Impact of Patient's Financial Burden of COVID-19 Treatment on Antiviral Prescription Rates, and Clinical and Economic Outcomes in Japan[1]

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Objectives

1) Estimate the impact of OOP payment initiation for COVID-19 antiviral drugs on the prescription rate of antiviral drugs for patients with COVID-19 in Japan using a large-scale claims database
2) Evaluate the potential impacts of a decrease in the prescription rate of oral antiviral drugs on clinical and economic outcomes using a budget impact model

Conclusions

The initiation of OOP payments in Japan decreased the antiviral prescription rate by at least 35%.

Such reductions in antiviral prescriptions would result in increased hospitalizations and deaths, thereby resulting in increased net costs despite savings from antiviral drug costs.

The findings of the study demonstrate the importance of continued government measures, including public financial support for the uptake of antiviral drugs for COVID-19 to prevent progression to severe disease.

Background

- By February 2024, four antiviral drugs were approved in Japan: remdesivir, molnupiravir, nirmatrelvir–ritonavir, and ensitrelvir. These drugs are indicated for COVID-19 patients, especially those with high risk[2].
- Out of pocket (OOP) payment for COVID-19 antiviral drugs was fully covered by public funds until the end of September 2023[3].
- The public support was stepwise reduced and completely ended in March 2024[3].
- A significant decrease in oral antiviral drug use was anticipated following the cessation of public support.
- A decrease in antiviral drug use may lower treatment acquisition costs while increasing the number of patients with severe COVID-19, potentially leading to higher treatment costs; therefore, the economic consequences of the change remain unclear.

Methods

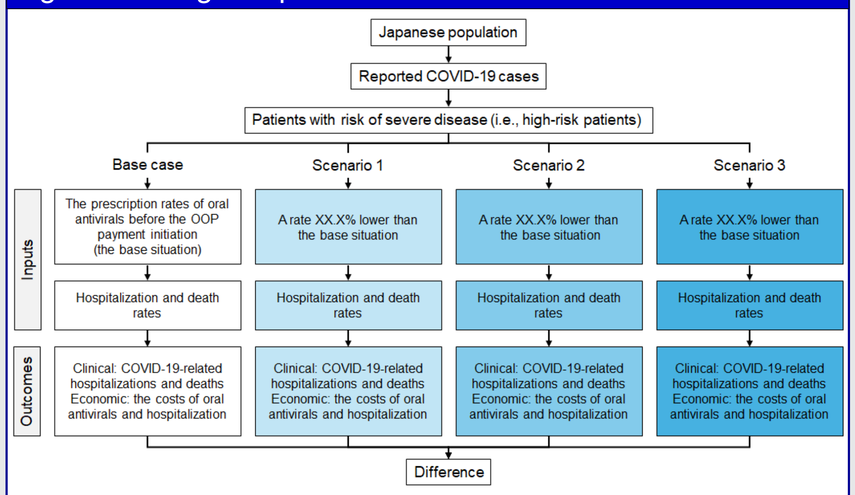
Analysis 1: Change in the prescription rate of antiviral drugs

- The claims database provided by JMDC Inc. (Tokyo, Japan) was used to examine changes in the prescription rate of COVID-19 antiviral drugs including remdesivir, nirmatrelvir–ritonavir, molnupiravir, and ensitrelvir[4].
- Anonymized data were extracted from the database for two 4-month periods, namely, June 1–September 30, 2023 (the pre-OOP payment initiation period) and October 1, 2023–January 31, 2024 (the post-OOP payment initiation period).
- The study population included patients diagnosed with COVID-19 (ICD-10 codes U071 and U072), excluding suspected cases.

Analysis 2: Impact on clinical outcomes and inpatient medical costs

- A budget impact analysis (BIA) model was developed to evaluate the impact of a decline in the prescription rate of oral antiviral drugs on clinical and economic outcomes in Japan, based on an existing study in the United States[5] (**Figure 1**).

Figure 1. Budget impact model structure



Abbreviations: OOP, out-of-pocket

- Clinical outcomes were the total number of hospitalizations and deaths due to COVID-19 infection, while economic outcomes were the cost of oral antiviral drugs, hospitalization cost, and total cost in Japan overall.
- Three scenarios for a decline in the prescription rate were examined, based on Analysis 1.
- The study adopted the payer's perspective, considering only the costs for medical procedures covered within the national health insurance.
- Japan's total population of approximately 120 million people was included in the analysis.
- The analysis was conducted over a one-year time horizon.
- Input data were obtained from multiple sources including published articles, government documents and statistics, claims databases, and medical fee schedules (**Table 1**).

Table 1. Model inputs

Parameters	Value
Prescription rate of oral antivirals (%)	23.0
Patients share of oral antivirals (%)	
Nirmatrelvir–ritonavir	9.7
Molnupiravir	75.7
Ensitrelvir	14.6
Annual COVID-19 cases	24,302,458
Proportion of high-risk patients (%)	23.9
Hospitalization rate (%)	12.7
Hospitalization use (%)	
General ward	80.6
ICU	10.7
ICU + Mechanical ventilation	8.7
Death rate (%)	0.8
Treatment effectiveness on hospitalization/death (%)	
Nirmatrelvir–ritonavir	79.6
Molnupiravir	20.1
Ensitrelvir	37.1
Treatment cost per course	
Nirmatrelvir–ritonavir	JPY99,708 (USD704)
Molnupiravir	JPY87,276 (USD617)
Ensitrelvir	JPY52,532 (USD371)
Hospitalization cost per case	
General ward	JPY1,239,964 (USD8,759)
ICU	JPY4,079,808 (USD28,820)
ICU + Mechanical ventilation	JPY6,364,921 (USD44,963)

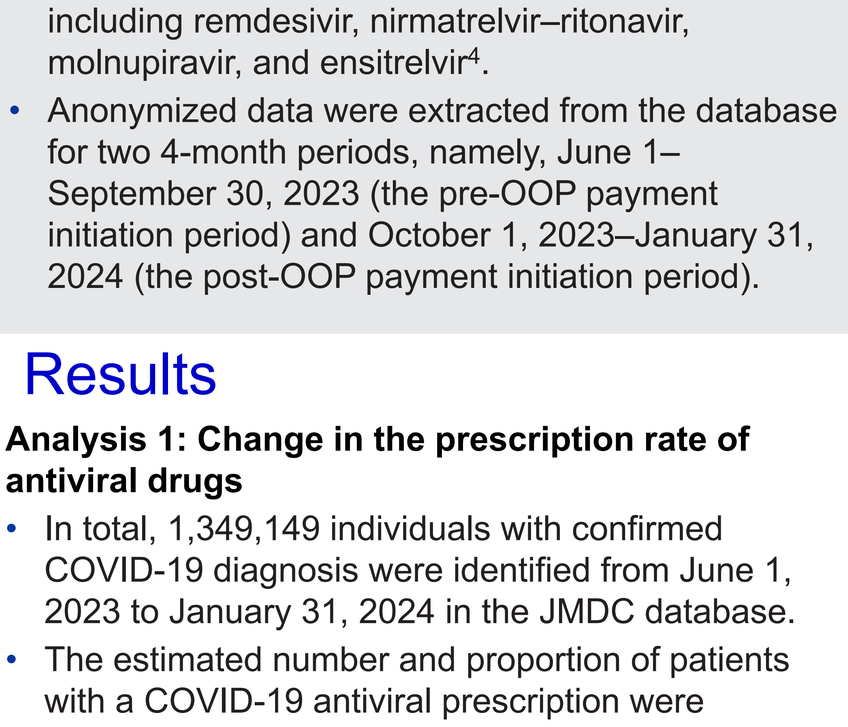
*as of May 2024

Results

Analysis 1: Change in the prescription rate of antiviral drugs

- In total, 1,349,149 individuals with confirmed COVID-19 diagnosis were identified from June 1, 2023 to January 31, 2024 in the JMDC database.
- The estimated number and proportion of patients with a COVID-19 antiviral prescription were 1,666,500 (17.5%) and 495,012 (11.5%) in the pre- and post-OOP payment initiation periods, respectively, indicating a 34.3% decrease in the prescription rate of all antivirals (**Figure 2**).

Figure 2. Proportion of patients with prescription of COVID-19 antiviral drugs



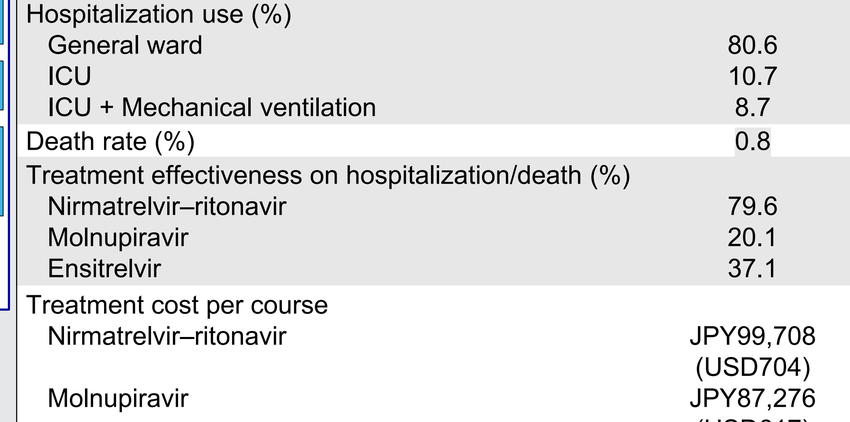
Analysis 2: Impact on clinical outcomes and inpatient medical costs

- Based on the result obtained from Analysis 1, we assumed a 34.3%, 51.5% (34.3%*1.5) and 77.2% (51.5%*1.5) decrease in the prescription rate of antiviral drugs from the current prescription rate (23.0%).
- The BIA model estimated that the numbers of one-year hospitalizations and deaths due to COVID-19 at the base case to be 679,985 and 5,712, respectively (**Table 2**).
- A 34.3%, 51.5% or 77.2% decrease of the prescription rate increased the total number of hospitalizations due to COVID-19 by 19,322 (2.8%), 28,983 (4.3%), or 43,474 (6.4%).
- Moreover, the total number of COVID-19 deaths increased by 162 (2.8%), 243 (4.3%), or 365 (6.4%).

Table 2. One-year clinical impacts of the reduction in oral antiviral prescriptions

		Base case	Reduction		
			-34.3%	-51.5%	-77.2%
Hospitalizations	N	679,985	699,307	708,968	723,460
	Difference	-	+19,322	+28,983	+43,474
	% Change	-	+2.8%	+4.3%	+6.4%
Deaths	N	5,712	5,874	5,955	6,077
	Difference	-	+162	+243	+365
	% Change	-	+2.8%	+4.3%	+6.4%

Figure 3. One-year economic impacts of the reduction in oral antiviral prescriptions



- The total cost related to COVID-19 at the base case was estimated to be approximately JPY1.4 trillion (USD10.2 billion) per year, comprising JPY88.2 billion (USD622.8 million) for antiviral drugs and JPY1.4 trillion (USD9.5 billion) for hospitalization.
- When accounting for a potential decrease in prescribing rates of 4.3%, 51.5% or 77.2%, the total costs would increase by approximately JPY8.2 billion (USD57.7 million) (0.6%), JPY12.2 billion (USD86.5 million) (0.9%), or JPY18.4 billion (USD129.8 million) (1.3%), respectively (**Figure 3**).
- The increase in total cost resulted from a net difference between reductions in the spend on oral antiviral drugs and an increase in the total hospitalization costs related to COVID-19.

References: **1.** Nagano M, Hyokai S, Togo K, et al. Impact of patient's financial burden of COVID-19 treatment on antiviral prescription rates and clinical and economic outcomes. Expert Rev Pharmacoecon Outcomes Res. 2024:1-11.; **2.** Ministry of Health, Labour and Welfare: Development of therapeutic drugs, vaccines, medical devices and test kits; **3.** Ministry of Health, Labour and Welfare: Response to COVID 19 (novel coronavirus) after the classification change; **4.** JMDC Inc.: JMDC Claims Database; **5.** Sandin R, Veenstra DL, Vankelegom M, et al. Budget impact of oral nirmatrelvir/ritonavir in adults at high risk for progression to severe COVID-19 in the United States. J Manag Care Spec Pharm. 2023;29(12):1290-1302.

Declaration of interest: MN, SH, KT, and AY are full-time employees of Pfizer Japan Inc. TM is a full-time employee of Pfizer Inc.