

The Budget Impact of Introducing Monocyte Distribution Width (MDW) As a Screening Tool for Sepsis in China



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BACKGROUND

- According to the global sepsis report released by the World Health Organization (WHO) in 2020, the incidence of sepsis is 189 cases per 100,000 person-years, and there are about 48.9 million sepsis patients worldwide.
- A population-based epidemiological study of sepsis showed that more than one million patients died of sepsis in China in 2015. In a Chinese intensive care unit (ICU) multicenter study in 2020, the fatality rate of sepsis patients was 35.5%, and the fatality rate of severe sepsis was as high as 50% or more.
- Sepsis progresses very rapidly from non-severe to life-threatening. In the emergency department, it is difficult to differentiate sepsis from non-infectious acute illness not caused by infection due to similar clinical symptoms. Therefore, the majority of patients with sepsis (>85%) are detected during hospital admission.
- In the emergency department, early screening of sepsis relies on clinical data when the patient arrives at the hospital. However, sepsis screening is frequently delayed in the emergency department due to lack of reliable screening tool, resulting in delayed treatment, prolonged ICU stay, and increased mortality.

OBJECTIVE

To estimate the economic impact of introducing monocyte distribution width (MDW) to sepsis screening from an emergency department's perspective and a patient's perspective in China.

METHODS

Overview

- The model estimates difference in total healthcare costs and per patient per year (PPPY) costs before and after adding MDW to the standard sepsis screening approach in an emergency department in China.
- The model includes MDW and standard of care (SoC).
- Healthcare costs associated with screening sepsis were calculated based on:
 - Epidemiology of sepsis
 - Time to antibiotic use
 - Hospitalization length of stay (LOS)
 - Screening costs
 - Cost of hospitalization
 - Labor costs of doctors and nurses
 - Other hospital operating costs

METHODS (continued)

Model Inputs (Table 1)

- Epidemiology inputs from published literature were used to estimate the number of patients eligible for MDW screening.
- The screening costs were based on assumption.
- Time to antibiotic use were based on trial data and hospitalization duration was calculated by time to antibiotic.
- Cost of hospitalization and labor costs of doctors and nurses were based on literature while other hospital costs were based on assumption.

Table 1. Model inputs

Parameters	Model inputs	Reference
Prevalence of sepsis in ICU	20.6%	Xie, J., et al., 2020
Time to antibiotic	- MDW: 2.07 hours - SoC: 3.95 hours	Paoli, C.J., et al., 2019
Hospitalization length of stay (LOS)	- MDW: 10.01 hours - SoC: 11.46 hours	Estimated based on time to antibiotic and model coefficients in Ferrer et al. 2014
Screening costs	- MDW: ¥500 - SoC: ¥500	Assumption based on market research and expert opinion
Hospitalization costs (per day)	¥3,267	Zhu, C., et al., 2018
Labor costs (per day)	Doctor: ¥423; Nurse: ¥317	Dang, W., et al 2020
Other hospital operating costs including miscellaneous, and equipment wear costs (per day)	¥2,000	Assumption based on expert opinion

RESULTS

Figure 1. Budget Impact Results – Total Costs

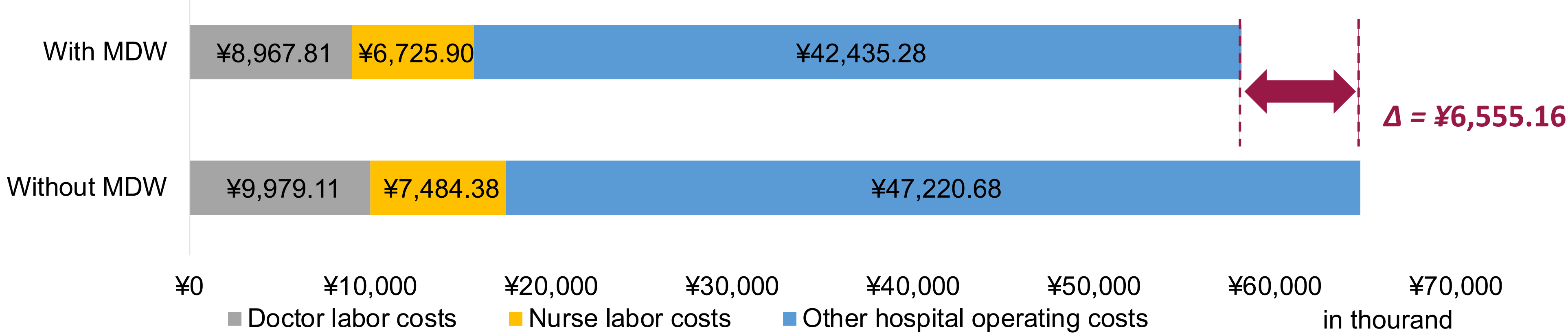
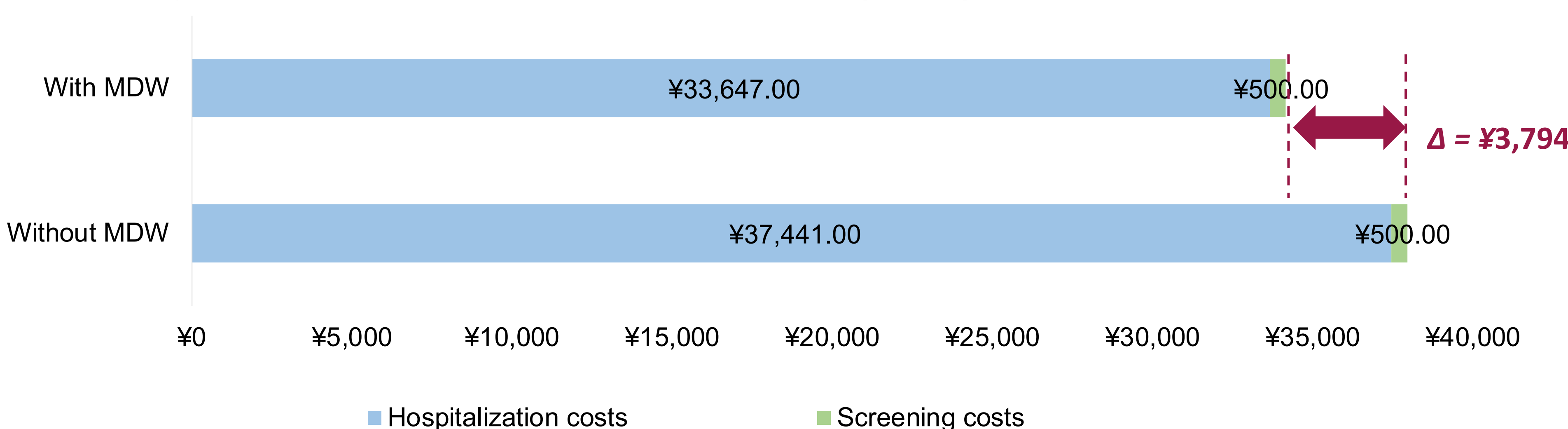


Figure 2. Budget Impact Results – per Patient per Year (PPPY) Costs



RESULTS (continued)

- In the base case, 206,000 patients were diagnosed with sepsis among the hypothetical one million patients.
- Inclusion of MDW in the sepsis screening decreased the healthcare budget by ¥0.66 billion from an emergency department's perspective (Figure 1) and ¥3,794 PPPY from a patient's perspective (Figure 2).
- The budget decrease was mainly due to the shorter time to antibiotic use and shorter hospitalization duration by adding MDW to the SoC (MDW vs. SoC: time to antibiotic use, 2.07 vs. 3.95 hours; hospitalization duration, 10.01 vs. 11.46 days).
- Results were the most sensitive to time to antibiotic use.

CONCLUSION

The inclusion of MDW in the sepsis screening offers an efficacious diagnostic approach with a decrease in the healthcare budget from both an emergency department's perspective and a patient's perspective in China.

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