

Physician practices in the diagnosis and treatment of infectious diseases in home care settings: A questionnaire study

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Abstract: To elucidate the current practices of infectious disease management in home care settings in Japan, we sent a questionnaire to 36 physicians working at 13 clinics that specialize in providing care to patients in their homes or residential care facilities. The questionnaire described three hypothetical scenarios (aspiration pneumonia, pyelonephritis, and neoplastic fever) in older patients with terminal cancer, and 25 respondents answered questions on testing and treatment strategies. Most respondents chose to obtain cultures for aspiration pneumonia (sputum) and for pyelonephritis (urine), although fewer respondents chose to obtain blood cultures. For neoplastic fever, most of respondents elected to continue observation without antibiotic treatment. The most frequently selected antibiotics were cephalosporins and quinolones. The results indicated that most respondents would perform bacterial culture tests before prescribing antibiotics and observe patients when bacterial infections are not suspected. Standardized guidelines are needed to optimize infectious disease management in home care.

Keywords: home care service, antimicrobial stewardship, antibiotic resistance, physician practice pattern

Introduction

Due to an exceptionally long-life expectancy and low birth rate, Japan has become the world's most super-aged country with 28.4% of its population aged ≥ 65 years in 2019 (1). This population aging will be accompanied by an increasing number of functionally impaired older persons with difficulty in regularly visiting health facilities to receive care. The Ministry of Health, Labour and Welfare of Japan is promoting home care as part of overarching efforts toward realizing regional medical care goals and developing community-based integrated care systems (2). Accordingly, home care will play an increasingly prominent role in Japan's healthcare system.

Infectious diseases are among the most frequently encountered health problems in older persons living at home (3). The minimization of preventable hospitalizations can help to contain rising healthcare costs and resource consumption in an aging population. Although it is important for home care service providers to link with hospitals when necessary, a previous study reported that approximately 80% of older patients with infection-induced fever were successfully treated at home

(4). This indicates that the home-based management of infections is a potentially important element in reducing hospitalizations. However, widespread overuse of antibiotics can lead to increases in adverse events and antibiotic resistance, thereby causing harm to both patients and society (5). For example, a recent study reported that antibiotic-resistant bacteria were detected in 24 (14.9%) of 161 older persons receiving home care in Okinawa (6). The quantity of antibiotics administered at home is likely to rise as home care services become more prevalent, resulting in a growing need to apply antimicrobial stewardship practices in home care settings.

Despite the need to ensure appropriate infectious disease management in home care, little is known about these current practices in Japan. Therefore, we conducted a questionnaire study to elucidate the testing and treatment strategies of home care physicians for suspected infections in older patients.

Study design and information collection

Study subjects: We conducted a questionnaire study targeting 36 physicians providing home care between

Table 1. Selected tests in each scenario (n = 25)

Selected tests	Own-home care	Residential care
Scenario 1 (Suspected aspiration pneumonia)		
Obtain past bacterial culture results	16 (64.0)	15 (60.0)
Sputum culture	19 (76.0)	20 (80.0)
Blood culture	8 (32.0)	8 (32.0)
Scenario 2 (Suspected pyelonephritis)		
Obtain past bacterial culture results	11 (44.0)	11 (44.0)
Urine culture	19 (76.0)	19 (76.0)
Blood culture	10 (40.0)	10 (40.0)
Scenario 3 (Suspected neoplastic fever)		
Obtain past bacterial culture results	11 (44.0)	11 (44.0)
Sputum culture	9 (36.0)	9 (36.0)
Urine culture	6 (24.0)	6 (24.0)
Blood culture	7 (28.0)	7 (28.0)

Values are presented as n (%). Own-home care refers to care provided to patients living at home, whereas residential care refers to care provided to patients living at a residential facility.

June 20 and August 19, 2018. The physicians were employed by 13 clinics operated by the Yushoukai Medical Corporation (Tokyo, Japan). These clinics specialize in providing home care within the Greater Tokyo Area, and offer a wide variety of home-based treatments such as pediatric care, chronic disease management, cancer care, and geriatric care.

Questionnaire: We developed a questionnaire to gather information on the respondents' testing and treatment strategies for hypothetical patient scenarios. Although there is a wide variety of baseline characteristics and underlying diseases among home care patients, our scenarios focused on older patients with terminal cancer. First, the questionnaire collected information on the following respondent characteristics: number of years since graduation, medical specialty, full-time/part-time employment at the clinic, and certification as an infectious disease specialist. The questionnaire then presented three patient case scenarios, and respondents were asked to select answers on their testing and treatment strategies for each scenario. Scenarios 1, 2, and 3 were indicative of suspected aspiration pneumonia, suspected pyelonephritis, and suspected neoplastic fever, respectively. The questionnaire also included a follow-up scenario and question for Scenario 3.

Questions: For each scenario, respondents were asked about their testing and treatment strategies. Questions on testing included whether the respondents would obtain past bacterial culture results from the previous physicians, and which bacterial culture tests they would perform. Questions on treatments included whether they would initiate oral or parenteral antibiotic therapy, whether they would observe the patient without initiating antibiotic therapy, or whether they would refer the patient to a hospital. To detect differences in strategies according to medical and long-term care resource availability, respondents answered these questions for two different situations: own-home care (if the patient was living in his/her personal home) and residential care (if the patient was living at a residential care facility). If

respondents chose to administer antibiotics, they were asked to specify the antibiotic type(s) that they would select for oral and parenteral administration. In the follow-up scenario for Scenario 3, we asked the duration of antibiotic administration after the patient's fever subsided. Detailed questions are shown in Supplementary Table S1 (<https://www.globalhealthmedicine.com/site/supplementaldata.html?ID=56>).

Analysis: The proportions of the various responses were compared. Due to the small sample size, the comparison only involved descriptive analyses without statistical inference.

Ethical considerations: The study was approved by the institutional review boards of the National Center for Global Health and Medicine (Approval Number: NCGM-G-002518-00) and Yushoukai Medical Corporation (Approval Number: 001).

Physician practices in home care settings for aspiration pneumonia, pyelonephritis, and neoplastic fever

The questionnaire was sent to 36 physicians, of which 25 responded (response rate: 69.4%). The median duration since graduation was 14 years (interquartile range: 13-17 years). Among the respondents, 16 (64.0%) were internists, 7 (28.0%) were surgeons, 3 (12.0%) were anesthesiologists, and 1 (4.0%) did not respond. Physicians employed full-time at the clinics accounted for 80% of the respondents, and only one respondent (4.0%) was a certified infectious disease specialist.

The responses for the selected tests in each scenario are shown in Table 1. The proportions of respondents who would obtain past bacterial culture results from previous physicians were 64.0% for own-home care and 60.0% for residential care in Scenario 1 (aspiration pneumonia), 44.0% for both own-home care and residential care in Scenario 2 (pyelonephritis), and 44.0% for both own-home care and residential care in Scenario 3 (neoplastic fever). The proportions of respondents who

Table 2. Selected treatments in each scenario (n = 25)

Selected treatments	Own-home care	Residential care
Scenario 1 (Suspected aspiration pneumonia)		
Observe without initiating antibiotic therapy	2 (8.0)	3 (12.0)
Initiate oral antibiotic therapy	15 (60.0)	12 (48.0)
Initiate parenteral antibiotic therapy	8 (32.0)	10 (40.0)
Refer the patient to a hospital	0 (0.0)	0 (0.0)
Scenario 2 (Suspected pyelonephritis)		
Observe without initiating antibiotic therapy	3 (12.0)	3 (12.0)
Initiate oral antibiotic therapy	8 (32.0)	8 (32.0)
Initiate parenteral antibiotic therapy	14 (56.0)	14 (56.0)
Refer the patient to a hospital	0 (0.0)	0 (0.0)
Scenario 3 (Suspected neoplastic fever)		
Observe without initiating antibiotic therapy	20 (80.0)	20 (80.0)
Initiate oral antibiotic therapy	2 (8.0)	2 (8.0)
Initiate parenteral antibiotic therapy	3 (12.0)	3 (12.0)
Refer the patient to a hospital	0 (0.0)	0 (0.0)

Values are presented as n (%). Own-home care refers to care provided to patients living at home, whereas residential care refers to care provided to patients living at a residential facility.

would obtain a sputum culture in Scenario 1 were 76.0% for own-home care and 80.0% for residential care, and the proportions of respondents who would obtain a urine culture in Scenario 2 were 76.0% for both own-home care and residential care. In contrast, the proportions of respondents who would obtain a sputum or urine culture in Scenario 3 were much lower at 36.0% and 24.0%, respectively (both own-home care and residential care). Similarly, the proportions of respondents who would obtain blood cultures for Scenarios 1, 2, and 3 were low at 32.0%, 40.0%, and 28.0%, respectively (both own-home care and residential care).

The responses for the selected treatments in each scenario are shown in Table 2. The proportions of respondents who would observe the patients without initiating antibiotic therapy were 8.0% for own-home care and 12.0% for residential care in Scenario 1, 12.0% for both own-home care and residential care in Scenario 2, and 80.0% for both own-home care and residential care in Scenario 3. In Scenario 1, a higher proportion of respondents chose to initiate oral antibiotic therapy than parenteral antibiotic therapy (60.0% vs. 32.0% in own-home care and 48.0% vs. 40.0% in residential care); however, this pattern was reversed in Scenario 2 (32.0% vs. 56.0% for both own-home care and residential care). None of the respondents chose to refer the patient to a hospital in any scenario. For the follow-up question in Scenario 3, 44.0% of respondents chose to discontinue the prescribed antibiotics, whereas 52.0% of respondents would continue antibiotic therapy for a total of one week. The remaining 4.0% did not respond to this question. None of the respondents chose to continue antibiotic therapy for two weeks or to change antibiotics.

Responses for the selected antibiotics in each scenario are shown in Supplementary Table S2 (<https://www.globalhealthmedicine.com/site/supplementaldata.html?ID=56>). In all scenarios, there was a general trend to select cephalosporins for parenteral antibiotics and

quinolones for oral antibiotics.

This questionnaire study examined infectious disease management practices by home care physicians in Japan. The analysis shed light on the respondents' choices for testing and treatment in three scenarios that described cases of suspected aspiration pneumonia, pyelonephritis, and neoplastic fever in older patients with terminal cancer.

The study's major findings are as follows: first, only approximately 60% and 40% of respondents chose to obtain past bacterial culture results for Scenarios 1 and 2, respectively. Since previous bacterial culture results can guide antibiotic selection (7), obtaining information about previous test results when a patient transitions from hospital to home care is a prudent practice. The findings showed that preparing cultures from infected organs before administering antibiotics is relatively common, even in home-care settings. However, obtaining blood cultures is not a common practice. Occasionally, blood cultures detect the causal microorganisms of bacteremia and provide useful microbiological information to the doctors. However, guidelines of infectious diseases evaluation in long-term care facilities (LTCF) developed by Infectious Diseases Society of America (IDSA) suggests limited use of blood cultures due to the difficulty of bacteremia treatment in home-care settings (8). Due to the numerous limitations of consultation time, equipment, and treatment availability in home care, infectious disease management is not always required to be performed with the same level of detail and regularity as that in hospital care.

The respondents tended to select oral antibiotics for Scenario 1 and parenteral antibiotics for Scenario 2. Oral antibiotics can be used to effectively treat complicated pyelonephritis (9), and Japanese guidelines recommend oral antibiotics as first-line therapy for mild-to-moderate infections (10). Recommendations of oral antibiotics toward complicated pyelonephritis could be encouraged

more to avoid unnecessary parenteral drug administration and reduce the workload of medical staff and caregivers. Next, 80% of respondents chose to observe the patient without initiating antibiotic therapy for Scenario 3. This finding indicates that the majority of our respondents prioritized the diagnostic process over immediately starting antibiotic therapy. For the follow-up question in Scenario 3, approximately half of the respondents chose to discontinue the prescribed antibiotics, whereas the other half chose to continue therapy for one week. The early discontinuation of antibiotics for neoplastic fever cases represents a more judicious approach that prevents antibiotic resistance.

In the selection of antibiotic types, we observed a general trend toward cephalosporins for parenteral antibiotics and quinolones for oral antibiotics, regardless of scenario or own-home/residential care. We posit that this was influenced by the availability of antibiotics that only require a single daily dose (ceftriaxone for parenteral administration and levofloxacin for oral administration), which makes it easy to prescribe in home care settings. However, guidelines do not recommend these antibiotics for aspiration pneumonia (11), which occurs relatively frequently at home, due to their ineffectiveness against anaerobic bacteria.

The findings indicate the complexity of testing and treatment during infectious disease management. In order to standardize the quality and testing and treatment practices for infectious diseases in home-care settings, formulating guidelines of best practices for infectious disease management in home care should be considered. Currently, many guidelines regarding infection control and prevention have been developed for home-care settings because of the COVID-19 pandemic (12,13). However, guidelines regarding management of infectious diseases are otherwise scarce. IDSA guidelines for the management of infectious diseases in LTCF, updated in 2008, are well designed and provide useful information to doctors about home-care management of infectious diseases (8). However, these guidelines do not address treatment of diseases, and only target LTCF and not nursing home or patient's own home. Furthermore, American and Japanese home-care settings are different, potentially requiring domestic guidelines in Japan.

This study has several limitations. First, the sample may be vulnerable to selection bias because the respondents were all affiliated with the same medical corporation, and our findings may not be representative of all home care physicians in Japan. Second, the study used a questionnaire, and is therefore susceptible to response bias where respondents tend to select socially desirable answers. Third, although our questionnaire provided detailed information on the patient's characteristics in each scenario, it did not specify the differences between own-home care and residential care. For example, differences in the availability of caregivers around a patient can influence a physician's decisions.

In conclusion, our questionnaire-based analysis explored the current testing and treatment strategies for infectious diseases in home care settings. Future studies should examine the formulation of guidelines to standardize home care and improve antibiotic use in this field.

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