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Bacteriological testing and recurrence prevention efforts in the diagnosis and treatment of nursing- and healthcare-associated pneumonia and aspiration pneumonia: a questionnaire survey of hospitals across Japan

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ABSTRACT

Background: Clinical practice guidelines for nursing- and healthcare-associated pneumonia (NHCAP) were developed considering pneumonia caused by drug-resistant bacteria and pneumonia in the elderly, particularly aspiration pneumonia. The identification of pathogenic bacteria and implementation of efforts to prevent the recurrence of aspiration pneumonia are very important in clinical practice. This study examined the extent to which clinicians have established bacteriological testing and recurrence prevention efforts for NHCAP and aspiration pneumonia.

Methods: Questionnaire surveys were mailed to the heads of internal medicine and respiratory medicine departments at 2490 Japanese hospitals. The questionnaire evaluated bacteriological testing for NHCAP or aspiration pneumonia and prevention of aspiration pneumonia recurrence.

Results: A total of 350 hospitals responded. These hospitals were grouped on the basis of whether a pulmonologist provided medical care for aspiration pneumonia and whether the hospital employed an infectious disease specialist. For hospitals in which pulmonologists treated aspiration pneumonia, the response rates for "is done in nearly all cases" were 70.0%, 84.7%, 31.6%, and 48.9% for sputum gram staining, sputum culture tests, blood culture tests, and pneumococcal vaccination, respectively. In hospitals employing an infectious disease specialist, the response rates for "is done in nearly all cases" were 72.8% and 41.3% for sputum gram staining and blood culture tests, respectively. Recurrence prevention for aspiration pneumonia (other than pneumococcal vaccination) was not actively implemented.

Conclusions: Sputum gram staining, sputum culture tests, and other bacteriological tests were implemented quite actively. However, physicians treating aspiration pneumonia should more actively implement efforts to prevent pneumonia recurrence.

Keywords: aspiration pneumonia, bacteriological testing, nursing- and healthcare-associated pneumonia, pneumococcal vaccine, recurrence prevention.

List of abbreviations: NHCAP, nursing- and healthcare-associated pneumonia; CAP, community-acquired pneumonia; HAP, hospital-acquired pneumonia; ATS, American Thoracic Society; IDSA, Infectious Diseases Society of America; HCAP, healthcare-associated pneumonia; ACE, angiotensin-converting enzyme.

1 INTRODUCTION

The Japanese Respiratory Society published the clinical practice guidelines for nursing- and healthcare-associated pneumonia (NHCAP) in 2011 [1]. NHCAP shows elements intermediate between those of community-acquired pneumonia (CAP) [2] and hospital-acquired pneumonia (HAP) [3] in Japan. The American Thoracic Society (ATS) and the Infectious Diseases Society of America (IDSA) made recommendations regarding the treatment of healthcare-associated pneumonia (HCAP) in the HAP guidelines that they published jointly in 2005 [4]. The NHCAP guidelines are equivalent to the Japanese version of HCAP guidelines. However, the meaning of "HC" (healthcare) in the guidelines jointly published by the ATS and IDSA is not always the same as in Japan. The Japanese healthcare system is characterized by universal nursing-care insurance for those aged 65 years and older and by universal health insurance for the entire population. NHCAP guidelines include both nursing-care-associated pneumonia and healthcare-associated pneumonia.

NHCAP satisfies any of the following criteria:

1. Pneumonia diagnosed in a resident of an extended care facility or nursing home,
2. Pneumonia diagnosed in a person who has been discharged from a hospital within the preceding 90 days,
3. Pneumonia diagnosed in an elderly or handicapped person who needs long-term care and has a performance status of 3 or 4, based on the Eastern Cooperative Oncology Group criteria [5], or
4. Pneumonia diagnosed in a person who is receiving regular outpatient endovascular treatment (e.g., dialysis, antibiotic therapy, chemotherapy, or immunosuppressant therapy).

The clinical practice guidelines for NHCAP were developed considering pneumonia caused by drug-resistant bacteria, which is a consequence of advanced medical care, and elderly pneumonia (especially aspiration pneumonia) in Japan [1]. In fact, more multidrug-resistant pathogens have been reported in the literature for NHCAP than for CAP [6, 7], and the mean age of individuals affected by NHCAP is 6–9 years older (mean age for NHCAP is approximately 80 years) [6, 7]. In addition, 63% of NHCAP cases involve aspiration pneumonia [5]. However, *Streptococcus pneumoniae* was the leading pathogen causing NHCAP. Moreover, common pathogenic bacteria are often detected as in CAP. Many patients with NHCAP do not need broad-spectrum antibiotic therapy targeting multidrug-resistant pathogens [8]. The high mortality in patients with NHCAP is the result of patient background or disease severity rather than the presence of multidrug-resistant pathogens [8]. HCAP was

deleted and slotted into CAP in IDSA/ATS 2016 clinical practice guidelines for hospital-acquired and ventilator-associated pneumonia, because resistant bacteria were not encountered very frequently, and patients with NHCAP generally visited an emergency department [9]. Drugs such as angiotensin-converting enzyme (ACE) inhibitors [10] and cilostazol [11] are effective for the treatment of aspiration pneumonia and preventing its recurrence. Moreover, the patients' level of consciousness [12, 13], drugs that cause swallowing difficulty [14], and the patients' head position while sleeping [15] might cause the recurrence of aspiration pneumonia. Patients with aspiration risk were at a greater risk of poor long-term outcomes with increased 1-year mortality, increased risk of rehospitalization, and a strong association with recurrent admissions with pneumonia [16]. Therefore, bacteriological testing to identify pathogenic bacteria and efforts to prevent the recurrence of aspiration pneumonia are very important in the clinical practice for NHCAP.

However, since the publication of the guidelines, the conditions of actual medical care provided by clinicians with regard to bacteriological testing and recurrence prevention have not been adequately surveyed. Therefore, the present study was performed to survey the compliance rate among clinicians for implementing bacteriological testing and recurrence prevention in patients with NHCAP or aspiration pneumonia by using the same database as in our previous study [17, 18].

2 PATIENTS and METHODS

2.1 Study design

This was a cross-sectional study conducted using questionnaire responses. The Research Ethics Committee and Epidemiological Ethics Committee of Jichi Medical University (Shimotsuke, Japan) determined that an ethical review was unnecessary and waived the requirement for written informed consent (Number: Ekigaku 12–34; approved on November 22, 2012). The other questions and results regarding fasting duration and resumption of oral intake after aspiration pneumonia were described in our previous report [17, 18].

2.2 Implementation methods of the survey

In Japan, medical treatment for patients with NHCAP and/or aspiration pneumonia is mostly prescribed by a pulmonologist or a general internal physician. Therefore, by using a directory of medical institutions nationwide, we surveyed all hospitals in Japan that were listed as having a department of internal medicine and a department of respiratory medicine. However, the list of all physicians was unavailable. Therefore, we collected one response from the heads of these departments at each hospital. Questionnaires on aspiration pneumonia treatment were then sent

to the hospitals surveyed and addressed to the physician overseeing pneumonia treatment. The questionnaire was developed in our laboratory. The completed questionnaires were returned to our research administrative office. The questionnaires were mailed in the latter part of September 2014, and we asked that they be completed and returned to us by November 30, 2014.

2.3 Details of the questionnaire

Questions regarding the bacteriological testing of patients with NHCAP or aspiration pneumonia and questions regarding efforts to prevent the recurrence of aspiration pneumonia in patients were posed with regard to the contents of the clinical practice guidelines for NHCAP [1]. The questions were as follows.

2.3.1 Questions regarding bacteriological testing: We would like to ask you and your hospital about the implementation of bacteriological testing in patients with NHCAP or aspiration pneumonia. To what extent are (a) sputum gram staining, (b) sputum culture tests, and (c) blood culture tests (multiple sets) implemented? Please respond by selecting the most appropriate one from the following options for each item.

1. Is done in nearly all cases (more than 90% of cases)
2. Is done when appropriate
3. Is essentially not done (less than 10% of cases)
4. Other

2.3.2 Questions regarding recurrence prevention: We would like to ask you and your hospital about efforts to prevent recurrence in patients with aspiration pneumonia. To what extent are the following implemented: (a) the use of ACE inhibitors, (b) the use of cilostazol, (c) efforts to increase consciousness level (dose reduction and discontinuation of sedatives, hypnotics, etc.), (d) dose reduction and discontinuation of drugs that cause swallowing difficulty, (e) sleeping position with the patient's head (upper body) slightly elevated is desirable, and (f) patients are given pneumococcal polysaccharide vaccine injection? Please respond by selecting the most appropriate one from the following options for each item.

1. Is done in nearly all cases (more than 90% of cases)
2. Is done when appropriate
3. Is essentially not done (less than 10% of cases)
4. Other

2.4 Data analysis

We performed reliability analysis and simple tabulation of the responding facilities by using

Cronbach's statistics. The response rate and hospital bed capacity were calculated. We calculated the number of beds in each hospital, and compared the hospital bed capacity between the responding and non-responding facilities by using the chi-square test.
Facilities were divided into two groups: (1) hospitals where a pulmonologist provided medical care for aspiration pneumonia and (2) hospitals where a non-pulmonologist provided medical care for aspiration pneumonia. The chi-square test was used to compare the survey responses of the two groups to questions regarding bacteriological testing and recurrence prevention.
The facilities were then divided into two groups: (1) hospitals employing an infectious disease specialist and (2) hospitals without an infectious disease specialist. The chi-square test was used for comparing the survey responses of the two groups to questions regarding bacteriological testing and recurrence prevention. IBM SPSS Statistics for Windows, Version 22.0 (IBM Corp., New York, NY) was used for statistical analysis. In all analyses, $P < 0.05$ was considered to indicate statistical significance.

3 RESULTS

Questionnaires were sent to 2525 medical institutions across Japan. Of these, questionnaires sent to 35 facilities were returned to the sender because of undeliverable addresses. We received responses from 350 of 2490 facilities (i.e., 14.1% response rate; one response was collected from the head of the department of each hospital). Reliability analysis of the questionnaire items analyzed in this study yielded a Cronbach's α of 0.859, indicating good reliability.
Table 1 shows the numbers of responding and non-responding hospitals and each hospital's bed capacity. The response rate from hospitals with larger bed capacities was higher, and most responding hospitals had more than 200 beds. The baseline data were similar to those in our previous study [17, 18].
Table 2 shows the demographic data of the responding hospitals. Pulmonologists provided medical care for aspiration pneumonia in 190 hospitals and infectious disease specialists were employed at 92 hospitals. The baseline data were similar to those in our previous study [17, 18].
Table 3 shows the survey response results for questions regarding bacteriological testing and recurrence prevention in the two groups in which a pulmonologist or non-pulmonologist provided medical care for aspiration pneumonia. In the group where a pulmonologist provided medical care for aspiration pneumonia, the response "is done in nearly all cases" had rates of 70.0%, 84.7%, and 31.6% for sputum gram staining, sputum culture tests, and blood culture

tests, respectively. These bacteriological tests were implemented significantly more actively in this group than in the group where a pulmonologist did not provide care for aspiration pneumonia. With regard to recurrence prevention efforts for patients with aspiration pneumonia, the response rate for “is done in nearly all cases” was 48.9% for pneumococcal vaccination in hospitals where a pulmonologist provided medical care for aspiration pneumonia. Pneumococcal vaccination was significantly more actively implemented in this group than in the group in which a pulmonologist did not provide medical care for aspiration pneumonia. The response “is essentially not done” was frequently given for the use of ACE inhibitors and the use of cilostazol, both of which improved swallowing function. Few “done in nearly all cases” responses were obtained for recurrence prevention efforts (e.g., increasing consciousness level, reducing the dose and discontinuing drugs that cause swallowing difficulty, and having the patient sleep with the head [i.e., upper body] slightly elevated). With the exception of pneumococcal vaccination, no significant differences were observed between the two groups in the medical care they received for recurrence prevention.

Table 4 shows the survey response results for questions regarding bacteriological testing and recurrence prevention efforts in the responding hospitals where an infectious disease specialist was or was not employed. In the responding hospitals with an infectious disease specialist, the response rates for “is done in nearly all cases” were 72.8%, 83.7%, and 41.3% for sputum gram staining, sputum culture tests, and blood culture tests, respectively. Sputum gram staining and blood culture tests were performed significantly more actively in these hospitals than in those that did not have an infectious disease specialist on staff. However, none of the items showed a significant difference between the two groups in recurrence prevention efforts.

4 DISCUSSION

We surveyed medical institutions in Japan that promote their departments of internal medicine and respiratory medicine to investigate the extents to which clinicians implement bacteriological testing and recurrence prevention in patients with NHCAP or aspiration pneumonia. Bacteriological testing to identify pathogenic bacteria, especially sputum gram staining and sputum culture tests, was implemented fairly actively. Various efforts at recurrence prevention for aspiration pneumonia, however, were not actively implemented.

The response “is done in nearly all cases” accounted for most of the responses for sputum gram staining and sputum culture tests. In particular, hospitals where a pulmonologist provided medical care for aspiration pneumonia performed significantly more tests than did hospitals where a non-pulmonologist provided such medical care. The response “is done in nearly all

cases" was less frequent for blood culture tests than for sputum gram staining and sputum culture tests. The response "is done when appropriate" was the most common answer for blood culture tests. Implementation of blood culture testing was significantly greater in hospitals where a pulmonologist provided medical care for aspiration pneumonia and hospitals with an infectious disease specialist than in the control groups (i.e., hospitals where non-pulmonologists treated aspiration pneumonia and hospitals that did not have an infectious disease specialist). The overall findings were that respondents actively performed testing (especially sputum gram staining and sputum culture tests) to identify pathogenic bacteria. Pulmonologists and infectious disease specialists also provided medical care with greater awareness of the importance of identifying pathogenic bacteria.

Among the efforts to prevent the recurrence of aspiration pneumonia, a significant difference was observed only for pneumococcal vaccination between hospitals where a pulmonologist did or did not provide medical care for aspiration pneumonia. The only effort at recurrence prevention for which the number of "is done in nearly all cases" responses exceeded that of "is done when appropriate" responses was for pneumococcal vaccination in the responding hospitals where a pulmonologist provided medical care for aspiration pneumonia and hospitals with an infectious disease specialist on staff. No significant difference was observed in pneumococcal vaccination between hospitals with or without an infectious disease specialist. We consider that infectious disease specialists could not contribute enough to the recurrence prevention of patients in the post-acute phase.

Drugs such as ACE inhibitors and cilostazol suppress the onset of pneumonia in patients at high risk of aspiration [10, 11]. However, efforts to prevent the recurrence of aspiration pneumonia were such that the response "is done in nearly all cases" was very rare and "is essentially not done" accounted for most responses. There were few "is essentially not done" responses for "efforts to increase consciousness level" and "dose reduction and discontinuation of drugs that cause swallowing difficulty"; however, the frequency of "is done when appropriate" responses exceeded that of "is done in nearly all cases" responses. The overall responses showed a lack of proactive efforts to prevent the recurrence of aspiration pneumonia. Efforts to prevent aspiration pneumonia recurrence are insufficient in terms of bacteriological testing considering the importance of identifying pathogenic bacteria.

Aspiration pneumonia is expediently classified as a respiratory disease under respiratory medicine. However, the Japanese postgraduate education for respiratory specialists and infectious disease specialists regarding aspiration pneumonia is not satisfactory; therefore, most respiratory specialists and infectious disease specialists lack good knowledge about the

rehabilitation of patients from the perspective of preventing aspiration pneumonia. In addition, because of the high number of elderly people with pneumonia, treatment and recurrence prevention of pneumonia, especially NHCAP or aspiration pneumonia, should be an important issue for every physician.

The present study has several limitations. First, the questionnaire response rate was somewhat low. In their questionnaire survey in Japan, Hagihara et al. [19] reported a response rate of 17.8% when respondents were randomly sampled and the survey was performed without compensation. Our survey did not include compensation, and the questionnaires were mailed to all hospitals that had an internal medicine department and a respiratory medicine department from a list of hospitals throughout Japan. Therefore, the survey recovery rate was within the acceptable range. However, we were concerned about some significant differences between the responders and non-responders. For example, clinicians who do not actively perform bacteriological testing tend not to respond because they are embarrassed. Therefore, the low response rate may bias the result of this survey. Moreover, in actual medical practice, the frequency of bacteriological testing and recurrence prevention efforts may be lower. Second, the questionnaire response rate from hospitals with a greater bed capacity was higher. Therefore, this study reflected the clinical conditions of more acute-stage hospitals, which have larger numbers of beds. The conditions of medical care provided by clinicians in charge of treating subacute to chronic stages of pneumonia may not have been fully reflected in the present survey. Therefore, bacteriological testing was actively performed to identify the pathogenic bacteria, but various efforts to prevent the recurrence of aspiration pneumonia were not proactively implemented. In addition, we did not enquire whether the bacteriological tests were performed in-house at the hospitals. The capability of “in-house testing” may also affect the frequency of bacteriological testing. Third, the involvement of a pulmonologist in medical care was clear when grouping hospitals on the basis of whether a pulmonologist did or did not provide medical care for aspiration pneumonia. In addition, some patients with NHCAP visit emergency departments. In this study, we did not consider the role of the emergency physician

who provides first aid to such patients; these emergency physicians provide only initial medical care to patients with pneumonia. Although an infectious disease specialist may have worked at a responding hospital, the present survey did not clarify the extent to which medical care for aspiration pneumonia was affected by the presence of an infectious disease specialist. There may be instances in which the specialist provides medical care for patients with aspiration pneumonia, instances in which the specialist is not responsible for medical care and is involved in in-hospital consultation or awareness building, and instances in which the specialist is not involved at all in medical care for aspiration pneumonia. We hope that infectious disease specialists will establish active educational campaigns for physicians and all healthcare workers in hospitals.

5 CONCLUSION

This survey was performed to determine the actual clinical conditions of patients with NHCAP or aspiration pneumonia in Japan. Bacteriological testing to identify pathogenic bacteria, especially sputum gram staining and sputum culture tests, was implemented fairly actively. However, various efforts to prevent the recurrence of aspiration pneumonia were not actively implemented. We believe that physicians involved in the care of patients with aspiration pneumonia, especially pulmonologists and infectious disease specialists, should be more actively involved in recurrence prevention efforts.

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Conflict of interest statement

The authors declare that they do not have any conflicts of interest that are related to this study.

Author contributions:

TK conceived of the study, participated in its design, and coordinated the drafting of the manuscript. AK, KK, YM, KM, DN, and AN participated in the design of the study, and created the questionnaire. SY drafted the manuscript, corrected and restructured the manuscript, and performed the statistical analysis. All authors read and approved the final manuscript.

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Table 1. Response rate and hospital bed capacity

Hospital bed capacity	Response rate	Number of responding facilities	Number of non-responding facilities	*P*-value
< 100 beds	8.3%	52 (14.9)	576 (26.5)	< 0.001
100–199 beds	10.6%	81 (23.1)	672 (30.9)	
200–299 beds	15.1%	49 (14.0)	276 (12.7)	
300–499 beds	17.6%	85 (24.3)	399 (18.3)	
≥ 500 beds	24.8%	83 (23.7)	252 (11.6)	

Number of facilities: 2525; number of responses, n (expressed as proportion, %)
Chi-square analysis was conducted to compare the responding facilities group and non-responding facilities group.
Source: *Geriatr Gerontol Int.* 2017; 17: 810-818 [17]. *Tohoku J Exp Med*. 2016; 240: 227-233 [18].

Table 2. Demographic data of the responding hospitals

	Number of facilities, n
Specialists in the hospital	
A pulmonologist provides medical care for aspiration pneumonia	190
An infectious disease specialist works at the facility	92
Number of regular doctors in the hospital	
≤5	53
6–10	43
11–20	41
21–30	32
31–50	40
51–100	58
≥101	80
No response	3
Number of physicians that treat CAP and NHCAP in the hospital	
≤5	171
6–10	103
≥11	71
No response	5
Patients with pneumonia in the hospital (annual number)	
≤50	54
51–100	64
101–150	47
151–200	48
≥201	130
No response	7

CAP, community-acquired pneumonia; NHCAP, nursing- and healthcare-associated pneumonia.

The total number of facilities was 350 hospitals.

Source: *Geriatr Gerontol Int.* 2017; 17: 810-818 [17]. *Tohoku J Exp Med*. 2016; 240: 227-233 [18].

Table 3. Survey responses to questions regarding bacteriological testing and recurrence prevention in hospitals where medical care for aspiration pneumonia is provided by a pulmonologist and in hospitals where such care is provided by a non-pulmonologist physician

	Pulmonologist group (n = 190)	**Non-pulmonologist group (n = 160)**	***P* values**
Sputum gram staining			
Is done in nearly all cases	133 (70.0%)	74 (46.3%)	
Is done when appropriate	43 (22.6%)	55 (34.3%)	
Is essentially not done	12 (6.3%)	26 (16.3%)	
Other/No response	2 (1.1%)	5 (3.1%)	≤0.001
Sputum culture test			
Is done in nearly all cases	161 (84.7%)	100 (62.5%)	
Is done when appropriate	27 (14.2%)	55 (34.3%)	
Is essentially not done	0 (0.0%)	2 (1.3%)	
Other/No response	2 (1.1%)	3 (1.9%)	≤0.001
Blood culture test			
Is done in nearly all cases	60 (31.6%)	32 (20.0%)	
Is done when appropriate	115 (60.5%)	98 (61.3%)	
Is essentially not done	14 (7.4%)	26 (16.3%)	
Other/No response	1 (0.5%)	4 (2.5%)	≤0.001
Use of ACE inhibitors			
Is done in nearly all cases	14 (7.4%)	6 (3.8%)	
Is done when appropriate	95 (50.0%)	81 (50.6%)	
Is essentially not done	77 (40.5%)	69 (43.1%)	
Other/No response	4 (2.1%)	4 (2.5%)	0.216
Use of cilostazol			
Is done in nearly all cases	3 (1.6%)	3 (1.9%)	
Is done when appropriate	48 (25.3%)	48 (30.0%)	
Is essentially not done	136 (71.6%)	104 (65.0%)	
Other/No response	3 (1.6%)	5 (3.1%)	0.173
Efforts to increase consciousness level (dose reduction and discontinuation of sedatives, hypnotics, etc.)			
Is done in nearly all cases	57 (30.0%)	48 (30.0%)	
Is done when appropriate	124 (65.3%)	103 (64.4%)	
Is essentially not done	5 (2.6%)	7 (4.4%)	
Other/No response	4 (2.1%)	2 (1.3%)	0.511

Dose reduction and discontinuation of drugs that cause swallowing difficulty			
Is done in nearly all cases	62 (32.6%)	51 (31.9%)	
Is done when appropriate	124 (65.3%)	99 (61.9%)	
Is essentially not done	1 (0.5%)	7 (4.4%)	
Other/No response	3 (1.6%)	3 (1.9%)	0.233
Sleeping position with the patient's head (upper body) slightly elevated is desirable			
Is done in nearly all cases	70 (36.8%)	45 (28.1%)	
Is done when appropriate	98 (51.6%)	86 (53.8%)	
Is essentially not done	21 (11.1%)	26 (16.3%)	
Other/No response	1 (0.5%)	3 (1.9%)	0.148
Pneumococcal polysaccharide vaccine injection			
Is done in nearly all cases	93 (48.9%)	55 (34.4%)	
Is done when appropriate	74 (38.9%)	79 (49.4%)	
Is essentially not done	21 (11.1%)	22 (13.8%)	
Other/No response	2 (1.1%)	4 (2.5%)	0.030

Pulmonologist group: Group in which pneumonia care is provided by a pulmonologist.

Non-pulmonologist group: Group in which pneumonia care is not provided by a pulmonologist.

ACE: angiotensin-converting enzyme.

Table 4. Survey responses to questions regarding bacteriological testing and recurrence prevention in responding hospitals with or without an infectious disease specialist on staff

	Infectious disease specialist group (n = 92)	**No infectious disease specialist group (n = 258)**	***P* values**
Sputum gram staining			
Is done in nearly all cases	67 (72.8%)	139 (53.9%)	
Is done when appropriate	17 (18.5%)	81 (31.4%)	
Is essentially never done	7 (7.6%)	31 (12.0%)	
Other/No response	1 (1.1%)	7 (2.7%)	0.005
Sputum culture test			
Is done in nearly all cases	77 (83.7%)	183 (70.9%)	
Is done when appropriate	13 (14.1%)	69 (26.7%)	
Is essentially never done	1 (1.1%)	1 (0.4%)	
Other/No response	1 (1.1%)	5 (1.9%)	0.067
Blood culture test			
Is done in nearly all cases	38 (41.3%)	54 (20.9%)	
Is done when appropriate	48 (52.2%)	164 (63.6%)	
Is essentially never done	6 (6.5%)	34 (13.2%)	
Other/No response	0 (0.0%)	6 (2.3%)	≤0.001
Use of ACE inhibitors			
Is done in nearly all cases	6 (6.5%)	14 (5.4%)	
Is done when appropriate	48 (52.2%)	127 (49.2%)	
Is essentially never done	38 (41.3%)	108 (41.9%)	
Other/No response	0 (0.0%)	9 (3.5%)	0.287
Use of cilostazol			
Is done in nearly all cases	1 (1.1%)	5 (1.9%)	
Is done when appropriate	21 (22.8%)	74 (28.7%)	
Is essentially never done	69 (75.0%)	171 (66.3%)	
Other/No response	1 (1.1%)	8 (3.1%)	0.148
Efforts to increase consciousness level (dose reduction and discontinuation of sedatives, hypnotics, etc.)			
Is done in nearly all cases	29 (31.5%)	75 (29.1%)	
Is done when appropriate	59 (64.1%)	168 (65.1%)	
Is essentially never done	3 (3.3%)	9 (3.5%)	
Other/No response	1 (1.1%)	6 (2.3%)	0.304

Dose reduction and discontinuation of drugs that cause swallowing difficulty			
Is done in nearly all cases	30 (32.6%)	82 (31.8%)	
Is done when appropriate	60 (65.2%)	163 (63.2%)	
Is essentially never done	1 (1.1%)	7 (2.7%)	
Other/No response	1 (1.1%)	6 (2.3%)	0.661
Sleeping position with the patient's head (upper body) slightly elevated is desirable			
Is done in nearly all cases	32 (34.8%)	82 (31.8%)	
Is done when appropriate	52 (56.5%)	132 (51.2%)	
Is essentially never done	7 (7.6%)	40 (15.5%)	
Other/No response	1 (1.1%)	4 (1.6%)	0.158
Pneumococcal polysaccharide vaccine injection			
Is done in nearly all cases	44 (47.8%)	104 (40.3%)	
Is done when appropriate	35 (38.0%)	117 (45.3%)	
Is essentially never done	11 (12.0%)	32 (12.4%)	
Other/No response	2 (2.2%)	5 (1.9%)	0.416

Infectious disease specialist group: Group with an infectious disease specialist on the hospital staff.

No infectious disease specialist group: Group without an infectious disease specialist on the hospital staff.

ACE: angiotensin-converting enzyme.