

Artigo original

Medidas de controle para disseminação de bactérias multirresistentes em hospital geral de Fortaleza, CE, Brasil

- Limpeza e desinfecção dos equipamentos médicos hospitalares-

Control measures for dissemination of multiresistant bacteria in a general hospital in Fortaleza, CE, Brazil

- Cleaning and disinfection of hospital medical equipment-

Medidas de control para la diseminación de bacterias multirresistentes en un hospital general en Fortaleza, CE, Brasil

- Limpieza y desinfección de los equipos médicos hospitalarios-

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RESUMO

Justificativa e objetivos: A contratação de serviços de limpeza terceirizados resulta em deterioração das práticas de higiene hospitalar em muitos países. Em maio de 2016 o controle de infecção de um hospital geral (CCIH) de Fortaleza detectou aumento de *Klebsiella pneumoniae* KPC. O objetivo deste estudo foi avaliar o impacto das medidas de controle para a disseminação de bactérias nos indicadores de infecções relacionadas aos cuidados de saúde (IRAS). **Métodos:** Em junho de 2016, a padronização "Limpeza e desinfecção do equipamento médico hospitalar" foi implementada como responsabilidade da equipe de enfermagem. Além disso, foram realizadas palestras para reforçar a higiene das mãos (HM). Nas enfermarias, uma pesquisa de satisfação em HM foi projetada para pacientes ou cuidadores. Na unidade de terapia intensiva, a adesão a HM foi observada por um membro da CCIH. A tendência de Taxa e Densidade de Infecção Hospitalar (TIH e DIH) e o perfil de sensibilidade dos principais microorganismos isolados em IRAS foram comparados entre o primeiro e o segundo semestre de 2016. **Resultados:** Observou-se queda 0,1469/mês para DIH e 0,2905 para TIH, mas devido a um curto período de seguimento, não houve significância estatística ($p > 0,05$). Foram isoladas 9 *K. pneumoniae* em aspirado traqueal no 1º semestre versus 3 no 2º semestre; em hemocultura, 4 versus 1. Houve melhora do perfil sensibilidade em secreção traqueal e hemocultura. **Conclusão:** A implantação de medidas que interrompem rotineiramente a colonização no ambiente hospitalar impactou na melhora do perfil sensibilidade microbiológica nosocomial e dos indicadores TIH e DIH.

DESCRITORES: Farmacorresistência Bacteriana. Controle de Infecções. Serviço Hospitalar de Limpeza.

RESUMEN

Antecedentes y objetivos: La contratación de servicios de limpieza resulta en el deterioro de las prácticas de higiene hospitalaria en muchos países. En mayo de 2016, el Comité de Control de Infección Hospitalaria (CCIH) en Fortaleza detectó un aumento de *Klebsiella pneumoniae* KPC. El objetivo de este estudio fue evaluar el impacto de las medidas de control para la diseminación de bacterias en los indicadores de infecciones asociadas a asistencia a la salud (HAI). **Métodos:** En junio de 2016 se implementó la estandarización "Limpieza y Desinfección del Equipamiento Médico Hospitalario" como responsabilidad del equipo de enfermería. Además, se realizaron conferencias para reforzar la higiene de manos (HH). En las enfermerías se diseñó una encuesta de satisfacción de HH para pacientes o cuidadores. En la unidad de cuidados intensivos, un miembro de CCIH observó la adherencia a la HH. La tendencia de la tasa y densidad de infección hospitalaria (HIR y HID) y el perfil de sensibilidad de los principales microorganismos aislados en HAI se compararon entre el primer y el segundo semestre de 2016. **Resultados:** Hubo una disminución de 0,1469 por mes para HID y 0,2905 para HIR, pero debido a un corto período de seguimiento, no hubo significación estadística ($p > 0,05$). *K. pneumoniae* se aisló en aspirado traqueal en 9 HAI en el 1° semestre, frente a solo 3 en el 2° semestre (67% de reducción) y 4 frente a 1 en hemocultivo (reducción del 75%). La mejora del perfil de sensibilidad se observó en el aspirado traqueal y en el hemocultivo. **Conclusiones:** La implantación de medidas que interrumpen de manera rutinaria la colonización en el ambiente impacta en la mejora del perfil de sensibilidad microbiológica nosocomial y los indicadores HID e HIR.

PALABRAS CLAVE: Farmacorresistencia Bacteriana. Control de Infecciones. Servicio de Limpieza en Hospital.

ABSTRACT

Background and Objectives: Hiring of outsourced cleaning service result in deteriorating hospital hygiene practices in many countries. May 2016 the Hospital Infection Control Committee (CCIH) in Fortaleza detected an increase of *Klebsiella pneumoniae* KPC. The objective of this study was to evaluate the impact of control measures for the dissemination of bacteria in healthcare-associated infections (HAI) indicators. **Methods:** The standardization "Cleaning and Disinfection of Hospital Medical Equipment" was implemented as responsibility of nursing team. In addition, lectures were held to strengthen hand hygiene (HH). In the wards, a HH satisfaction survey was designed for patients or caregivers. In the intensive care unit, HH adherence was observed by a CCIH member. The trend of Hospital Infection Rate and Density (HIR and HID) and the sensitivity profile of the main microorganisms isolated in HAI were compared between the first and second semester of 2016. **Results:** There was decrease of 0.1469 per month for HID and 0.2905 for HIR but due to a short period of follow-up, there was no statistical significance ($p > 0.05$). *K. pneumoniae* was isolated in tracheal aspirate in 9 HAIs in the 1st semester, versus only 3 in the 2nd semester (67% reduction), and 4 versus 1 in hemoculture (75% reduction). The improvement of the sensitivity profile was observed in tracheal aspirate and blood culture. **Conclusions:** The implantation of measures that routinely interrupt the colonization in the environment impacted on the improvement of the nosocomial microbiological sensitivity profile and the HID and HIR indicators.

KEYWORDS: Drug Resistance, Bacterial. Infection Control. Housekeeping, Hospital.

INTRODUCTION

In May 2016, the Hospital Infection Control Committee (CCIH) of a general hospital in Fortaleza, in its task of monitoring indicators of hospital infection, detected an increase in cultures of multiresistant (MR) microorganisms, mainly *Klebsiella pneumoniae* Carbapenemase

(KPC) isolated in tracheal aspirates, causing pneumonia associated with mechanical ventilation (VAP) early. This fact led to the need to investigate the possible causes of failures in health care processes.

It was verified that the process of cleaning and disinfecting hospital medical equipment was performed by the hospital's outsourced cleaning service, which was not in accordance with the recommendations of the National Agency of Sanitary Surveillance (ANVISA). In addition, it was necessary to reinforce the importance of hand hygiene (HH), the main means of cross-transmission of MR bacteria.

Increasingly, budget constraints and hiring of cleaning services have resulted in deterioration in hospital hygiene practices in health care institutions in many developing countries. Although the extent to which environmental cleanliness contributes to the development of healthcare associated infections (HAI) remains controversial and debated, a growing body of evidence has shown that the removal of such microorganisms by cleaning with or without disinfection can reduce the cross-transmission of pathogens.¹ However, environmental cleanliness, particularly of surfaces close to the patient, and touched by the hands more frequently, is inadequately performed by the cleaning service in many health care institutions in Brazil and perhaps in the world.

The hospital environment is a reservoir source of microorganisms capable of spreading mainly by the hands of health professionals or by fomites. The increase in cases of health-care-associated infections and the disturbing emergence of multi-antibiotic-resistant hospital pathogens over the last decade are of great concern. Microorganisms such as *S. aureus* (MARSA), Vancomycin resistant *Enterococcus* (VRE), *C. difficile*, and *Acinetobacter* sp. can survive on the surfaces of the environment for weeks to months.²

Key measures to reduce nosocomial infections related to the environment include: continuous surveillance and appropriate assessment of excessive cases (epidemic), proper cleaning, disinfection and sterilization of the devices and surface of the environment, as well as adherence to recommendations for isolations and hand hygiene, which are part of the “Patient Safety Program”.³⁻⁵

Automated area decontamination technologies using UV light or hydrogen peroxide vapor/mist, currently available, can be a useful adjunct to routine manual cleaning and disinfection in some more modern hospital settings.¹

Brazil is part of the “World Alliance for Patient Safety”, created by the World Health Organization (WHO) in 2004. The objective of the alliance is to adopt measures to improve patient care and increase the quality of health services. Along with the other countries that have

joined the alliance, Brazil is politically committed to these WHO purposes. For this, on april 1, 2013, the ministry of health (MS) instituted the “National Patient Safety Program” (PNSP), through administrative rule number 529.^{6,7}

Improving HH is the most important measure to prevent infections associated with health care. Despite the recognized importance, hospital infection rates range from 5% to 20%. The constant challenge is to put into practice the procedures that ensure the proper hand hygiene. This is the goal of the WHO's "Save Lives: Sanitize Your Hands" campaign, which aims to promote the encouragement and awareness of professionals towards adherence to the practice of hand hygiene in a constant and routine way.⁸

The quality of care provided in health services is increasingly a requirement of society, reinforced by both internal and external commitments. It is in this sense the development of efforts aimed at improving communication and transparency of information. With the PNSP, the MS seeks the active participation of health professionals, patients, family members and caregivers in the collection of information about any procedure performed that has caused harm to the user's health during hospitalization or care.^{9,10}

The objective of this study was to implement control measures for the dissemination of MR bacteria and to evaluate the impact on HAI indicators.

METHODS



In June 2016, training was carried out for the nursing team and the standard operational procedure (POP) of "Cleaning and Disinfection of Hospital Medical Equipment (Terminal, Concurrent or With Presence of Organic Matter)" was carried out as routine work and responsibility of nursing. An auxiliary or nursing technician was defined as performing this task, under the supervision of the unit nurse.

Three moments were well defined for the execution of the task "Cleaning and Disinfection of Hospital Medical Equipment": 1) Concurrent Cleaning: performed three times a day in critical areas, and twice a day in semi-critical areas; 2) Terminal: after the patient leaves the unit, 3) Cleaning with Presence of Organic Matter: carried out whenever there is dirt with presence of organic matter and at any time of day.

In order to reinforce the importance of adherence to HH in the prevention and control of HAI, posters and lectures were given to health professionals.

In addition, in the wards, a satisfaction survey on HH (Figure 1) was intended for patients or caregivers in order to monitor and at the same time raise awareness about HH in the prevention of HAI.

Figure 1 - Satisfaction Survey on Hand Hygiene (HH).

 	
ROOM NUMBER: _____ DATE: _____	
1) Do you consider that the hygiene of the professionals' hands was properly performed always before and after touching the patient and his environment? <input type="checkbox"/> Proper; <input type="checkbox"/> Partially adequate; <input type="checkbox"/> Inadequate.	2) Did your bedroom or bed have Soap and Alcohol Gel available all the time? <input type="checkbox"/> Yes, Soap and Alcohol Gel; <input type="checkbox"/> Soap Only; <input type="checkbox"/> Alcohol Only Gel; <input type="checkbox"/> None; <input type="checkbox"/> Missed paper towel.

Source: Elaborated by the author.

In the intensive care unit (ICU), adherence to HH was observed by a member of CCIH using a WHO model (Figure 2).

Figure 2 - Observation of Adhesion to Hand Hygiene (HH).

Observer: _____	Date: _____ Start: _____. End: _____.	Duration of the session: _____
Identification of the Professional observed - name: _____ <input type="checkbox"/> Doctor; <input type="checkbox"/> Nursing technician; <input type="checkbox"/> Physiotherapy.	Indication of HH: <input type="checkbox"/> Before touching the patient; <input type="checkbox"/> Before aseptic procedure; <input type="checkbox"/> After handling body fluids; <input type="checkbox"/> After touching the patient; <input type="checkbox"/> After touching the environment near the patient.	Ação realizada para a HH: <input type="checkbox"/> Friction with Alcohol gel; <input type="checkbox"/> Water and soap; <input type="checkbox"/> Not performed.

Source: WHO, 2009b.¹¹

The HAI indicators, such as the Hospital Infection Rate (HIR = number of HAI / number of hospital discharges,%), Hospital Infection Density (HID = HAI number / 1.000 day-patients,%o), and the sensitivity profile of the main microorganisms isolated in HAI cultures, were compared before and after the interventions. Since the occurrence and training coincided

with the calendar month June/2016, those indicators of the first and the second half of 2016 were compared.

This work was approved by the Medical Ethics Committee of the General Hospital of Fortaleza, with number of appreciation 002/2017, in which the researchers involved in the project compromised to maintain confidentiality about the data collected in the CCIH files, as well as the privacy of its contents, as recommended by the International Documents and Resolution 466/12 of the National Health Council.¹²

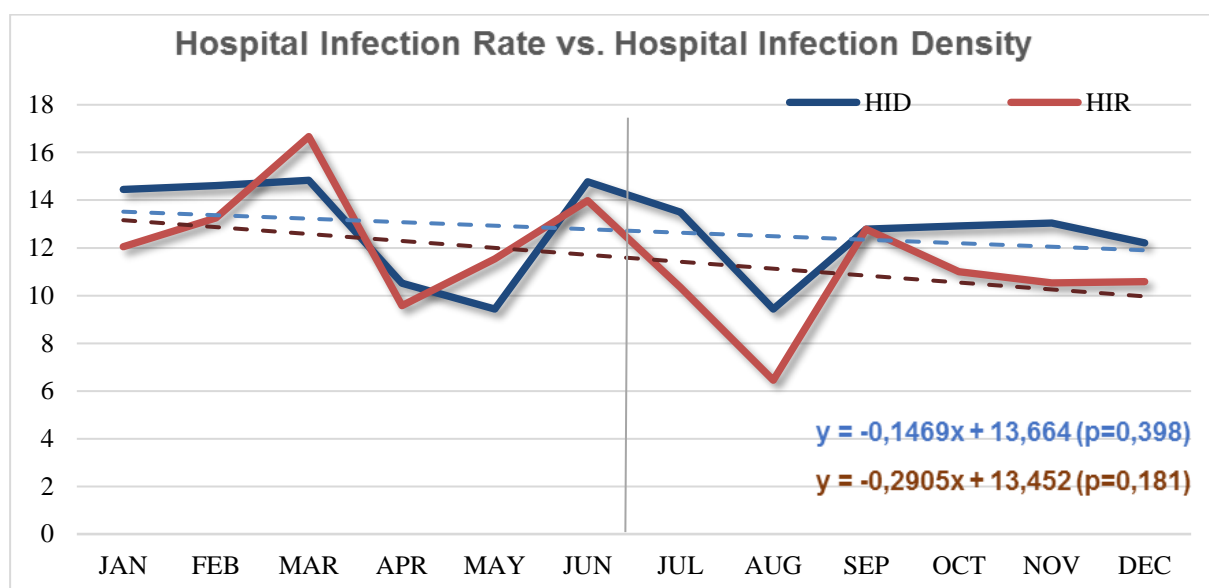
RESULTS

The satisfaction survey on HH and the availability of inputs (alcohol gel, soap, paper towel) in the wards was performed in 36 patients or companions and showed adequate HH in 28 (78%), and partially adequate or inadequate in 8 (22%). Regarding to the availability of the inputs for HH, soap and alcohol gel was available in 54% of the interviewees; only soap at 2%; only alcohol gel in 24%; paper was missing in 20% of the clients interviewed.

In the period from august to november of 2016, a member of the CCIH observed in the ICU the adhesion to HH in the 5 moments indicated by WHO, altogether 35 assistance professionals, being 13 nursing technicians, 12 nurses, 6 physiotherapists and 4 physicians. The greatest indications were "after touching the patient" (25/71%) and "before touching the patient" (24/68%). We observed less indication for "after touching the environment close to the patient" (7/20%), "before aseptic procedure (6/17%), and after handling of body fluids (2/6%). Regarding the action taken, 24 opportunities (68%) were observed for "water and soap"; "friction with alcohol gel" in 9 opportunities (26%); "unfulfilled" in none. There were two observations where the action was not checked and in one observation the professional performed two actions (water, soap and alcohol gel).





































































































The graphic 1 shows the HAI indicators for the year 2016, HID (‰) and HIR (%), and the construction of a trend line for each indicator, using as a predictor variable the time. There was a trend of a decrease of 0.1499 per month for HID and 0.2905 per month for HIR, but due to a short period of follow-up and a consequent low power of the test, there was no statistical significance in the value of angular coefficient ($p > 0.05$).

Graphic 1 - Hospital Infection Rate vs. Hospital Infection Density.



In relation to the main microorganisms found in HAI (Table I), in general *K. pneumoniae* was the main one, followed by *P. aeruginosa*. *K. pneumoniae* was isolated in tracheal aspirate in 9 HAI in the first semester, versus only 3 in the 2nd semester (67% reduction) and 4 versus 1 blood culture (75% reduction). *Pseudomonas aeruginosa* was isolated in tracheal aspirate in 6 HAI in the first semester, versus 4 in the 2nd semester (33% reduction). *A. baumannii* presented similar frequency in the two semesters (4 versus 5) in tracheal aspirate.

Table 1 - Sensitivity profile (% S) of the main HAI, 2016- HGeF/Fortaleza, CE- Brazil.

SENSITIVITY PROFILE (S%) OF THE MAIN MICROORGANISMS ISOLATED IN HOSPITAL INFECTION 2016/ HGeF, CE- BRAZIL												
Tracheal aspirate	N	Amica	Colistin	Tigecic	Merop	Genta	Cefep	Ceftriax	Ciproflo	Pip/Taz	Amp/Sulb	
<i>K. pneumoniae</i>	9	 33	 22	 0	 22	 72	 11	 11	 0			
	3	 67	 33	 33	 33	 33	 0	 0	 67			
<i>P. aeruginosa</i>	6	 67	 50		 17	 67	 50		 50	 33		
	4	 75	 100		 50	 50	 0		 75	 0		
<i>A. baumannii</i>	4	 25	 75	 50	 0	 50	 0		 0		 25	
	5	 40	 100	 100	 20	 20	 20		 20		 20	
Hemoculture	N	Amica	Colistin	Ceftazid	Merop	Genta	Cefep	Cefoxiti	Ciproflo	Pip/Taz	Amp/Sulb	
<i>K. pneumoniae</i>	4	 75	 100		 75	 50		 25	 0	 25		
	1	 100	 100		 100	 100		 100	 0	 0		
<i>P. aeruginosa</i>	1	 0	 100	 0	 0	 0	 0		 0	 0		
	1	 100	 0	 100	 0	 100	 100		 100	 0		
Uroculture	N	Amica	Norflox	Tigecic	Merop	Genta	Cefep	Ceftriax	Ciproflo	Pip/Taz	SMZ/TMP	
<i>K. pneumoniae</i>	7	 71			 43	 14					 14	
	6	 50			 17	 0					 0	
<i>P. aeruginosa</i>	1	 100	 0		 100	 0	 100		 100	 100		
	4	 75	 25		 50	 25	 50		 50	 75		
 1 ^o Semester		 2 ^o Semester		N= Number of isolates								

DISCUSSION

According to the vision of the patient or companion, we obtained a satisfactory answer regarding to the adherence to HH of health professionals, but we observed that the availability of supplies for HH was insufficient.

Among the measures adopted to optimize the dispensing of the inputs, besides the meeting with the cleaning service supervision in view of such failure, the monthly quantification of the volume of soap and alcohol gel consumed was requested, following national recommendations, with the construction of the indicator volume/ patient-day/ month.³

Adequate access to facilities for hand hygiene and the use of means of communication to inform patients and their families about the risks of contamination and precautions necessary to minimize them are among the most relevant measures for surveillance in hospital infection control.^{13,14}

We observed from the cited data that in the ICU there was greater use of soap and water in relation to alcohol gel for hand hygiene. We know, however, that alcohol gel has a better potential to reduce microbial load, but if there is presence of dirt it is necessary to use water and soap.^{3,15} This probably occurred due to the lack of availability of alcohol gel in that sector, which was also evidenced.

The observation of adherence to HH by the CCIH member showed some professionals with poor adherence, and provided the opportunity to reinforce the importance of this action individually, and to constantly raise the awareness of health care professional about this.

The improvement of the sensitivity profile (majority with increased sensitivity) was observed in tracheal secretion and blood culture, but not in uroculture. This fact could be explained by the risk of urinary infection of those patients being more related to intrinsic factors than to the environment, since most of them had no infection related to delayed bladder catheter, occurring in elderly patients with prolonged hospitalization.

We observed in this study a very high resistance of *Klebsiella p* to colistin in tracheal aspirates, in the first semester 78% and in the second semester 67% of resistance, however, these are well above the literature data, where we find in Brazil 25% (São Paulo, 2016), USA 16% (Network of Long-Term Acute Care Hospitals, 2017), Europe up to 20% (Greece, 2014).¹⁶⁻¹⁸ There are, however, reports of particularly high rates of resistance to colistin (20-55.2%) in ICU patients.¹⁷

We then found that the confirmatory tests for sensitivity profiles of automated cultures, such as Hodges for carbapenems and E - test for carbapenems or colistin, were not performed in the routine of that hospital, as recommended by national and international standards of antibiogram. So our high resistance findings of *K. pneumoniae* to colistin may be overestimated.

In order to adapt the reports according to the Clinical and Laboratory Standards Institute (CLSI)¹⁹, the E-test was implanted in that hospital in March 2017. However we emphasize that currently according to the Brazilian Antimicrobial Susceptibility Testing Committee (BrCAST) it is necessary to make the broth dilution test to confirm resistance to colistin, as recommended by the European Committee for Antimicrobial Susceptibility Testing (EUCAST).²⁰

Bloodstream infections caused by Carbapenem-resistant Enterobacteriaceae (CRE) kill up to half of the affected. Such infections are difficult to treat by limiting therapeutic options and are increasing in ICU patients or long-term hospitalizations.⁵

The sources of in-hospital transmission of CRE, as well as the microorganisms that colonize the environment, are contaminated hands and surfaces. CRE colonize dry surfaces for hours to weeks, but some references suggest that they play a minor role in cross-transmission; *Acinetobacter baumannii* colonizes for weeks to months and is difficult to remove even by cleaning and disinfecting. *Pseudomonas aeruginosa* colonizes the moist body sites (throat, nose, armpits, perineum), gastrointestinal tract, and wet hospital surfaces such as aerators and respiratory therapy equipment.^{2,5}

The cleaning and disinfection of surfaces at the patient's side, ie equipment and utensils for direct patient care, are tasks for the nursing team, including infusion pump and mechanical ventilation monitors, equipment for measuring vital signs, drainage containers and others.⁴

However, several health institutions have not yet adapted their work routines, underestimating this important route of transmission of multidrug resistant hospital bacteria.

In Fortaleza, Ceará, Brazil, all hospitals investigated, the cleaning service is still responsible for cleaning and disinfecting hospital medical equipment and surfaces close to the patient. There is a great resistance of nursing team to accept such task, perhaps by work overload or non-acceptance of performing "cleaning service".

Good practices in hospital hygiene and correct cleaning techniques are part of the principles of any health institution to avoid contamination and dissemination of MR bacteria, since the hospital concentrates countless types of microorganisms such as mycobacteria, fungi and viruses harmful to patients' health and health professionals, who come into contact daily through work activities.

In Canada the recommendations of the Public Health Agency assess the risk for determining the frequency of surface cleaning and disinfection in health care services, and this method is based on probability of contamination, patient vulnerability and potential exposure.²¹

Considering Decree No. 94.406 of June 8, 1987, which regulates Federal Law No. 7.498/86, of the Professional Nursing Exercise, Article 8 states that:

Art 8- The nurse must:

II - as a member of the health team: e) prevention and systematic control of hospital infection, including as a member of the respective commissions;

Art. 10 - The nursing technician performs the activities of medium level, assigned to the nursing team, being responsible for:

I. D) prevention and control of hospital infection;

II. E) prevention and systematic control of physical damage that may be caused during health care.

Art. 11- The nursing assistant performs the auxiliary activities of medium level, assigned to the nursing team, being responsible for:

III. Performing specifically prescribed or routine treatments, in addition to other nursing activities, such as:

I. Perform disinfection and sterilization activities;

IV. Provide hygiene and comfort care to the patient and ensure their safety, including:

B) ensure the cleanliness and order of the material, equipment and dependence of the health unit.²²

According to the legislation, nursing assistants and technicians are trained to perform nursing activities in direct patient care, as well as hygiene and disinfection care of hospital medical equipment and materials.

Considering also the ANVISA protocol, "Patient safety in health services: cleaning and disinfection of surfaces, 2012", provides on "duties not incumbent on the cleaning professional":

- Removal of materials or equipment from patient care in rooms, wards or any other unit, prior to performing cleaning, either competitor or terminal. Examples are: infusion pumps, comadres, parrots, drainage containers and others. These tasks belong to the nursing team, since they are materials related to patient care.
- Carrying out cleaning of the patient's bed, while the patient is still there. This task is incumbent on nursing, since improper handling in the bed can cause harm to the patient's health, such as displacements of drains and catheters.⁴

In view of the above, it is responsibility of nursing to hygiene and disinfect all material and equipment related to patient care, aiming to guarantee the safety of the entire team. It is of paramount importance to carry out institutional protocols in search of the internal standardization of surface cleaning actions, which should be validated by the CCIH service and nursing coordination.

The implementation of measures that routinely interrupt the transmission chain of MR bacteria, such as responsibility of nursing in the cleaning and disinfection of medical-hospital equipment, in addition to constant surveillance and re-education in HH, had impacted on the improvement of the microbiological sensitivity profile of HAI and the indicators HID and HIR.

In addition, the study provided the opportunity to detect the health professional with poor adherence to HH to be oriented, showed that the availability of inputs for HH may be an obstacle to the hospital infection control and evidenced a weakness of the laboratory regarding the performance of the tests for confirmation of susceptibility to carbapenems and colistin, which could then be corrected. However, with the new EUCAST/ BrCAST recommendations, the resistance confirmation method for colistin will need to be revised.

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