OBJECTIVE: Identifying the main infections associated with health care occurred in ischemic and hemorrhagic post-stroke hospitalized patients and the associated risk to death. Method: an integrative review conducted in LILACS, IBECS, MEDLINE and Scielo library, comprising the period from 2004 to 2014. There were included full-text articles in Portuguese, English and Spanish, available for free, the data were presented in a flow chart and table with their international checklists recommended. Results: the most common IRAS are pneumonia and urinary tract infection. Pneumonia was associated with death in four studies. Conclusion: the issue approached must be disclosed and researches stimulated in the national context, due to knowledge gaps in the investigation of infections related to worsening of the patient. The occurrence of infections associated with increased risk of death and the functional outcome of hospitalized patients. Descriptors: Stroke; Infection; Risk.
INTRODUCTION

The healthcare-associated infections (HAIs) are common complications occurred in patients who have suffered strokes and are important prognostic markers for hospital patient. They relate to the further decline of neurological deficit, co-morbidities, prolonged hospital stay, use of invasive devices and advanced age. Topographies are related to urinary tract infection (UTI) and respiratory.1, 3

Infectious processes were highlighted as a cause of mortality in 190 autopsied cases of stroke.4

They are a health problem due to the high morbidity and mortality and associated costs, and are among the most frequent complications of hospitalization. HAIs have many characteristics that make them a critical component of any patient safety program.5

The impact of chronic diseases, such as stroke and infectious complications of hospitalization is reflected in all health care levels, which denotes the emergency nature of attention to treatment. The health care strategies mainly include the control, prevention, improvement of service and professional training structures, and actions based on scientific evidence.6, 7

The conceptual hypothesis is presented based on the relationship between stroke pathology, the occurrence of infections related to health care in-hospital scope and impact on the prognosis of this patient.

OBJECTIVE

• Identifying the main infections associated with health care occurred in hospitalized ischemic and hemorrhagic stroke post stroke patients and the associated risk of death.

METHOD

This is an integrative review 9 guided by the question: “What are the main infections occurred and associated with the risk of death in ischemic post-stroke and hemorrhagic patients during hospitalization?” The steps leading this review were: determining the specific purpose and wording of the question; search and collection of relevant research within the inclusion criteria; categorization of studies; data interpretation, presentation of results and conclusions.

In search strategy the terms in Portuguese were used: stroke and infection and death (DECs exchanged); and strategy in English: stroke and infection and death (MESH entry terms) in LILACS, IB ECS, MEDLINE and SciELO, from 2004 to 2014.

We opted for the use of table and flowchart for organizing and synthesizing data. The Strengthening the Reporting Initiative of Observational Studies in Epidemiology (STROBE), was aggregated to this step in order to refine the presentation of data obtained in this review and to expand the researcher’s perspective on the description of the content of the articles allowing greater understanding and further analysis.8

The STROBE Statement has 22 items with the intention of scoring and recommending best practice concerning the presentation and description of the data and should not be used to evaluate the quality of observational studies. The scoring procedure is characterized by the presence or absence of the instrument for each item in the checklist format.

The Transparent Reporting of Systematic Reviews and Meta-Analyses (PRISMA), is intended to systematic reviews with or without meta-analysis. It has similar characteristics to the foregoing instrument up on the use of written communication checklist for verification of manuscripts, consists of 27 items and a recommended flowchart.10

Inclusion criteria were: full text articles available; free; in Portuguese, English and Spanish; who described the infections in hospitalized patients with stroke independent of the inpatient unit and presenting the associated risk of death.

Exclusion criteria of articles were: not made available in summary form; not free; that were repeated in electronic databases and that did not meet the inclusion criteria.

Articles found in LILACS, MEDLINE and SciELO were evaluated from reading the title and abstract and those who met the inclusion criteria were saved electronically in full text format. Critical reading was performed in full each included study in order to describe clearly and objectively the results shown by research that raised the construction of the discussion of the main findings and general conclusion about the chosen subject.

RESULTS

There were found 327 articles on bases, from these 43 were excluded because they abstracts available and 21 are repeated in SciELO, LILACS and MEDLINE. After reading the abstracts were eliminated 255 articles, for not meeting the inclusion criteria for the
study, at the end, the review consisted of a total of six articles, as in figure 1.

Figure 1. Study selection flowchart.

There were selected six articles: one corresponds to the LILACS base in the Spanish language; three found in MEDLINE in English and four in SciELO in English.

Table 1. References and study characteristics.

<table>
<thead>
<tr>
<th>References</th>
<th>Year</th>
<th>Country</th>
<th>Delineation</th>
<th>Number of patients</th>
<th>Population Selected</th>
<th>Outcomes</th>
<th>STROBE/PRISMA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hong KS, et al11</td>
<td>2008</td>
<td>Korea</td>
<td>Prospective Observational</td>
<td>1254</td>
<td>Investigation of complications in a patient with acute stroke from the seventh day of hospitalization</td>
<td>Most common complications: progression of ischemic stroke and Pneumonia. Pneumonia infections (OR = 4.44-2.20-8.99) and ITU (OR = 2.72-1.32-5.60) were not</td>
<td>STROBE 22</td>
</tr>
</tbody>
</table>

Figure 2 shows six articles chosen for this review.
<table>
<thead>
<tr>
<th>Study</th>
<th>Year</th>
<th>Country</th>
<th>Study Design</th>
<th>Excerpt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stott DJ, et al&lt;sup&gt;12&lt;/sup&gt;</td>
<td>2009</td>
<td>Scotland</td>
<td>Prospective Cohort</td>
<td>Stroke patients who have had UTI X stroke patients who haven't had UTI associated with death. ITU group: elderly, history of diabetes, presented incapacitating STROKE. 40% acquire Pneumonia and 30.8% another bacterial infection. It was not associated with death in the multivariate analysis (OR = 1903.845-4,284).</td>
</tr>
<tr>
<td>Westendorp WF, et al&lt;sup&gt;13&lt;/sup&gt;</td>
<td>2011</td>
<td>Holland</td>
<td>Systematic Review</td>
<td>Post STROKE infections: Group of ICU X non-ICU Group Infection: complication in 30% of patients with acute stroke. Rates of Pneumonia and UTI were 10%. Ventilator-associated pneumonia with death (OR = 3.62-2.80-4.68).</td>
</tr>
<tr>
<td>Wang PL, et al&lt;sup&gt;14&lt;/sup&gt;</td>
<td>2012</td>
<td>China</td>
<td>Multicenter Prospective</td>
<td>Stroke patients with medical complications X Stroke Patients without medical complications Complications: Pneumonia (11.9%) Significant risk of death during hospitalization and between 3, 6 and 12 months post STROKE. 20.3% presented ITU. The ITU is independent of the factor as a complication of STROKE outcome (OR = 14.08-3.06-64.84) or death (OR = 9.81-1.46-65.68).</td>
</tr>
<tr>
<td>Popovic N, et al&lt;sup&gt;15&lt;/sup&gt;</td>
<td>2013</td>
<td>Serbia</td>
<td>Descriptive Retrospective</td>
<td>Stroke patients treated in a period of one year 20.3% presented ITU. The ITU is independent of the factor as a complication of STROKE outcome (OR = 14.08-3.06-64.84) or death (OR = 9.81-1.46-65.68).</td>
</tr>
<tr>
<td>Carnesoltas LS, et al&lt;sup&gt;16&lt;/sup&gt;</td>
<td>2013</td>
<td>Cuba</td>
<td>Prospective Descriptive Observational</td>
<td>Patients in the stroke Unit with Pneumonia Intra-hospital High mortality in patients with prolonged stay, bleeding and in use of ictus mechanical</td>
</tr>
</tbody>
</table>

**References:**
- Stott DJ, et al. 2009 Scotland
- Westendorp WF, et al. 2011 Holland
- Wang PL, et al. 2012 China
- Popovic N, et al. 2013 Serbia
- Carnesoltas LS, et al. 2013 Cuba

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The methodological characteristics of the analyzed studies support the description and validity of data, such as clinical and epidemiological research, relative to the sample size, the investigative path chosen for evaluation of clinical phenomena and indicate the bias found.  

The outcomes show that in-hospital infections are common complications occurred in patients who have suffered strokes, besides representing great importance among the causes of death. The effect of post-stroke infection was 48% died vs. 18% of patients without infection. Death rates were also higher in patients with pneumonia and a little higher in patients with urinary tract infection. In this study the total infection rate was 30%. Pneumonia and urinary tract infection occurred in 10% of patients.

The IRAS are in a health problem due to the high morbidity and mortality and associated costs, are among the most frequent complications of hospitalization becoming a critical component of any patient safety program.

The approaches are in various ways: according to risk, according to the frequency, severity, mortality, and costs. Regarding the risk emphasizes the use of invasive devices which are artificial input ports for microorganisms. Consequently, it is related to infections of the urinary tract into the bloodstream or respiratory tract skin and soft tissue.

Urinary tract infection (UTI) are the most common nosocomial infections in acute care hospitals and long term care, accounts for approximately 40% of all infections acquired in the hospital. They constitute the main source for nosocomial sepsis and related mortality.

In the acute care unit for stroke, the vast majority of ITUs occur in patients with intermittent bladder catheterization, 23% of patients had this infectious episode in two weeks of hospitalization. Recurrence is generally related to cystoscopy and other urologic procedures.

Secondly, the rate of infection was associated with the clinical condition of patients. Studies including patients with higher or lower stroke severity consciousness levels had higher rates of infection, especially for pneumonia. More dependent patients have a higher risk of developing infections, so the severity of the stroke and the degree of addiction are important indicators for assistance.

Infections also behave as complications of immobility and restricting the patient to the bed. The widespread use of tracheal intubation and mechanical ventilation, to give life support to critical patients, defined a larger group of patients who are at risk, particularly high, for the development of nosocomial pneumonia.

Pneumonia ranks second among global nosocomial infections and the first most common infection in intensive care units. Additionally it is associated with significant mortality factors and considerable increase in care costs. Factors associated with increased mortality include: Gram-negative bacteria as particularly Pseudomonas aeruginosa pathogens, the severity of the underlying disease, age, inappropriate antibiotic therapy, shock, bilateral infiltrates, neoplastic disease, hospitalization duration and position of supine head in ventilated patients.

In this group of patients, the infection is commonly referred to as ventilator-associated pneumonia (VAP). In fact, strict attention to detail in the prevention and treatment of complications early improves the functional outcome of stroke and reduction of mortality. The findings suggest close agreement with what has been recommended actions and interventions for hospitalized patients and are directed mainly to prevention and safety during hospitalization, beyond the effective subsidy of Hospital Infection Control Commissions.

**DISCUSSION**

The six selected articles are: quantitative study with descriptive longitudinal section; three prospective observational, being a...
multicenter, retrospective and a systematic review of the literature. It evidenced the international scenario of conducting these studies.11-14

It was identified limitation on the characterization of the range of outcomes in the investigated phenomena, because the studies did not address the community associated infections periods of seasonality that influence infection rates within-hospital by identifying outbreaks or epidemics.21

The main infections in patients with stroke and found this review were related to urinary and respiratory tract with evidence of pneumonia.11-14 The authors’ conclusions tend to suggest the prevention of infections in patients with stroke because they are associated with the risk of death in these patients and interventions accordingly can improve the functional outcome of the patient,13,14 however, no need for in-depth research in this scenario to clarify, with respect to the performance of health professionals, the infection phenomenon.

Classify infections as a frequent and common complication and is associated with prolonged hospital stay, in-hospital complications, the type of stroke and invasive devices used during hospitalization.11-6,21-22

Contextualizing the intrinsic factors of stroke onset in the patient, which refers to the screening of the infection, such as pathology of a complex nature, serious and causes immunosuppression, associated with the external factors of treatment, such as length of stay, use of invasive devices and microbiological agents, constitute scientific evidence which contribute to support the clinical practice of multidisciplinary care, particularly in recognition of the relationship between infections after stroke and its implications for the outcome of death or serious sequelae.

CONCLUSION

There is the occurrence of infections associated mainly to the urinary and respiratory tract and they are related to immunosuppression caused by stroke and risk factors, relevant, prolonged hospital stay, use of invasive devices, in addition to stroke severity.

This study contributed to show that, in the context of the approached theme is necessary to encourage researches at the national level and the prevention of infections is vital, as they are associated with increased risk of death and the functional outcome of stroke patients hospitalized.

There are knowledge gaps in relation to the depth of investigation of infection while worsening markers of aggravation in the progression of acute disease aspect, the interference of community infections related to seasonal periods in the hospital and regarding the welfare culture as a determinant of preventive practices under the phenomenon of infection.

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