Effects of Establishing a Department of General Internal Medicine on the Length of Hospitalization

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Abstract

Objective This study aimed to evaluate the effects of establishing a Department of General Internal Medicine (DGIM) on the length of hospitalization. We evaluated the length of hospitalization associated with diseases for which full-time specialists were not available and were instead treated by physicians of the DGIM after its establishment.

Methods A retrospective cohort study was conducted with a review of the subjects’ medical records. The subjects included patients ≥16 years of age who were hospitalized with pneumonia or cerebral infarction and treated by a physician with a specialty in internal medicine as the disease outside their specialty prior to DGIM establishment (October 1, 2006 to September 30, 2008) or by a physician of the DGIM after its establishment (October 1, 2009 to September 30, 2011). The primary outcome was the change in the length of hospitalization. The length of hospitalization for heart failure, which was treated by specialists (cardiologists) in both study periods, was also examined for comparison.

Results We evaluated 322 and 423 cases of pneumonia treated before and after the establishment of the DGIM, as well as 223 and 229 cases of cerebral infarction and 132 and 206 cases of heart failure, respectively. The length of hospitalization before and after establishment of the DGIM was 21.6 and 16.0 days for the pneumonia patients (p<0.001) and 24.2 and 19.9 days for the cerebral infarction patients (p<0.001), respectively. On the other hand, the change in the length of hospitalization for the heart failure patients was not statistically significant (19.9 vs. 17.6 days; p=0.281).

Conclusion The establishment of the DGIM reduced the length of hospitalization associated with diseases for which full-time specialists were not available by over 17%.

Key words: General Internal Medicine, length of hospitalization, full-time specialist

Introduction

In Japan, there are currently 18 basic practice areas for physicians with a specialty. General physicians, who possess comprehensive clinical abilities, will be recognized as professional physicians in a soon to be introduced 19th basic practice area. Various situations require physicians who can provide comprehensive medical care (1). It is often the case that regional hospitals lack full-time specialists, even central hospitals. For this reason, it is not uncommon for full-time specialists to treat diseases outside of their specialty. In this context, it is the role of the general physician (i.e. general practitioner, general internist or generalist) to treat such diseases while maintaining a certain standard of medical care and providing support for community medicine.

Studies conducted outside of Japan have reported that differences in the type of attending physician (e.g., hospitalist or non-hospitalist) affect the clinical outcomes (2-7). However, only a few studies have evaluated the impact of treatment by a general physician in the setting of community medicine in Japan.

Fukuchiyama City Hospital is a regional center hospital that employs a given number of full-time cardiologists and gastroenterologists and one full-time neurosurgeon but has no full-time pulmonologists or neurologists. Rather, a part-
time pulmonologist and a neurologist work one to three days a week as an outpatient clinician only. A Department of General Internal Medicine (DGIM) was established at this hospital in April 2009. The DGIM consists of a few staff and resident physicians. Internal diseases for which no full-time specialist is available are treated by physicians of the DGIM (e.g. pneumonia, exacerbation of chronic obstructive pulmonary disease, cerebral infarction, diabetes mellitus, fever of unknown origin, etc.). These diseases account for approximately 1,200 cases at our facility each year. This study aimed to assess the effects of establishing a DGIM on the quality of inpatient care by evaluating the length of hospitalization before and after establishment of the department.

**Materials and Methods**

This retrospective cohort study surveyed inpatient medical records from Fukuchiyama City Hospital, a regional center hospital in the north region of Kyoto, Japan. Fukuchiyama City Hospital has 354 beds (310 beds for inpatients in the acute phase and 44 beds on the sub-acute rehabilitation unit) and an emergency medical care center. There are approximately 100,000 people living in the medical district covered by this hospital, and there are no other central hospitals within the same medical district.

The target diseases assessed in this study were pneumonia and cerebral infarction. We also evaluated patients with heart failure for comparison. Almost all patients with these diseases required immediate hospitalization, and there were no established clinical paths for these diseases during the study period. The clinical competency of the physician may affect the care associated with hospitalization, including the length of stay in the hospital. Prior to the establishment of the DGIM, pneumonia and cerebral infarction were typically treated by full-time specialists whose specialties did not encompass these diseases. After establishment of the DGIM, almost all cases of pneumonia and cerebral infarction were treated by physicians of the DGIM. On the other hand, heart failure was treated by full-time specialists (i.e. cardiologists) both before and after the establishment of the DGIM.

The study period was defined as follows: the period “before establishment” of the DGIM was defined as the period from October 1, 2006 to September 30, 2008 and that “after establishment” of the DGIM was defined as the period from October 1, 2009 to September 30, 2011 (“after establishment” of the DGIM); the main purpose of hospitalization was to treat pneumonia or cerebral infarction; the patients were treated by full-time physicians with an internist specialty (i.e. cardiologist, gastroenterologist or hematologist); or

- i) Hospitalized during the period of October 1, 2006 to September 30, 2008 (“before establishment” of the DGIM); the main purpose of hospitalization was to treat pneumonia or cerebral infarction; the patients were treated by full-time physicians of the DGIM; or
- ii) Hospitalized during the period of October 1, 2009 to September 30, 2011 (“after establishment” of the DGIM); the main purpose of hospitalization was to treat pneumonia or cerebral infarction; the patients were treated by full-time cardiologists.
- iii) Hospitalized during the study period; the main purpose for hospitalization was to treat heart failure; the patients were treated by full-time cardiologists.

The exclusion criteria were: 1) inpatient treatment beginning before the target period and 2) hospitalization longer than 90 days, which was considered to be excessively long for acute-phase treatment.

The main outcome was the change in the mean length of hospitalization. In-hospital mortality was also evaluated. For each patient, we obtained information regarding age, sex, admission date, discharge date and in-hospital mortality. These data were assessed before and after establishment of the DGIM, and the mean length of hospitalization was investigated for each disease. We excluded cases of in-hospital death when calculating the mean length of hospitalization. We also conducted a subgroup analysis of elderly patients with pneumonia and cerebral infarction (65-74 years old, 75-84 years old and ≥85 years old) and determined the mean length of hospitalization in these groups.

The statistical analyses were performed using the STATA software program, version 10.0 (StataCorp LP, College Station, USA). The length of hospitalization was compared using the Mann-Whitney U-test, and the in-hospital mortality rates were analyzed using the Chi-square test.

**Results**

The patient characteristics by disease are summarized in Table 1. The length of hospitalization before and after the establishment of the DGIM was 21.6 and 16.0 days for pneumonia (p<0.001) and 24.2 and 19.9 days for cerebral infarction (p<0.001), respectively. In contrast, the length of hospitalization before and after the establishment of the DGIM was 19.9 and 17.6 days for heart failure, respectively (p=0.281) (Figure). The mean length of hospitalization decreased to 74.1% for pneumonia and 82.2% for cerebral infarction after the establishment of the DGIM compared to that observed prior to establishment. The mortality rates during hospitalization are shown in Table 2; the mortality rates did not worsen after the establishment of the DGIM.

The results of the subgroup analysis for the elderly pa-
Table 1. Patient Characteristics.

|                | pneumonia | cerebral infarction | heart failure |
|----------------|-----------|---------------------|--------------|
|                | before    | after               | before       | after       | before      | after       |
| n              | 322       | 423                 | 223          | 229         | 132         | 206         |
| Age mean       | 77.0      | 77.0                | 75.8         | 76.9        | 79.8        | 81.1        |
| Median         | 80        | 81                  | 77           | 80          | 80          | 83          |
| Male sex-no. (%)| 56.6      | 63.1                | 51.0         | 58.5        | 40.2        | 43.2        |

n: number of patients
before: before establishment of the Department of General Internal Medicine
after: after establishment of the Department of General Internal Medicine

Figure. Mean length of hospitalization in the patients with pneumonia, cerebral infarction and heart failure. before: before establishment of the Department of General Internal Medicine, after: after establishment of the Department of General Internal Medicine

Table 3. Mean Length of Hospitalization for Elderly Patients Groups of Pneumonia and Cerebral Infarction.

| subgroup (years old) | n, mean hospitalization period (day) | p value |
|----------------------|--------------------------------------|---------|
|                      | before | after | before | after | before | after |
| pneumonia 65-74      | 55     | 60    | 21.6   | 14.7  | 0.016  |       |
| 75-84                | 118    | 169   | 21.5   | 18.1  | 0.001  |       |
| 85 and older         | 105    | 137   | 25.6   | 15.6  | <0.001 |       |
| all of 65 and older  | 278    | 366   | 23.1   | 16.6  | <0.001 |       |
| cerebral infarction 65-74 | 51     | 47    | 24.4   | 16.7  | 0.001  |       |
| 75-84                | 80     | 88    | 25.3   | 20.8  | 0.003  |       |
| 85 and older         | 53     | 62    | 24.9   | 24.8  | 0.356  |       |
| all of 65 and older  | 184    | 197   | 24.9   | 21.1  | <0.001 |       |

n: number of patients
before: before establishment of the Department of General Internal Medicine
after: after establishment of the Department of General Internal Medicine

Inpatients with pneumonia and cerebral infarction are shown in Table 3. In all groups, except for the subjects with cerebral infarction and an age of ≥85 years, the length of hospitalization decreased by 16-39% after the establishment of the DGIM compared to that observed before the establishment of the department.

Discussion

In the present study, the length of hospitalization for pneumonia and cerebral infarction decreased considerably when treatment was provided by a general physician. In particular, a greater than 30% reduction was observed in the length of hospitalization for inpatients in some of the elderly subgroups. On the other hand, although we cannot deny the tendency towards reduction in the mean length of hospitalization for heart failure, which was treated by specialists (cardiologists) in the current study, the length of hospitalization for heart failure did not differ significantly before and after the establishment of the DGIM. The length of hospitalization for acute care hospital is affected by health provider-related factors, such as the health care system (8-10), number of long-term beds in the medical district (11) and physician characteristics. The present findings revealed that the length of hospitalization for diseases for which full-time specialist are unavailable can be reduced when these patients are treated by general physicians.

Inpatients with community-acquired pneumonia cared for by hospitalists exhibit a shorter hospitalization period than those treated by primary care physicians (12). Considering that pneumonia is the third leading cause of death in Japan and that there are only 5,500 respiratory disease specialists (13), compared to more than 7,500 hospitals in Japan, not all facilities are able to employ full-time specialists and it is unrealistic to expect inpatients with pneumonia to be treated by full-time respiratory disease specialists. Despite this issue, inpatients with pneumonia and cerebral infarction, the target diseases in this study, continue to be treated at many hospitals in Japan (14). In hospitals with no DGIM, similar to Fukuchiyama City Hospital prior to the establish-
ment of the DGIM, there is no choice but to have such patients treated by full-time specialists whose specialty typically lies outside of the target disease. From the perspective of patient satisfaction, no differences are observed between treatment by a hospitalist or primary care physician (15). Considering the possibility that the presence of a DGIM at a central hospital may make it easier for organ specialists to administer their care (16), particularly against the backdrop of the physician shortage, promoting the establishment of DGIMs may be a solution for improving the quality of regional medicine. Even overseas, it has been reported that the length of hospitalization is shorter when diseases are treated by general physicians than by specialists whose specialty lies outside the given disease (17). Our findings are consistent with this observation.

In Japan, professional physicians who provide comprehensive medical care include “Fellows of the Japanese Society of Internal Medicine” (certified by the Japanese Society of Internal Medicine) as well as “Japan Primary Care Association certified family physician”. The qualities desired of the former include being a generalist, hospitalist, emergency room (ER) physician or subspecialist (1). Moreover, it is the role of the general physician to provide a certain standard of care for common diseases that can be maintained with treatments performed by teams composed of general physicians, thus supporting quality medicine in the community. These factors all contribute to the goal of general physicians of “serving as physicians who can meet various needs that differ by region.”

It is highly likely that the patients with the diseases targeted in this study were elderly and had many existing comorbidities. The primary disease and presence of complications have been reported to influence the length of hospitalization among hospitalized elderly patients (18). In addition, psychosocial factors are also a factor (8), and the use of a bio-psycho-social approach has been suggested to effectively reduce the length of hospitalization (19). In the present study, we observed a notable reduction in the length of hospitalization, even in most of the subgroups ≥65 years of age. The DGIM of Fukuchiyama City Hospital consistently employs a number of “Fellows of the Japanese Society of Internal Medicine” and “Japan Primary Care Association certified family physician”. These physicians strive to address various health-related issues and administer care by considering psychosocial factors in addition to the patient’s disease. They also actively consider discharge support plans immediately after hospitalization together with other medical staff and case workers. With respect to the elderly, it has been suggested that treatment by generalists, who have a background in family medicine, reduces the length of hospitalization and is cost-effective (20). In our facility, the above-mentioned considerations have spread throughout the DGIM via daily conferences, thereby possibly contributing to reductions in the length of hospitalization.

The present study is associated with several limitations. First, we did not consider disease severity. However, it is unlikely that the severity and incidence of common diseases would vary greatly year to year. Considering that Fukuchiyama City Hospital is a regional center hospital that accepts two-thirds of emergency transport patients with suspected internal diseases in its administrative district, it is unlikely that the distribution of disease severity among the studied patients would differ substantially over time. Moreover, the disease severity is not thought to always affect the length of hospitalization in some elderly patients (21). Second, we did not consider the impact of changes in the number of physicians. The number of physicians increases or decreases each year. In particular, Fukuchiyama City Hospital has accepted residents since 2009 as a designated hospital for postgraduate training. It is possible that the increase in the total number of physicians affected the current results. However, the residents not only belonged to the DGIM, they also carried out treatment in the field of cardiovascular medicine during the allotted term. Considering the changes in the length of hospitalization for heart failure, it is unlikely that accepting residents significantly shortened the length of hospitalization solely for diseases treated at the DGIM. Third, we did not consider the effects of patient re-hospitalization, given the difficulty of accurately assessing this parameter. Although Fukuchiyama City Hospital accepts two-thirds of cases in its administrative district, we cannot rule out the possibility that patients underwent treatment at different medical institutions after discharge. Studies aiming to improve the quality of care, while taking into consideration the above-mentioned issues, are anticipated in the future. Finally, given that the current study is based on data obtained from one regional hospital, caution should be exercised when generalizing the results to other hospitals.

In this study, we found that newly establishing a DGIM at a regional hospital substantially reduced the length of hospitalization in patients with diseases for which a full-time specialist is unavailable. In view of the importance of enhancing regional medicine in Japan, our findings suggest that establishing and enhancing a DGIM in various hospitals may be a potential strategy for addressing this issue.

The authors state that they have no Conflict of Interest (COI).

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