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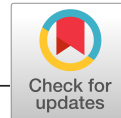
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A comparison of pneumonia care quality between general physicians and pulmonologists

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Abstract

Background: We compared the quality of care for nursing- and healthcare-associated pneumonia (NHCA) and aspiration pneumonia provided by general physicians and pulmonologists.

Methods: Questionnaires were mailed to 2490 medical facilities across Japan. The questionnaire assessed participants' implementation of microbiological investigations for NHCA or aspiration pneumonia, as well as steps taken to prevent pneumonia recurrence (eg, use or discontinuation of drugs associated with swallowing and administration of pneumococcal polysaccharides). Survey results were statistically compared between the two groups using chi-square tests.

Results: We received responses from 350 hospitals; of those, medical care for aspiration pneumonia was provided by pulmonologists at 190 hospitals and by general physicians at 79 hospitals. No significant differences were observed between the two groups of physicians for any of the items regarding proactive microbiological investigations or measures for preventing pneumonia recurrence. However, general physicians tended to be more proactive in conducting Gram's stains for sputum, sputum culture inspections, and blood culture tests. They also were more likely to implement measures for preventing pneumonia recurrence such as striving to increase patients' consciousness levels, reducing medication doses, and discontinuing drugs that cause difficulty with swallowing (response rates of "is done in nearly all cases" were 73.4%, 88.6%, 36.7%, 35.4%, and 40.5%, respectively).

Conclusions: The quality of care provided by general physicians may be on par with pulmonologists in terms of proactive microbiological investigations and preventing pneumonia recurrence.

KEYWORDS

aspiration pneumonia, general practitioner, microbiological investigation, nursing- and healthcare-associated pneumonia, quality of care, recurrence prevention

1 | INTRODUCTION

The Japanese Medical Specialty Board has approved a general practice specialist training program that will commence in Japan in April 2018. Physicians who complete this 3- to 4-year program will be certified as general practice specialists. However, general physicians (*sougoushinryou-i* in Japanese) are already actively practicing outpatient and home care under titles such as “family physician” and “primary care physician,” as well as inpatient care (treating common diseases) under the title of “hospitalist.”

In the United States, hospitalists have a favorable influence on clinical outcomes and are sought by hospital managers in order to reduce costs.¹ Hospitalists are also leaders in the improvement of medical care quality; specifically, hospitalists make major contributions to organizational and clinical processes, including ensuring compliance with treatment guidelines.² However, to our knowledge, no studies have yet assessed the quality of care provided by general physicians in Japan.

Pneumonia is the third-leading cause of death in Japan.³ Care for patients with pneumonia in Japan is provided not only by pulmonologists but also by other physicians, including general physicians. A previous study examined pulmonologists' and nonpulmonologist physicians' proactive microbiological investigation and recurrence-prevention efforts during the diagnosis and treatment of nursing- and healthcare-associated pneumonia (NHCAP) and aspiration pneumonia.⁴ For this study, we examined the quality of medical care provided by general physicians in comparison with pulmonologists (who are specialists in pneumonia patient care) using a subset of this previous study's data. Specifically, we focused on care for patients with two types of pneumonia: NHCAP⁵ and aspiration pneumonia, as these are both common and deadly forms of pneumonia.

2 | MATERIALS AND METHODS

2.1 | Study design

This study surveyed the current status of medical practices related to NHCAP⁵ and aspiration pneumonia. Although we requested an ethical review by the Epidemiology Research Ethics Committee at Jichi Medical University, ethical approval was waived because our study was based on a questionnaire survey. Returning the administered questionnaire was considered as consent to participate by the participants. Details regarding fasting duration and resumption of oral intake following aspiration pneumonia have been published previously.^{6,7}

2.1.1 | Definition of NHCAP

Nursing- and healthcare-associated pneumonia guidelines⁵ focus on nursing- and healthcare-associated pneumonia. NHCAP is defined as any of the following:

- 1) Pneumonia diagnosed in a person living in a nursing home or long-term care facility;

- 2) Pneumonia diagnosed in a person within 90 days of the most recent hospital stay;
- 3) Pneumonia diagnosed in an elderly or handicapped person who requires long-term care and has an Eastern Cooperative Oncology Group performance status of 3 or 4⁴; or
- 4) Pneumonia diagnosed in a person who is receiving regular outpatient endovascular treatment (eg, dialysis, antibiotic therapy, chemotherapy, or immunosuppressant therapy).

Guidelines for NHCAP in Japan were developed with consideration of pneumonia in the elderly (particularly aspiration pneumonia) and pneumonia caused by drug-resistant bacteria (an effect of advanced medical treatment).

2.1.2 | Definition of aspiration pneumonia

Based on consensus guidelines adopted by the Japanese Respiratory Society,⁵ Aspiration pneumonia was defined as pneumonia that occurred in patients with dysphagia or aspiration, and/or patients who were strongly suspected of having dysphagia or aspiration based on their clinical course.

2.2 | Survey procedure

Medical care for NHCAP and/or aspiration pneumonia is mostly prescribed by a pulmonologist, general physician (*sougoushinryou-i* in Japanese), or general internal medicine physician (*ippannaika-i* in Japanese) in Japan. Using the roster of all Japanese medical institutions, we targeted hospitals equipped with internal medicine and respiratory medicine departments across Japan. However, there is no list of all physicians in Japan; therefore, we collected one response from the head of the department at each hospital. Questionnaires regarding aspiration pneumonia were sent to each hospital during September 2014 and were addressed to the physician who oversaw pneumonia treatment. We requested that participants return the completed questionnaires to our research office by November 2014. Our questionnaire details were based on NHCAP guidelines.⁵ The present study's rates were the compliance rates among clinicians per NHCAP guidelines.

2.3 | Questionnaire details

The questionnaire contained items assessing the microbiological investigation of patients affected by NHCAP and/or aspiration pneumonia, along with prevention initiatives for aspiration pneumonia recurrence. This content follows from NHCAP clinical practice guidelines.¹ Questionnaire content is described in more detail below.

2.3.1 | Questions regarding microbiological investigations

“We would like to ask you about the implementation of microbiological investigations for patients affected by NHCAP or aspiration pneumonia. To what extent are (a) Gram's stains for sputum; (b) sputum

culture inspections; and (c) blood culture tests implemented before starting antibiotic treatment, and/or when pneumonia was diagnosed? Please choose the closest answer from the following options.

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

Sputum Gram stain is highly specific for the etiologic diagnosis and useful in guiding pathogen-targeted antibiotic treatment of pneumonia.⁸ NHCAP guidelines recommend the implementation of sputum Gram stain.⁵

2.3.2 | Questions regarding prevention initiatives

"We would like to ask you about your efforts regarding prevention initiatives for patients affected by NHCAP or aspiration pneumonia. To what extent are the following implemented: (a) using angiotensin-converting enzyme (ACE) inhibitors; (b) using cilostazol; (c) efforts to raise consciousness level (dose reduction and discontinuation of hypnotics, sedatives, etc.); (d) discontinuation and dose reduction of drugs that reduce swallowing function; (e) elevation of the patient's head (upper body) during meals; and (f) inoculation via a pneumococcal vaccine? Please choose the closest answer from the following options.

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

Drugs such as ACE inhibitors⁹ and cilostazol¹⁰ are effective for treating aspiration pneumonia and for preventing its recurrence. Moreover, the patients' level of consciousness,^{11,12} drugs that cause swallowing difficulty,¹³ and the patients' head position while sleeping¹⁴ might cause the recurrence of aspiration pneumonia. The NHCAP guidelines suggested the use of ACE inhibitors and

cilostazol. These were good indications for patients with a history of cerebral infarction. Additionally, NHCAP guidelines recommend these to prevent the conditions mentioned above.

2.4 | Data analyses

The reliability of our survey instrument was tested using Cronbach's alpha. We performed simple tabulations of responses to each questionnaire item and the capacity (number of beds) of each hospital. Medical institutions were assigned to two groups: (a) hospitals in which pneumonia care was provided by a pulmonologist (pulmonologist group); and (b) hospitals in which pneumonia care was provided by a general physician (general physician group). After determining hospital bed capacity, we compared capacity between the two groups using chi-square tests. Chi-square tests were also used to compare survey responses for questions assessing microbiological investigations and recurrence prevention. All analyses were performed using IBM SPSS software (version 22.0; IBM Corp., Armonk, NY, USA), and statistical significance was set at $P < 0.05$.

3 | RESULTS

The questionnaire was mailed to 2525 medical facilities across Japan. From these, the addresses of 35 facilities were incorrect; consequently, these questionnaires were returned. Of the remaining 2490 institutions, 350 provided adequate responses. The overall response rate was 14.1% (one response was collected from the department head at each hospital). Cronbach's alpha was 0.859, indicating good reliability for the questionnaire.

Total hospital capacity from the responding hospitals is summarized in Table 1. Of the 350 facilities that responded, care for aspiration pneumonia was provided by pulmonologists at 190 facilities and by general physicians at 79 facilities. The two groups did not differ significantly in terms of hospital bed capacity.

Table 2 shows responses to microbiological investigation items between the pulmonologist and general physician groups. In the pulmonologist group, Gram's stains of sputum, sputum culture inspections, and blood

Hospital bed capacity	Pulmonologist group ^a (n = 190) n (%)	General physician group ^b (n = 79) n (%)	P-value ^c
<100 beds	14 (7.4)	9 (11.4)	0.448
100-199 beds	31 (16.3)	7 (8.9)	
200-299 beds	23 (12.1)	9 (11.4)	
300-499 beds	50 (26.3)	27 (34.2)	
≥500 beds	70 (36.8)	26 (32.9)	
Unknown	2 (1.1)	1 (1.3)	

Total number of facilities surveyed: N = 269.

^aPulmonologist group: Hospitals in which pneumonia care is provided by a pulmonologist.

^bGeneral physician group: Hospitals in which pneumonia care is provided by a general physician.

^cChi-square analyses were conducted for group comparisons.

TABLE 1 Hospital bed capacity

TABLE 2 Survey responses for items assessing microbiological investigations in both hospital groups

	Pulmonologist group ^a (n = 190) n (%)	General physician group ^b (n = 79) n (%)	P-values
Gram's stain of sputum			
Is done in nearly all cases	133 (70.0)	58 (73.4)	0.413
Is done when appropriate	43 (22.6)	15 (19.0)	
Is essentially not done	12 (6.3)	6 (7.6)	
Other/no response	2 (1.1)	0 (0.0)	
Sputum culture inspection			
Is done in nearly all cases	161 (84.7)	70 (88.6)	0.249
Is done when appropriate	27 (14.2)	9 (11.4)	
Is essentially not done	0 (0.0)	0 (0.0)	
Other/no response	2 (1.1)	0 (0.0)	
Blood culture test			
Is done in nearly all cases	60 (31.6)	29 (36.7)	0.621
Is done when appropriate	115 (60.5)	43 (54.4)	
Is essentially not done	14 (7.4)	7 (8.9)	
Other/no response	1 (0.5)	0 (0.0)	

^aPulmonologist group: Hospitals in which pneumonia care is provided by a pulmonologist.

^bGeneral physician group: Hospitals in which pneumonia care is provided by a general physician.

culture tests were “done in nearly all cases” at 70.0%, 84.7%, and 31.6% of the responding hospitals, respectively. For the general physician group, these respective percentages were 73.4%, 88.6%, and 36.7%. Although the general physician group tended to be somewhat more proactive, there were no significant differences between the groups.

Table 3 displays responses to survey questions assessing recurrence prevention. In the pulmonologist group, 48.9% of hospitals indicated that inoculation via a pneumococcal vaccine “is done in nearly all cases,” as compared to 41.8% in the general physician group; this difference was not significant.

In many hospitals across both groups, the implementation of ACE inhibitors and cilostazol for improving swallowing function “is essentially not done.” In the pulmonologist group, the hospitals that answered, “done in nearly all cases” for “efforts to raise consciousness level” and “discontinuation and dose reduction of drugs that reduce swallowing function,” were 30.0% and 32.6%, respectively, as compared to 35.4% and 40.5% in the general physician group. Although the general physician group tended to be more proactive, these differences were also not

statistically significant. Furthermore, we observed no significant differences between the two groups for any of the other questions.

4 | DISCUSSION

The present study assessed the quality of medical care for patients with NHCAP and aspiration pneumonia provided by general physicians (general practice specialists in Japan) in comparison with pulmonologists (specialists in pneumonia care). In terms of microbiological investigations and efforts toward recurrence prevention, we observed no significant differences between the pulmonologist and general physician groups.

In a previous analysis⁴ that compared pulmonologists to nonpulmonologist physicians, Gram's stains of sputum, sputum culture inspections, and blood culture tests were performed significantly more often by pulmonologists than by nonpulmonologist physicians. In the present study, although not statistically significant, those who stated that Gram's stains of

TABLE 3 Survey responses to questions regarding recurrence prevention in both hospital groups

	Pulmonologist group ^a (n = 190) n (%)	General physician group ^b (n = 79) n (%)	P-value
Use of ACE ^c inhibitors			
Is done in nearly all cases	14 (7.4)	5 (6.3)	0.248
Is done when appropriate	95 (50.0)	46 (58.2)	
Is essentially not done	77 (40.5)	28 (35.4)	
Other/no response	4 (2.1)	0 (0.0)	
Use of cilostazol			
Is done in nearly all cases	3 (1.6)	1 (1.3)	0.462
Is done when appropriate	48 (25.3)	19 (24.1)	
Is essentially not done	136 (71.6)	59 (74.7)	
Other/no response	3 (1.6)	0 (0.0)	
Efforts to raise consciousness level (dose reduction and discontinuation of sedatives, hypnotics, etc.)			
Is done in nearly all cases	57 (30.0)	28 (35.4)	0.299
Is done when appropriate	124 (65.3)	47 (59.5)	
Is essentially not done	5 (2.6)	4(5.1)	
Other/no response	4 (2.1)	0 (0.0)	
Discontinuation and dose reduction of drugs that reduce swallowing function			
Is done in nearly all cases	62 (32.6)	32 (40.5)	0.193
Is done when appropriate	124 (65.3)	46 (58.2)	
Is essentially not done	1 (0.5)	1 (1.3)	
Other/no response	3 (1.6)	0 (0.0)	
Elevation of the patient's head (upper body) during meals			
Is done in nearly all cases	70 (36.8)	29 (36.7)	0.635
Is done when appropriate	98 (51.6)	38 (48.1)	
Is essentially not done	21 (11.1)	12 (15.2)	
Other/no response	1 (0.5)	0 (0.0)	
Inoculation using a pneumococcal vaccine			
Is done in nearly all cases	93 (48.9)	33 (41.8)	0.544
Is done when appropriate	74 (38.9)	36 (45.6)	
Is essentially not done	21 (11.1)	9 (11.4)	
Other/no response	2 (1.1)	0 (0.0)	

^aPulmonologist group: Hospitals in which pneumonia care is provided by a pulmonologist.

^bGeneral physician group: Hospitals in which pneumonia care is provided by a general physician.

^cAngiotensin-converting enzyme.

sputum, sputum culture inspections, and blood culture tests were "done in nearly all cases" tended to be higher in the general physician group.

In the original study⁴ comparing pulmonologists and nonpulmonologist physicians, inoculation using a pneumococcal vaccine was administered significantly more often by pulmonologists in an effort to prevent pneumonia recurrence. However, that study found no statistically significant differences in the use of ACE inhibitors, efforts to raise consciousness level, discontinuation and dose reduction of drugs that reduce swallowing function, and elevation of the patient's head (upper body) during meals (although the pulmonologist group tended to be more proactive regarding these measures). In the present study, we similarly observed no significant

differences between the pulmonologist and general physician groups in any of the aforementioned measures. However, efforts to raise consciousness level and discontinuation and dose reduction of drugs that reduce swallowing function tended to be implemented more often by the general physician group. Preventing recurrence of pneumonia entails providing care from the subacute phase to the chronic phase, which is not necessarily the focus among pulmonologists, while this type of care is typical for general physicians.

Based on these findings, it could be concluded that the quality of care for NHCAP and aspiration pneumonia provided by general physicians may be on par with what is provided by pulmonologists. In the United States, hospitals with hospitalists were associated with better

performance for pneumonia treatment and prevention than hospitals without hospitalists.¹⁵ This study showed a similar tendency.

However, there were few responses of “is done in all cases” to questions regarding pneumococcal polysaccharide vaccine injection and other proactive efforts for preventing recurrence among general physicians. In addition, general physicians did not demonstrate superiority in prevention efforts as compared to pulmonologists. This suggests that general physicians must be more proactive in preventing the recurrence of pneumonia.

This study has two major limitations. First, the overall response rate for the questionnaire was low (14.1%). Hagihara et al¹⁶ reported a response rate of only 17.8% for a Japanese questionnaire survey that randomly selected respondents (and who were not remunerated). Therefore, we believe that our response rate is acceptable, as we did not offer any compensation for participating and did not provide reminders to potential respondents. However, selective bias should be suspected regarding the response rate. In this research, the proportion of small facilities is small. In small-scale facilities, it is necessary to implement Gram staining on its own, but in large-scale facilities, dedicated engineers are conducting the procedure, and there is a possibility that there is no difference in the enforcement rate of Gram staining. Second, we did not directly examine medical care outcomes, including shortened hospital stays, reduced mortality, and improved hospital costs, between the two groups.

5 | CONCLUSION

The present study compared pulmonologists and general physicians (*sougoushinryou-i*) in terms of the quality of medical care provided for patients affected by NHCAP and aspiration pneumonia in Japan. In terms of proactive microbiological investigations and efforts to prevent pneumonia recurrence, the care provided by general physicians may be on par with that provided by pulmonologists. Thus, general physicians appear to provide adequate care for managing patients with NHCAP and aspiration pneumonia.

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CONFLICT OF INTEREST

The authors have stated explicitly that there are no conflicts of interest in connection with this article.

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