Patient Behavior During the COVID-19 Pandemic and Impacts on Medical Institution Revenue*

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Abstract

We analyzed patient behavior before and during the COVID-19 pandemic (from February 2019 to October 2021) using a combination of data sources, including claims data from the national health insurance and over-75s healthcare insurance systems, and outpatient and inpatient data (so-called "DPC data") from a large, nationally distributed group of Japanese hospitals. We identified that COVID-19-related hygiene measures and behavioral changes significantly reduced medical consultations and hospitalizations for non-COVID-19 infectious diseases. Medical consultations relating to chronic diseases, such as hypertension, diabetes, back pain, and knee pain, greatly decreased. The prolonged interval of drug prescriptions appears to be a major factor behind the decrease in follow-up visits. In addition, medical consultations at acute care hospitals for minor illnesses and casual use of ambulance services also greatly decreased. It also appears possible that certain medical investigations and interventions, such as for cancer and angina pectoris, were postponed or cancelled.

The significant changes that we identified in patient behavior during the COVID-19 pandemic, namely a major reduction in non-COVID-19 patients' propensity to seek medical care, present major challenges to the management of medical institutions in Japan. This is because the vast majority of hospitals and clinics operate on a fee-for-service basis—or a prospective, per-diem basis in the case of inpatient services (except for surgical procedures, which are fee-for-service) at hospitals operating under the "DPC/PDPS" system—and therefore rely on long-term hospitalizations and frequent consultations for revenue. With Japan's population continuing to decline rapidly, it is essential to construct a medical care provision system that does not depend on these factors. To achieve this, consolidation of medical institutions, a review of the remuneration system, and the introduction of medical care quality evaluations will be inevitable.

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In addition to improving the transparency of medical services through the use of DPC and health insurance claims data, it is also necessary to improve transparency and verify the effectiveness of the various COVID-19 subsidies received by medical institutions, such as through the mandated electronic disclosure of business reports. All medical institutions should have to prepare and publish annual financial statements under accounting standards equivalent to those imposed on companies.

Keywords: COVID-19, strain on health care, doctor-to-bed ratio, nurse-to-bed ratio, DPC patient data, health insurance claims (national health insurance and over-75s healthcare insurance systems), patient behavior, medical institution revenue, COVID-19 subsidies, primary care
JEL Classification: H51, I10, I18

I. Introduction

In Japan, the numbers of COVID-19 infections and COVID-19-related deaths have been significantly lower than those seen in Europe and the United States, and the number of hospital beds per capita is the highest in the world. Why, therefore, is Japan's healthcare system collapsing? This question has been the subject of much debate since the outbreak of the COVID-19 pandemic.

It has been noted by various economists and media outlets that Japan's public spending and economic losses relating to the pandemic are vast in scale and comparable to those of Europe and the United States. It is necessary to verify how this public spending has been used.

Japan is financing the costs of COVID-19 countermeasures through borrowing rather than by raising taxes or by cutting budgets in other areas. Naturally, it is important that the government should provide the level of financial support necessary to counter the effects of the COVID-19 crisis, but it is also essential that this is properly scrutinized.

In this paper, we first present and discuss the results of our analyses of relevant hospital admissions and attendances data, health insurance data, and revenue data, and use these data to examine the changes in patient demand for medical care brought about by the COVID-19 pandemic, and the effects of these changes on medical institutions. Next, we describe the fundamental problems with the Japanese healthcare system, many of which came into even sharper focus during the pandemic. These problems were known to exist long before the onset of the COVID-19 crisis, and it can be said that neglecting to confront them was the key factor that brought about the "collapse" of the healthcare system (Japan Times, 2021). We finally explain the reforms that are necessary in the healthcare system, and drawing upon the results of our analyses, we identify the specific changes that are required to prevent such a situation from occurring again in the near future.

II. Changes in demand for medical services during the COVID-19 pandemic

During and immediately after Japan's COVID-19 'emergency declaration' period in April 2020, there were numerous reports that the pandemic had brought the healthcare system to the brink of collapse (NHK, 2020; Asahi Shimbun, 2020) . However, as we explore in further detail later, hospitals and clinics actually experienced a considerable fall in numbers of both outpatients and inpatients seeking healthcare services. Using a range of data sources covering hospital attendances and admissions from early 2019 to the autumn of 2021, we analyzed the changes in behavior of patients in terms of their use of medical services before and during the COVID-19 crisis. We then use the results of this analysis to infer and explain the problems in the Japanese healthcare system that have been so starkly revealed by the COVID-19 pandemic.

II-1. Analysis of DPC data for acute care hospitals

First, we describe the results of our analysis of so-called 'DPC data,' which refers to data obtained from hospitals which are reimbursed via a payment methodology called the 'Diagnosis Procedure Combination/Per-Diem Payment System' (DPC/PDPS[1]). Of the 8,236 hospitals operating in Japan (approximate figures as of the end of January 2021), 1,757 of these are acute care hospitals (i.e., top-tier hospitals offering advanced medical services) that use DPC/PDPS as the basis of payment. These DPC/PDPS hospitals correspond to 54% of the total number of hospital beds in Japan. Global Health Consulting Japan Co., Ltd. (GHC), a consultancy firm carrying out benchmarking services for over 800 of Japan's DPC/PDPS hospitals, provided the DPC data for analysis in the present study. The dataset comprises outpatient data for 315 hospitals and inpatient data for 599 hospitals[2], covering the period from February 2019 to September 2021. For the purposes of this study, we define data from February 2019 to January 2020 as pre-COVID-19, and from February 2020 to September 2021 as during the COVID-19 crisis. Furthermore, in line with accepted conventions, we define the first, second, third, fourth, and fifth 'waves' within the COVID-19 crisis (in which national recorded COVID-19 case numbers showed a marked increase) as April-May 2020, July-August 2020, November 2020-January 2021, April-May 2021, and August-September 2021, respectively.

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[1] 'Diagnosis Procedure Combination' refers to reimbursement via a fixed payment based on a diagnosis-related classification (i.e., a predetermined sum for a particular disease, condition, or procedure), while the "Per-Diem" payment methodology refers to reimbursement by prospective payment based on the number of days spent in hospital.

[2] Details of sample sizes for the period February 2019 to September 2021 are as follows.

Outpatient attendances (first visits and repeat visits) at 315 hospitals:

Total attendances:	141,852,354
Pre-COVID-19 (Feb 2019-Jan 2020):	56,293,438
During COVID-19 (Feb 2020-Sep 2021):	85,558,916

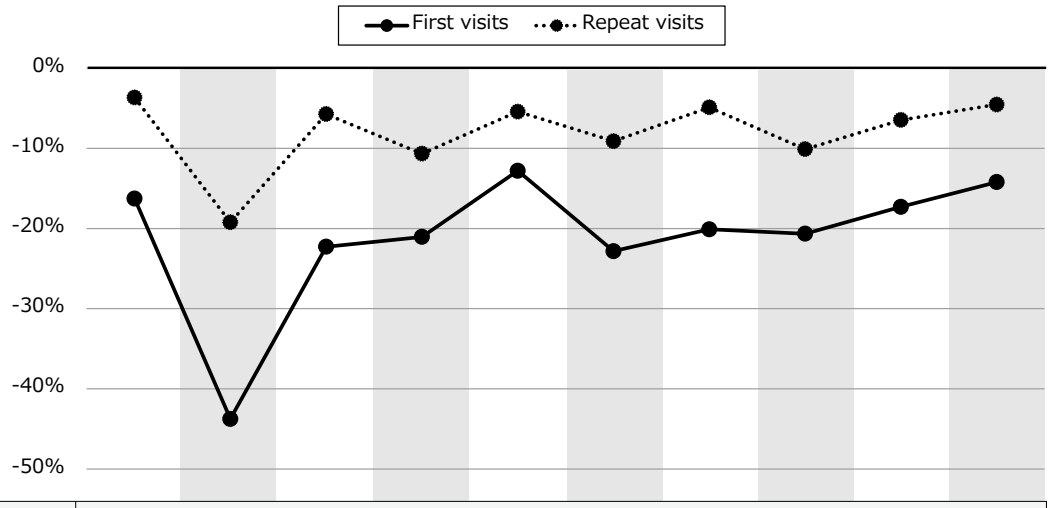
Inpatient hospitalizations (scheduled and urgent) at 599 hospitals:

Total hospitalizations:	12,344,717
Pre-COVID-19 (Feb 2019-Jan 2020):	4,903,240
During COVID-19 (Feb 2020-Sep 2021):	7,441,477

Figure 1 shows that the number of outpatient visits (attendances) at the hospitals in our dataset decreased significantly after April 2020, in terms of both first visits and repeat visits (i.e., both initial and follow-up consultations). In particular, during the first wave, first visits fell by over 40%, and the number of repeat visits decreased by approximately 20%, compared with the same pre-COVID-19 period in 2019. Casual hospital attendances for mild symptoms and ambulance transportation for mild or moderate symptoms also decreased significantly during this period (Ministry of Internal Affairs and Communications, 2021), and a tendency to opt for self-medication was observed as a behavioral change in patients showing mild symptoms.

Table 1 presents the changes in the number of outpatient first visits made during the COVID-19 crisis from February 2020 to September 2021, compared with the same period in the previous year (except for February to September 2021, for which each defined period is compared with the equivalent pre-COVID-19 period from February to September 2019), for the top 20 most common diagnoses, listed in descending order of the total number of visits recorded from February 2019 to January 2020. It can be seen that the top reasons for visiting DPC/PDPS hospitals prior to the pandemic were acute upper respiratory infection (a diagnosis classification that covers upper respiratory tract complaints of varying severity, in-

Figure 1: Percentage change in outpatient visits during COVID-19 pandemic, compared with equivalent pre-pandemic period



	Percentage change by period									
	Initial Phase, Feb–Mar 2020	First Wave, Apr–May 2020	Jun 2020	Second Wave, Jul–Aug 2020	Sep–Oct 2020	Third Wave, Nov 2020 –Jan 2021	Feb–Mar 2021	Fourth Wave, Apr–May 2021	Jun–Jul 2021	Fifth Wave, Aug–Sep 2021
First visits	−16.3%	−43.8%	−22.3%	−21.0%	−12.8%	−22.8%	−20.1%	−20.7%	−17.3%	−14.2%
Repeat visits	−3.7%	−19.2%	−5.7%	−10.7%	−5.4%	−9.1%	−4.9%	−10.1%	−6.5%	−4.5%

Note 1: Based on analysis of data for 315 DPC/PDPS hospitals
Note 2: Percentage changes shown for each period are relative to the equivalent pre-pandemic period between Feb 2019 and Jan 2020
Source: Analysis by Global Health Consulting Japan Co., Ltd.

Table 1: Number of outpatient first visits from Feb 2019 to Jan 2020, and percentage change during COVID-19 pandemic compared with equivalent pre-pandemic period

Diagnosis	Total number of outpatient first visits, Feb 2019 –Jan 2020	Percentage change by period									
		Initial Phase, Feb–Mar 2020	First Wave, Apr–May 2020	Jun 2020	Second Wave, Jul–Aug 2020	Sep–Oct 2020	Third Wave, Nov 2020 –Jan 2021	Feb–Mar 2021	Fourth Wave, Apr–May 2021	Jun–Jul 2021	Fifth Wave, Aug–Sep 2021
Acute upper respiratory infection	176,052	−18.6%	−63.3%	−62.4%	−49.5%	−53.2%	−63.8%	−62.3%	−44.1%	−24.6%	−28.6%
Diabetes mellitus	100,194	−11.4%	−36.0%	−14.3%	−13.8%	−3.3%	−10.8%	−3.1%	−5.9%	−7.4%	0.4%
Hypertension	86,357	−8.3%	−30.2%	−9.5%	−16.6%	−2.7%	−14.9%	−4.1%	−12.1%	−17.5%	−12.8%
Acute bronchitis	85,154	−18.5%	−65.9%	−68.1%	−61.0%	−59.5%	−66.1%	−67.1%	−57.6%	−32.1%	−35.4%
Bronchial asthma	61,717	−21.2%	−58.4%	−52.5%	−52.2%	−46.8%	−51.9%	−51.8%	−52.1%	−40.4%	−46.5%
Acute gastroenteritis	59,466	−23.8%	−74.4%	−60.4%	−44.0%	−43.8%	−61.7%	−60.6%	−54.6%	−43.8%	−51.6%
Colorectal cancer	56,317	−11.4%	−45.4%	−28.9%	−22.8%	−2.1%	−8.4%	−2.1%	−8.4%	−15.1%	−12.1%
Headache cephalalgia	54,787	−22.4%	−43.0%	−25.3%	−22.5%	−22.3%	−31.3%	−25.7%	−13.2%	−15.8%	−19.8%
Cerebral infarction	48,433	−15.5%	−42.8%	−13.0%	−18.2%	−8.1%	−19.2%	−9.3%	−18.2%	−19.5%	−17.8%
Prolapse prolapsus	45,647	−8.7%	−39.4%	−22.9%	−17.9%	−17.0%	−24.8%	−11.3%	−13.9%	5.2%	−27.5%
Angina pectoris	45,232	−13.8%	−35.7%	−24.5%	−18.3%	−5.2%	−19.0%	−18.2%	−21.6%	−25.0%	−11.5%
Colonic polyp	44,970	−8.4%	−52.1%	−25.3%	−25.2%	1.6%	−13.9%	−4.0%	−11.8%	−20.2%	−14.3%
Lumbar spinal canal stenosis	44,890	−14.9%	−44.3%	−7.8%	−16.9%	−5.9%	−17.0%	−6.4%	−16.6%	−16.5%	−12.6%
Influenza type A	43,986	−78.7%	−96.3%	−87.3%	−94.8%	−98.6%	−99.6%	−99.6%	−97.5%	−87.7%	−98.5%
Fever pyrexia	42,623	−4.3%	−11.3%	−6.2%	32.9%	28.6%	−1.4%	7.8%	89.9%	81.7%	136.5%
Lung cancer	42,503	−9.7%	−37.5%	−26.7%	−24.4%	−5.7%	−13.6%	−11.0%	−18.2%	−22.7%	−16.4%
Constipation	42,101	−21.0%	−42.8%	−25.2%	−23.6%	−20.7%	−30.8%	−28.9%	−26.8%	−16.6%	−23.3%
Head bruises	37,980	−15.3%	−44.3%	−28.6%	−12.6%	−10.3%	−18.2%	−17.6%	−22.9%	−19.4%	−23.0%
Hypertrophy of prostate gland	37,335	−16.3%	−40.9%	−19.4%	−24.7%	−7.9%	−20.7%	−13.7%	−21.8%	−24.5%	−12.6%
Prostate cancer	37,285	2.0%	−28.9%	−20.0%	−26.3%	−6.0%	−15.5%	0.1%	−6.7%	−16.0%	−3.4%

Note 1: Based on analysis of data for 315 DPC/PDPS hospitals
Note 2: Data are for the top 20 most common diagnoses, listed in descending order of the total number of visits recorded from Feb 2019 to Jan 2020
Note 3: Percentage changes shown for each period are relative to the equivalent pre-pandemic period between Feb 2019 and Jan 2020
Source: Analysis by Global Health Consulting Japan Co., Ltd.

cluding common colds) and lifestyle diseases (diabetes and hypertension), as well as bronchial asthma, headache, fever, lower back pain (lumbar spinal canal stenosis), and constipation.

From the first wave of COVID-19 onwards, the number of outpatient consultations decreased sharply across all diagnoses, but the fall in patient visit numbers is particularly notable for acute upper respiratory infection, acute bronchitis, bronchial asthma, and viral infections such as type-A influenza. Hospital attendances for acute gastroenteritis, the main cause of which is viral or bacterial infection, also decreased dramatically.

Table 2 presents the changes in the number of repeat visits (i.e., for follow-up consultations or procedures for a diagnosis that has already been made) between February 2020 and September 2021, compared with the equivalent periods before the pandemic, as described

Table 2: Number of outpatient repeat visits from Feb 2019 to Jan 2020, and percentage change during COVID-19 pandemic compared with equivalent pre-pandemic period

Diagnosis	Total number of outpatient revisits, Feb 2019 –Jan 2020	Percentage change by period									
		Initial Phase, Feb–Mar 2020	First Wave, Apr–May 2020	Jun 2020	Second Wave, Jul–Aug 2020	Sep–Oct 2020	Third Wave, Nov 2020 –Jan 2021	Feb–Mar 2021	Fourth Wave, Apr–May 2021	Jun–Jul 2021	Fifth Wave, Aug–Sep 2021
Hypertension	2,838,923	−1.8%	−12.9%	−3.4%	−7.5%	−3.8%	−7.2%	−3.8%	−9.4%	−5.4%	−3.8%
Diabetes mellitus	1,664,523	−1.2%	−13.6%	−4.8%	−7.7%	−3.6%	−7.1%	−2.1%	−7.8%	−5.2%	−3.8%
Chronic kidney disease	1,593,742	0.1%	−5.3%	2.0%	−3.3%	−2.1%	−3.9%	−1.0%	−5.6%	−2.3%	−3.5%
Hypertrophy of prostate gland	908,810	−2.8%	−13.7%	−2.3%	−8.9%	−4.6%	−9.4%	−5.6%	−11.5%	−8.1%	−6.0%
Bronchial asthma	777,644	−8.7%	−27.8%	−23.1%	−23.3%	−20.8%	−23.9%	−22.2%	−26.6%	−21.3%	−19.3%
Lumbar spinal canal stenosis	741,100	−5.2%	−21.1%	−5.1%	−11.1%	−6.7%	−10.8%	−6.5%	−10.6%	−8.0%	−6.9%
Prostate cancer	678,784	0.4%	−8.8%	1.0%	−6.3%	−0.9%	−5.8%	0.0%	−4.8%	−2.9%	0.0%
Breast cancer	666,082	−5.4%	−15.4%	−0.5%	−8.5%	−4.1%	−6.7%	−4.5%	−9.2%	−7.1%	−4.2%
Rheumatoid arthritis	569,480	−0.7%	−14.2%	−0.9%	−8.2%	−4.4%	−7.5%	−0.6%	−8.1%	−2.5%	−0.5%
Gonarthrosis	534,011	−8.4%	−24.0%	−5.3%	−12.8%	−7.5%	−10.6%	−9.0%	−12.7%	−10.2%	−8.0%
Angina pectoris	478,283	−8.2%	−22.4%	−12.4%	−14.5%	−9.4%	−13.9%	−15.5%	−19.4%	−16.7%	−13.4%
Colonic polyp	456,151	−1.7%	−29.9%	−15.4%	−12.2%	−1.9%	−8.6%	−3.4%	−8.3%	−9.3%	−4.4%
Intraocular lens insertion eye	402,471	−1.1%	−15.6%	−2.7%	−10.4%	−2.9%	−7.2%	−1.4%	−6.9%	−4.7%	−2.2%
Stomach cancer	381,031	−5.6%	−22.3%	−8.4%	−12.0%	−5.0%	−10.3%	−7.1%	−11.8%	−9.7%	−6.2%
Rectum cancer	364,577	−0.1%	−11.5%	2.4%	−4.0%	−0.6%	−3.4%	1.5%	−4.9%	−0.6%	2.9%
Uterine fibroid	335,803	−1.6%	−22.2%	−4.5%	−8.6%	−5.5%	−9.2%	−0.3%	−7.3%	−2.3%	−1.9%
Epilepsy	324,558	−5.6%	−17.1%	−8.0%	−10.2%	−5.9%	−9.4%	−8.4%	−13.9%	−9.1%	−7.9%
Allergic rhinitis	320,492	−13.5%	−32.8%	−20.1%	−20.6%	−14.7%	−19.3%	−19.4%	−25.7%	−19.4%	−14.0%
Cerebral infarction	309,578	−8.4%	−24.5%	−11.9%	−14.5%	−9.4%	−14.9%	−15.6%	−22.1%	−19.5%	−16.2%
Gastric ulcer	289,349	−11.9%	−24.4%	−11.8%	−14.9%	−10.4%	−14.1%	−17.9%	−21.5%	−18.6%	−15.0%

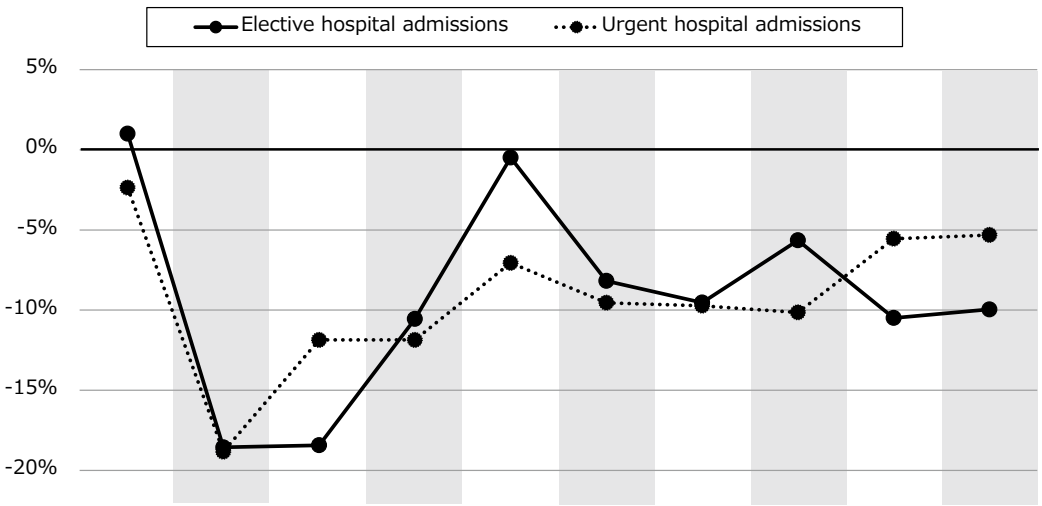
Note 1: Based on analysis of data for 315 DPC/PDPS hospitals
Note 2: Data are for the top 20 most common diagnoses, listed in descending order of the total number of visits recorded from Feb 2019 to Jan 2020
Note 3: Percentage changes shown for each period are relative to the equivalent pre-pandemic period between Feb 2019 and Jan 2020
Source: Analysis by Global Health Consulting Japan Co., Ltd.

for Table 1. Although the changes are not as dramatic as those seen for first visits, they show a decrease across the board for nearly all diagnoses. Referring back to Table 1, the total number of first visits prior to the pandemic (February 2019-January 2020) observed at the 315 hospitals analyzed was highest for acute upper respiratory tract infection (~180,000 visits), followed by diabetes (~100,000 visits), and then hypertension (~90,000 visits). By comparison, the data in Table 2 for total repeat visits at the same 315 hospitals in the same period shows hypertension in first place, with approximately 2,840,000 visits, followed by diabetes, with approximately 1,660,000 visits, which demonstrates that the number of repeat visits is significantly larger than that of first visits. Therefore, although the percentage decreases for repeat visits shown in Table 2 are generally smaller than those seen for first visits, this corresponds to a much greater decrease in the total number of repeat visits, and hence the impact on hospital revenue is also much more significant.

In addition to hypertension and diabetes, common reasons for repeat visits prior to the pandemic included chronic kidney disease, prostatic hypertrophy, lower back pain (lumbar spinal canal stenosis), knee pain (gonarthrosis, or osteoarthritis of the knee), and allergic rhinitis. The number of repeat attendances for these conditions decreased dramatically during the COVID-19 pandemic. One of the reasons for the decrease in repeat visits for conditions such as hypertension and diabetes is that, in cases where the purpose of the consultation was for a medical prescription, the standard length of prescription was extended, for example, from 1 month to as long as 2-3 months. The decrease in repeat visits for cancer, angina pectoris, colonic polyp, and intraocular lens implant is thought to be partly due to postponement of pre-surgery consultations and a reduction in postoperative follow-up appointments.

Figure 2 also shows a significant fall in the number of inpatient hospitalizations (admissions), both non-urgent (scheduled/elective) and urgent (emergency). Emergency hospitalizations decreased by approximately 18% during the first wave, compared with the previous year, and continued to decline by 5%-10% throughout the periods that followed. For elective

Figure 2: Percentage change in hospital admissions during COVID-19 pandemic, compared with equivalent pre-pandemic period



	Percentage change by period									
	Initial Phase, Feb–Mar 2020	First Wave, Apr–May 2020	Jun 2020	Second Wave, Jul–Aug 2020	Sep–Oct 2020	Third Wave, Nov 2020 –Jan 2021	Feb–Mar 2021	Fourth Wave, Apr–May 2021	Jun–Jul 2021	Fifth Wave, Aug–Sep 2021
Elective hospital admissions	1.0%	−18.6%	−18.4%	−10.6%	−0.5%	−8.2%	−9.5%	−5.6%	−10.5%	−10.0%
Urgent hospital admissions	−2.4%	−18.8%	−11.9%	−11.9%	−7.1%	−9.5%	−9.7%	−10.1%	−5.5%	−5.3%

Note 1: Based on analysis of data for 599 DPC/PDPS hospitals
Note 2: Percentage changes shown for each period are relative to the equivalent pre-pandemic period between Feb 2019 and Jan 2020
Source: Analysis by Global Health Consulting Japan Co., Ltd.

hospital stays, compared with before the pandemic, a decrease of approximately 18% was observed from the first wave until the end of June 2020, after which hospitalizations largely returned to pre-pandemic levels by October 2020, before decreasing again by typically 5%-10% during the third wave and beyond.

Table 3 shows that cataract surgery was the most common reason for elective hospital admission before the pandemic. In the majority of developed countries, cataract surgery is carried out as a day procedure; however, in Japan, hospital admission is the most common approach, and these admissions can be seen to have decreased sharply as a result of the COVID-19 pandemic. The third-placed procedure in Table 3, surgery for benign disease (including tumor) of the small or large intestine, refers to polypectomy. The number of cases whereby polyps are discovered during an endoscopy and surgically removed 'just in case' fell sharply during the pandemic. Furthermore, the fourth-placed angina pectoris (without

Table 3: Number of elective hospital admissions from Feb 2019 to Jan 2020, and percentage change during COVID-19 pandemic compared with equivalent pre-pandemic period

Diagnosis [with (w/) or without (w/o) surgery]	Total number of elective admissions, Feb 2019 –Jan 2020	Percentage change by period									
		Initial Phase, Feb–Mar 2020	First Wave, Apr–May 2020	Jun 2020	Second Wave, Jul–Aug 2020	Sep–Oct 2020	Third Wave, Nov 2020 –Jan 2021	Feb–Mar 2021	Fourth Wave, Apr–May 2021	Jun–Jul 2021	Fifth Wave, Aug–Sep 2021
Cataract and other disorders of lens (w/)	147,495	−4.1%	−37.2%	−36.9%	−26.7%	−11.2%	−25.5%	−36.1%	−30.2%	−35.5%	−34.2%
Malignant pulmonary tumor (w/o)	111,127	1.5%	−7.0%	−10.1%	−8.8%	0.7%	−4.3%	−3.9%	−3.0%	−8.0%	−11.1%
Benign disease of small and large intestine (including benign tumor) (w/)	101,162	−1.7%	−35.0%	−34.7%	−21.9%	−7.9%	−17.9%	−18.3%	−14.2%	−20.4%	−22.4%
Angina pectoris, chronic ischemic heart disease (w/o)	81,120	−17.7%	−44.5%	−35.5%	−17.4%	−5.6%	−22.4%	−31.6%	−28.9%	−30.3%	−25.7%
Angina pectoris, chronic ischemic heart disease (w/)	53,955	−4.0%	−25.1%	−26.0%	−10.2%	1.9%	−9.1%	−12.9%	−7.5%	−15.8%	−12.4%
Malignant prostatic tumor (w/o)	52,803	12.0%	−14.0%	−26.9%	−20.8%	−6.5%	−12.3%	−3.9%	2.9%	−8.8%	−6.5%
Malignant gastric tumor (w/)	49,500	4.2%	−8.4%	−20.3%	−25.3%	−15.0%	−8.9%	−7.0%	−9.3%	−15.9%	−15.7%
Malignant breast tumor (w/)	46,587	7.9%	−3.9%	−8.7%	−7.7%	−6.9%	−5.5%	0.2%	2.0%	−0.1%	−0.8%
Inguinal hernia (w/)	45,080	−3.0%	−37.8%	−25.1%	−6.9%	−1.3%	−16.0%	−22.5%	−9.8%	−22.7%	−11.4%
Tachycardiac arrhythmia (w/)	40,940	6.8%	−17.9%	−21.6%	−2.7%	7.6%	−3.0%	−4.2%	5.5%	2.9%	−2.3%
Malignant tumor of colon (ascending to sigmoid colon) (w/)	40,742	6.8%	−0.1%	−14.1%	−11.8%	−6.6%	4.8%	2.4%	7.8%	3.9%	−1.4%
Non−Hodgkin lymphoma (w/o)	38,972	10.4%	5.5%	11.4%	6.6%	5.8%	−2.7%	9.3%	6.4%	4.2%	−1.2%
Urinary bladder tumor (w/)	38,505	1.6%	−1.7%	−5.1%	−6.0%	4.0%	−2.8%	−4.3%	4.0%	−4.3%	−2.9%
Malignant tumor of liver/intrahepatic bile duct (w/)	33,091	−5.0%	−8.2%	−3.2%	−7.0%	−0.9%	−10.0%	−15.6%	−13.4%	−16.7%	−14.4%
Type 2 diabetes (excluding diabetic ketoacidosis) (w/o)	30,317	−4.5%	−31.4%	−30.2%	−15.3%	0.7%	−11.1%	−26.2%	−16.1%	−28.4%	−25.5%
Malignant tumor of colon (ascending to sigmoid colon) (w/o)	30,304	3.8%	−11.1%	−9.6%	−9.2%	1.4%	−7.1%	−7.5%	−9.5%	−17.6%	−15.7%
Malignant pulmonary tumor (w/)	29,274	2.9%	0.3%	−5.6%	−9.4%	0.2%	−1.6%	1.2%	1.9%	−5.7%	−0.2%
Malignant tumor of cervix/corpus of uterus (w/)	28,188	0.1%	−5.1%	−10.7%	−10.8%	−0.5%	−0.7%	−3.4%	1.7%	2.6%	−4.1%
Hypertension or other diseases associated with pregnancy/labor/puerperium (w/)	27,088	−1.2%	−20.5%	−24.0%	−11.1%	−1.0%	−9.3%	−8.0%	−8.1%	−3.5%	−2.4%
Arthropathy of knee (including degenerative disease) (w/)	27,085	8.9%	−8.9%	−34.8%	−13.9%	−5.2%	−3.2%	−10.4%	−3.7%	−19.0%	−14.0%

Note 1: Based on analysis of data for 599 DPC/PDPS hospitals
Note 2: Percentage changes shown for each period are relative to the equivalent pre-pandemic period between Feb 2019 and Jan 2020
Source: Analysis by Global Health Consulting Japan Co., Ltd.

surgery) refers to cardiac catheterization (examining the degree of coronary artery stenosis), and the fifth-placed angina pectoris (with surgery) refers to surgical dilation of the coronary arteries. Hospital admissions fell in both cases. As procedures judged by doctors to be acceptable to postpone, both were greatly affected by the first wave of COVID-19. Table 3 also includes type 2 diabetes mellitus as one of the top 20 most common diagnoses for hospital admission. This represents hospitalization for 'educational reasons[3],' an approach unique to Japan with the purpose of teaching diabetes patients how to effectively manage their disease. Hospital admissions of this type also saw a major decrease compared with those before the pandemic.

Among the reasons for scheduled hospitalizations, surgery for malignant tumors also decreased significantly. With cancer screenings falling significantly[4], especially during the first wave, there was concern that larger numbers of advanced-stage cancers would be discovered later on, leading the Ministry of Health, Labour and Welfare (2021a)[5] and the Japan Cancer Society to promote greater awareness of the importance of undergoing cancer screening. However, as discussed by Kassai and Ii (2022), and as reported by the Organisation for Economic Co-operation and Development (OECD, 2019), there are many non-evidence-based cancer screening initiatives in Japan. There have been numerous cases of individuals who are at low risk of cancer receiving false-positive results as part of a screening program. In addition to the financial burden of undergoing further examinations, there are many disadvantages imposed on people after being given a false-positive result, such as negative psychological impact and unnecessary exposure to radiation. However, even before the pandemic began, owing to reasons such as not having access to a doctor whom they usually see in the community, there were numerous people who, despite showing symptoms, were unable to consult a doctor and whose cancers therefore progressed. During the COVID-19 crisis, this became an even more serious problem. The effects of postponing surgical procedures on malignant tumors and delaying their discovery during the COVID-19 pandemic should be the subject of future research.

Table 4 presents the changes in the number of cases of urgent hospital admissions. First, the reason for the fall in cerebral infarction and heart failure, which were ranked second and third, respectively, in terms of pre-pandemic numbers of admissions, can be attributed in part to lifestyle changes brought about by the pandemic, such as reduced alcohol consumption and eating out less frequently. In fact, excess mortality for these two conditions also decreased[6] (Figure 3).

Furthermore, it should be noted that there were sharp declines observed in the infectious diseases that were within the top 20 most common reasons for urgent hospitalization before

[3] Please refer to the separate paper in this issue, Nawata, Ii, and Kassai (2022), for more information.
[4] According to the Japan Cancer Society (2021), there was a 30% drop in cancer screenings in 2020, and a 17% drop in the first half of 2021.
[5] The Ministry of Health, Labour and Welfare (2021a) launched a promotion campaign for cancer screening on November 26, 2021.
[6] There were approximately 9,000 fewer deaths overall in Japan in 2020 compared with in 2019, including a total reduction of approximately 8,000 deaths related to heart disease and cerebrovascular disease.

Table 4: Number of urgent hospital admissions from Feb 2019 to Jan 2020, and percentage change during COVID-19 pandemic compared with equivalent pre-pandemic period

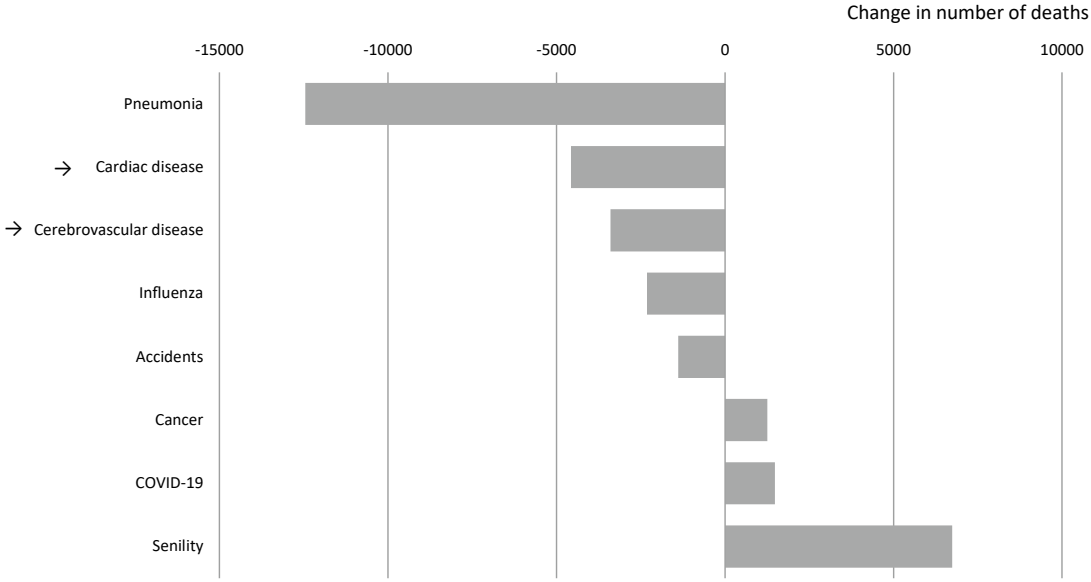
Diagnosis [with (w/) or without (w/o) surgery]	Total number of urgent admissions, Feb 2019 –Jan 2020	Percentage change by period									
		Initial Phase, Feb–Mar 2020	First Wave, Apr–May 2020	Jun 2020	Second Wave, Jul–Aug 2020	Sep–Oct 2020	Third Wave, Nov 2020 –Jan 2021	Feb–Mar 2021	Fourth Wave, Apr–May 2021	Jun–Jul 2021	Fifth Wave, Aug–Sep 2021
Pneumonia (w/o)	129,326	−10.6%	−46.9%	−53.3%	−47.4%	−41.6%	−47.7%	−51.0%	−53.0%	−46.9%	−45.9%
Cerebral infarction (w/o)	82,821	0.9%	−12.7%	−4.5%	−4.5%	−0.1%	−3.4%	0.2%	−7.1%	−4.0%	−5.5%
Heart failure (w/o)	82,090	−2.7%	−14.3%	−4.6%	−7.9%	4.9%	−2.0%	−6.0%	−9.9%	−7.6%	−6.8%
Aspiration pneumonia (w/o)	62,983	−3.4%	−17.9%	−13.2%	−15.0%	−7.9%	−5.4%	−6.1%	−13.3%	−10.3%	−6.0%
Renal infection (w/o)	57,094	10.1%	−6.5%	8.8%	−1.9%	2.4%	−0.8%	8.3%	−4.1%	1.0%	−7.2%
Fracture of proximal femur (w/)	55,009	2.2%	−8.7%	2.3%	−5.8%	1.5%	−0.8%	1.1%	−5.9%	−3.9%	0.7%
Acute bronchitis, acute bronchiolitis, lower respiratory tract infection (others) (w/o)	39,928	−21.7%	−81.6%	−87.3%	−87.2%	−87.4%	−72.6%	−65.4%	−35.3%	37.4%	−46.6%
Viral enterocolitis (w/o)	36,739	−29.2%	−72.6%	−54.4%	−31.9%	−26.4%	−48.8%	−57.1%	−60.6%	−42.5%	−40.7%
Bile duct (intra/extra hepatic) lithiasis (w/)	36,501	3.8%	−6.4%	3.0%	−4.0%	2.6%	−3.8%	−2.6%	−3.7%	−1.8%	−5.5%
Disorder associated with shortened gestation period or low birth weigh (w/o)	36,251	3.3%	0.7%	−0.9%	−3.4%	−6.1%	−6.5%	−5.9%	−5.5%	−4.3%	−2.9%
Intestinal obstruction without hernia (w/o)	36,099	−3.4%	−14.7%	−10.6%	−7.2%	−7.1%	−13.9%	−12.4%	−13.1%	−9.4%	−13.7%
Asthma (w/o)	27,601	−29.8%	−68.7%	−68.7%	−59.3%	−45.8%	−44.8%	−58.8%	−54.5%	−35.5%	−44.3%
Acute myocardial infarction, recurrent myocardial infarction (w/)	26,980	2.5%	−7.4%	−6.1%	−3.0%	2.5%	−2.1%	−1.3%	2.1%	−1.5%	−5.9%
Nontraumatic intracranial hematoma (w/o)	25,167	5.2%	−8.0%	−7.0%	−3.3%	1.4%	−4.1%	−1.0%	−6.2%	−7.2%	−1.0%
Epilepsy (w/o)	25,095	5.3%	−18.2%	−11.7%	−9.9%	0.1%	−15.7%	−9.3%	−15.4%	−10.9%	−11.2%
Influenza, viral pneumonia (w/o)	24,312	−44.4%	−86.8%	−96.8%	−96.1%	−95.9%	−96.7%	−94.4%	−60.5%	33.4%	−66.5%
Uncomplicated diverticulosis (w/o)	24,139	−1.3%	−9.4%	−10.6%	−7.4%	−4.3%	−9.2%	−8.1%	−4.8%	−8.2%	−12.9%
Bradyarrhythmia (w/o)	23,264	0.1%	−2.5%	2.9%	6.9%	9.9%	8.4%	−1.3%	4.4%	11.0%	12.2%
Malignant pulmonary tumor (w/o)	22,655	1.3%	−5.3%	4.2%	−2.7%	−3.4%	−3.8%	−3.4%	−10.4%	−2.8%	−5.0%
Impairment from fracture of thoracic or lumbar vertebra or lower (w/o)	21,204	0.5%	−16.1%	6.0%	−1.3%	3.2%	−3.8%	−1.4%	−9.7%	−4.1%	−7.3%

Note 1: Based on analysis of data for 599 DPC/PDPS hospitals
Note 2: Percentage changes shown for each period are relative to the equivalent pre-pandemic period between Feb 2019 and Jan 2020
Source: Analysis by Global Health Consulting Japan Co., Ltd.

the COVID-19 crisis, including pneumonia, aspiration pneumonia, acute bronchitis, acute bronchiolitis, lower respiratory tract infection, viral enteritis, influenza, and viral pneumonia. Figure 4 shows the changes by age group in admissions for pneumonia, acute bronchitis, influenza, and viral enteritis between February-December 2019 and February-December 2020. All four of these diseases exhibit a fall in hospitalizations, with the decrease among patients under 15 years of age particularly pronounced, at approximately 60%-80%. The 31.7% decrease in pneumonia admissions among those aged 65 years and over is lower as a percentage than those of the other diseases, but because the absolute number of pneumonia admissions for this group was so large in 2019, this represents a dramatic fall in patient volumes in real terms over the course of the COVID-19 pandemic.

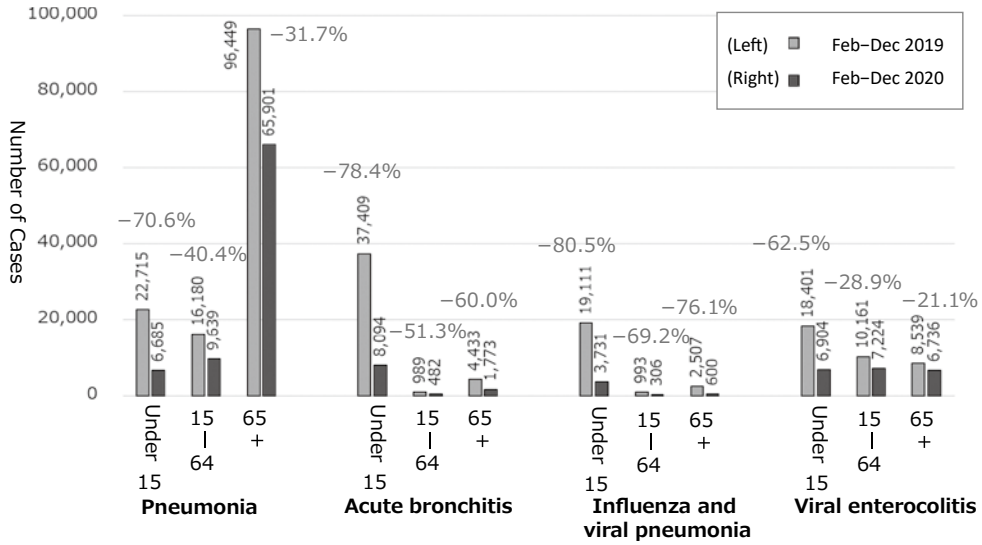
Hospitalization rates in Japan for infectious diseases such as acute bronchitis and viral

Figure 3: Change in leading causes of death in Jan-Sep 2020, compared with equivalent pre-pandemic period



Note 1: Changes shown are relative to the equivalent pre-pandemic period Jan-Sep 2019
Note 2: The blue arrows highlight the reduction in excess mortality for cardiac disease (i.e., heart failure) and cerebrovascular disease (i.e., cerebral infarction) referred to in the main text
Source: Created by the authors using data available in the Ministry of Health, Labour and Welfare's "Vital Statistics: Monthly Report (Approximate Figures)" (https://www.e-stat.go.jp/stat-search), and with reference to the Nikkei Shimbun (Feb 22, 2021)

Figure 4: Comparison of urgent hospital admissions for pneumonia, acute bronchitis, influenza and viral pneumonia, and viral enterocolitis, for February-Dec 2019 and 2020, by age group



Note 1: Based on analysis of data for 627 DPC/PDPS hospitals
Note 2: Data includes a total of 4,400,892 discharged patients for Feb-Dec 2020, and 4,382,643 discharged patients for Feb-Dec 2019
Source: Analysis by Global Health Consulting Japan Co., Ltd.

enteritis are typically much higher than those of other countries. Outside Japan, when a patient is admitted to hospital with one of these conditions, the length of stay is also comparatively short. An analysis of 420 Japanese hospitals from February to September 2020 revealed that the average length of hospitalization for viral enteritis was relatively long, at 4.1 days for children under the age of 15, 5.3 days for people aged 15 to 64, and 9.1 days for those aged 65 and over. Long-term hospitalization of older people, for any disease or condition, increases the risk of cognitive decline, reduced muscle strength and ADL (activities of daily living) function, and falls. Being hospitalized for a longer period than necessary increases patients' medical expenses and yet does not improve their quality of life. However, as we will explore later in further detail, the present reimbursement system for medical services in Japan actually contributes to keeping patients hospitalized for longer by rewarding medical providers for doing so.

The major changes we have identified in healthcare-related behavior during the COVID-19 pandemic can thus be summarized as follows:

1. As a result of the public infection prevention measures observed during the pandemic, such as wearing masks, washing hands, social distancing, staying at home, and avoiding unnecessary outings, hospital attendances and admissions for non-COVID-19 infectious diseases dropped significantly compared with those before the pandemic. The specialties in which the decrease was particularly marked included pediatrics (which deals with many cases relating to respiratory diseases), general internal medicine (which treats pneumonia), and otolaryngology (ear, nose, and throat conditions).
2. Casual hospital visits (for mild symptoms) and casual use of ambulances (where travelling to hospital by car would have been possible), i.e., nonessential use of medical services, showed a significant decrease. Although it is difficult to define what constitutes a nonessential admission to hospital, it can be said that some or perhaps most of the long hospitalizations for conditions that are dealt with overseas in a shorter admission period or as an outpatient procedure are probably nonessential. Furthermore, in Japan, it is not uncommon to attend hospital solely to obtain a medical prescription[7]. One of the major reasons for the decrease in repeat visits to hospital during the COVID-19 crisis was the lengthening of the standard interval between prescriptions, which was previously fortnightly or monthly. This point is examined in greater detail in Section 2.2.
3. Further research is necessary to investigate and identify the effects of any withdrawal of necessary medical care during the pandemic, including postponing surgical interventions for conditions such as cancer and angina pectoris.

The fall in demand for regular medical services during the COVID-19 pandemic was due not only to the demand side (patients) but also the supply side (hospitals). For example, on April 1, 2020, the Japan Surgical Society issued a statement calling for the postponement

[7] The average annual number of outpatient visits in Japan is 12 per person, which is double the average among OECD countries. One of the key reasons is the large number of consultations made for the purpose of obtaining prescriptions.

of scheduled surgical procedures and tests. Owing to the need to focus medical resources, including doctors and nurses, on the acceptance of COVID-19 patients, the decisions of medical institutions themselves had a highly significant effect on non-COVID-19 patients. Examples of such decisions include choosing to limit the number of non-COVID-19 patients being accepted, or dedicating facilities entirely to COVID-19 patients because of an inability to separate (or 'zone') the process of dealing with COVID-19 patients in intensive care units (ICU) or general wards. Of course, consideration should also be given to whether those non-COVID-19 patients should have attended or been admitted to an acute care hospital in the first place.

Overall, it can be said that the behavior of patients in terms of their propensity to seek medical care changes significantly in the face of events such as the COVID-19 pandemic. In Japan, at hospitals that use DPC/PDPS as the system of reimbursement, hospital admissions are billed on a prospective, per-diem basis (excluding surgical fees), and outpatient attendances are billed on a fee-for-service basis, while at all other hospitals, both outpatients and inpatients are billed on a fee-for-service basis. With all clinics also operating on a fee-for-service basis, it is clear that dramatic changes in patient behavior will have major impacts on the operation of medical institutions as businesses.

II-2. Analysis of health insurance claims data

We now turn to the results of our analysis of so-called 'claims data' from the national health insurance and over-75s healthcare insurance systems, the dataset for which was provided by Data Horizon Co., Ltd. and is based on itemized statements of medical expenses produced by medical providers for insurance purposes. The national health insurance data in our dataset represents 20 different insurers, and neither includes employee's health insurance nor persons who are covered by the over-75s healthcare insurance system. The over-75s system, as the name suggests, covers those who are transferred automatically from the standard national health insurance scheme when they reach the age of 75, but it also includes people aged 65 and over with specified diseases or conditions, including patients undergoing dialysis and patients who have one of a number of serious or intractable diseases that are designated by the scheme, such as AIDS. Our dataset for over-75s healthcare insurance represents one insurer. Our analysis covers the pre-pandemic period from January to August 2019, and the early stages of the COVID-19 crisis from January to August 2020.

Table 5 shows that the number of medical institutions (hospitals, clinics, and pharmacies) visited by people covered by the national and over-75s health insurance schemes in 2020 decreased compared with 2019. In all three cases, it can be seen that an extremely large number of institutions were visited by patients, relative to the total number of institutions in existence in Japan. Tables 6 and 7 present the number of insured persons that were included in the analysis, separated by health insurance scheme and by age group, respectively. Compared with 2019, the number of those covered by the over-75s insurance scheme increased slightly in 2020, while those covered by the national health insurance scheme de-

Table 5: Number of medical institutions included in the analysis, and number of medical institutions used by insured persons in 2019 and 2020, by institution type and by health insurance scheme

Category	Number of medical institutions					
	National Health Insurance			Over-75s Healthcare Insurance		
	2019	2020	Total (actual)	2019	2020	Total (actual)
Hospitals	3,180	2,676	3,664	1,045	839	1,271
Clinics	14,735	12,999	18,769	2,434	2,064	3,057
Pharmacies/drugstores	11,708	10,293	14,734	2,276	1,993	2,892

Number of medical insurers: National Health Insurance (operated by local government areas), 20 insurers; Over-75s Health Insurance (operated by public service association covering several local government areas), 1 insurer
Number of medical insurers by population size: <5,000 people, 3 insurers; 5,000-9,999 people, 3 insurers; 10,000-99,999 people, 13 insurers; >100,000 people, 1 insurer (both National Health Insurance and Over-75s Healthcare Insurance)
Note: Medical institutions included are not limited to the insurer's area. Number of medical institutions listed for 2019 and 2020 is based on the number visited by insured persons in each category in Jan-Aug 2019 and Jan-Aug 2020, respectively, regardless of clinical department. The total (actual) is the actual total number of individual medical institutions visited by insured persons throughout 2019 and 2020.
Source: Data Horizon Co., Ltd.

Table 6: Number of insured persons included in the analysis, by health insurance scheme

	March 2019	March 2020	Change (2019 to 2020)
National Health Insurance	445,651	438,472	−1.61%
Over-75s Healthcare Insurance	179,897	181,647	0.97%

Number of medical insurers: National Health Insurance (operated by local government areas), 20 insurers; Over-75s Health Insurance (operated by public service association covering several local government areas), 1 insurer
Number of medical insurers by population size: <5,000 people, 3 insurers; 5,000-9,999 people, 3 insurers; 10,000-99,999 people, 13 insurers; >100,000 people, 1 insurer (both National Health Insurance and Over-75s Healthcare Insurance)
Source: Data Horizon Co., Ltd.

creased in number, with children under the age of 5 years exhibiting particularly large decreases across the period.

Tables 8 and 9 show, in terms of numbers of national health-insured and over-75s healthcare-insured persons in our dataset, respectively, the percentage changes by prescription length and by month in 2020, compared with the same month in 2019. It is clear that there was a distinct trend towards switching to long-term prescriptions during this period for patients in either health insurance scheme. Although not shown in the tables, in 2020, the number of patients seeking initial consultations (first visits), and the resulting medical expenses, decreased significantly compared with 2019, for persons enrolled in either insurance

Table 7: Percentage change in insured persons in each month of 2020, by age group

Age group	Percentage change in number of insured persons in 2020							
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
0	−8%	−8%	−8%	−8%	−7%	−7%	−6%	−7%
5	−4%	−5%	−4%	−4%	−4%	−3%	−3%	−3%
10	−3%	−2%	−2%	−2%	−1%	−1%	−1%	−1%
15	−5%	−4%	−5%	−6%	−6%	−6%	−5%	−5%
20	−2%	−1%	−1%	0%	0%	1%	1%	1%
25	4%	4%	4%	4%	3%	3%	4%	3%
30	−2%	−2%	−2%	−2%	−1%	−1%	0%	0%
35	−3%	−2%	−2%	−2%	−2%	−2%	−2%	−1%
40	−5%	−4%	−4%	−3%	−3%	−3%	−2%	−2%
45	0%	0%	0%	0%	1%	1%	1%	1%
50	3%	3%	3%	3%	4%	4%	4%	4%
55	−2%	−2%	−2%	−1%	−1%	0%	0%	1%
60	−7%	−7%	−6%	−7%	−7%	−7%	−6%	−6%
65	−10%	−10%	−10%	−9%	−9%	−9%	−8%	−8%

Note: Percentage changes shown are relative to the same month in 2019
Source: Data Horizon Co., Ltd.

Table 8: Percentage change in outpatient long-term prescription users in each month of 2020 for persons covered by National Health Insurance, by prescription length

Long-term prescription length	Percentage change in number of patients, 2020							
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
< 30 days	−13%	−10%	−16%	−19%	−20%	−15%	−13%	−9%
30−59 days	1%	1%	−2%	−12%	−9%	1%	−4%	−4%
60−89 days	6%	9%	12%	19%	9%	16%	11%	7%
≥ 90 days	6%	2%	18%	41%	9%	22%	24%	12%

Note: Percentage changes shown represent the change in the total number of patients on long-term prescription receiving that prescription length in the given month, relative to the same month in 2019. Where one person has received multiple prescriptions, the prescription with the longest number of days is counted.
Source: Data Horizon Co., Ltd.

Table 9: Percentage change in outpatient long-term prescription users in each month of 2020 for persons covered by Over-75s Healthcare Insurance, by prescription length

Long-term prescription length	Percentage change in number of patients, 2020							
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
< 30 days	−4%	−5%	−8%	−3%	−6%	−9%	−6%	−4%
30−59 days	2%	3%	1%	−9%	−7%	1%	−4%	−6%
60−89 days	10%	12%	17%	27%	13%	24%	18%	17%
≥ 90 days	19%	13%	25%	35%	22%	33%	36%	21%

Note: Percentage changes shown represent the change in the total number of patients on long-term prescription receiving that prescription length in the given month, relative to the same month in 2019. Where one person has received multiple prescriptions, the prescription with the longest number of days is counted.
Source: Data Horizon Co., Ltd.

scheme. The fall in first visits was particularly affected by a sharp decrease in the number of consultations for respiratory infections. For national health-insured persons, the number of initial consultations for diabetes, dyslipidemia, hypertension, cerebral infarction, and heart failure also decreased. However, the percentage decrease in repeat visits is relatively small for both the national health and over-75s healthcare insurance schemes, compared with that of first visits. This fall in repeat and follow-up consultations is believed to be largely attributed to the impact of switching to long-term prescriptions, especially given that only approximately 1% of insured persons can be considered to have discontinued medical treatment after the outbreak of the pandemic[8]. This demonstrates the importance of optimizing medical expenses through issuing long-term prescriptions and setting appropriate consultation intervals according to the characteristics of the disease and the individual's condition. Furthermore, as was the case for first visits, the largest decline in repeat visits was for respiratory infections.

Tables 10 and 11 display the top 15 diagnoses from our dataset, listed by ICD10 (International Classification of Diseases 10th Revision) classification, in terms of numbers of consultations and medical expenses, respectively, among persons covered by national health insurance in both 2019 and 2020. Because of the categorization process[9] performed as part of

Table 10: Top reasons for clinic visits in May 2019 and 2020, by number of visits, for persons covered by National Health Insurance

Rank	May 2019		May 2020	
	Diagnosis (ICD10 classification)	Number of visits	Diagnosis (ICD10 classification)	Number of visits
1	Essential (primary) hypertension	60,532	Essential (primary) hypertension	55,595
2	Disorders of lipoprotein metabolism and other lipidemias	60,423	Disorders of lipoprotein metabolism and other lipidemias	55,462
3	Gastritis and duodenitis	37,695	Gastritis and duodenitis	32,762
4	Vasomotor and allergic rhinitis	32,842	Unspecified diabetes mellitus	27,355
5	Unspecified diabetes mellitus	30,559	Vasomotor and allergic rhinitis	25,565
6	Sleep disorders	26,265	Sleep disorders	24,233
7	Gastro−esophageal reflux disease	25,733	Gastro−esophageal reflux disease	23,872
8	Dorsalgia	24,582	Dorsalgia	21,791
9	Disorders of refraction and accommodation	23,652	Other diseases of liver	20,988
10	Other diseases of liver	22,913	Disorders of refraction and accommodation	19,028
11	Other dermatitis	20,905	Other dermatitis	18,315
12	Conjunctivitis	19,884	Other functional intestinal disorders	17,916
13	Other functional intestinal disorders	19,411	Conjunctivitis	16,359
14	Asthma	16,570	Type 2 diabetes mellitus	13,803
15	Osteoporosis without pathological fracture	14,641	Asthma	12,911

Source: Data Horizon Co., Ltd.

[8] We estimated the number of patients who discontinued medical treatment by counting those in our dataset who were billed for medical services consecutively over the period of November 2019 to February 2020 but who were not subsequently billed for medical services from March 2020 onwards.

Table 11: Top reasons for clinic visits in May 2019 and 2020, by total medical expenses, for persons covered by National Health Insurance

Rank	May 2019		May 2020	
	Diagnosis (ICD10 classification)	Total medical expenses (yen)	Diagnosis (ICD10 classification)	Total medical expenses (yen)
1	Essential (primary) hypertension	211,206,822	Chronic kidney disease	185,839,017
2	Chronic kidney disease	204,366,736	Essential (primary) hypertension	185,333,701
3	Unspecified kidney failure	131,892,707	Unspecified kidney failure	116,198,460
4	Disorders of lipoprotein metabolism and other lipidemias	129,657,481	Disorders of lipoprotein metabolism and other lipidemias	113,920,539
5	Unspecified diabetes mellitus	121,799,949	Unspecified diabetes mellitus	107,765,914
6	Type 2 diabetes mellitus	69,019,494	Type 2 diabetes mellitus	66,194,630
7	Other cataract	59,770,153	Sleep disorders	50,558,301
8	Gastritis and duodenitis	53,492,848	Other cataract	44,778,446
9	Sleep disorders	53,062,992	Osteoporosis without pathological fracture	41,887,842
10	Gonarthrosis [arthrosis of knee]	47,370,984	Gastritis and duodenitis	39,760,240
11	Osteoporosis without pathological fracture	46,699,820	Atrial fibrillation and flutter	39,021,132
12	Asthma	42,938,024	Gonarthrosis [arthrosis of knee]	38,644,824
13	Glaucoma	42,115,375	Glaucoma	35,718,660
14	Atrial fibrillation and flutter	36,672,438	Other rheumatoid arthritis	33,170,122
15	Vasomotor and allergic rhinitis	35,771,117	Asthma	31,150,511

Source: Data Horizon Co., Ltd.

the analysis, secondary diseases and conditions, i.e., those that are not the patient's main diagnosis, are also reflected in the data[10]. The data show the same declining trend as that observed for outpatient attendances at DPC/PDPS hospitals, and that hypertension, dyslipidemia, diabetes, and sleep disorders ranked highly in terms of number of consultations and expenses, both before and during the COVID-19 pandemic. A decrease of approximately 2,000-5,000 people was observed across all diagnoses, and likewise, medical expenses fell in all categories, compared with 2019. It is interesting to note that the top 15 most common reasons for consultations listed in Table 10, the majority of which represent visits to clinics (although the dataset does also include a proportion of outpatient visits to hospitals), bear many similarities to the top 20 most common diagnoses revealed in our analysis of DPC/PDPS data, listed in Table 1, which reflected outpatient first visits to acute care hospitals.

One of the messages that can be taken from the results of our health insurance claims analysis is that there is a need to consider revising the number of medical providers in Japan in response to the declining population. During the COVID-19 pandemic, the number of

[9] The categorization process for medical expenses data is a method of linking costs of treatments and medications with specific diagnosis names, regardless of whether it is the name of the patient's main diagnosis, even though the patient's main diagnosis is what the expenses would usually be billed under.

[10] Even when prescribing medication to prevent against the onset of a disease, doctors often use that disease name as the diagnosis classification for billing purposes; for example, prescriptions of antacid medication to prevent gastritis and duodenitis are often billed under the diagnosis classification 'gastritis and duodenitis.' Therefore, such cases are also reflected in the data on the number of visits for that disease, even though the primary reason for those visits may have been a different disease.

people seeking medical services relating to infectious diseases decreased sharply as residents placed greater focus on infection prevention and managing their own health. Additionally, the number of consultations among patients with conditions that require daily management and lifestyle changes, such as stroke, also decreased significantly. Educating patients and the population clearly plays an important role toward striking the right balance in consultation frequencies. From our results, it is evident that reforms are required to remove the need for healthcare providers to maximize the volume of patients that they see. These reforms can be summarized as follows:

1. It is necessary to move towards a healthcare system in which medical services are provided on the basis of a data-led risk assessment of patients and the population as a whole.
2. It is necessary to introduce a system of reimbursement for medical providers that secures their income even if more time is spent on educating patients and the population on health matters.

II-3. Analysis of medical institution revenue

Here, we discuss the results of our analysis of data from the Social Insurance Medical Reimbursement Fund. Tables 12 and 13 present the percentage changes in the number of billing statements and the total number of points[11] contained in those billing statements, respectively, as issued for insurance purposes by hospitals and clinics from December 2020 to September 2021, compared with the equivalent pre-pandemic period. The tables provide an overview of the changes in the number of consultations (represented by the number of billing statements) and revenue (represented by the number of points) across all medical institutions in Japan. It can be seen from Table 12 that the number of consultations at both hospitals and clinics decreased significantly in December 2020 to September 2021 (except for orthopedic clinics, which saw modest increases during much of the period), compared with equivalent pre-pandemic numbers. However, in terms of revenue, it can be seen from Table 13 that medical institution earnings recovered rapidly from around April 2020 onwards, exceeding those of the previous year in nearly every month, at both hospitals and clinics.

Even before the pandemic, 70% of hospitals were running at a financial loss; however, during the pandemic, hospital revenue initially fell further and their financial position worsened. However, hospitals then recovered rapidly through the receipt of additional income and higher unit prices. In addition to remuneration for medical services provided, medical institutions also received numerous subsidies, although these are not included in Table 13. For example, in respect of ‘emergency comprehensive support grants,’ a scheme in which large subsidies funded entirely by national government were paid to medical institutions via a system operated at prefectural level, there has been no transparency relating to the size,

[11] In Japan, medical service fees are scored using a points-based system, with one point having an equivalent reimbursement value set by the Ministry of Health, Labour and Welfare and the Central Social Insurance Medical Council.

Table 12: Percentage change in the number of billing statements issued by hospitals and clinics during COVID-19 pandemic, compared with equivalent pre-pandemic period

Month and year	Hospitals	Clinics	Internal medicine	Pediatrics	Orthopedics
Dec 2020	−8.7%	−12.2%	−19.6%	−29.1%	+1.3%
Jan 2021	−12.2%	−15.8%	−22.9%	−35.2%	−3.2%
Feb 2021	−8.9%	−11.8%	−17.1%	−26.2%	−1.1%
Mar 2021	−3.4%	−8.4%	−10.8%	−15.8%	+3.8%
Apr 2021	−5.7%	−5.7%	−8.8%	−13.4%	+5.9%
May 2021	−8.8%	−6.4%	−8.9%	−12.5%	+3.1%
Jun 2021	−2.8%	−3.8%	−6.0%	−10.4%	+5.3%
Jul 2021	−6.6%	−4.7%	−6.2%	−8.9%	+1.5%
Aug 2021	−3.0%	−1.8%	−0.1%	−7.1%	+1.4%
Sep 2021	−2.6%	−4.2%	−3.2%	−20.7%	+1.3%

Note: Percentage changes shown are in the number of billing statements (medical receipts) issued by each medical institution type (hospital or clinic, and by clinic specialty) for insurance purposes, relative to the equivalent pre-pandemic month between Mar 2019 and Feb 2020. One billing statement represents one patient visit.
Source: Data from the Social Insurance Medical Reimbursement Fund (figures for Sep 2021 are preliminary)

Table 13: Percentage change in the number of points contained in billing statements issued by hospitals and clinics during COVID-19 pandemic, compared with equivalent pre-pandemic period

Month and year	Hospitals	Clinics	Internal medicine	Pediatrics	Orthopedics
Dec 2020	−2.9%	−7.6%	−11.1%	−23.7%	+3.6%
Jan 2021	−6.3%	−10.5%	−13.6%	−27.0%	−1.1%
Feb 2021	−6.1%	−6.9%	−8.9%	−17.7%	+0.5%
Mar 2021	+3.4%	−0.2%	−0.5%	−2.3%	+9.4%
Apr 2021	+0.7%	+3.3%	+2.3%	+6.4%	+9.8%
May 2021	−2.0%	+2.1%	+2.1%	+10.2%	+5.5%
Jun 2021	+3.8%	+5.6%	+4.6%	+16.5%	+10.6%
Jul 2021	−2.4%	+3.3%	+3.6%	+23.0%	+2.4%
Aug 2021	+1.3%	+8.3%	+12.4%	+23.3%	+4.0%
Sep 2021	+6.1%	+5.4%	+8.4%	−1.3%	+5.7%

Note: Percentage changes shown are in the total number of points contained in billing statements (medical receipts) issued by each medical institution type (hospital or clinic, and by clinic specialty) for insurance purposes, relative to the equivalent pre-pandemic month between Mar 2019 and Feb 2020. One point is equal to 10 yen of reimbursement; changes in points therefore represent changes in medical institution revenue.
Source: Data from the Social Insurance Medical Reimbursement Fund (figures for Sep 2021 are preliminary)

nature, or recipients of the payments, except where individual prefectures themselves have chosen to make this data public. The key reasons given for this lack of transparency included the difficulty in disclosing data because of the administrative burden it places on prefectural governments, and that it was not possible to publish the names of recipients of the subsidies because the medical institutions that accept COVID-19 patients had not been made public, and thus disclosing whether they received subsidies or not would effectively result in their COVID-19 patient acceptance status being revealed. Finally, on November 12, 2021, the government's COVID-19 task force established a policy intended to prepare for the next wave of increased case numbers, which included a stipulation that data on the proportion of beds secured for and occupied by COVID-19 patients at each medical institution should be disclosed on a monthly basis, starting from December 2021 (Ministry of Health, Labour and Welfare, 2021b). However, the names of those clinics and other medical providers that provide outpatient services for people with fevers and have received large subsidies are yet to be made public. In Japan, where patients are free to choose the clinic or hospital that they wish to attend, medical institutions that are known to accept COVID-19 patients are prone to reputational damage and therefore tend to be reluctant to disclose this information.

Regarding the disclosure of annual financial statements, those of hospitals established by local governments or operated by publicly owned local incorporated administrative agencies are accessible via 'Local Public Enterprise Statistical Yearbooks.' However, for private medical corporations, it is possible to obtain financial statements by submitting a freedom-of-information request to the relevant prefecture, but this process takes time. Records are largely paper-based, and hence analyzing them is time-consuming. Furthermore, in the financial statements of private medical corporations, subsidies are included in business income figures, and it is therefore not possible to analyze grants and subsidies separately.

Keeping track of such data is also important as a basis for making decisions on the revision of medical service fees. The current 'Survey on Economic Conditions in Health Care' is a sample-based survey conducted with a relatively small sample size, and thus its accuracy in terms of revealing trends by key attributes, such as by clinical department, is low. Issues with this method that have been raised previously include the difficulty in gaining a clear grasp of the effects of medical fee revisions because of the small proportion of clinics that settle their annual accounts in March, and the inability to gain a proper understanding of changes over time (Arai, 2020).

The 'Basic Policy on Economic and Fiscal Management and Reform, 2021' (Cabinet Office, 2021, p. 37)[12] states that, "The Government will establish a nationwide electronic disclosure system to upload and publish business reports of medical corporations, and establish a system for early analysis of the impact of the infections on medical institutions." In order to verify the effectiveness of the various subsidies handed out by government during the COVID-19 crisis, this disclosure system should be established as soon as possible. At

[12] The aim of this policy document is to outline the key issues for the present administration and the basic direction to be taken in the budget preparations for the next fiscal year.

the same time, it is necessary to refine and expand the contents of these business reports to also make clear the grants and subsidies that have been received. At present, the financial statements of small hospitals and clinics that are not registered as corporations are not made available. All medical institutions should have to prepare and publish annual financial statements under accounting standards equivalent to those imposed on companies.

III. Problems in the healthcare system revealed by the COVID-19 pandemic

III-1. Problems with inpatient care

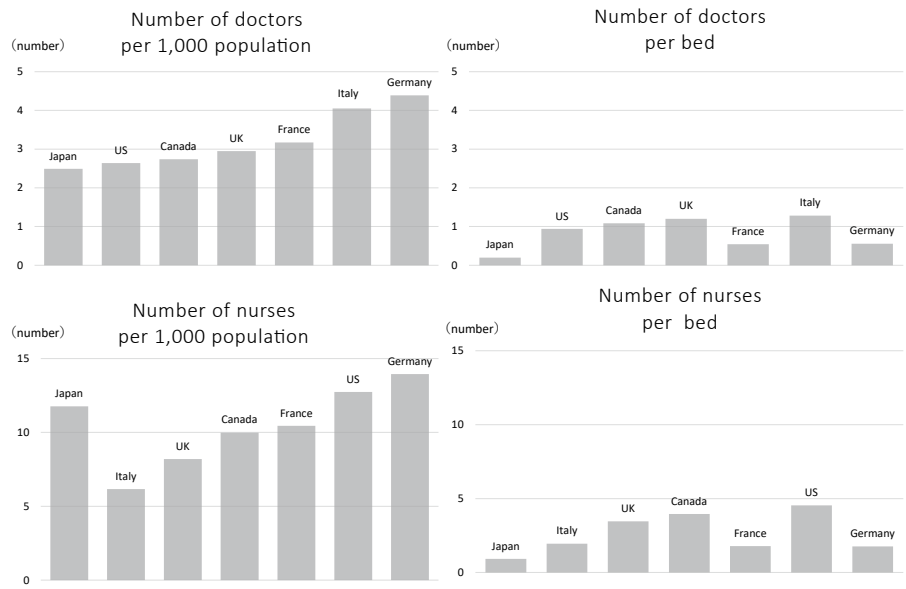
We have already noted that Japan has the highest number of hospital beds per capita in the world; however, the COVID-19 pandemic still succeeded in bringing the medical system to the point of collapse. The major three factors that led to this situation can be summarized as follows:

1. The excessive number of hospitals and beds causes medical professionals to be thinly spread across medical institutions. This creates a system with poor doctor-to-bed and nurse-to-bed ratios and, during the pandemic, making it more difficult for hospitals to accept COVID-19 patients, who generally require a more intensive level of care.
2. There was no triage process for deciding whether to hospitalize COVID-19 patients, and no effective categorization of patients by the severity of their condition or risk factors, leading to ineffectual allocation of specialist resources and functions.
3. There was a lack of cooperation between and among medical institutions and nursing care facilities.

Regarding the first factor, one of the distinctive characteristics of Japan's healthcare provision system is the extremely thin spread of medical practitioners relative to hospital beds. Figure 5 shows an international comparison of the number of doctors and nurses per 1,000 population and per hospital bed. Japan has 2.5 doctors per 1,000 population, which is slightly lower than, but still comparable to, the average across OECD countries of 3.5 doctors per 1,000 population, while the number of nurses per capita is actually higher than the OECD average. However, when measured in relation to hospital beds, Japan's ratio of both doctors and nurses is extremely low. This suggests that, rather than there being a shortage of medical practitioners, there are simply too many hospital beds in existence.

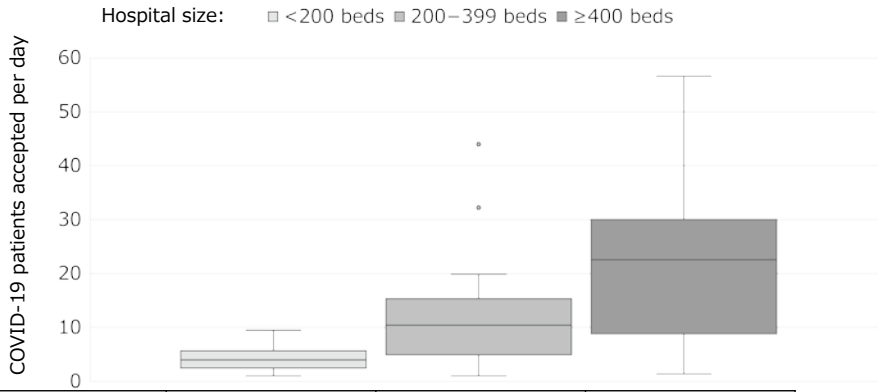
Japan's healthcare provision system has resulted in a fragile situation in which each hospital will only take on a small number of COVID-19 patients at a time. For example, Figure 6 shows that in Osaka Prefecture, where the fourth wave of the pandemic saw a particularly rapid spread of infections, the median daily number of COVID-19 patients accepted was 4 at hospitals with fewer than 200 beds, 10 at hospitals with 200-399 beds, and 23 at hospitals with 400 or more beds. Figure 7 shows that even when Tokyo was hit by the fifth wave of the pandemic, the acceptance rates for the same three sizes of hospital were 5, 10, and 21 patients, respectively. It is therefore clear that Japan's acceptance rates are exceptionally small, especially compared with the numbers of COVID-19 patients typically accepted at

Figure 5: International comparison of the number of doctors and nurses per 1,000 population and per hospital bed



Source: Created by the authors using OECD Health Data (https://www.oecd.org/health/health-data.htm) and with reference to the Nikkei Shimbun (May 30, 2021)

Figure 6: Number of COVID-19 patients accepted per day at hospitals in Osaka Prefecture during fourth wave of pandemic, by hospital size



Number of hospitals	9	22	17
Maximum	9.5	44.0	56.6
75th percentile	5.7	15.4	30.0
Median	4.0	10.4	22.6
25th percentile	2.4	4.9	8.8

Note 1: Based on analysis of 2,825 patients discharged from 48 hospitals between April 1 and May 19, 2021
Note 2: Hospitals where more than 80% of COVID-19 patients are transferred to other hospitals within 5 days are assumed not to accept COVID-19 cases and are thus excluded from the analysis
Note 3: COVID-19 patients are defined as those whose most medically resource-intensive diagnosis was COVID-19 (excluding suspected cases)
Source: Analysis by Global Health Consulting Japan Co., Ltd.

Figure 7: Number of COVID-19 patients accepted per day at hospitals in Tokyo Prefecture during fifth wave of pandemic, by hospital size

Number of hospitals	1	7	13
Maximum	5.3	24.3	64.5
75th percentile	5.3	18.6	42.0
Median	5.3	9.9	21.0
25th percentile	5.3	9.4	14.8

Note 1: Based on analysis of 1,276 patients discharged from 21 hospitals between July 1 and July 19, 2021
Note 2: Hospitals where more than 80% of COVID-19 patients are transferred to other hospitals within 5 days are assumed not to accept COVID-19 cases and are thus excluded from the analysis
Note 3: COVID-19 patients are defined as those whose most medically resource-intensive diagnosis was COVID-19 (excluding suspected cases)
Source: Analysis by Global Health Consulting Japan Co., Ltd.

hospitals overseas. One of the major reasons why it has been difficult to scale up the number of beds for COVID-19 patients in individual hospitals in Japan is that there are many small- and medium-sized hospitals, and the number of medical practitioners per hospital, and per bed, is so small.

Emergency and critical care specialists, who have been in short supply since before the pandemic, are widely dispersed. This is also the case for respiratory specialists, who see patients with moderate cases of COVID-19. There are many hospitals that employ only a single ICU or respiratory doctor, or that have no doctors of these specialties at all, which makes it very difficult to accept COVID-19 patients, even if there are beds available. An even more serious issue is the nursing workforce. In order to accommodate patients with moderate or severe cases of COVID-19, who often require a higher degree of care than 'ordinary' patients, it is necessary to have a nursing team that is densely staffed. The reality is that hospitals dealing with moderate and severe COVID-19 infections quickly end up being unable to maintain a sufficient number of nurses per bed.

Naturally, in addition to being inefficient, this low 'density' of care provision also raises concerns about quality of care. Consolidating medical functions, i.e., concentrating the allo-

cation of beds and specialists into one place to provide higher-density services and more specialized functions, also has the effect of concentrating patients at certain hospitals, where they can benefit from the higher degree of specialism and intensiveness of service. Doctors and nurses working in such environments build up experience and acquire further skills by intensively treating these patients. This is true not only for COVID-19, but also for the treatment of diseases such as cancer, stroke, and cardiovascular disease, and the lack of opportunity for medical practitioners to accumulate expertise in this way has therefore been raised as a problem in the healthcare delivery system since even before the COVID-19 crisis began.

The second factor we have cited as being responsible for the collapse of the healthcare system is the absence of hospital admission triage for COVID-19 patients and the failure to categorize patients by the severity of their condition and by risk assessment to appropriately allocate specialist resources and functions. One of the reasons why the allocation of beds, specialists, and other resources was unsuccessful was that Japan's hospital admission triage process has long been ineffective. During the fifth wave of the pandemic, there were instances of COVID-19 patients—initially with mild symptoms, but whose condition became more severe—who were unable to be admitted to hospital and subsequently died at home. This generated a lot of public reaction and became a major topic of discussion in Japanese society. However, the majority of patients with mild symptoms were under 65 years of age, with no underlying diseases, and at low risk of developing a more severe case of COVID-19. Such patients accounted for over a quarter of all hospitalized COVID-19 patients during the fourth and fifth waves of the pandemic[13]. If these mild cases had been appropriately triaged and thus recommended for home health care or secure accommodation, it would have been possible to grant admission to greater numbers of patients who really needed hospitalization.

To develop an effective hospital admission triage process and to encourage a broad degree of cooperation among medical institutions both locally and regionally, it is necessary to have a system that clearly defines the agreed criteria for hospitalization, allows real-time sharing of the COVID-19 bed occupancy status at each hospital, provides an integrated management function that can track hospital admissions and transfers between hospitals, and enables cooperation and collaboration within and across different geographical areas. The so-called 'Gathering Medical Information System' (G-MIS), an electronic information support system established by the government as a means of sharing information between medical institutions locally and nationally, should allow COVID-19 bed occupancy status to be visible between hospitals, but proved difficult to put into practical use because of issues such as time lag and missing data. However, in November 2021, entering real-time information into G-MIS became a mandatory requirement for medical institutions to receive subsidies, and greater use of the system is therefore expected in future[14].

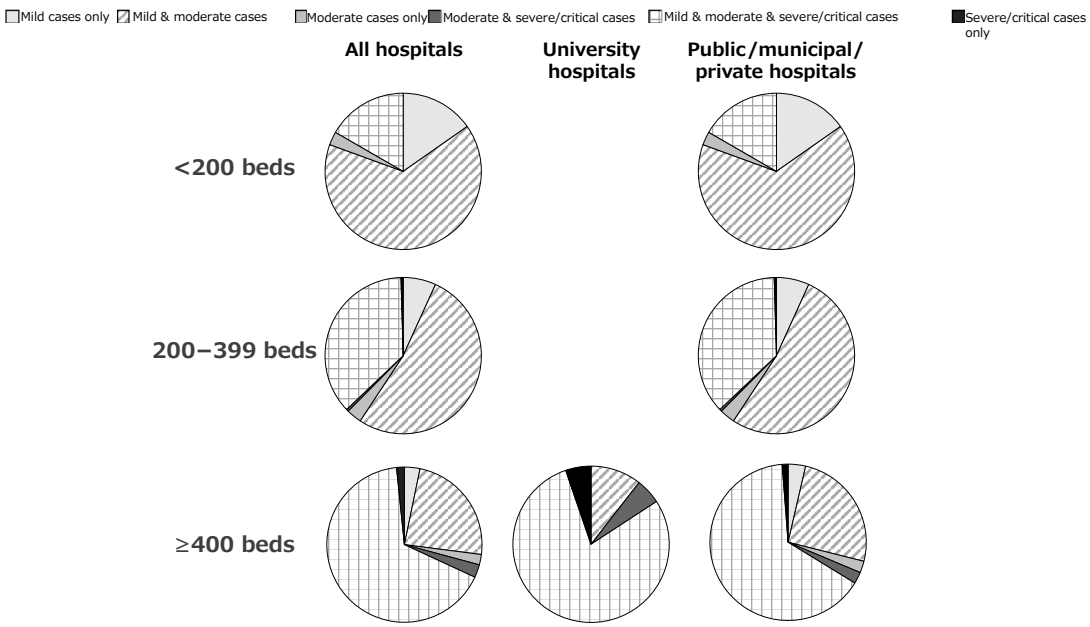
Figure 8 shows that COVID-19 patients were not effectively categorized and dealt with according to the severity of their condition, and that the roles of the various types and sizes

[13] The analytical results that support this statistic are not presented here, but were part of an analysis by GHC.
[14] See footnote 13 for details.

of medical institutions were not differentiated in terms of the disease-stage categories of their beds and the severity of cases they should accept. In the fourth wave of the pandemic, from March to May 2021, it can be seen that the largest hospitals actually accepted the widest range of severity of COVID-19 cases (mild, moderate, and severe cases). This was the case for 70% of the hospitals that have 400 beds or more. It would be more effective for large hospitals to focus on only moderate and severe cases. In an analysis of university hospitals by GHC, the results of which are shown in Figure 9, an average of 46% of patients admitted had mild COVID-19 infections. University hospitals, as top-tier providers of the most advanced and specialized medical services, should prioritize the acceptance of patients with moderate-to-severe symptoms, and cannot play their role in the healthcare system effectively if their beds are occupied by patients with mild cases of COVID-19. Conversely, returning to Figure 8, it can be seen that 30% of hospitals with fewer than 200 beds accepted severe cases of COVID-19. If these smaller hospitals did not have sufficient numbers of appropriate medical practitioners to deal with cases of high severity, a situation we highlighted earlier as being common in Japan, there is a concern as to whether it was possible for these hospitals to provide the right care and specialist treatment to these patients.

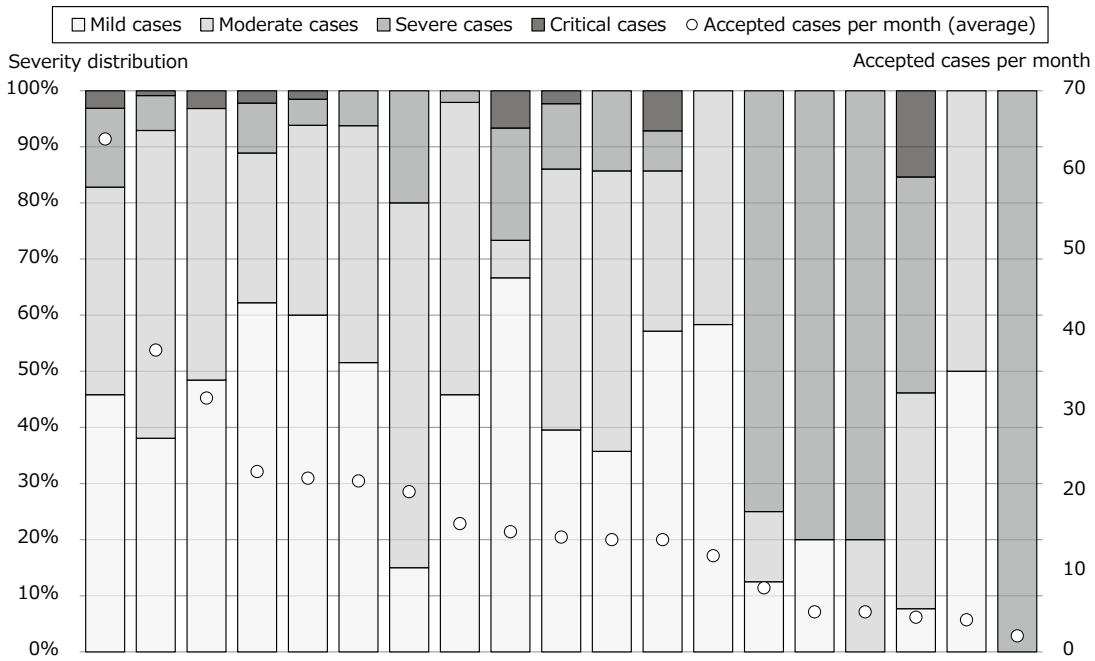
The third key problem with inpatient care that we listed is the issue of coordination be-

Figure 8: Proportion of hospitals accepting different severities of COVID-19 cases, by hospital size and hospital type



Note 1: Based on analysis of 20,787 patients discharged from 486 hospitals between March and May 2021 (478 hospitals excluding those 8 hospitals where more than 80% of COVID-19 patients were transferred to other hospitals within 5 days)
Note 2: COVID-19 patients are defined as those whose most medically resource-intensive diagnosis was COVID-19 (excluding suspected cases)
Source: Analysis by Global Health Consulting Japan Co., Ltd.

Figure 9: Severity distribution, and average number accepted per month, of COVID-19 cases at 19 university hospitals during fourth wave of pandemic

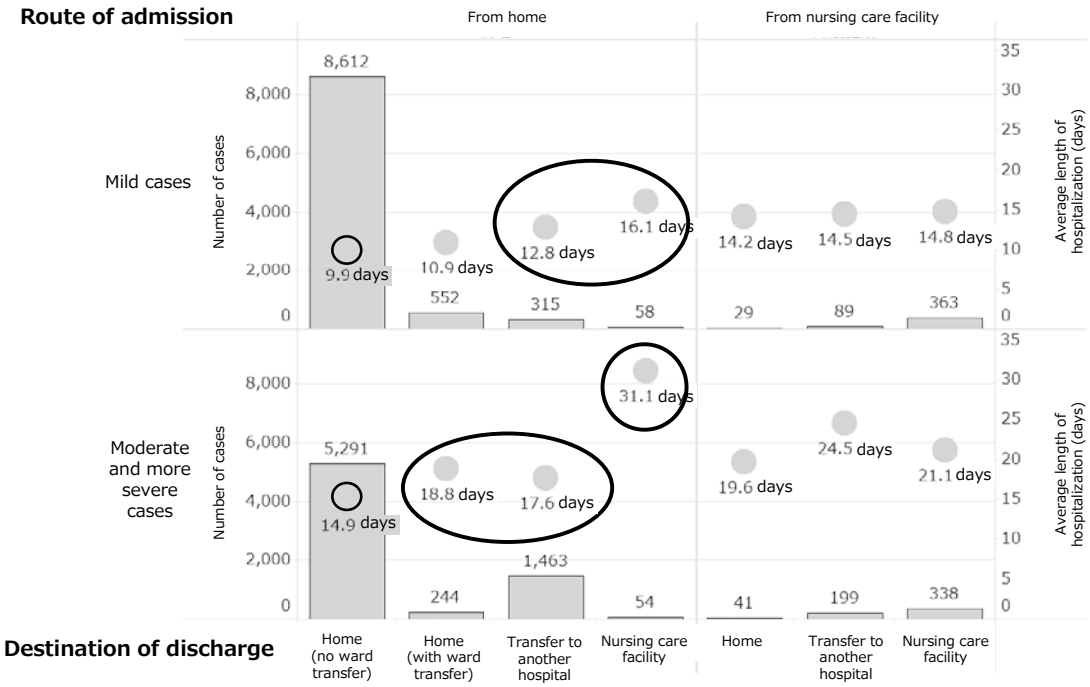


Note 1: Based on analysis of COVID-19 patients discharged from 19 university hospitals between March and May 2021
Note 2: COVID-19 patients are defined as those whose most medically resource-intensive diagnosis was COVID-19 (excluding suspected cases)
Source: Analysis by Global Health Consulting Japan Co., Ltd.

tween and among medical institutions and care facilities[15]. In the event that a COVID-19 patient has completed treatment and has met the criteria for discharge but still requires some level of ongoing care, the inadequacy of the logistical support system means that they are unable to be transferred to another hospital, and therefore their bed cannot be used effectively for the next COVID-19 patient. Furthermore, there are problems in coordinating with care facilities in cases where nursing care is needed following COVID-19 treatment. It is relatively simple to return a patient to a nursing home after hospitalization for COVID-19 treatment if they were originally admitted to hospital from that nursing home, regardless of whether their case was mild, moderate, or severe. However, patients who are hospitalized for COVID-19 treatment directly from home, or who have arrived from another hospital, tend to stay in hospital for much longer before being transferred to a nursing care facility. The lack of smooth collaboration between medical care providers and nursing care providers has been highlighted as a problem in the healthcare system since long before the pandemic, and it is fair to say that

[15] The lack of coordination described in this paragraph is demonstrated in Appendix 1, which shows COVID-19 case numbers and average hospitalization lengths for different routes of admission and discharge destinations. The data suggest that patients who were admitted to hospital directly from home but were discharged to another hospital or nursing care facility spent a much longer average time in hospital.

Appendix 1: Number of COVID-19 cases and average length of hospitalization for different routes of admission and discharge destination, by degree of severity



Note 1: Based on analysis of 19,250 cases between March and May 2021 (excluding cases where route of admission was transfer from another hospital)
Note 2: Cases where either the route of admission or the destination of discharge was not the patient's home, another hospital, or a nursing care facility (e.g., where the patient died), and cases with a length of hospitalization greater than 90 days, are excluded from the analysis
Note 3: COVID-19 patients are defined as those whose most medically resource-intensive diagnosis was COVID-19 (excluding suspected cases)
Source: Analysis by Global Health Consulting Japan Co., Ltd.

the importance of this issue was illustrated even more plainly during the COVID-19 crisis.

This section has discussed the key problems with inpatient care that have been exposed by the COVID-19 pandemic, namely the weaknesses in Japan's system of medical care provision, the absence of systems to allocate patients appropriate resources according to their condition, the lack of differentiation and specialization among hospitals, and poor collaboration and cooperation across health care providers. We now turn to what should be done to address these problems.

First, in recognition of the fact that there are too many acute care hospitals and acute care beds, a program of consolidation is required to increase the 'density' of care that can be provided, i.e., to improve the ratio of medical practitioners to hospital beds and to ensure that suitably staffed teams are available to provide the requisite specialist knowledge and intensiveness of care for the appropriate medical specialty at any given institution. To this end, the government has been promoting a regional health care concept that focuses on better differentiation and specialization of bed allocations and medical functions, and the consoli-

dation and restructuring of hospitals. However, discussions between hospitals regarding this proposal have so far been unproductive, and progress has therefore been limited.

In order to consolidate the number of acute care beds and to optimize their allocation and utilization, it is essential to reduce the length of hospitalization. Even though the average length of stay in acute care hospital beds has been gradually decreasing, international comparisons clearly show that hospitalizations in Japan are still extremely long. One of the key reasons for this is the effect of the current remuneration system for medical services. At present, inpatient care at DPC/PDPS hospitals, which make up a large proportion of acute care hospitals, is reimbursed through a combination of fee-for-service and prospective, per-diem payments. Because hospitals receive a fixed fee per day of hospitalization, this creates an incentive to extend the length of hospital admissions to increase revenue. As the current trend of falling demand for inpatient care continues, an increase in the number of unoccupied beds will lead to hospitals becoming no longer viable as businesses. In other words, hospitals end up extending the lengths of admission as a management tool to strengthen their finances. However, such unnecessary admissions and extended periods of hospitalization only lead to negative consequences for the patient[16].

There is a similar motive at work in admitting patients to hospital who could have been treated as outpatients. Because medical fees for inpatient treatment are set higher than those for outpatient treatment[17], there is a financial incentive for medical providers to fill their vacant acute care beds with patients who do not strictly need to use them, and Japan therefore struggles to move toward a system that favors outpatient services. There is also a tendency for patients and their families to feel that hospitalization causes less of a burden of care on families and offers greater peace of mind.

As discussed in the next section, a clinic's revenue is proportional to the number and frequency of outpatient visits it receives. This means that, under the current payment system, as local residents become healthier, and the number of patients requiring medical services decreases accordingly, it will become more and more difficult not only for hospitals but also for clinics to operate on a stable financial footing.

Payment methodologies that could achieve a reduction in average lengths of hospitalization, thereby contributing toward a consolidation of medical functions and bed numbers, are discussed in Section 4.

III-2. Problems with outpatient care

The results of the data analysis presented in Section 2 demonstrated that, in Japan, pa-

[16] In a separate paper in this journal, Ito et al. (2022) showed that lengths of hospitalization varied widely between hospitals, even for the same disease and in the same region, and even when corrected for age group and severity. They also revealed that long hospitalization periods did not improve the recovery or rehabilitation prospects of the patient, finding no difference, or a significant decrease, in physical function between time of admission and time of discharge, compared with equivalent shorter hospital stays.

[17] Typical examples of procedures for which this is the case include cataract surgery, polypectomy, chemotherapy, cardiac catheterization, tonsillectomy, and inguinal hernia repair.

tients with lifestyle-related diseases such as hypertension, diabetes, and dyslipidemia, as well as relatively stable chronic diseases, are often seen as outpatients at DPC/PDPS hospitals, which are primarily top-tier acute care facilities. We are not proposing that patients should avoid visiting hospitals for chronic conditions, colds, and other mild symptoms. However, in such cases, we suggest that it is inappropriate to use the medical resources of acute care hospitals, whose primary function is to focus on providing top-tier medical functions and intensive levels of care to inpatients. Instead, it is necessary to make proper use of the full range of medical facilities available, such as electing to see a primary care doctor or, particularly during the COVID-19 crisis, making use of online medical services rather than traditional face-to-face consultations.

Frequent and repeated consultations for chronic illnesses are a phenomenon unique to Japan. Because the unit payment of reimbursement for medical services is low, it is difficult for providers to make a profit unless doctors see many patients in a short space of time and frequently. Owing to this need to rush through consultations, there is not enough time for doctors and nurses to give full explanations to patients about their condition, treatment, and lifestyle-related factors. In Europe and the United States, however, where there has been widespread differentiation and specialization of medical institutions, the frequency of consultations for chronic diseases is typically only once every few months, if the symptoms are stable. In this way, patients receive prescription refills and detailed guidance from nurses, including suggestions for lifestyle improvements, at regular intervals. Furthermore, approximately once a year, or whenever there has been a notable change in condition such as a worsening of symptoms, patients are seen by a general practitioner (GP), also known as a family doctor, who refers them to a specialist only when they deem it to be necessary.

Over-provision of medical care is often noted as an inherent problem in the Japanese healthcare system, but under-provision is also a real issue. This is caused by an absence of doctors responsible for the health of local communities.

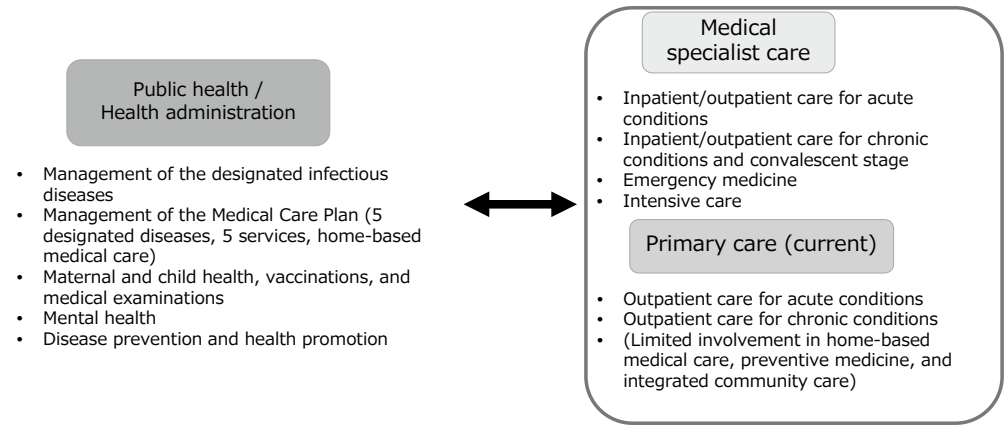
The key characteristics of the Japanese healthcare system are summarized in Figures 10-12. In many countries, GP clinics[18] have long provided not only medical care but also a public health function similar to that of Japanese public health centers. During the COVID-19 pandemic, GP clinics also played an important role in delivering PCR testing and in managing patients who were recovering at home, including those who had been discharged from hospital[19]. There is a need to reconsider the design of the healthcare system in Japan to include provision of such preventative and public health functions as well as to achieve better integration within the community. If this happens, discussions pertaining to how medical fees are reimbursed will also be necessary.

There needs to be incentivization for medical providers not only in the reimbursement

[18] GP clinics are clinics that are typically operated by multiple family doctors and a wider team of medical and support staff.

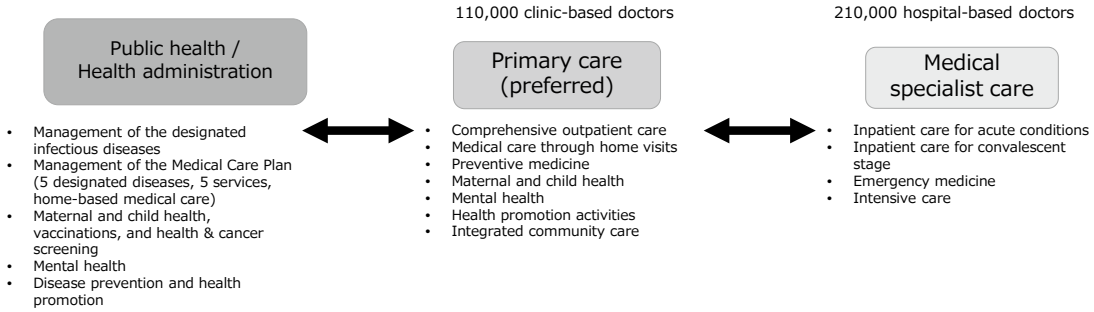
[19] Not all countries used the approach whereby patients with a fever or displaying other COVID-19 symptoms were always seen by a primary care practitioner first. Some countries also deployed a system in which such patients were sent to 'walk-in centers,' facilities set up at medical institutions with inpatient beds, where they were immediately tested and triaged. Patients deemed to have severe symptoms were then admitted to hospital, while those with moderate or mild symptoms were admitted to nearby hotels or sent home, with remote follow-up provided by either outpatient nurses or primary care practitioners.

Figure 10: Current relationship between public health/health administration and medical care in Japan



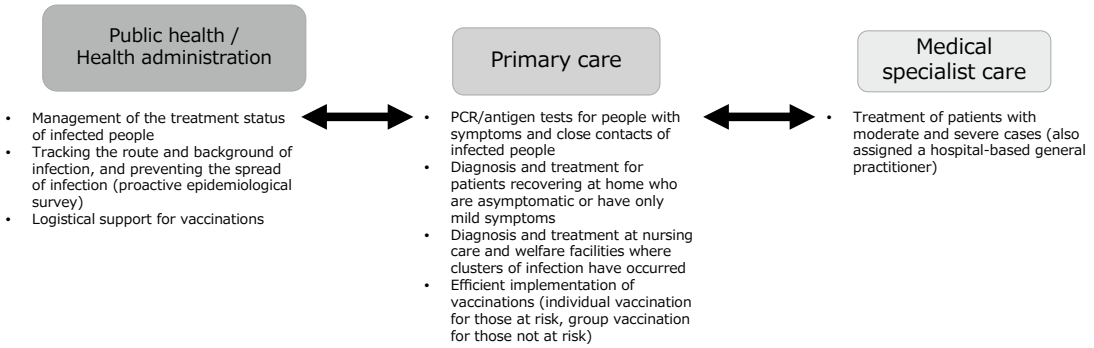
Source: Created by the authors based on material (Kusaba (2021)) from the Fiscal System Council (Oct 11, 2021)

Figure 11: Preferred roles of primary care



Source: Created by the authors based on material (Kusaba (2021)) from the Fiscal System Council (Oct 11, 2021)

Figure 12: Applying the preferred roles of primary care under the COVID-19 pandemic



Source: Created by the authors based on material (Kusaba (2021)) from the Fiscal System Council (Oct 11, 2021)

system for inpatients but also in that for outpatients. Many countries have a system whereby clinics operate on a patient registration or enrollment basis, while hospitals receive referrals from clinics. Clinics receive income on the basis of how many patients are registered there.

Because clinics hold data on the health of local residents, such as vaccination histories and results of regular health checks, it is possible to proactively engage with their patient populations about topics such as preventing the onset or aggravation of health conditions.

Additionally, reputational and financial damage, such as that which many medical institutions fear will result if their acceptance of COVID-19 patients is made public, may be partly caused by the freedom that exists in the Japanese healthcare system for patients to choose their own provider of medical services. In many countries, medical institutions that are accepting COVID-19 patients are published online, and often on their own websites.

IV. Conclusions and recommendations

Despite the numbers of reported COVID-19 cases and deaths being significantly lower than those in Europe and the United States, Japan ended up in a situation where access to both inpatient and outpatient medical care had to be restricted. However, the economic losses due to the pandemic and the scale of public expenditure—including subsidies for medical institutions—have been enormous, and easily comparable to those in Europe and the United States.

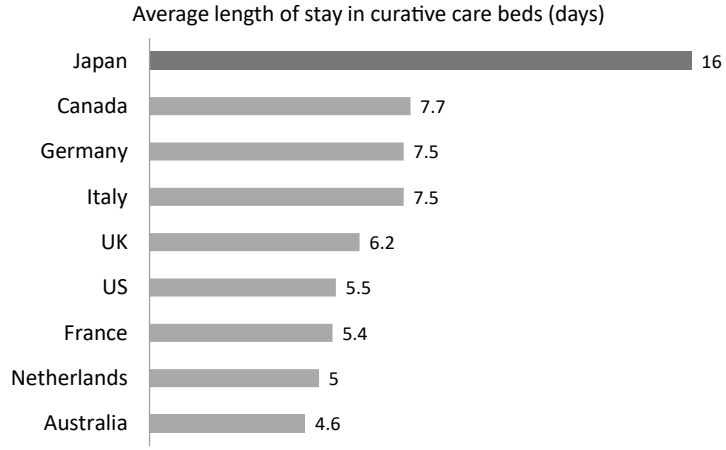
The COVID-19 crisis has starkly exposed the problems inherent in Japan's healthcare system. We now have an excellent opportunity to drive through reforms that have long been necessary but have made little progress.

In 2019, before the COVID-19 crisis, the average length of stay in curative care beds in Japan was 16 days, which is more than double the average across OECD countries (Figure 13). Meanwhile, the occupancy rate of hospital beds in Japan was comparatively low, at 76% (Figure 14)[20]. This indicates that not all hospital beds were filled, even with extremely long average hospital stays, and that there is therefore an excessive number of beds. The longstanding surplus of hospitals and beds has led to medical resources and medical staff being thinly dispersed across institutions. This low 'density' of care provision was a significant factor in bringing the healthcare system to the point of collapse after the onset of the COVID-19 pandemic.

With Japan's population rapidly declining, it is necessary to consolidate medical institutions, not only to prepare the country for dealing with newly emerging infectious diseases but also to rectify the issue of health care professionals being spread so thinly. This will ensure that the right level of care and expertise is available in the right place at the right time. The re-

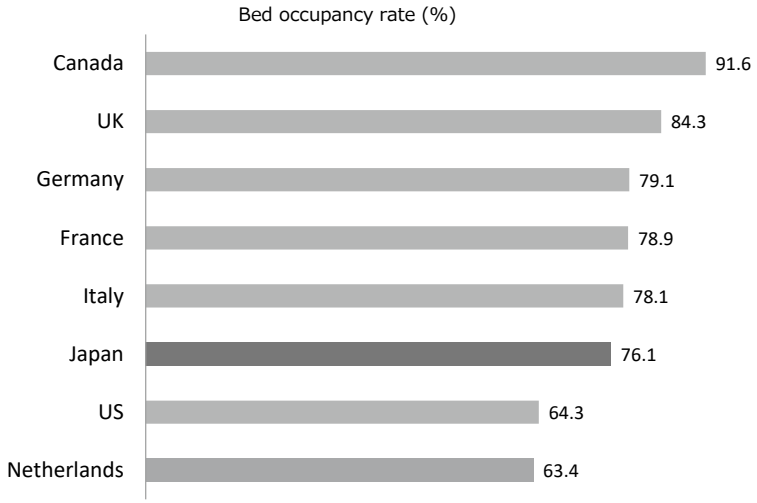
[20] Appendix 2 shows the changes in the number of hospital beds per 1,000 population in the OECD countries over the past 30 years; Japan, with 13 beds per 1,000 people in 2019, has by far the largest number in the group. Appendix 3 shows the number of acute care beds per 1,000 population among the OECD countries in 2019, with Japan having 7.7 beds per 1,000 people, the highest in the world. Appendix 4 shows the ratio of the number of beds available for COVID-19 patients to the number of general beds in Japan, across the five waves of the pandemic, revealing an extremely low ratio of only 4.4% even by the time of the fifth wave in August 2021. Appendices 5 and 6 show the number of doctors and nurses, respectively, per hospital bed and the number of beds per 1,000 population, among the OECD countries. Appendix 5 shows that the sheer number of hospital beds in Japan means that there is only one doctor for every five beds, while there is one doctor for every three beds in Germany and France, and one doctor per bed in the United Kingdom and United States. Appendix 6 shows that there is one nurse per bed in Japan, 1.8 nurses per bed in Germany and France, 3.5 nurses per bed in the United Kingdom and the Netherlands, and 4.5 nurses per bed in the United States.

Figure 13: Average length of stay in curative care beds in OECD countries (2019)



Note: Data are from 2019, except for Germany, the US, and Australia (2018), and Italy (2020)
Source: OECD Health Data (2021), available at https://data.oecd.org/healthcare/length-of-hospital-stay.htm

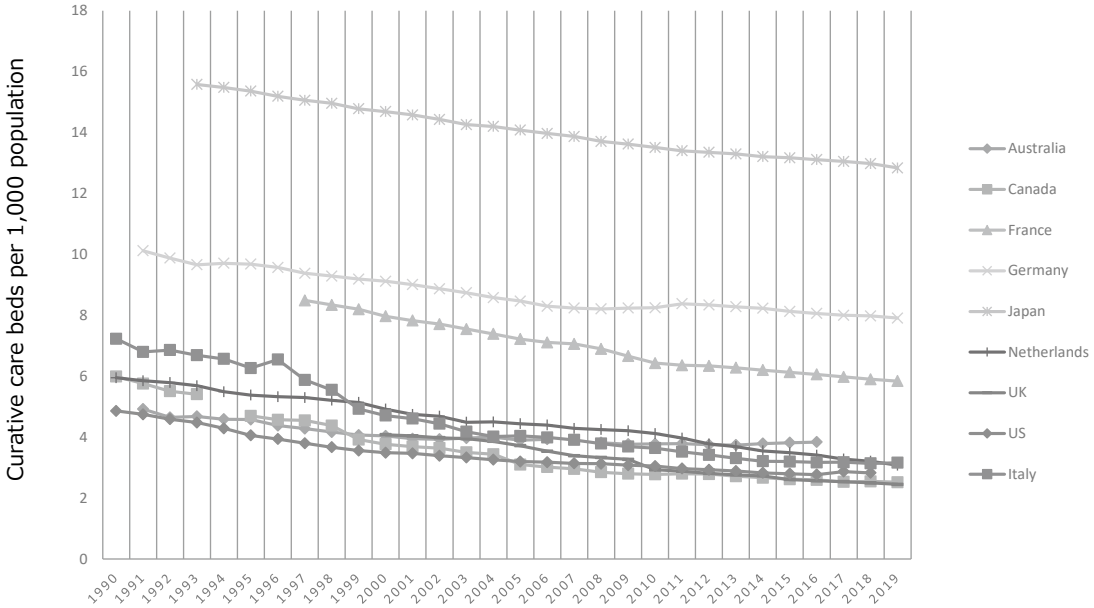
Figure 14: Average occupancy rates of curative care beds in OECD countries (2019)



Note: Data are from 2019, except for the UK (2017)
Source: OECD Health Data (2021)

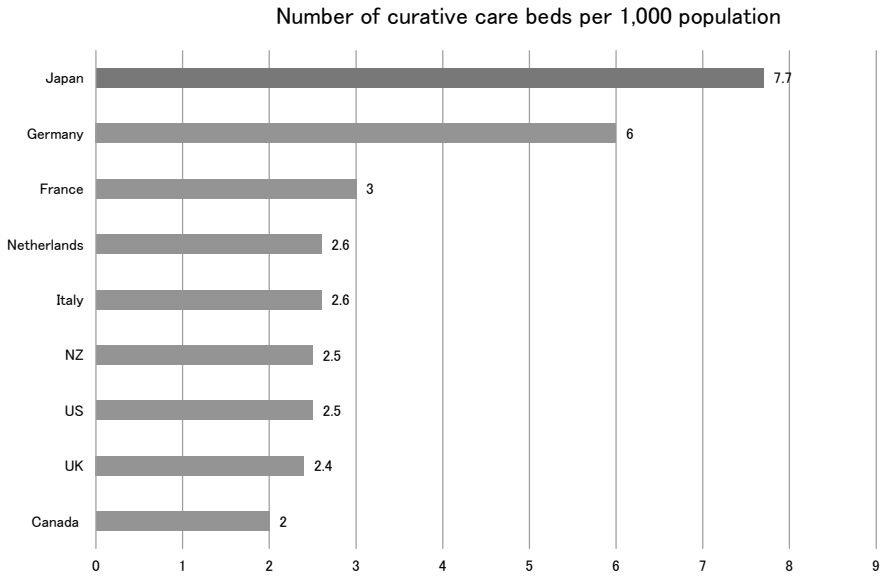
structuring and consolidation of hospitals will require a reduction in the number of acute care beds, and to achieve this, it is essential to reduce the length of hospitalizations. However, under the present remuneration system for providing medical services, filling hospital beds is a means of securing financial and operational stability. Therefore, if there are not enough inpatients for the number of beds available, there is an incentive to extend the length of hospitalization or to admit patients to hospital who could otherwise have been treated as outpatients.

Appendix 2: Year-by-year change in the number of curative care beds per 1,000 population in OECD countries



Source: OECD Health Data (2021)

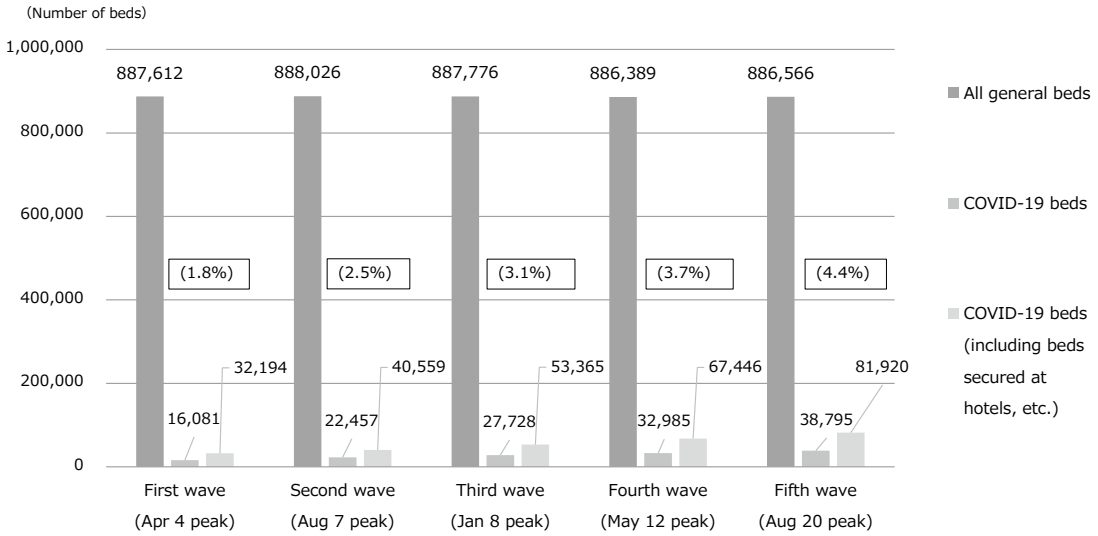
Appendix 3: Number of curative care beds per 1,000 population in OECD countries (2019)



Note: Data are from 2019, except for the US (2018), and the UK and New Zealand [NZ] (2020)

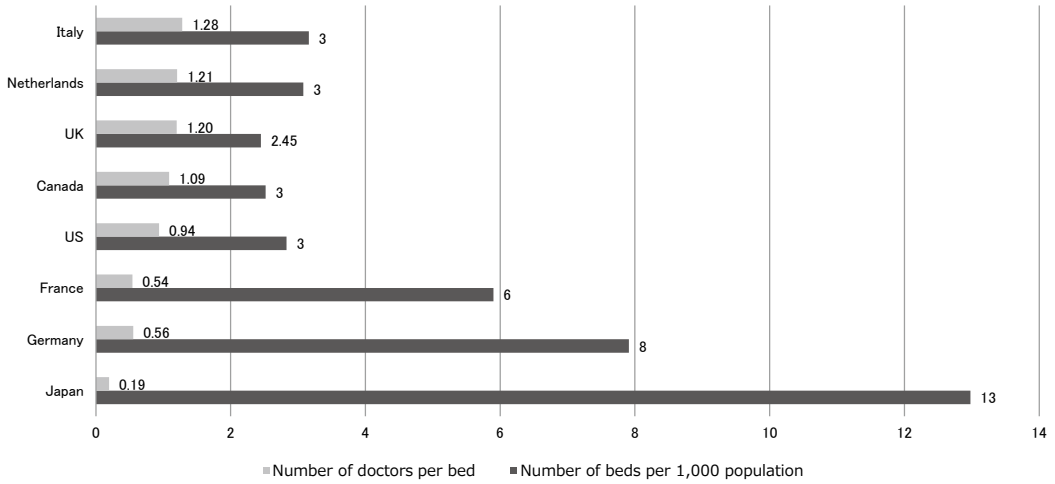
Source: OECD Health Data (2021)

Appendix 4: Number of hospital beds made available for COVID-19 patients relative to the total number of general beds in Japan, across the five waves of the pandemic



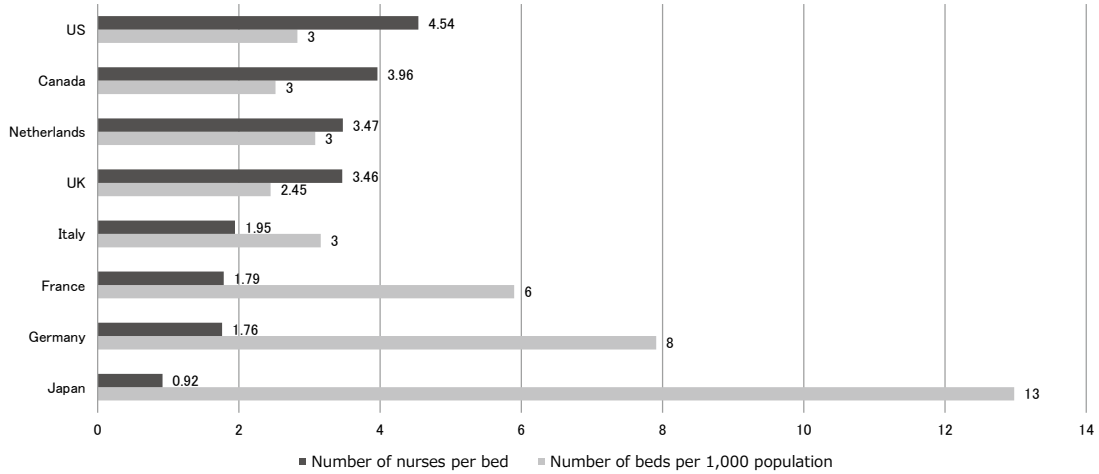
Note 1: The percentages in parentheses represent the ratio of COVID-19 beds to the total number of general beds for that wave of the pandemic. General beds include both acute care beds and sub-acute care beds (e.g., recovery rehabilitation wards and integrated community care wards).
Source: Ministry of Health, Labour and Welfare, "Medical Facility Survey: number of hospital beds" (first wave, Apr 2020; second wave, Aug 2020; third wave, Jan 2021; fourth wave, May 2021; fifth wave, Aug 2021) and "Survey results on the medical treatment status and number of beds, etc., for COVID-19 patients" (first wave, May 1, 2020 [as the closest data point available for us to use in our analysis]; second wave, Aug 12, 2020; third wave, Mar 24, 2021; fourth wave, May 12, 2021; fifth wave, 25 Aug, 2021)

Appendix 5: Number of doctors per hospital bed and the number of hospital beds per 1,000 population in OECD countries



Note: Data are from 2019, except for Germany and the US (2018)
Source: OECD Health Data (2021)

Appendix 6: Number of nurses per hospital bed and the number of hospital beds per 1,000 population in OECD countries



Note: Data are from 2019, except for Germany and the US (2018)
Source: OECD Health Data (2021)

If the average length of hospitalization in Japan was reduced to 7 days, which is comparable to that of other OECD countries, the number of acute care beds could be reduced by as much as half. However, under the current reimbursement system for medical fees, reducing the duration that patients stay in hospital would result in a drastic fall in revenue and, therefore, profit. This would make running hospitals financially unviable. For this reason, it is essential to proceed with discussions on changing the remuneration system, such as by moving toward a 'per-hospitalization' payment method, i.e., a fixed amount paid per single admission to hospital based on the patient's diagnosis, similar to the diagnosis-related groups (DRGs) system applied in the United States and Europe.

To counter the risk of a per-hospitalization reimbursement methodology leading to inadequate consultation and diagnosis (and, hence, poor treatment), medical care quality evaluation will become more important. Regardless of a change in the payment system for medical fees, care quality evaluations based on outcomes such as complication rate, mortality rate, and readmission rate are necessary even in the current system[21]. Among countries that have introduced per-hospitalization payments[22], some have adopted a method of determining the reimbursement amount in a way that also reflects evaluation of outcomes, that is, a payment methodology in which the greater the value of the medical care provided (where value = quality / medical fees), the more profitable this becomes for the hospital.

For outpatients, many medical institutions initially refused to see patients suspected of

[21] This topic is discussed in further detail in the separate papers by Ito and Kassai (2022) and Ito et al. (2022) in this journal.
[22] Japan primarily uses the DPC/PDPS payment methodology, as already discussed, while the United States and European countries primarily use a methodology called "DRGs/PPS" (disease-related groups/prospective payment system). Both DPC and DRGs refer to diagnosis group classification, by name of disease, while PDPS and PPS refer to the payment systems themselves, based on per-diem and per-hospitalization payments, respectively.

having COVID-19, and they provided only limited services to COVID-19 patients who were in nursing care facilities or staying at home. In order to maintain access to health care even during emergencies such as the COVID-19 pandemic, one idea that has been put forward is to establish a 'system of certified primary care doctors' that allows citizens to select a doctor to support them in managing their own health (Kusaba, 2021). By extending the interval between consultations in a way that is proportionate to the patient's condition, or by issuing longer-term prescriptions, reforms that optimize medical expenditure will also lead to greater convenience for patients. In doing so, it is essential to have a payment system that does not cause difficulties for medical institutions as a result of a fall in patient volumes. Based on the experiences of other countries, it may also be reasonable and appropriate to introduce a system of remuneration for medical services that pays a fixed fee per local resident, such that primary care clinics are also able to provide disease prevention and educational functions.

Finally, not only during emergencies such as the COVID-19 pandemic but also as a matter of course in ordinary times, all medical institutions should be required to prepare and promptly publish annual financial statements. At the same time, hospitals that received COVID-19-related subsidies, such as those for securing hospital beds and facilitating vaccinations, should have their subsequent COVID-19 patient acceptance records and other relevant measures properly scrutinized, and there should be a push for greater overall transparency in the healthcare system.

It is said that the Japanese are generally poor at prioritizing and allocating their expenditure according to their limited budget. Perhaps people feel that there is an unlimited budget when it comes to medical services, particularly during the pandemic. In a study to estimate how much of an economic sacrifice different countries would be willing to make in order to reduce their COVID-19 death toll by one person, Nakata (2021) found that Japan felt this was worth sacrificing around 2 billion yen, while Australia was 1 billion yen, the United States 500 million yen, and the United Kingdom 50 million yen. This suggests that Japan places greater value in making economic sacrifices to achieve a lower death toll than do many other countries.

Japan, with its huge budget deficit, has limited resources to put into medical services, but there are ways to reduce costs while improving quality of care. This requires consolidation of hospitals and beds and differentiation of functions, to achieve which it is necessary to drive forward policies that have long been identified as important but have politically stalled, including shortening the average length of hospital stays, reducing the number of acute care beds, and improving functional specialization and coordination. In the long term, such reforms would undoubtedly benefit both health care providers and the communities they serve.

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Conflict of interest statement

There are no conflicts of interest to declare.

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