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Original Article

INFECÇÕES ASSOCIADAS AO USO DE DISPOSITIVOS INVASIVOS EM IDOSOS INTERNADOS EM UNIDADE DE TERAPIA INTENSIVA

INFECTIONS ASSOCIATED WITH THE USE OF INVASIVE DEVICES IN ELDERLY PEOPLE IN INTENSIVE THERAPY UNIT

INFECCIONES ASOCIADAS AL USO DE DISPOSITIVOS INVASIVOS EN HOSTALES INTERNADOS EN UNIDAD DE TERAPIA INTENSIVA

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RESUMO

Objetivo: Caracterizar a ocorrência de infecções associadas ao uso de dispositivos invasivos em idosos internados em unidade de terapia intensiva. **Método:** Estudo retrospectivo, descritivo. Foram analisados dados de prontuários de idosos internados, em uma unidade de terapia intensiva e do banco de dados do serviço de controle de infecção hospitalar, relativos a 10 meses de atendimento. Realizaram-se análises estatísticas descritivas. **Resultados:** Dentre os 428 idosos internados, 12% (53) tiveram infecções associadas ao uso de dispositivos invasivos, sendo 50,9% mulheres, a maioria (39,6%) e entre 60 e 69 anos. Predominaram as infecções do trato respiratório associadas à ventilação mecânica (44,3%) e microrganismos gram negativos (66%), sendo a *Klebsiella pneumonia* (18,4%) a mais prevalente. Do total de idosos com infecções, 39,6% morreram. Dentre os 58,4% que saíram de alta, para outras unidades do hospital, 58% faleceram na instituição. **Conclusão:** A prevenção das infecções relacionadas ao uso de dispositivos invasivos, considerando a vulnerabilidade da população idosa, é fundamental, bem como o monitoramento epidemiológico e gestão dos riscos a ela relacionados. A qualificação dos profissionais de saúde e, em específico, da enfermagem deve ser realizada de forma sistemática para se avançar na qualidade assistencial.

Descritores: Enfermagem; Infecção hospitalar; Unidades de Terapia Intensiva; Segurança do paciente.

ABSTRACT

Objective: To characterize the occurrence of infections associated with the use of invasive devices in elderly patients admitted to an intensive care unit. **Method:** a retrospective descriptive study was carried out. Data from medical records of elderly patients hospitalized in an intensive care unit and from the hospital Infection Control Service database were analyzed. The data were related to 10 months of service. Descriptive statistical analyses were performed. **Results:** Among the 428 hospitalized elderly, 12% (53) had infections associated with the use of invasive devices, being 50.9% women, being the majority of them (39.6%) between 60 and 69 years old. Respiratory tract infections associated with mechanical ventilation predominated (44.3%) and Gram-negative microorganisms (66%), with Klebsiella pneumonia (18.4%) being the most prevalent. Of the total elderly with infections, 39.6% died. Among the 58.4% who left discharge for other hospital units, 58% died in the institution. **Conclusion:** the prevention of infections related to the use of invasive devices considering the vulnerability of the elderly population is fundamental, as well as the epidemiological monitoring and management of risks related to them. The qualification of health professionals and in specific nursing should be carried out systematically in order to advance the quality of care. The prevention of infections is of fundamental importance, mainly in vulnerable populations such as the elderly. The qualification of health professionals is necessary and must be carried out in a systematic way to advance the quality of care.

Descriptors: Nursing; Cross Infection; Intensive Care Units; Patient Safety.

RESUMEN

Objetivo: caracterizar la aparición de infecciones asociadas con el uso de dispositivos invasivos en personas mayores hospitalizadas en una unidad de cuidados intensivos. **Método:** estudio retrospectivo y descriptivo. Se analizaron datos de registros médicos de ancianos hospitalizados en una unidad de cuidados intensivos y de la base de datos del Servicio de Control de Infecciones del hospital, datos relacionados con 10 meses de servicio. Se realizaron análisis estadísticos descriptivos. **Resultados**: entre los 428 ancianos hospitalizados, el 12% (53) tuvo infecciones asociadas con el uso de dispositivos invasivos, siendo el 50,9% mujeres, la mayoría (39,6%) entre 60 y 69 años. Predominan las infecciones del tracto respiratorio asociadas con la ventilación mecánica (44,3%) y microorganismos Gram-negativos (66%), siendo la neumonía klebsiella (18,4%) la más frecuente. Del total de ancianos con infecciones, el 39,6% murió. Entre el 58,4% que dejó el alta para otras unidades hospitalarias, el 58% murió en la institución. **Conclusión**: la prevención de infecciones relacionadas con el uso de dispositivos invasivos teniendo en cuenta la vulnerabilidad de la población de edad avanzada es fundamental, así como el seguimiento epidemiológico y la gestión de los riesgos relacionados con ellos. La cualificación de los profesionales de la salud y en la enfermería específica debe llevarse a cabo sistemáticamente con el fin de avanzar en la calidad de la atención. La prevención de infecciones reparte importancia fundamental, especialmente en las poblaciones vulnerables, como los ancianos.

Descriptores: Enfermería; Infección Hospitalaria; Unidades de Cuidados Intensivos; Seguridad del Paciente.

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INTRODUCTION

Infections acquired in health services, currently called IRAS - Infection Related to Health Care - consist in adverse events, while their higher occurrence associated with severe diseases, medical and surgical interventions and complications related to them, as well as the prolonged hospitalization[1]. They favor the increase of morbidity and mortality, hospitalization time and increase hospital costs and impact on the quality of care provided by health services. Characterized as preventable event, appear between the international goals recommended for the safety of the patient[1-2].

With the increase in life expectancy of the population, we face, increasingly in hospitals, with the care provided to patients of advanced age, who are characterized by having many chronic diseases, in addition to having their immune response committed by natural aging process. This population sometimes needs to be assisted in Intensive Care Units (ICU) when in critical condition. Being in intensive treatment, it is necessary to be monitored and increase the chances of being subjected to invasive procedures, such as insertion of a central venous catheter (CVC) and long-time vesical catheter (CVD), for example.

When need ventilatory support, it is often the use of endotracheal tube (TOT) and tracheostomy (TQT) for mechanical ventilation (MV). They are procedures necessary for repairs in life and for the control of the general condition of the patient and result of hemodynamic instability or risk of acute instability, immediate postoperative of long surgeries and infusion of vasoactive drugs.

However, constitute themselves as the main risk factors for the onset of infections, as pointed out in different studies, one of them being an integrative review performed with 13 studies in which it had as objective to evaluate the occurrence of infections in elderly patients[3], as well as in other studies conducted with people hospitalized in intensive care unit[4-5]. In a survey conducted in a general and teaching hospital, it was found that, among patients with bloodstream infection, 49% were elderly, being the most prevalent microorganism was Acinetobacyter baunanni (23.5%)[6].

This context signals the need to devote differentiated attention to elderly patients, since they are more susceptible to severe complications, if compared to an adult patient under the same conditions. In addition, the dissemination of microorganisms is a serious threat to public health, since there are limited therapeutic options by the resistance profile of these microorganisms[2-3]. In addition, it is necessary to deepen the knowledge related to the occurrence of these infections, in this population in particular and, when in intensive treatment, being still a situation little investigated in Brazil, configuring it as a triggering factor for this research. Thus, the objective of this study was to characterize the occurrence of infections associated with the use of invasive devices in elderly patients hospitalized in an intensive therapy unit.

Noting that the IRAS cause several damages to patients, especially the elderly, with direct and indirect social impacts, for society as a whole, the importance of prevention in accordance with the survey data, by means of conducting epidemiological studies, monitoring and management of risks, it is of great importance for the quality of care and, mainly, for the safety of the patient, which justifies its accomplishment[7-9].

METHOD

It is a retrospective and a descriptive study, performed in a public hospital, of teaching and large, specialized in cases of urgency and emergency trauma and non-trauma of Belo Horizonte/Minas Gerais. The study was conducted through the analysis of records and data collected in the Service of Hospital Infection Control of the Institution (SCIH) within a time of 10 months, time in which it was held the immersion of the researcher, resident in nursing, in the dimension of care of the Residency Program.

There were included in this study, elderly patients (age greater than or equal to 60 years old), hospitalized in the ICU, which used the invasive devices long-time vesicle catheter, mechanical ventilation, central venous catheter and double lumen catheter and with a diagnosis of IRAS (in Portuguese) associated with its use, according to the criteria of the National Sanitary Surveillance Agency (ANVISA)[10]. We excluded patients who had infections not associated with invasive devices analyzed and the situations of lack of accuracy in the records relating to the information to be collected in the medical records

and, in particular, in the nursing developments related to the use of the devices.

For the identification of sociodemographic and clinical profile of patients, data were collected from electronic medical records: age, gender, marital status, comorbidities, diagnosis at hospitalization, and length of hospital stay in the intensive care unit, hospitalization time, outcome in intensive care unit and hospital outcome. The identification of microorganisms was obtained by means of the results of cultures given by the laboratory of the institution, for the Service of Hospital Infection Control, as well as the epidemiological data related to infections. The data were recorded in the instrument elaborated by the authors.

For identification of the IRAS related to the use of invasive devices, data were evaluated as the date of insertion and removal of the device; a time of permanence; closed infections associated with invasive devices, Bloodstream Infection (BSI), Urinary Tract Infection (UTI), Ventilator-Associated Pneumonia (VAP); Infection of the Arterial or Venous System (CVC/VASC), closed date of infection associated with the use of the device and outcome in the medical records. These data were obtained by the Automated System of Hospital Infection Control, which is a database fed by nurses who work in the Service of Hospital Infection Control of the Institution, by means of active search of cases and homogeneous application of the criteria of the ANVISA[10].

Descriptive statistical analyzes were performed with calculations of continuous variables, such as absolute and relative frequency, average and standard deviation. The study began after approval by the ethics committee with the opinion N 86429418.4.0000.5149.

RESULTS

In the analyzed time, 120 cases of IRAS were associated with the use of invasive devices, in the ICU of the teaching hospital, being 52.5% (53) in elderly patients. The total number of elderly inpatients in the period was 428, of whom 12% (53) were affected by this type of infection. Among the infected elderly hospitalized in the ICU, there was a slight prevalence of females aged between 60 and 69 years old and single patients (Table 1).

Tabela 1 **-** Perfil sociodemográfico da população idosa pesquisada em um Hospital Público de Belo Horizonte - MG, Brasil (N=53).

Gender	**N**	**%**
Female	27	50,9
Male	26	49,1
Idade		
60 – 69	21	39,6
70 – 79	14	26,4
80 - 89	15	28,3
90 +	3	5,7
Marital Status		
Single	21	39,6
Married	15	28,3
Widower	12	22,6
Divorced	5	9,4

Source: Data from the computerized medical records of patients and SCIH.

The main diagnoses on admission to the ICU were 20.7% (11) for neurological impairment, vascular 20.7% (11), respiratory 18.8% (10), hematemesis 11.3% (6), acute abdomen 9.4% (5), renal impairment 7.5% (four), fractures 5.6% (three). The diagnoses with equivalence to one were defined as other and corresponded to 3.5% (three). The main comorbidities presented by elderly inpatients were systemic arterial hypertension, followed by diabetes mellitus and congestive heart failure (Table 2).

Table 2 - Comorbidities described in computerized medical records.

Previous Comorbidities	N	%
Systemic Arterial Hypertension - SAH	34	26.5%
Diabetes Mellitus - DM	14	10.9%
Congestive Heart Failure - CHF	14	10.9%
Stroke	13	10.1%
Chronic Kidney Disease - CKD	7	5.4%
Chronic Arterial Disease - CAD	7	5.4%
Dementia	6	4.6%
Chronic Obstructive Pulmonary Disease - COPD	4	3.1%
Hypothyroidism	4	3.1%
Dyslipidemia	2	1,5%
Osteoporosis	2	1.5%
Depression	3	2.3%
Other Diseases	15	11.7%

Source: Data from the computerized medical records of patients.

The average time of ICU hospitalization of the elderly with IRAS was 23 days, with a standard deviation (SD) of 15.3 days. The minimum length of hospital stay was four days and maximum 91 days. Among the elderly inpatients, 9.6% (five) remained from one to seven days in the ICU; 19.2% (10) eight to 14 days; 46.2% (24) from 15 to 30 days and 25.0% (13) remained for more than 30 days. The average ICU hospitalization time until the diagnosis of IRAS was 11 days, with SD of 8.05 days. Among the patients who were discharged for other sectors, the average duration of hospital stay was 37 days, with a standard deviation of 36.5 days, being the minimum time of hospitalization of four days and a maximum of 170 days.

We analyzed the occurrence of IRAS by topographic location. We observed a higher incidence in respiratory tract infections (44.3%). The pneumonia (VAP) were responsible for 28.5% (18) and the infection in the lower respiratory tract (LRI/BRON), responsible for 15.8%, both associated with mechanical ventilation. The bloodstream infection (BSI) was identified in 33.3% (21) of the situations in patients in use of CVC and CDL; 4.8% (three) associated to the central catheter (CVS/VASC) and in the urinary tract infection (UTI), in 17.4% (11) of the elderly assisted. The remaining time of the devices ranged from two to 88 days, detailed in Table 3.

Table 3 – Remaining time of invasive devices in elderly hospitalized in the ICU.

Device	Minimum	Maximum	Average	Standard Deviation
CVC	3	62	20.9	12.3
CVD	2	88	20.7	15.2
VM	2	49	18.6	12.5

Source: Data from the computerized medical records of patients.

The ITU's presented a greater incidence, in the period prior to 14 days after admission (Table 4).

Table 4 - Diagnosis of IRAS associated with invasive devices on days in the elderly hospitalized in the ICU.

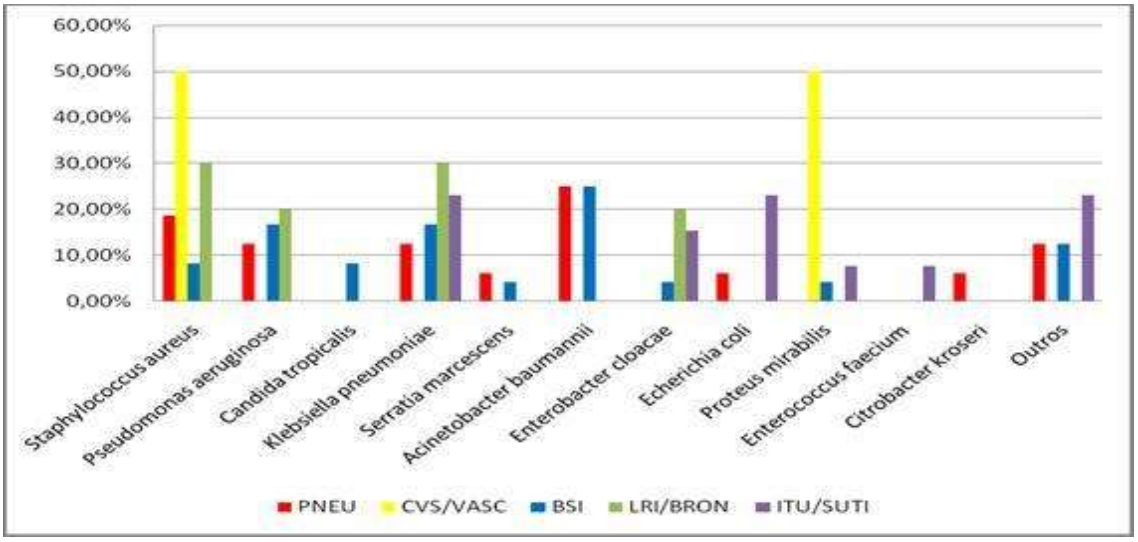
INFECTION	0 – 7	8 – 14	15 – 30	30+
CVS/VASC	0.0%	0.0%	66.6%	33.3%
BSI	5.5%	16.6%	50.0%	27.7%
LRI/BRON	12.5%	12.5%	50.0%	25.0%
ITU	22.2%	44.4%	33.3%	0.0%
PNEU	0.0%	33.3%	33.3%	33.3%

Source: Data transferred by SCIH.

Among the microorganisms isolated, gram-negative prevailed in 66.1% of samples, being the most prevalent Klebsiella pneumoniae 18.4% (12), followed by Acinetobacter baumannii 15.3% (10) and Pseudomonas aeruginosa in 12.3% (8). Among the gram-positive, the most prevalent organism was Staphylococcus aureus, 13.8% (9). Candida tropicalis fungi were isolated in 3.0% of samples. When considering the topography, in the bloodstream, the microorganisms most prevalent were Acinetobacter baumannii (25%), followed by Klebsiella pneumoniae (16.6%). At the tips of catheters, the main ones were Proteus mirabillis (50%) and Staphylococcus aureus (50%). In infections of the urinary tract, the main microorganisms isolated in the urine cultures were Echerichia coli (23%), in the respiratory tract infections, the main isolated microorganisms, in tracheal aspirates and minibal were Acinetobacter baumannii with (25%) and Staphylococcus aureus (18.7%).

Already in the infections of the lower respiratory tract, there were isolated on minibal Klebsiella pneumoniae (30%) and Staphylococcus aureus (30%), as shown in Figure 1.

Figure 1 - Microorganisms identified in infections diagnosed from June 2017 to March 2018.



Source: Data transferred by SCIH.

With reference to the outcome of elderly patients with IRAS admitted to the ICU, 39.6% (21) died, 58.4% (31) were discharged from the ICU and 1.8% (one) was transferred to another hospital. Among those who were discharged for other units of the hospital, 58% (18) died, 38.7% (12) were discharged from hospital and 3.3% (a) has been transferred to another institution.

DISCUSSION

The findings of this study show alarming rates of infections related to the use of invasive devices, in elderly patients with intensive treatment, as well as the high rate of mortality in this population in the final outcome. Show, still, long retention rates of hospitalization, not only in the ICU, as well as the units of hospitalization among those who were discharged from the intensive care unit. This scenario has major implications not only from a financial point of view, but by both the cost of the treatment of infections and increased hospitalization time necessary for its implementation, as well as impact on quality of care of the institution and in reducing the supply of beds to other patients.

They are findings that deserve reflection, in view of the fact that the elderly population come to occupy, increasingly, the beds in intensive therapy, at the expense of the aging population and indicate the need to consider the greater vulnerability of this population, in the planning of assistance, once that age alone is a risk factor for hospital mortality[11].

In a study carried out in a teaching hospital in the Northeast, there was found time a little less of ICU (21, 5 days)[3]. In another study, it was identified that 46.2% of patients in intensive therapy were elderly and remained from eight to 14 days in the unit[2], also lower than found in this study. The greatest time of hospitalization favors the occurrence of other unfavorable outcomes, such as malnutrition, which contributes to hamper the recovery of the elderly, benefiting a vicious circle of complications[12]. In a multicenter study, it was found that the largest number of deaths there was associated with greater duration of hospitalization in the ICU, which was associated with prolonged use of invasive devices[13]. Other studies show similar outcomes and also worrying and deserving of the attention of professionals[14].

Studies show that the increase of life expectancy of the population has been associated with higher incidence of chronic diseases, which also constitute a factor that facilitates the development of IRAS, since they contribute to the greater complexity of clinical condition, being associated with greater frequency of hospitalizations and by requiring, many times, interventions for its control[15-17]. Some studies have shown a higher incidence of sepsis and an increase of mortality of hospitalized patients associated to their comorbidities[17-18]. Diabetes is a disease that favors the occurrence of infections, in a general way, to undermine the functioning of the immune system, in addition to being a complicating factor in the treatment of infections and mainly affects older people[19-20].

The higher prevalence of infections in the respiratory tract associated with mechanical ventilation corroborate with the results of other studies. The literature shows that this incidence can vary according to the length of time on mechanical ventilation, with rates of 3% with up to five days in duration and 2% for the following days, being the global mortality attributable to 20% to 60%, considering the severity of the disease, the micro-organism and the impairment of the elderly. It is estimated that 33% of the patients with VAP die by this type of infection[21-22]. For micro-organisms identified in these infections, the findings show some variations as to those of other studies, such as the one performed in a public hospital with 190 people, in which the microorganism Staphylococcus aureus was identified in (46.3%) of the samples as the main cause of VAP, followed by Pseudomonas aeruginosa[21-22]. An epidemiological study showed that the presence of comorbidities in advance, together with pathologies of neurological and cardiovascular character, leave the elderly more dependent of MV[21-22]. In this study, the most prevalent diagnoses in the studied population, were of neurological and vascular nature (20.7%), which may corroborate the predominance of VAP.

For the prevention of infections related to the use of invasive devices there were created bundles that are “packages” of measures that collaborate in their control, generating better results at the expense of preventive conducts isolated, being very widespread today. Inside the package of measures for the prevention of infection per MV, there is the achievement of oral hygiene with 0.12% chlorhexidine at least once a day; looking after the elevation of the headland between 30 and 45°; care of the Cuff pressure from 20 to 30 cm H_2O; withdrawal of sedation at the beginning of the daily service and endotracheal aspiration following tube, nose and mouth[1, 22].

In this study, the occurrence of infection of the bloodstream and related to catheter occurred after 15 days of use of invasive device (CVC/CDL), being the average time of permanence of the device for 20 days. It is estimated that, in a period exceeding seven days of permanence of the device, the risk of infection goes from 5 to 10%, increasing, at the same time, the risk of mortality due to bloodstream infection[23]. The puncture site of CVC, also influences the appearance of infections related to the use of vascular catheters, being greater when the puncture occurs in femoral region. Added to this is the factor manipulation of the catheter, which as bigger it is and associated with prolonged time of its stay, causes a higher risk of occurrence of infections of the bloodstream[3]. For its prevention, the literature recommends specific care, such as the selection of sites with lower risk of infection, hand hygiene, skin care, choice of catheter, stabilization, use of cover and fixation with sterile dressings, care which should be followed by health professionals[1].

With reference to the microorganisms identified in samples of tip catheters and bloodstream, the findings corroborate with those of another study[3]. At the tip of the catheters (CVC and CDL), the main microorganisms found

are similar to the findings of other studies[24]. The prevalence of gram-negative microorganisms as the Acinetobacter baumannii may be associated to its opportunist profile with the ability to adapt to the inanimate surfaces, create biofilms to proliferate in immunosuppressed patients exposed in critical environment, the elderly and in the use of invasive devices[24]. In this study there were isolated, at the tip of the catheters and in the bloodstream, the Acinetobacter sp. in (33.3%) of the samples, Staphylococcus sp. in (22.2%) and Klebisiella pneumoniae and Echerichia coli in a sample. The prevalence of gram-negative microorganisms as the Acinetobacter baumannii may be associated to its opportunist profile with the ability to adapt to the inanimate surfaces, create biofilms to proliferate in immunosuppressed patients, exposed in critical environment, the elderly and in use of invasive devices[24].

Regarding infections related to the use of CVD, the findings in this study differ, in part, from the results of another study, in which we observed polymicrobial growth of Pseudomonas aeruginosa in (17.39%) and Escherichia coli (13.04%) of urine cultures[25]. Urinary tract infections are characterized by a high potential of prevention. Among the main causes of its occurrence is the prolonged time of catheterization, which promotes the formation of biofilm[25]. In this study, the average time of permanence of the vesical catheter was 21 days, having the infection, with early onset, after admission to the ICU.

In the literature, there is no consensus about the maximum time to be performed the replacement of CVD. Current studies indicate that there is a need for an exchange of devices with fixed periods, but that it should be performed based on ongoing and daily assessments[26]. In addition, the vesical catheters delay should be kept only when strictly necessary. The nursing staff perform the daily care of hygiene of the genitalia with patients in use of catheters, as well as the maintenance of aseptic technique in handling the bag of diuresis.

The microbiological analysis of cultures show that both in infections associated with bloodstream regarding low respiratory tract and urinary tract have predominance of Klebsiella pneumoniae, a producer of betalactamases, which are enzymes capable of degrading the betalactamic ring. Its resistance to antimicrobials is associated with this feature, which allows it to inactivate the synthesis of cell wall of the bacterium, which, associated to its profile of resistance is known as Klebsiella pneumoniae producing carbapenemases (KPC)[27]. The presence of this microorganism with the ability to become resistant to antimicrobials, in three topographies of the four analyzed in this study, reinforces the importance of access to the precautionary measures recommended in the institution to avoid the spread of multi-resistant pathogens.

The hand hygiene is recognized as the most effective practice in the prevention and reduction of IRAS. Since 2005, the World Health Organization recommends this hygiene as a goal for the safety of the patient, being a recommendation quite widespread among hospital institutions. However, it should be noted that there are professionals who do not adhere to this essential care in their usual routine of work, favoring the its occurrence[28]. It is a negligent conduct that should be monitored and mitigated by the institutions.

The scarcity of studies turned to the occurrence of infections related to the use of invasive devices, in particular with older people, turned out to be a limiting factor in the discussion of the results. In addition, there were not carried out further analysis that could indicate associations between variables. However, it is believed that the results can contribute to new research, which is also suggested.

CONCLUSION

The infections associated with the use of invasive devices in elderly patients admitted in intensive care unit reveal a worrying scenario, especially when one considers the outcome of patients affected with a high mortality rate. The results indicate the importance of the adoption of measures of prevention and precaution of infections by the health team and, especially, by the nursing team, which routinely handles the invasive devices. All staff should be sensitized to the specificities of the elderly population, which tends to be more vulnerable.

In addition, it is necessary the everyday monitoring to identify early and precisely the occurrence of infections, as well as the careful access of prevention measures imposed, in order to ensure the quality of care and patient safety. It

is believed that the results of this study will assist other services, in their analysis, which was a complicating factor in this work by the scarcity of studies of this nature in the elderly. Moreover, the results could contribute to the planning of actions of service management regarding the prevention of IRAS as a whole.

REFERENCES

1- Brasil. Agência Nacional de Vigilância Sanitária (BR). Medidas de prevenção de infecção relacionada à assistência à saúde. Brasília: ANVISA, 2017.

2- Ferraz CCB, Ortega FB, Silva RB, Leite LRC, Hildebrand CR. Fatores associados a infecções hospitalares causadas por microrganismos multirresistentes num hospital de ensino. PECIBES 2017 [citado em 29 jul 2019]; 2(2):52-7. Available in: http://desafioonline.ufms.br/ojs/index.php/pecibes/article/view/1380

3- Costa FM, Nunes RS, Santos JAD, Carneiro JA. Fatores associados à ocorrência de infecção hospitalar em idosos: Uma revisão integrativa. Renome 2015 [citado em 29 jul 2019]; 4(1):70-86. Available in: http://www.renome.unimontes.br/index.php/renome/article/view/85

4- Giacomini MG, Lopes MV, Gandolfi JV, Lobo SM. Choque séptico: Importante causa de morte hospitalar após alta da unidade de terapia intensiva. Rev Bras Ter Intensiva 2015;27(1):51-6. DOI: 10.5935/0103-507X.20150009

5- Rodrigues CN, Pereira DCA. Infecções relacionadas à assistência à saúde ocorridas em uma Unidade de Terapia Intensiva. Rev Investig. Bioméd 2016;8(1):41-51. DOI: 10.24863/rib.v8i1.28

6- Sousa MAS, Lima TR, Sousa AFL, Carvalho MM, Brito GMI, Camilotti A. Prevalência de infecção da corrente sanguínea em idosos internados em um Hospital Geral. Rev Prev Infec Saúde. 2015;1(3):11-7. DOI: 10.26694/repis.v1i3.4252

7- Bastos ECB, Lima PS, Laurindo MV, Ribeiro LML, Vasconcelos FF, Rocha RR, et al. Perfil epidemiológico das infecções em uma unidade de terapia intensiva de emergência. Braz J Hea Rev. 2019 [citado em 29 jul 2019]; 2(3): 1654-1660. Available in: http://www.brjd.com.br/index.php/BJHR/article/view/1432/1549

8- Escosteguy CC, Pereira AGL, Medronho RA. Três décadas de epidemiologia hospitalar e o desafio da integração da Vigilância em Saúde: Reflexões a partir de um caso. Ciênc Saúde Coletiva 2017;22(10): 3365-79. DOI: 10.1590/1413-812320172210.17562017

9- Rosenthal VD, Desse J, Maurizi DM, Chaparro GJ, Orellano PW, Chediack V, et al. Impact of the International Nosocomial Infection Control Consortium (INICC)'s Multidimensional Approach on Rates of Central Line-Associated Bloodstream Infection in 14 Intensive Care Units in 11 Hospitals of 5 Cities in Argentina. Infect Control Hosp Epidemiol. 2018;39(4):445-51. DOI: 10.1017/ice.2017.298

10- Brasil. Agência Nacional de Vigilância Sanitária. Critérios diagnósticos de infecções relacionadas à assistência à saúde. Brasília: Anvisa; 2017.

11- Kaplan V, Angus DC, MF Griffin. Hospitalized community-acquired pneumonia in the elderly. Am J Respir Crit Care Med. 2002; 165(6):766-72. DOI: 10.1164/ajrccm.165.6.2103038

12- Correia MITD, Perman MI, Waitzberg DL. Hospital Malnutrition in Latin America: A systematic review. Clin Nutr 2017;36(4):958-67. DOI: 10.1016/j.clnu.2016.06.025

13- Kaye KS, Marchaim D, Chen TY, Baures T, Anderson DJ, Choi Y, et al. Effect of nosocomial bloodstream infections on mortality, length of stay, and hospital costs in older adults. J Am Geriatr Soc. 2014;62(2):306-11. DOI: 10.1111/jgs.12634

14-Sousa AFL, Queiroz AAFLN, Oliveira LB, Moura LKB, Andrade D, Watanabe E, et al. Óbitos em idosos com infecção adquirida em Unidades de Terapia Intensiva. Rev Bras Enferm. 2017;70(4):733-9. DOI: 10.1590/0034-7167-2016-0611

15- Heyland D, Cook D, Bagshaw SM, Garland A, Stelfox HT, Mehta S, et al. The very elderly admitted to ICU: A quality finish? Crit Care Med 2015;43 (7):1352-60. DOI: 10.1097/CCM.0000000000001024

16- Sprung CL, Artigas A, Kesecioglu J, Pezzi A, Wiis J, Pirracchio R, et al. The Eldicus prospective, observational study of triage decision making in European intensive care units. Part II: Intensive care benefit for the elderly. Crit Care Med. 2012;40(1):132-8. DOI: 10.1097/CCM.0b013e318232d6b0

17- Lesthaeghe R. The second demographic transition: A concise overview of its development. PNAS 2014 [citado em 24 set 2019]; 111(51):18112-5. Available in: http://www.pnas.org/content/111/51/18112.full.pdf

18- Pauletti M, Otaviano MLPO, Moraes ADST, Schneider DS. Perfil epidemiológico dos pacientes internados em um Centro de Terapia Intensiva. Aletheia 2017 [citado em 29 jul 2019]; 50(1/2):38-46. Available in: http://www.periodicos.ulbra.br/index.php/aletheia/article/view/4160
19- Ferreira RC. Perfil de infecção urinária associada à taxa de glicemia alterada. Rev Bras Anal Clin. 2016; 48(4):346-51. DOI: 10.21877/2448-3877.201600485
20- Sinésio T, Cardoso M, Magro MCDS, Carneiro TA, Silva KGN. Fatores de risco às infecções relacionadas à assistência em unidades de terapia intensiva. Cogitare Enferm. 2018;23(2):1-10. DOI: 10.5380/ce.v23i2.53826
21- Mota EC, Oliveira SP, Silveira BR, Silva PL, Oliveira AC. Incidência da pneumonia associada à ventilação mecânica em unidade de terapia intensiva. Medicina 2017;50(1):39-46. DOI: 10.11606/issn.2176-7262.v50i1p39-46
22- Gonçalves E. Cuidados de enfermagem na prevenção de pneumonia associada à ventilação mecânica (PAVM), em unidade de terapia intensiva, uma revisão integrativa da literatura. Health Res J. 2018 [citado em 29 jul 2019]; 1(1):123-37. Available in: http://healthresearchjournal.com/hrj/index.php/hrj/article/view/27
23- Lopes APA, Torquato O, Borges SLC; Sarat CNF. Infecção relacionada ao cateter venoso central em unidades de terapia intensiva. Ciênc Agrár Saúde 2012 [citado em 29 jul 2019]; 16(1):25-41. Available in: http://www.redalyc.org/pdf/260/26025372002.pdf
24- Araújo PL, Mendonça AEO, Medeiros RÁ, Souza Neto VL, Nobre TTX, Costa IKF. Prevalência de infecção relacionada à assistência à saúde em pacientes internados em unidade de terapia intensiva. Enfermería Global 2018;17(4):278-315. DOI: 10.6018/eglobal.17.4.289311
25- Campos CC, Alcoforado CLGC, Franco LMDC, Carvalho RLRD, Ercole FF. Incidência de infecção do trato urinário relacionada ao cateterismo vesical de demora: um estudo de coorte. Rev Min Enferm. 2016;20:1-7. DOI: 10.5935/1415-2762.20160043
26- Arrais ELM, Oliveira MLC, Sousa IDB. Prevenção de infecção urinária: Indicadores de qualidade da assistência de enfermagem em idosos. Rev Enferm UFPE 2017 [citado em 29 jul 2019]; 11(8): 3151-7. Available in: https://periodicos.ufpe.br/revistas/revistaenfermagem/article/download/110221/22137
27- Sotgiu G, Are BM, Pesapane L, Palmieri A, Muresu N, Cossu A, et al. Nosocomial transmission of carbapenem-resistant Klebsiellapneumoniae in an Italian university hospital: A molecular epidemiological study. J Hosp Infect. 2018;99(4):413-8. DOI: 10.1016/j.jhin.2018.03.033
28- Ribeiro HCTC. Global patient safety challenges: a brief history of advances and research in Brazil. Rev Enferm Cent-Oeste Min. 2017;7:1-4. DOI: 10.19175/recom.v7i0.2691

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