



ISSN: 2230-9926

Available online at <http://www.journalijdr.com>

IJDR

International Journal of Development Research

Vol. 11, Issue, 07, pp. 49144-49147, July, 2021

<https://doi.org/10.37118/ijdr.22498.07.2021>



RESEARCH ARTICLE

OPEN ACCESS

RISK FACTORS FOR ASPIRATION PNEUMONIA IN HOME CARE PATIENTS

¹Diego de Senna Gabeto, ²Monique Lírio Cantharino de Carvalho, ¹Juarez Pereira Dias, ²Rosemary Soares Teles, ³Áurea Angélica Paste and ²Gleide Regina de Sousa Almeida Oliveira

¹Escola Bahiana de Medicina e Saúde Pública, Salvador, Brazil

²S.O.S Vida, Salvador, Brazil

³Universidade Federal da Bahia, Salvador, Brazil

ARTICLE INFO

Article History:

Received 10th April, 2021

Received in revised form

19th May, 2021

Accepted 23rd June, 2021

Published online 30th July, 2021

Key Words:

Pneumonia,
Aspiration,
Elderly,
Home care.

*Corresponding author:

Fernanda de Souza Borges Gomes

ABSTRACT

Aspiration pneumonia is both a form of community-acquired and healthcare-associated pneumonia, and a leading cause of death among ageing populations. Home care comprises services for older people with disabilities, including chronic degenerative diseases. This study evaluated the risk factors for Aspiration Pneumonia in patients who were at Home care service in a facility in Salvador, northeast Brazil. This is a case-control study, in which 89 patients were included, of which 33 corresponded to cases (pneumonia with bronchoaspiration) and 56 corresponded to controls (pneumonia without bronchoaspiration). Each case was paired with at least one control. After submission to a final logistic regression model, the following factors: Change in the level of consciousness and use of proton pump inhibitors and histamine H2 receptor antagonists, considering $p < 0.05$, were presented as independent predictors for pneumonia bronchial aspiration (OR 5.293; 95% CI 1.809 - 15.488) and (OR 13.037; 95% CI 2.415 - 70.378), respectively. There was an association between increasing age and the presence of neurological disorders with the development of aspiration pneumonia, in addition to altering the level of consciousness and the use of medications, such as proton pump inhibitors and histamine H2 receptor antagonists.

Copyright © 2021, Diego de Senna Gabeto et al. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Citation: Diego de Senna Gabeto, Monique Lírio Cantharino de Carvalho, Juarez Pereira Dias, Rosemary Soares Teles et al. "Risk factors for aspiration pneumonia in home care patients", *International Journal of Development Research*, 11, (07), 49144-49147.

INTRODUCTION

Bronchoaspiration or Aspiration pneumonia (AP) can be defined as an acute lung infection that occurs after aspiration of oropharyngeal or upper gastrointestinal contents in large volumes. AP may occur as community-acquired pneumonia (CAP) and healthcare-associated pneumonia (HCAP), which include hospital, nursing-home, Homecare and other long-term care facilities (Kollef *et al.*, 2008). The incidence of nursing home-acquired pneumonia (NHAP) is about six to ten times the incidence of community-acquired pneumonia (CAP) (Marrie, 2002). Previous studies have shown estimated incidences of NHAP of between 48.6% and 61.2% (Nakagawa *et al.*, 2014; Sakoda, *et al.*, 2014; Ugajin *et al.*, 2014). Home care (as nursing or personal care) is a modality of healthcare service provided to a homebound individual (as one who is convalescing, disabled, or terminally ill). The purpose of Home care comprises the access to services for older people with disabilities, including chronic degenerative diseases, decrease of hospitalizations and providing care for a dignified death (Silva *et al.*, 2005).

The increasing number of patients with complex conditions now receiving medical care at home has brought many issues to light, including increased risk of infection. This, along with the increased use of medical devices in the home and patients ageing process, places this population at high risk of infections (Shang *et al.*, 2015).

Previous studies have shown that the risk of aspiration pneumonia increases with age and if a patient's status is complicated with many geriatric disorders (Manabe *et al.*, 2015). It has been described a statistical relationship between pneumonia and cognitive impairment in elderly patients (Shah *et al.*, 2013). Thus, Homecare inpatients comprises a population at risk for developing Aspiration Pneumonia. This study evaluated the risk factors for Aspiration Pneumonia in patients who were at Home care service in a facility in Salvador, northeast Brazil.

MATERIALS AND METHODS

Study design and population: This is a descriptive case-control study, carried out in a company that provides home care services in Salvador, northeast Brazil. The company has a Home Infection Control Service that carries out epidemiological surveillance of infections acquired by patients in all types of assistance through active search through prescribed antimicrobials and discussion of cases with assistance staff. Infection rates are calculated monthly. In the present study, all patients with pneumonia in 2018 were included, whose symptoms started 48 hours after admission to Home care. Patients who were already admitted to the service while during treatment for infection, who developed the condition within 48 hours of admission or who had concomitant infections were excluded. The cases comprised all patients who developed pneumonia with bronchoaspiration in 2018. The controls, on the other hand, would correspond to cases of pneumonia without bronchoaspiration from the same period. Each case would then be paired with 1 or 2 corresponding control with similarity by age, sex and trimester that developed the episode.

Data collection and analysis: Data were collected through electronic medical records, and, later, stored in a used by the Home Care Infection Control Service to monitor infections. Bronchial aspiration pneumonia was defined as pneumonia that occurred after evidence of the entry of a large amount of contaminated liquids or objects from the mouth or stomach. The following risk factors were assessed: dysphagia / swallowing dysfunction, altered level of consciousness, main comorbidities of each patient, emesis, constipation, abdominal distension, presence of tracheostomy, use of mechanical ventilation, gastrostomy and enteral diets, in addition to the use of some central nervous system depressant medications (sedatives), antacids, proton pump inhibitors (PPIs) and H2 receptor antagonists. Categorical variables were expressed in absolute and relative frequency by calculating the percentages. Continuous variables with normal distribution were expressed as mean and standard deviation and those with non-normal distribution, as median and interquartile range. The normality of the numerical variables was assessed by the Kolmogorov-Smirnov test. A Chi-square test was performed to verify statistical significance ($p < 0.05$) of the risk factors in question. Those who presented significance underwent multivariate logistic regression, to establish some type of statistical correlation between risk factors and the outcome (bronchoaspiration) and, thus, to identify the chance of occurrence of the events (OR - Odds Ratio). The collected data were stored and consolidated for analysis, using the Statistical Package for the Social Sciences (SPSS) for Windows version 20.0.

Ethical issues: The project was submitted for analysis by the Research Ethics Committee of Hospital Couto Maia and approved under number 3.046.218 on February, 02, 2018. The study was conducted according to the resolution of CNS 466 of October 12, 2012 of the National Health Council.

RESULTS

A total of 89 patients who developed pneumonia were included in the study, of which 33 were part of the case group (with AP) and 56 of the control group (without AP). The cases of AP comprised 18 (54.5%) female and 15 (45.5%) male, with age ranging from 21 to 100 years, with a median of 82 (IQR = 71.08 - 83.83) years. The main comorbidities were dementia, eight (25.8%), followed by previous stroke, seven (22.6%) and Alzheimer's disease, five (16.1%). The most frequent risk factors were dysphagia, 26 (78.8%), emesis, 18 (54.5%), altered level of consciousness (GCS < 12), 16 (48.5%), abdominal distension and constipation, seven (21.2%) and six (18.2%), respectively. Regarding the use of devices, 21 (63.6%) gastrostomy, 16 (48.5%) used tracheostomy, two (6.1%) mechanical ventilation. In relation to medications, ten (30.3%) were using antacids, PPIs or H2 antagonists. No patient was using sedatives.

Among the control group, 33 (58.9%) were female and 23 (41.1%) were male. Age ranged from 16 to 95 years, with a median of 82 (IQR = 72.13 - 81.62) years. The main comorbidities of these patients were: previous stroke, 14 (25.0%), followed by dementia, eight (14.3%) and Chronic obstructive pulmonary disease, seven (12.5%). The most frequent risk factors were: dysphagia, 45 (80.4%), emesis, three (5.4%), altered level of consciousness (GCS < 12), 9 (16.1%), distention abdominal and constipation, 10 (17.9%) and 15 (26.8%), respectively. Regarding the use of devices, 40 (71.4%) used gastrostomy, 29 (51.8%) tracheostomy, and nine (16.1%) mechanical ventilation. Concerning medications, two (3.6%) were using antacids, PPIs or H2 antagonists, while three (5.4%) sedatives (Table 1). After Chi-square test analysis, only the following factors were statistically significant ($p < 0.05$): Change in the level of consciousness, emesis and use of antacids or PPIs and antagonists of H2 histamine receptors (Table 2). Multivariate analysis by logistic regression showed that there was only statistical significance, considering $p < 0.05$, for the following risk factors: Change in the level of consciousness (GCS < 12) and Use of antacids, PPIs or antagonists H2. Although the emesis factor has statistical significance, it was not included in the logistic regression because it is presenting itself as a confounding factor for the analysis of several other factors. In this context, dysphagia that did not fit the significance criteria, was included in the logistic regression model, due to its biological plausibility as a risk factor for the outcome. Regarding these requirements, individuals with GCS < 12 had 5.293 (95% CI = 1.809 - 15.488) chances of developing bronchial aspiration pneumonia. Those who used the medications previously described, had 13.037 (95% CI = 2.415 - 70.378) chances of developing this same process, thus being independent predictive factors for aspiration pneumonia (Table 3) inhibitor, Sig. = Significance, CI = Confidence interval, OR = Odds ratio. * Statistically significant

DISCUSSION

The study first evaluated risk factors for aspiration pneumonia in patients admitted to Homecare and identified changes in the level of consciousness (GCS < 12) and use of antacids, PPIs or H2 antagonists as independent risk factors. The change in the level of consciousness was a prevalent risk factor in the studied population and associated with comorbidities such as dementia, stroke, and Alzheimer's disease. These disorders impair the defense mechanisms of the individual, such as the cough reflex, dysfunction in the swallowing process, which are essential to prevent the onset of respiratory infectious conditions (Manrique *et al.*, 2013). A previous study with 322 hospitalized patients with the diagnosis of CAP, validated these data, since it revealed that dementia was the main risk factor for the development of this condition, in a proportion of 5.26 times (95% CI = 2.30 - 12.03), with value $p < 0.001$, after submission to a logistic regression model (Noguchi *et al.*, 2017). In a cohort with 1.348 hospitalized patients, a total of 186 were diagnosed with pneumonia with risk factors for aspiration. Among the case group, 81 (43.5%) had some associated neurological deficit (Parkinson's disease, multiple sclerosis or stroke), 55 (29.57%) with altered level of consciousness due to diverse causes including hypoglycemia, use of medications such as sedatives, PPI and 35 with episodes of vomiting and dysphagia. This frequency of individuals with altered levels of consciousness and episodes of emesis corroborates the results brought by our study (Taylor *et al.*, 2013). However, despite its biological plausibility, in the present study, emesis factor was not added to the logistic regression model because it compromised the analysis of the other variables, presenting itself as a confounding factor. The use of medications such as PPI or histamine H2 receptor antagonists is associated with the development of aspiration pneumonia. This is because these drugs act to change gastric pH and alter the intestinal microbiota, which can facilitate the colonization of pathological agents and directly induce the infection process. A systematic review and meta-analysis demonstrated that patients older than 65 years undergoing PPI therapy were more susceptible to developing CAP than those who did not use these medications (OR 1.33; 95% CI 1.13 - 1.58) and this risk was even greater if this therapy lasted for less

Table 1. Number and percentage of risk factors in the case and control group by sex. Salvador, Bahia, 2019.

Variable	Cases			Controls		
	Male %	Female %	Total n %	Male %	Female %	Total n %
GCS<12	18,2	30,3	1648,5	8,9	7,1	916,0
Dysphagia	36,4	42,4	26 78,8	33,9	46,4	45 80,3
Emesis	30,3	24,2	18 54,5	-	5,3	3 5,3
Distention abdominal	12,1	9,1	7 21,2	3,6	14,3	10 17,9
Constipation	15,1	3	6 18,2	14,3	12,5	15 26,8
Tracheostomy	18,2	30,3	16 48,5	25	26,8	2951,8
Invasive Mechanical Ventilation	-	6,1	2 6,1	7,1	8,9	9 16
Antacids, PPI or Histamina H2 receptor antagonists	12,1	18,2	10 30,3	1,8	1,8	2 3,6
Enteral diet	39,4	42,4	27 81,8	35,7	44,6	45 80,3
Sedatives	-	-	-	-	5,3	35,3
Gastrostomy	27,3	36,4	21 63,7	30,3	41,1	4071,4

Table 2. Factors associated with aspiration pneumonia, as analyzed by the Chi-square test. Salvador, Bahia, 2019.

Variable	Cases		Controls		P value
	n	%	n	%	
GCS<12	16	(48,5%)	9	(16,1%)	0,001*
Disphagia	26	(78,8%)	45	(80,4%)	0,859
Emesis	18	(54,5%)	3	(5,4%)	0,000*
Distention abdominal	7	(21,2%)	10	(17,9%)	0,697
Constipation	6	(18,2%)	15	(26,8%)	0,356
Tracheostomy	16	(48,5%)	29	(51,8%)	0,764
Invasive Mechanical Ventilation	2	(6,1%)	9	(16,1%)	0,166
Antacids, PPI or Histamina H2 receptor antagonists	10	(30,3%)	2	(3,6%)	0,000*
Enteral diet	27	(81,8%)	45	(80,4%)	0,866
Sedatives	-	-	3	(5,4%)	0,176
Gastrostomy	21	(63,6%)	40	(71,4%)	0,444

Legend: GCS = Glasgow Coma Scale, PPI = Proton pump inhibitors. *Statistically significant

Table 3. Final logistic regression model defining independent predictors of aspiration pneumonia. Salvador, Bahia, 2019

Variable	Sig.	OR	IC 95%
GCS<12	0,002*	5,293	1,809 – 15,488
Dysphagia	0,500	1,562	0,427 – 5,709
Antacids, PPI or Histamina H2 receptor antagonists	0,003*	13,037	2,415 – 70,378

Legend: GCS = Glasgow Coma Scale, PPI = Proton pump inhibitors, Sig. = Significance, CI = Confidence interval, OR = Odds ratio. *Statistically significant

than a month (OR 2.10; 95% CI 1.39 - 3.16) (Lambert *et al.*, 2015). These data corroborate with the results of the present study, with an association between Pneumonia and the use of medications to treat gastrointestinal conditions. Regarding dysphagia, even though the analysis did not present any statistical difference, it was noted that this factor was prevalent in both groups. In a previous case-control study with elderly patients, there was a prevalence of dysphagia in 91.7% in the case group (individuals with pneumonia) and 40.3% in the control group (OR 11.9; 95% CI = 3.03 - 46.9) (Almirall *et al.*, 2013). In our study, both groups (cases and controls) had pneumonia. The socio-demographic profile of the sample showed that female and older individuals were more affected by CAP. Some epidemiological studies have pointed out that the incidence of aspiration pneumonia increases with age, and the risk of developing this infectious condition was six times greater in individuals aged ≥ 75 years, when compared with those aged <60 years (Marik e Kaplan, 2003). Another study showed that bronchial aspiration pneumonia is a very common bacterial condition in elderly individuals and about 90% of deaths from this condition occurred in individuals over 65 years of age (Van der Maarel-Wierink *et al.*, 2011). A limitation of this study was secondary data analysis once the diagnosis of bronchial aspiration pneumonia depends on a clinical history, in which an episode of macroaspiration is evident. In addition, the small sample size of the present study that may have taken part of the risk factors analyzed in this study did not demonstrate a statistical difference between the groups. However, despite this numerical limitation, this is one of the few studies that specifically evaluated patients in home care and the sample reflected the profile of the assisted patients, mostly elderly, with multiple comorbidities, use of invasive devices and polypharmacy.

CONCLUSION

In the population studied, fluctuations in the level of consciousness and use of proton pump inhibitors and H2 receptor antagonists were independent predictive factors for the development of bronchial aspiration pneumonia. Patients admitted to Homecare have a high prevalence of these risk factors, requiring preventive strategies and measures to reduce CAP.

REFERENCES

- Almirall J, *et al.* 2013. Oropharyngeal dysphagia is a risk factor for community-acquired pneumonia in the elderly. *Eur Respir J.* Apr; 41:923-8.
- Kollef MH, *et al.* 2008. Health care-associated pneumonia HCAP: a critical appraisal to improve identification, management, and outcomes--proceedings of the HCAP Summit. *Clin Infect Dis.* Apr 15;46 Suppl 4:S296-334; quiz 335-8.
- Lambert AA, *et al.* 2015. Risk of community-acquired pneumonia with outpatient proton-pump inhibitor therapy: a systematic review and meta-analysis. *PLoS One.* Jun 4;106:e0128004.
- Manabe T. *et al.* 2015. Risk Factors for Aspiration Pneumonia in Older Adults. *PloS one*, 1010.
- Manrique M, *et al.* 2013. The development of compromised Swallowing in patients with Alzheimer's Disease and dysphagia. *Revista Colombiana de Gastroenterologia*, 283, 219-224
- Marik PE, Kaplan D 2003. Aspiration pneumonia and dysphagia in the elderly. *Chest.* Jul;1241:328-36.

- Marrie TJ 2002. Pneumonia in the long-term-care facility. *Infect Control Hosp Epidemiol.* Mar;233:159-64.
- Nakagawa N, et al. 2014. Comparison of clinical profile in elderly patients with nursing and healthcare-associated pneumonia, and those with community-acquired pneumonia. *Geriatr Gerontol Int.* Apr;142:362-71.
- Noguchi S, et al. 2017. Impact of the number of aspiration risk factors on mortality and recurrence in community-onset pneumonia. *Clin Interv Aging.* Dec 7;12:2087-2094.
- Sakoda Y, et al. 2014. Retrospective analysis of nursing and healthcare-associated pneumonia: analysis of adverse prognostic factors and validity of the selection criteria. *Respir Investig.* Mar;522:114-20.
- Shah FA, et al. 2013. Bidirectional relationship between cognitive function and pneumonia. *Am J Respir Crit Care Med.* Sep 1;1885:586-92.
- Shang J, et al. 2015. Infection in home health care: Results from national Outcome and Assessment Information Set data. *Am J Infect Control.* May 1;435:454-9.
- Silva KL, et al. 2005. Internação domiciliar no Sistema Único de Saúde. *Rev Saude Publica.* 39 3: 391-397.
- Taylor JK, et al. 2013. Risk factors for aspiration in community-acquired pneumonia: analysis of a hospitalized UK cohort. *Am J Med.* Nov;12611:995-1001.
- Ugajin M, et al. 2014. Prognostic value of severity indicators of nursing-home-acquired pneumonia versus community-acquired pneumonia in elderly patients. *Clin Interv Aging.* Feb 11;9:267-74.
- Van der Maarel-Wierink CD, et al. 2011. Risk factors for aspiration pneumonia in frail older people: a systematic literature review. *J Am Med Dir Assoc.* Jun;125:344-54.
