RBFHSS
Revista Brasileira de Farmácia Hospitalar e Serviços de Saúde

Original Paper

Open Access

Cost assessment for the implementation of an intravenous admixture service in a hospital on the southwest border of Brazil

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Submitted: 09-02-22 Resubmitted: 06-05-2022 Accepted: 27-05-2022

Peer review: blind reviewers

Abstract

Objective: The objective of this study was to evaluate the cost for the implementation of an intravenous medication mixing center (CMI) in a philanthropic hospital on the southwestern border of Brazil. **Methods:** A survey of the costs of equipment, furniture, utensils and human resources required by the current legislation for the implementation of the CMI was carried out. In addition, an analysis of prescriptions was performed from hospitalized patients in Adult (UTI-AD) and Neonatal (UTI-NEO) Intensive Care Units (July to December/2020) who used injectable drugs. The costs of those medication and of losses for leftover medication were estimated. Seven drugs/mixtures were then selected as a proposal to carry out a pilot test for the implementation of the CMI. **Results:** The costs involving the physical area, furniture, equipment and materials were estimated at US$ 10,446.52. It is also estimated that it would be necessary to employ at least 2 pharmacists, 4 pharmacy assistants and 2 more students, with monthly costs calculated around US$ 2,267.80, excluding labor charges. The estimated total cost of intravenous drugs, solutions and materials to meet medical prescriptions for the 169 patients included in the study was US$ 24,748.13. Considering that the hospital does not have a CMI to centralize the preparation of unit doses of injectable drugs, a total loss of medication leftovers was estimated at approximately US$ 7,764.64. For pilot testing, the following preparations were suggested: omeprazole, heparin, midazolam and insulin (UTI-AD), electrolyte solutions, ampicillin and gentamicin (UTI-NEO). **Conclusion:** Although the implementation of a CMI requires significant resources, it would provide greater patient safety and an estimated savings of 31.4% with injectable drugs costs.

Keywords: Parenteral infusion; Patient safety; Intensive care units.

Avaliação de custos para implementação de uma central de misturas intravenosas em um hospital da fronteira sudoeste do Brasil

Resumo

Objetivo: O objetivo deste estudo foi avaliar os custos para implantação de uma central de misturas intravenosas (CMI) em um hospital filantrópico da fronteira sudoeste do Brasil. **Métodos:** Foi realizado um levantamento dos custos de equipamentos, móveis, utensílios e recursos humanos exigidos pela legislação vigente para a implantação da CMI. Além disso, foi realizada uma análise de prescrições de pacientes internados em Unidades de Terapia Intensiva Adulta (UTI-AD) e Neonatal (UTI-NEO) (julho a dezembro/2020) que fizeram uso de medicamentos injetáveis. Foram estimados os custos desses medicamentos e de perdas por sobras de medicamentos. Sete medicamentos/misturas foram então selecionados como proposta para a realização de um teste piloto para a implantação do CMI. **Resultados**: Os custos envolvendo área física, móveis, equipamentos e materiais foram estimados em US$ 10.446,52. Estima-se também que seria necessário empregar pelo menos 2 farmacêuticos, 4 auxiliares de farmácia e mais 2 estudantes, com custos mensais calculados entorno de US$ 2.267,80, excluindo-se encargos trabalhistas. O custo total estimado de medicamentos injetáveis, soluções e materiais para atender às prescrições médicas para os 169 pacientes incluídos no estudo foi de US$ 24.748,13. Considerando que o hospital não possui CMI para centralizar o preparo de doses unitárias de medicamentos injetáveis, uma perda total de sobras de medicamentos foi estimada em aproximadamente US$ 7.764,64. Para o teste piloto, foram sugeridas as seguintes preparações: omeprazol, heparina, midazolam e insulina (UTI-AD), soluções eletrolíticas, ampicilina e gentamicina (UTI-NEO). **Conclusão**: Embora a implantação de uma CMI demande recursos significativos, proporcionaria maior segurança ao paciente e uma economia estimada de 31,4% com custos de medicamentos injetáveis.

Palavras chaves: Infusões parenterais; Segurança do paciente; Unidade de terapia intensiva.

Introduction

In 2013, after the significant repercussion of the disclosure of the "*To Err is Human*" report, in Brazil, the Ministry of Health published the "Protocol for Safety in the Prescription, Use and Administration of Medications", with the purpose of instituting safe practices in the use of medications in health institutions of different complexity levels throughout the country[1-2].

A number of studies show that medication errors are among the most frequent causes of adverse events that affect patient safety, resulting from failures in interpretation of prescriptions, preparation of medications without proper use of reconstitution and dilution standardization, distraction of professionals during the activity and lack of communication and records regarding drug administration, as well as some environmental problems[3].

In the hospital setting, the Pharmacy Service aims at ensuring safe and rational use of the medications prescribed by medical professionals. In the current routine, four types of drug distribution systems can be used: collective, individualized, mixed and by unit dose. Choice of the system should consider the cost-effectiveness and quality assurance of the activity, the physical and administrative structure of the hospital unit and the pharmacy service, and the physical and human resources available[4].

From the Individualized, Collective and Mixed Medication Distribution Systems, the medication needs of patients admitted to the Hospital Institution are met through a medical prescription that is valid for 24 hours, with scheduling by the Nursing team and the medications dispensed by the Pharmacy team, provided that the minimum legal requirements in relation to acceptability and readability are met[5-6]. In hospitals that still use these systems, there is high incidence of medication errors due to illegibility of medical writing, incorrect doses, overload of the Nursing team and limited knowledge about handling and stability of the medications prescribed[7-8].

With the use of the Drug Distribution System by Unit Dose (*Sistema de Distribuição de Medicamentos por Dose Unitária*, SDMDU), the medications are destined to the inpatient units already fractionated, diluted and prepared by the Pharmacy team, with only their administration remaining under responsibility of the Nursing team, thus reducing work overload of this team. In addition to that, this offers greater guarantee of the effectiveness of drug treatments, greater safety for the patients, fewer possibilities of medication errors and greater guarantee of pharmaceutical assistance[4].

One of the requirements to be met for adopting the SDMDU is implementing the Intravenous Admixtures Center (IAC). Implementation of this unit in hospital institutions requires high initial financial resources to deploy the physical area of such center, acquisition of materials and furniture and hiring of employees[9].

Given the above, this study aimed at carrying out a cost assessment for the implementation of an IAC at a hospital in the Brazilian Southwest border, as well as at suggesting a proposal for a pilot test for its deployment.

Methods

This is a descriptive and retrospective study conducted from a cost and documentary survey. The study was applied to the need to implement an IAC at a philanthropic general hospital in the Brazilian Southwest border, with high complexity in Oncology and Neurosurgery and 230 beds. A survey of equipment, furniture, utensils and human resources required by the current legislation for the implementation of this center was carried out, as well as a survey of related costs.

For the investigation of the economic aspects related to implementation of the physical area, materials and equipment, a price survey was carried out from a number of suppliers' Internet websites, considering the minimum legal requirements determined by Collegiate Board Resolution No. 67/2007 of the National Health Surveillance Agency (*Agência Nacional de Vigilância Santária*, ANVISA). The values were converted to American dollars using the mean conversion rate corresponding to the period from July to December 2020 (US$ 5.38393). For the investigation of the economic aspects related to hiring professionals in sufficient numbers to work at the IAC in the four different shifts, a consultation was carried out with the Transparency Portal of the City Hall of Uruguaiana and the Pharmacists Union of the state of Rio Grande do Sul/Brazil.

Finally, a documentary analysis was carried out on hospital prescriptions in order to evaluate the costs currently involved in the medication process and devise a project implementation proposal. For this, the estimated costs involved in dispensing of medications and related materials used to meet the prescriptions of patients hospitalized in Urgency and Emergency Units were compared to the probable dispensing cost that would be required to meet these prescriptions, based on centralized drug preparation. For this purpose, a price survey was carried out in the cost center of the Pharmacy Service, as well as in the medical records of patients hospitalized in the Adult Intensive Care Unit (ICU-AD) and Neonatal Intensive Care Unit (ICU-NEO). As inclusion criteria, all medical records of patients hospitalized in the ICU-AD and ICU-NEO who used injectable medications were selected, from July to December 2020. The medical charts of patients with incomplete information were excluded from the study. The following data were collected: patient code, hospitalization unit, medications prescribed (dose, length of treatment in time and volume of diluent), and related materials requested (syringes and needles). The project was approved by the Ethics Committee of the Federal University of Pampa (CAAE 47931221.8.0000.5323). From these data, six medications with the highest estimated impact of costs regarding losses and/or leftovers were selected as pilot test proposals for implementing the IAC.

Results

According to the national legislation, a hospital pharmacy unit that aims at preparing unit doses of sterile medications must follow some important requirements and be adequate to the activities to be developed. The minimum required is a room for handling injectable medications, a room for gowning, a room for cleaning and washing materials, a room for administrative activities, stock, and a space for dispensing medications by unit. It must also have a sufficient number of professionals to carry out the everyday activities, who must receive Personal Protective Equipment (PPE), training and qualification[10].

In the current study scenario, the central pharmacy is located on the ground floor of the institution, with a space for dispensing medications and correlated materials in individualized form, a room for fractionation of solid pharmaceutical presentations, stock and an administrative room. It has six active pharmacists, three resident pharmacists and ten Pharmacy assistants, who are divided across four work shifts.

In order to implement an IAC in this service, an initial adaptation and reform of the physical area of the already existing Pharmacy will be necessary. Thus, the administrative sector would only need minimum space for its activities. However, an exclusive room would be necessary to prepare unit doses of injectable medications, with dimensions compatible with the number of operations and that would facilitate cleaning of the environment and proper allocation of the equipment as much as possible. The costs related to the infrastructure will be managed according to the criteria defined by the hospital's Engineering sector, as long as they obey the required legal rules.

Among the equipment items described and with the greatest importance to compose the handling room, we can mention the biological safety cabinet, with air renewal through a High-Efficiency Particulate Arrestance (HEPA) filter[11]. A computer and a barcode printer should also be made available to record formulations and produce labels, respectively[10]. After placing the medications in their respective primary packaging (syringes or bags), they must be arranged in secondary plastic packaging, transparent and sealed with the aid of a sealer machine[12].

Table 1 presents the necessary resources (equipment and furniture) for the IAC, totaling US$ 10,446.52 in costs. In a first perspective, this initial investment can be considered relatively high for a philanthropic hospital, which has a financial deficit due to low remuneration according to the Unified Health System table, which only transfers 60% of the costs of the procedures, as well as to the lack of resources allocated from the government[13]. On the other hand, the results point to certain compensation of this investment with the reduction in consumption of medications, solutions and materials, the reduction in the Nursing team dedication time to the tasks related to medications (allowing greater dedication to assistance to the patients), greater control of the medications dispensed and administered to the patient, and the reduction in the percentage of losses and deviations[14-15].

Table 1: Estimated cost for the acquisition of equipment and furniture.

Equipment and furniture	Quantity	Unit mean cost (US$)*
Biological safety cabin	01	6,523.25
Bench with drawers	01	574.16
Refrigeration chamber for medications	01	2,354.10
Digital thermometer with maximum and minimum	01	11.80
Ancillary cart	01	64.60
Foot-switch sealer machine	01	78.40
Computer	01	406.60
Barcode printer	01	274.30
Chair	02	45.83
Stool	02	15.80
Sink	02	16.40
Faucet with foot switch	01	52.65
Clinical faucet	01	23.80
Soap and alcohol dispenser	04	4.83
Total estimated cost:		**US$10,446.52**

*Based on the mean of the three quotations obtained from the providers.

To compose the general staff, it is necessary to adapt the human resources already existing in the Pharmacy Service of the Institution; therefore, it would be necessary to hire at least the professionals listed in Table 2, as well as to select university students from the Higher Education Institution of the municipality, to carry out their curricular internships. As the assistants may have technical training in Pharmacy or Nursing, and as one of the advantages of the SDMDU is to reduce the Nursing team workload, these professionals could also be relocated from clinical units, if available, considering the experience of these assistants with the handling of syringes and bags.

According to Table 2, the calculated monthly costs (considering the professionals' mean wage) is around US$ 2,267.80, and an additional cost of 60% to 100% of this amount should also be considered with labor charges for the institution[16]. All the employees who participate directly in the handling process must receive PPE, totaling US$ 2.51 for each full set, as shown in Table 3.

Table 2: Monthly cost related to hiring of professionals.

Position	Quantity	Hour load	Monthly mean remuneration (US$)
Pharmacist	02	40 hours	643.60*
Pharmacy assistant	04	36 hours	245.15**
Intern	02	20 hours	0.0
Estimated monthly cost:			**US$ 2,267.80**

*Calculated based on the wage floor established by the Pharmacists Union of the state of Rio Grande do Sul/Brazil. **Calculated according to the base salary for Pharmacy assistants published in the Transparency Portal of the Uruguaiana City Hall/RS.

Table 3: Costs for full gowning.

PPE	Quantity	Mean price (US$)*
Apron	01	0.99
FPP2 mask	01	0.27
Sterile gloves, 1 pair	02	0.70
2% chlorhexidine brush	01	0.48
Cap	01	0.02
Foot protectors, 1 pair	01	0.05
Total for gowning:		**US$ 2.51**

*Based on the mean of the three quotations obtained from the providers.

The investigation of costs related to drug dispensing for patients hospitalized in the ICU-AD and ICU-NEO was carried out based on the analysis of 169 (61.9%) medical records corresponding to all 273 (100%) patients hospitalized from July to December 2020. A total of 104 patients with incomplete medical charts were excluded.

The overall cost related to the individualized dispensing of intravenous medications, solutions and materials for the patients included in the study was estimated at US$ 24,748.13, considering a unit mean of the prices contracted by the Institution, due to the different value readjustments during the COVID-19 pandemic in 2020[18]. Tables 4 and 5 display the percentage of these values represented by each medication prescribed in the ICU-AD (totaling US$ 21,444.07) and in the ICU-NEO (totaling US$ 3,304.06). Considering the dosages prescribed, the presentation and stability of the drugs prescribed, it was estimated that the losses with medications leftovers, solutions and materials reached US$ 7,764.62, corresponding to 31.4% of the total estimated cost. It is worth noting that these costs were estimated from the cost of the doses prescribed to the patients. In this study, a total of 841 therapeutic regimes prescribed were analyzed, consisting of 53 different types of medications and their diluted solutions.

But what is really worrisome is the high estimated cost of losses related to medication leftovers, which is justified by the current dispensing system used by the institution. In this system, utilization and fractionation of doses from ampoules and vials becomes inadequate, as there are no suitable environments in the clinical units for aseptic handling of sterile medications, except for immediate use. Thus, their sterile nature and apirogenicity are not ensured after storage. In addition to that, there is no physical space or pharmaceutical temperature and humidity control to safely store them. Thus, in the clinical units it is currently possible only to prepare injectable medications immediately before use, and the perforated vials and broken ampoules should be immediately discarded, under penalty of endangering the lives of the patients.

Tables 4 and 5 indicate the medications that we initially suggest to conduct a pilot test for the implementation of an IAC. Selection of these medications was based on three different factors: the highest number of therapeutic regimens prescribed, the highest consumption value, and the highest calculated loss value.

Table 4: Analysis of the prescriptions corresponding to patients hospitalized in the ICU-AD.

Prescribed medications (active ingredient) and administration route	Total estimated cost (%)	Estimated cost of the losses (%)	Prescribed dosage regimes (%)
Regular insulin 100 UI/10 ml – SC*	9.78	26.98	2.22
Heparin 25,000 UI/5 ml – SC*	8.30	17.74	8.44
NPH insulin 100 UI/10 ml – SC	3.43	8.63	2.37
Omeprazole 40 mg – IV*	6.48	7.69	9.06
Dobutamine 250 mg/20 ml + PhS 250 ml	3.22	6.77	2.07
Fenitoine 250 mg/5 ml – IV	2.90	4.74	4.29
Metoclopramide 10 mg/2 ml – IV	2.97	4.26	2.66
Metoprolol 5 mg/5 ml – IV	1.89	3.87	1.92
Heparin + 0.9% PhS 100 ml – IV	2.59	3.77	1.66
Nitroglycerine 50 mg/10 ml + 0.9% PhS 250 ml	2.26	2.89	1.63
Noripurum 100 mg – IV	1.42	1.98	0.59
Clindamycin 600 mg/4 ml – IV	2.06	1.80	2.07
Hydrocortisone 500 mg – IV	0.88	1.50	0.74
Dexamethasone 10 mg/2.5ml – IV	2.45	1.23	4
Ranitidine 50 mg/2 ml – IV	3.10	1.01	2.07
Amphotericin B 50 mg – IV	1.37	0.99	1.33
Ceftriaxone 1G – IV	9.82	0.80	4.60
Methylprednisolone 500 mg + 0.9% PhS 1,000 ml – IV	0.40	0.77	0.29
Nitroprussiatode Na 50mg + 5% PhS 250 ml – IV	0.28	0.64	0.59
Furosemide 20 mg/2 ml – IV	0.94	0.58	6.96
Midazolam 15 mg/3 ml + 0.9% PhS 250 ml*	12.50	0.51	4
Ceftazidime 1G – IV	1.42	0.30	0.88
NaCl 20%/20 ml + 0.9% PhS 1,000 ml	0.07	0.17	1.19
Cefuroxime 750 mg – IV	0.44	0.15	0.74
Dipyrone 1G/2 ml – IV	0.84	0.07	6.52
B complex + 0.9% PhS 1,000 ml	1.10	0.05	0.59
KCl+ 10%/10 ml + 0.9% PhS 250 ml	0.24	0.05	0.90
Amiodarone 150 mg/3 ml + 5% GS 500 ml	0.82	0.04	4.44
KCl 10%/10 ml + 5% GS 250 ml	4.84	0.01	2.07
Fentanyl 0.05 mg/2 ml – IV	1.05	0.01	2.81
Meropenem 500 mg – IV	3.41	0	1.92
Tramadol 50 mg/1 ml – IV	1.85	0	3.70
Cephalothin 1G – IV	1.26	0	2.22
Tenoxicam 20 mg/2 ml – IV, IM	1.15	0	2.22
Vancomycin 500 mg – IV	1.08	0	0.59
Norepinephrine 8 mg/4 ml + 5% GS 250 ml	0.78	0	2.37
B complex – IV	0.23	0	0.30
Glucose 50%/10 ml + 0.9% PhS 100 ml – IV	0.15	0	0.59
Calcium chloride 10%/10 ml – IV	0.10	0	1.63
Haloperidol 5 mg/1 ml – IM	0.09	0	0.29
Midazolam 15 mg/3 ml – IV	0.04	0	0.47
Total: **	**100%**	**100%**	**100%**

*Medications suggested for implementation of the pilot test. **In relation to the total cost in the units under study. IV: Intravenous route; SC: Subcutaneous route; IM: Intramuscular route.

Table 5: Analysis of the prescriptions corresponding to patients hospitalized in the ICU-NEO.

Prescribed medications (active ingredient) and administration route	Total estimated cost (%)	Estimated cost of the losses (%)	Prescribed dosage regimes (%)
Serums and electrolyte solutions**	15.17	28.84	54.17
Ampicillin 500 mg – IV*	31.54	17.71	12.11
Gentamicin 20 mg/1 ml – IV*	30.89	15.50	16.26
Fentanyl 0.05 mg/2 ml – IV	3.97	14.85	6.62
Hydrocortisone 500 mg – IV	14.81	14.15	5.42
Vancomycin 500 mg – IV	3.48	8.63	0.60
Glucose 25%/10 ml – IV	0.14	0.32	4.82
Total: * **	**100%**	**100%**	**100%**

*Medications suggested for implementation of the pilot test. **Medications included in the "Serums and electrolyte solutions" group. ***In relation to the total cost in the units under study. IV: Intravenous route; SC: Subcutaneous route.

When comparing the initial investment suggested in this paper for the acquisition of equipment and furniture for implementation of the IAC (US$ 10,446.52) to the estimated total losses in the six months of study (US$ 7,764.62), it can be predicted that this initial investment would have a financial return in approximately eight months (more precisely 245 days), not taking into account the monthly costs for the employees' wages and the necessary maintenance asks.

Discussion

A study conducted in the Dr. Paulo Sacramento Clinical Hospital reported the savings generated after three years of having substituted the Individualized system by the SDMDU. This study compared the consumption difference between both systems during a six-month period, obtaining US$ 78,324.40 in savings (50.61%). In other words, consumption was reduced by half after implementing the SDMDU. At the time, the cost of equipment and material resources to implement the service was US$ 24,361.58, which was paid out in two months thanks to the savings enabled by the SDMDU[7]. Thus, it can be assumed that the actual savings to be generated by implementing the IAC and, consequently, an SDMDU in the Institution under study, may be even higher than the one estimated in this paper.

In order to propose a pilot test for the implementation of the new system, after investigating the prescriptions of patients admitted to the ICU-AD, it is initially suggested to perform centralized preparation of omeprazole and heparin, for being medications with a high number of therapeutic regimens prescribed during the study (Table 4). The omeprazole presentation standardized by the institution is lyophilized powder. Consequently, the Nursing team needs to spend more time in the reconstitution and preparation process. Although the most frequently prescribed dosage is 40 mg/10 ml once a day, 20 mg/5 ml was also identified. Thus, the medication could be dispensed in 10 ml or 5 ml syringes.

In the case of heparin (Table 4), the most frequently prescribed dosage corresponded to 5,000 UI with 12-hour intervals. However, the Institution only standardizes the 25,000 UI/5 ml package. Dispensing of the medication in the aforementioned dosage leads to a daily cost of US $1.97 (one 5 ml vial + two 1 ml syringes), estimating US$ 1.09 in losses. In addition to that, preparation in the units does not always comply with the preparation and storage conditions required by the manufacturer[17]. With implementation of the IAC, the daily cost of heparin (5,000 IU), including the syringe (1 ml), the protective cap (*luerlock)* and the needle (13x0.45 mm) for two administrations, would be US$ 0.96. The cost difference between preparing the medication in the IAC and by the Nursing team in the Units would be US$ 1.01.

The solution consisting of 10 midazolam ampoules in 250 ml of 0.9% saline solution was also listed as a pilot test proposal in the ICU-AD, for being one of the medications with the highest consumption value identified (Table 4), as its unit cost is high. In this case, it would be interesting to establish standard bag preparation routines for the prescribing physician to adjust the dose administered to the patient through the infusion rate, as the preparation remains stable for 24 hours at room temperature, or for three days at 5°C, when prepared under aseptic conditions[18]. The preparation and packing methods for these medications can be manual or automated.

Finally, from the study carried out in the ICU-AD, it was also possible to list insulin as a proposal for pilot testing, considering the high estimated value in losses for the institution. Insulin is delivered in 10 ml vials, which must be placed in storage under refrigeration at 2ºC-8ºC. From the IAC, it could be dispensed according to the prescription (in 1 ml syringes), also maintaining a reduced stock with standard quantities for emergency situations (0.5 ml and 1 ml syringes), which would allow adjustment to the dose prescribed, according to the patient's need at the time.

On the other hand, when analyzing the prescriptions of patients admitted to the ICU-NEO, it is initially suggested to implement a pilot test with the serum and electrolyte solutions, as they correspond to the largest number of prescribed regimens (90 out of 166), when grouped. Neonatal patients use countless different electrolyte concentrations in a single formulation, with the possibility of causing potential and severe preparation errors. As small doses are used per patient, centralized preparation allows using large volume solutions and electrolyte vials to prepare solutions for more than one patient, reducing waste and generating savings for the service.

Preparation of the ampicillin and gentamicin antimicrobials in the IAC is suggested, as they are among the medications with the highest consumption values and highest estimated loss rates. The prescribed doses for neonatal patients are small and can be fractionated for more than one patient, according to the medical prescription (when prepared in an aseptic environment). Preliminary studies carried out by the pharmacovigilance committee of *Instituto da Criança* (The Children's Institute) show that, with implementation of the SDMDU, the Institution's pharmacy would have the capacity to reduce internal consumption by up to 35%. In other words, for a consumption of US$ 371,475.88, the hospital pharmacy would save nearly US$ 130,016.55 only with the centralization of antibiotic handling[19].

Conclusion

According to the literature, the current drug dispensing system employed by the hospital in this study has countless disadvantages, including lower patient safety, possibility of drug-related problems and consequent prolongation of hospitalization times. Implementing an SDMDU (which requires fractionation of doses of injectable medications in an IAC) would provide different technical, clinical and economic advantages, such as optimization of the Nursing team working hours, reduction of medication waste, significant improvement in patient safety, reduction of the possibility of medications becoming contaminated during preparation, and cost reductions. In this study it was possible to estimate 31.4% in savings on medications and materials.

On the other hand, a barrier that ends up hindering implementation of this IAC is the high demand of financial resources. Although financial return of the initial investment may occur in a short period of time (in this study, estimated at 8 months), hospital institutions devoted to serving most patients from the public health system do not always have the necessary capital for immediate use.

Finally, from the investigation of the medications most frequently used in the institution, which involve the highest cost related to loss of medications and materials, it was possible to suggest 7 proposed medications to perform a pilot test, involving the ICU-AD and ICU-NEO. Considering that the hospital under study is a reference for several specialties, offering more than 200 beds, the urgent need to plan and direct resources for the implementation of an SDMDU is emphasized.

Funding sources

This research did not receive funding for its conduction.

Collaborators

PAS and BF were in charge of study conception, as well as of data analysis and interpretation. PAS, MNM, MNP and BF were responsible for the relevant critical review of the intellectual content.

Acknowledgements

MEC/PRIMUS Unipampa, Hospital Santa Casa de Uruguaiana.

Conflict of interest statement

The authors declare that there are no conflicts of interest in relation to this article.

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