

Mia Kobayashi, PhD¹; Ataru Igarashi, PhD²; Yuriko Hagiwara, PhD²; Ayako Shoji, PhD²; Hiroshi Yoshihara, MS²; Shunya Ikeda, MD, PhD^{2,3}
¹Yamanashi University, Chuo-shi, Japan; ²Keio University, Tokyo, Japan; ³International University of Health and Welfare, Narita, Japan

1. BACKGROUND

- Herpes zoster (HZ) causes substantial morbidity and costs in aging societies, mainly through postherpetic neuralgia (PHN).
- In Japan, a one-dose live attenuated varicella vaccine and a two-dose adjuvanted recombinant zoster vaccine (RZV) are available for adults aged 50 years or older.
- The economically preferred vaccine and target age remain uncertain.

2. OBJECTIVE

- To evaluate the cost-effectiveness of alternative HZ vaccination strategies in Japan.

3. METHODS

- Cost-utility analysis using a Markov model.
- Strategies: no vaccination, live vaccine, and RZV.
- Cohorts aged 50, 55, 60, 65, 70, 75, and 80 years were evaluated.
- Population strategies targeting all adults above selected age thresholds were also assessed.
- Japanese epidemiologic data, medical costs, vaccine effectiveness, duration of protection, and quality-of-life losses were incorporated.
- Outcomes: costs, QALYs, and ICERs.
- Willingness-to-pay threshold: JPY 5 million per QALY.

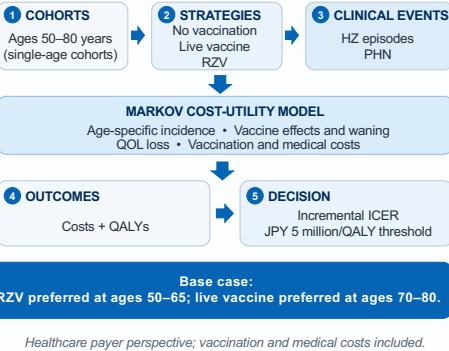
4. KEY MODEL INPUTS

Parameter	Base-case input
HZ incidence	9.2-12.9 per 1,000 PY, by age
PHN among HZ cases	14.6%-32.9%, by age
Live vaccine HZ effect	38% in year 1; waning to 17% by year 7; zero thereafter
Live vaccine PHN effect	50% in year 1; 25% in years 2-7
RZV HZ effect	98.9% (<70 years) or 95.4% (≥70 years), with linear waning
Vaccine costs	Live: JPY 10,000; RZV: JPY 40,000 (including administration)

Analyses were conducted from the healthcare payer perspective, incorporating vaccination and medical costs regardless of patient cost-sharing.

Economic decision rule: the preferred strategy was determined by incremental comparison among no vaccination, live vaccine, and RZV at the JPY 5 million/QALY threshold.

ANALYTIC FRAMEWORK

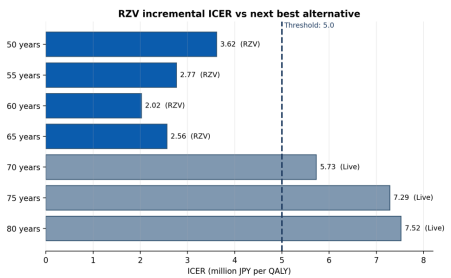


5. BASE-CASE RESULTS

Single-age cohort analysis

Age	Live vs no (million/QALY)	RZV vs no (million/QALY)	Preferred at JPY 5m
50	2.57	3.22	RZV
55	2.42	2.65	RZV
60	2.84	2.02	RZV
65	3.48	2.56	RZV
70	3.55	4.93	Live
75	3.45	5.68	Live
80	3.20	5.66	Live

At least one vaccination strategy was cost-effective in all age groups compared with no vaccination.



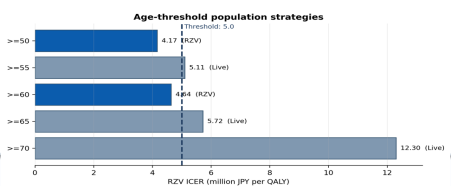
Key findings

- RZV was preferred at ages 50-65 years.
- At ages 70, 75, and 80 years, the live vaccine was preferred at the JPY 5 million/QALY threshold.
- Older-cohort conclusions were sensitive to PHN protection, utility loss, incidence, and waning effectiveness.

6. AGE-THRESHOLD STRATEGIES

Population strategies targeting all adults above selected ages

Target	Relevant RZV ICER (million/QALY)	Preferred at JPY 5m
≥50 years	4.17	RZV
≥55 years	5.11	Live
≥60 years	4.64	RZV
≥65 years	5.72	Live
≥70 years	12.30	Live



7. INTERPRETATION

Why RZV at younger ages?

Higher initial effectiveness and durable protection offset the higher acquisition cost.

Why live vaccine at older ages?

Lower vaccine cost can outweigh additional RZV benefits when remaining lifetime risk and benefits are smaller.

Why assumptions matter?

PHN-related QOL loss and duration of protection materially affect incremental value.

8. SCENARIO ANALYSES

- Live-vaccine PHN prevention was varied across four scenarios, from maintained protection to no additional PHN effect.
- Alternative QOL decrements from previous Japanese economic studies were tested.
- HZ incidence was varied using Miyazaki Study estimates.
- Age-specific live-vaccine effectiveness assumptions were also explored.

Overall scenario pattern

- Using larger QOL losses increased cases favoring RZV.
- Lower incidence worsened ICERs modestly but generally preserved the base-case pattern.
- Results near age 70 were most sensitive to assumptions.

9. CLINICAL AND POLICY CONTEXT

- HZ and PHN increase with age; PHN may substantially impair daily activities and quality of life.
- In Japan, both live vaccine and RZV are available for HZ prevention in adults aged 50 years or older.
- Choice of target age and vaccine type should consider economic value, protection duration, and PHN burden.

10. CONCLUSIONS

- HZ vaccination is economically attractive in Japan at a JPY 5 million/QALY threshold under base-case assumptions and sensitivity analyses.
- RZV offers better value for adults aged 50-65 years and selected age-threshold programs.
- The live vaccine may be more efficient for older or narrower target populations.
- Policy decisions should consider target age, PHN-related QOL loss, waning protection, and implementation feasibility.

11. REFERENCES

National Institute of Infectious Diseases, Japan. Herpes zoster vaccine fact sheet, 2nd ed. Revised Jun 20, 2024; partially corrected Nov 1, 2024. Japanese.

Takao Y, Miyazaki Y, Okeda M, et al. J Epidemiol. 2015;25(10):617-625. doi:10.2188/jea.JE20140210.

Yaegashi M, Matsui H, Yoshida A, et al. Vaccine. 2024;42(3):464-470. doi:10.1016/j.vaccine.2023.12.082.

Strezova A, Diez-Domingo J, Al Shawaf K, et al. Open Forum Infect Dis. 2022;9(10):ofac485. doi:10.1093/ofid/ofac485.

Hoshi SL, Kondo M, Okubo I. Vaccine. 2017;35(24):3264-3271. doi:10.1016/j.vaccine.2017.04.046.

Hoshi SL, Seposo X, Shono A, Okubo I, Kondo M. Vaccine. 2019;37(27):3588-3597. doi:10.1016/j.vaccine.2019.05.006.

Shiragami M, Mizukami A, Kaise T, et al. Dermatol Ther (Heidelb). 2019;9(2):281-297. doi:10.1007/s13555-019-0291-4.

Teng L, Mizukami A, Ng C, et al. Dermatol Ther (Heidelb). 2022;12(6):1447-1467. doi:10.1007/s13555-022-00744-8.

Disclosures

This study was supported by the Health and Labour Sciences Research Grants from the Ministry of Health, Labour and Welfare, Japan.