# The Budget Impact of Introducing a Rapid Polymerase Chain Reaction Test for the Detection of Influenza and Respiratory Syncytial Virus in China

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## BACKGROUND

- The cumulative number of influenza virus infections was 89 million (95% uncertainty intervals, 49 -170 million) between 2010 and 2020 in China.
- The respiratory syncytial virus (RSV) associated infections, which share similar symptoms, has a relatively low incidence rate in adults but leads to a high hospitalization among children aged 0-59 months (14 [95% confidence interval [CI]:14–14)/1,000 person-years].
- In China, all patients with respiratory infection symptoms are required to have diagnostic tests for influenza and RSV. Therefore, diagnostic tests with high efficiency will be beneficial in China.

## OBJECTIVE

- To estimate the economic impact of introducing a rapid polymerase chain reaction (PCR) test to detect influenza and RSV from a fever clinic's perspective and a patient's perspective in China.

## METHODS

### Overview

- The model estimates assess the differences in total hospital costs and per patient per year (PPPY) healthcare costs before and after adding a rapid PCR test to detect influenza and RSV in China.
- The model includes the rapid PCR test, cFDA-PCR test, rapid antigen detection tests, and immunochromatographic assay.
- Healthcare costs associated with influenza and RSV diagnostic were calculated based on:
  - Epidemiology of influenza and RSV
  - Influenza and RSV diagnostic fee
  - Influenza and RSV medication and supportive care costs
  - Hospitalization costs and other laboratory tests during RSV hospitalization
  - Labor costs of doctors, nurses, laboratory technicians
  - Other hospital operating costs

### Model Inputs

- Epidemiology inputs from literature were used to estimate the number of patients with influenza and RSV and the number of hospitalization associated with RSV.
- The diagnostic costs were based on assumptions; influenza and RSV medication and supportive care costs, test reporting time, disease duration of influenza and RSV and percentage of other laboratory tests during RSV hospitalization were based on literature.
- Labor costs of doctors, nurses, and laboratory technicians were based on literature, while other hospital costs were based on assumptions. **(Table 1)**

## METHODS (continued)

**Table 1. Model inputs**

| Parameters | Model inputs | Reference |
|---|---|---|
| Patients with influenza in a fever clinic | 65% | Data on file |
| Patients with RSV in a fever clinic | 10% | Data on file |
| Influenza and RSV diagnostic fee and reporting time (hours) | • Rapid PCR test: ¥200; 0.1 hrs<br>• cFDA-PCR test: ¥150; 0.5 hrs<br>• Rapid antigen detection tests: ¥80; 0.5 hrs<br>• Immunochromatographic assay: ¥210; 0.5 hrs | Assumption based on market research and expert opinion |
| Influenza disease course (days) and influenza and RSV medication and supportive care costs (PPPY) | • Rapid PCR test: 8 ds; ¥368<br>• cFDA-PCR test: 10.5 ds; ¥578<br>• Rapid antigen detection tests: 13 ds; ¥719<br>• Immunochromatographic assay: 9 ds; ¥430 | Influenza disease course: Cleveland clinic<br>Medication costs: market research and expert opinion |
| RSV associated hospitalization rate under each test and other laboratory tests during RSV hospitalization (PPPY) | • Rapid PCR test: 73.3%; ¥90<br>• cFDA-PCR test: 77.7%; ¥102<br>• Rapid antigen detection tests: 85%; ¥102<br>• Immunochromatographic assay: 77.7%; ¥102 | RSV associated hospitalization rate and percentage of other laboratory tests during RSV hospitalization: Wabe, N., et al. (2019)<br>Medication costs: Medical Services Price, China, 2022 |
| Hospitalization costs (per day) | ¥2,540 | Zhang, T 2014 |
| Labor costs of doctors, nurses, and technicians (per day) | ¥423; ¥317; ¥350 | Dang, W., et al 2020 |
| Other hospital operating costs (per day) | ¥2,000 | Assumption based on expert opinion |

## RESULTS

**Figure 1. Budget Impact Results – Total Hospital Costs per Year**

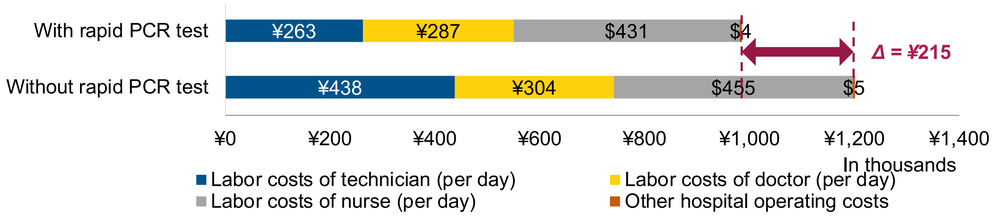
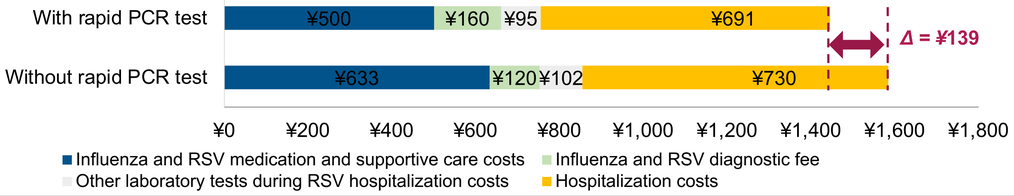



**Figure 2. Budget Impact Results – PPPY**




## RESULTS (continued)

- In the base case, all patients visiting the fever clinic are required to have influenza and RSV tests in a hypothetical population of 20,000.
- Adding the rapid PCR test decreased the hospital costs by ￥0.22 million per year **(Figure 1)** and reduced the healthcare budget by ￥139 PPPY. **(Figure 2)**
- The hospital budget decrease was mainly due to the fewer RSV hospitalizations (total inpatient days per year before vs. after market entry: 5,746 vs. 5,438 days [Δ= 307 days]).
- The PPPY budget decrease was mainly due to the shorter influenza disease course that leads to less influenza and RSV medication and supportive care costs per patient per year (before vs. after market entry: ¥633 vs. ¥500 [Δ= ¥133]).
- The total hospital costs per year and PPPY healthcare budget were most sensitive to RSV-associated hospitalization rate.

## CONCLUSION

**The inclusion of a rapid PCR test to detect influenza and RSV offers an efficacious approach with a decrease in the healthcare budget from both a fever clinic's perspective and a patient's perspective in China.**

### Disclosure

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### Acknowledgements

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