming the role of daily educator in the SC, interacting with healthcare professionals, and enabling them to make the necessary improvements.

The on-site work of nurses strengthens the relationship with the other professionals, even assisting in their view of the audit not as a supervisory exercise, but rather as an advisory and educational exercise aimed at good nursing practices.

Study limitations

This research was carried out based on materials and equipment only dispensed in the OR. The authors intend to carry out a new study that encompasses the entire surgical ward, including items dispensed in anesthetic recovery and in the material and sterilization center.

REFERENCES

- Castilho V, Castro LC, Couto AT, Maia FOM, Sasaki NY, Nomura FH, et al. Levantamento das principais fontes de desperdício de unidades assistenciais de um hospital universitário. *Rev Esc Enferm USP*. 2011;45(n. esp.):1613-20. <https://doi.org/10.1590/S0080-62342011000700012>
- Castro LC. O custo de desperdício de materiais de consumo em um centro cirúrgico [tese]. São Paulo: Escola de Enfermagem, Universidade de São Paulo; 2012.
- Silva MJN, Ribeiro AL. Gestão em centro cirúrgico: identificação de desperdícios. *Rev SOBECC*. 2016;21(2):82-9. <https://doi.org/10.5327/Z1414-4425201600020004>
- Limoeiro ACO. Processos de auditoria no bloco cirúrgico. In: Carvalho R, editor. *Enfermagem em centro cirúrgico e recuperação anestésica. Manuais de especialização*. Barueri: Manole; 2015. p. 282-9.
- Falk JA. Gestão de custos para hospitais: conceitos, metodologias e aplicações. São Paulo: Atlas; 2011.
- Motta ALC. Auditoria de enfermagem nos hospitais e operadoras de planos de saúde. 6ª ed. São Paulo: Látria; 2013. p. 166-9.
- Guerrer GFF, Lima AFC, Castilho V. Estudo da auditoria de contas em um hospital de ensino. *Rev Bras Enferm*. 2015;68(3):358-63. <https://doi.org/10.1590/0034-7167.20156803061>
- Lana LD, Ferraza CAC, Quadros JN, Birrer JA. Auditoria em organizações prestadoras de serviço: uma estratégia de gestão econômica. *RAS*. 2012;14(56):103-8.
- Scarparo AF, Ferraz CA. Auditoria em enfermagem: identificando sua concepção e métodos. *Rev Bras Enferm*. 2008;61(3):302-5. <https://doi.org/10.1590/S0034-71672008000300004>
- Bessera EP, Alves MDS. Pesquisa sobre auditoria em serviços de saúde. *Rev Adm Saúde*. 2009;11(44):143-8.
- Pinto KA, Melo CMM. A prática da enfermeira em auditoria em saúde. *Rev Esc Enferm USP*. 2010;44(3):671-8. <https://doi.org/10.1590/S0080-62342010000300017>
- Duarte LTD, Saraiva RA. Quando o índice bispectral (BIS) pode fornecer valores espúrios. *Rev Bras Anesthesiol*. 2009;59(1):99-109. <https://doi.org/10.1590/S0034-70942009000100013>
- Nunes RR, Fonseca NM, Simões CM, Rosa DM, Silva ED, Cavalcante SL, et al. Consenso brasileiro sobre monitoração da profundidade anestésica. *Rev Bras Anesthesiol* [Internet]. 2015 [access on Nov. 10, 2019];65(6):427-36. Available from: http://www.scielo.br/pdf/rba/v65n6/pt_0034-7094-rba-65-06-00427.pdf. <https://doi.org/10.1016/j.bjan.2015.10.001>
- Sevorane [bula]. Buenos Aires: Abbott Laboratories Argentina AS; 2017.
- Bernardis RCG, Silva MP, Gozzani JL, Pagnocca ML, Mathias LAST. Uso da manta térmica na prevenção da hipotermia intraoperatória. *Rev Assoc Med Bras*. 2009;55(4):421-6. <https://doi.org/10.1590/S0104-42302009000400017>
- Pereira PM, Petry P, Porto AR, Thofehrn MB. A importância do enfermeiro auditor na qualificação da assistência profissional. *Rev Enferm UFPE OnLine* [Internet]. 2010 [access on Oct. 28, 2019];2(4):504-9. Available from: <https://pdfs.semanticscholar.org/a6e5/e18a3d90fc62f552a9e24fa319fc7d4bc67a.pdf>. <https://doi.org/10.5205/reuol.644-7078-1-LE.0402201008>
- Albano TC, Freitas JB. Participação efetiva do enfermeiro no planejamento: foco nos custos. *Rev Bras Enferm*. 2013;66(3):372-7. <https://doi.org/10.1590/S0034-71672013000300011>
- Richa AC, Guimarães SM, Cardoso TV. Gestão por padronização de processos: a percepção dos enfermeiros de centro cirúrgico. *Rev SOBECC*. 2014;19(1):3-10. <https://doi.org/10.4322/sobecc.2014.003>
- Menezes JGBRL, Bucchi SM. Auditoria em enfermagem: um instrumento para assistência de qualidade. *Rev Enferm UNISA*. 2011;12(1):68-72.

