



Feature Article

Nursing home-acquired pneumonia, dysphagia and associated diseases in nursing home residents: A retrospective, cross-sectional study



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ABSTRACT

Background: Nursing home-acquired pneumonia (NHAP) is a common infection among nursing home residents. There is also a high prevalence of dysphagia in nursing home residents and they suffer more often from comorbidity and multimorbidity. This puts nursing home residents at higher risk of (mortality from) NHAP. Therefore it is important to gain more insight into the incidence of NHAP and the associated medical conditions in nursing home residents with dysphagia.

Objective: To investigate possible associations between NHAP and dysphagia in nursing home residents and to search for a medical risk profile for NHAP.

Design: A retrospective cross-sectional study.

Setting: Three nursing homes in The Netherlands.

Participants: 416 electronic medical files of nursing home residents aged 65 or older living in 3 nursing homes.

Methods: Data about age, gender, diagnosis of dysphagia and/or pneumonia, medical diagnosis and possible cause of death of the nursing home residents were extracted from electronic medical files.

Results: The data of 373 electronic medical files were analyzed. A significant difference in the prevalence of dysphagia was found between the nursing homes ($p < 0.001$). The incidence of NHAP was 5–12% in the participating nursing homes. Statistically significant higher incidence of NHAP was found in residents with dysphagia ($p = 0.046$). Residents with dysphagia had statistically significantly more diseases compared to residents without dysphagia ($p = 0.001$). Logistic regression analyses revealed no statistically significant associations between NHAP and the number of diseases and the ICD-10 diseases.

Conclusions: Dysphagia was found to be a risk factor for NHAP. Awareness of the signs of dysphagia by nurses and other care providers is important for early recognition and management of dysphagia and prevention of NHAP.

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Abbreviations: ACP, advance care planning; ADL, activities of daily living; CAP, community-acquired pneumonia; COPD, chronic obstructive pulmonary disease; CVA, cerebrovascular accident; FEES, fiberoptic endoscopic evaluation of swallowing; ICD-10, International Classification of Diseases-10; NHAP, nursing home-acquired pneumonia; OPES, oro-pharyngo-esophageal scintigraphy; SDM, shared decision making; VFS, videofluoroscopy.

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Introduction

Pneumonia is the second-most common infection among nursing home residents.¹ The incidence of nursing home-acquired pneumonia (NHAP) is believed to be six to ten times the incidence of community-acquired pneumonia (CAP).² Previous studies have shown estimated incidences of NHAP of between 48.6% and 61.2%.^{3–5} In general, NHAP patients suffer from a more severe pneumonia with

more complications and these patients are likely to have one or more neurological diseases, cerebrovascular diseases and diabetes mellitus, compared to CAP patients.^{3,5–8} Furthermore, other factors such as advanced age, male gender, tracheotomy tube and inadequate oral health care have been associated with NHAP.^{5,9–11}

Pneumonia in nursing home residents that occurs as a result of aspiration of oropharyngeal or gastric contents may be caused by dysphagia.¹² Aging causes a number of significant changes in the swallowing process, putting elderly people at higher risk of dysphagia.^{13,14} Dysphagia may also be induced by stroke, dementia or Parkinson's disease.^{15–17} Reported prevalence of dysphagia in nursing home residents varies between 38 and 69.6%.^{15,18–20} Additionally, dysphagia increases the risk of aspiration, which may lead to aspiration pneumonia.^{9,11,21–23}

A previous study of nursing home residents in The Netherlands found that the risk of aspiration is a relevant care problem. In this study, speech therapists assessed the risk of aspiration found no difference between physically disabled and cognitively impaired residents.²² Nonetheless, cognitive decline or impairment, such as dementia, will influence the individual ability of nursing home residents and nurses to interpret the symptoms of swallowing problems.²⁴ Furthermore, residents of Dutch nursing homes did recognize their swallowing problems (subjective dysphagia), but considered their swallowing problems to be a natural symptom of aging or of their diseases.²⁵ Owing to this decreased ability to interpret symptoms and the perception of swallowing problems as a natural symptom of aging, dysphagia might not be recognized in time, which increases the risk of aspiration pneumonia amongst these people. Several studies suggest that a standard swallowing assessment, prior to or soon after admission to a nursing home, with adequate treatment of dysphagia, should be included routinely in nursing care.^{15,26,27}

Owing to the high incidence of NHAP among residents with dysphagia, there is a need to gain better understanding of the underlying comorbidities that may be contributing to this problem. These insights will help nurses and other medical professionals to recognize dysphagia earlier and to help prevent NHAP. Therefore, the aim of the present study was to investigate potential associations between NHAP and dysphagia for nursing home residents and to search for a medical risk profile for NHAP.

Methods

Design, setting, participants and data collection

A retrospective cross-sectional study was carried out in three nursing homes in The Netherlands. The participating nursing homes were located in three regions of the country.

Because data were collected from residents' electronic medical files and no medical research experiment took place among these residents, in The Netherlands this study is not defined as a medical research experiment.²⁸ Therefore, ethical approval from a medical evaluation board was not required. However, to be allowed access to the residents' electronic medical files, approval for this study was sought and received from the nursing homes' medical ethics committees.

The first step was to identify medical electronic files of residents who were eligible for inclusion in the study. Only the medical electronic files of residents who were aged 65 or older when the study started in the respective nursing homes were included. Next, from the included residents' electronic medical files the following details were extracted: gender, diagnosis of dysphagia, diagnosis of pneumonia, starting date of (the first) pneumonia episode, additional medical diagnoses according to the International Classification of Diseases-10 (ICD-10) index and

the potential date of death. Diagnosis of dysphagia was considered if dysphagia was present in the examination period or prior to an occurrence of NHAP. Dysphagia was determined on the basis of a registration of dysphagia in the electronic medical file. In case of any ambiguity related to the diagnosis of dysphagia, the nursing home's speech therapist and elderly care physician were consulted for additional information. For residents who died during the examination period, the cause of death was registered and considered as an additional medical diagnosis. The diagnosis of pneumonia was determined by the physician, based on the clinical characteristics that were present in the resident. Each registered diagnosis of pneumonia was considered as NHAP.

The study period in each nursing home comprised a period of 1 year. Data were collected from the period April 2011 to April 2012 (nursing home 1), in the period April 2012 to April 2013 (nursing home 2) and in the period April 2013 to April 2014 (nursing home 3). Collecting data from three different examination periods reduced the risk that the data were influenced by medical, social and economic events, such as a flu epidemic.

The residents' electronic medical files revealed that four (diagnostic) methods had been used in the nursing homes to diagnose dysphagia: 1.) standard swallowing assessment by a speech therapist at the resident's admission; 2.) evaluation of the swallowing process by a speech therapist after a cerebrovascular accident or in case of a history of cerebrovascular accident at the time of admission; 3.) swallowing assessment after reported clinical symptoms of or complaints about swallowing problems; and 4.) previously registered signs and symptoms in the electronic medical file before admission. Only nursing home 1 performed a standard swallowing assessment at admission.

To enhance the alignment between the researchers in the process of the data extraction, two investigators explored the residents' electronic medical files simultaneously in nursing home 1, by following the predetermined standardized collection instruction. If relevant data were missing or had been described inaccurately, or if a resident had been discharged from the nursing home during the examination period, the resident was excluded. After the collection of data in nursing home 1, the data-collection procedure was critically evaluated and discussed by the investigators. After it was agreed that the data collection did not need adjustments, three other investigators carried out the data collection in nursing homes 2 and 3 following instructions from the investigators of the first nursing home.

The International Classification of Diseases (ICD-10)

The medical diagnoses and conditions derived from the residents' electronic medical files were arranged and clustered using The International Classification of Diseases (ICD-10).²⁹ The chapters 'Pregnancy, childbirth and the puerperium (O00–O9A)' and 'Conditions originating in the Perinatal period (P00–P96)' were excluded, because they are not applicable to nursing home residents.

Statistical analyses

Statistical analyses were performed using SPSS version 20.0 (SPSS INC, Chicago, IL, USA), including descriptive frequency distributions for all variables. Student's *t*-test and the chi-square test were used for testing differences between groups. Multiple logistic regression analyses were used to explore associations of NHAP with the diseases classified according to ICD-10. In these models, NHAP was the dependent variable and the respective diseases were the independent variables. Odds ratios (OR) with 95% confidence intervals (95% CI) were calculated. All ORs were corrected for gender and diagnosed dysphagia.

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