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Evaluating Public and Physician Perspectives on Herpes Zoster Vaccination in Japan Using the Capability–Opportunity–Motivation–Behavior Model

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Abstract

To investigate the knowledge, attitudes, and practices (KAP) related to herpes zoster (HZ) and its vaccination among people in Japan. This mixed-methods research consisted of two distinct phases. During phase 1, concept elicitation interviews were held with members of the general public (n = 24) and physicians (n = 6). The capability-opportunity-motivation-behavior model was employed to pinpoint key themes connected to KAP. In phase 2, these themes were confirmed using self-administered quantitative surveys distributed to a broader sample (public: n = 600; physicians: n = 60).

Even though awareness levels were high for both HZ (92.9%–94.0%) and HZ vaccination (76.0%–80.4%) in the public group, actual knowledge regarding HZ remained limited, vaccination coverage was low (13.1%–32.0%), and the willingness to get vaccinated was modest (12.6%–18.2% among those not yet vaccinated against HZ). Members of the public showed strong readiness to accept HZ vaccination when advised by their physician (78.7%–84.0%). However, physicians frequently hesitated to recommend the vaccine due to obstacles, including their belief that patients were unwilling (51.7%) and concerns about the vaccine's cost (51.7%). Several forms of government assistance were identified as potential ways to stimulate discussions between patients and physicians about HZ and to boost vaccination rates in the general population (30.0%–53.3%). The results of this study could help shape future public health approaches to reduce barriers to HZ vaccine acceptance in Japan.

Keywords: Vaccination, Herpes zoster, Model, Zoster virus

Introduction

Herpes zoster (HZ) is an infectious condition triggered by the reactivation of the dormant varicella zoster virus within the dorsal root ganglia [1, 2]. It typically presents as a painful rash that follows a dermatomal pattern [1, 2] and may result in serious, prolonged complications, such as postherpetic neuralgia (PHN; defined as pain continuing for more than 90 days after the rash appears), loss of vision, and persistent motor impairments [3, 4]. HZ significantly affects quality of life (QoL) by impairing physical, social, and emotional well-being [4, 5].

The likelihood of contracting HZ increases substantially with advancing age, particularly after age 50, mainly because the immune system naturally weakens [4]. In addition, certain health conditions that become more common with age, including diabetes and cardiovascular diseases [6, 7], are known to further elevate the risk of HZ [8–10]. Consequently, there is growing concern that the overall burden of HZ will rise in countries with aging populations, such as Japan [11], where the highest incidence rates occur among adults aged 50 years and older [1].

Standard management of HZ usually involves antiviral medications and pain relievers [12]. However, these therapies have shown only modest success in preventing PHN and provide minimal improvement in quality of life

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[4, 13–15]. On the other hand, HZ vaccination offers a preventive strategy that can reduce the risk of developing HZ and lessen the severity and consequences of its symptoms [16–18]. At present, two HZ vaccines are licensed in Japan: the freeze-dried live attenuated varicella vaccine [19, 20] and the recombinant zoster vaccine (RZV) [21–23]. Both are indicated for preventing HZ in adults 50 years of age and older, while RZV is also approved for adults aged 18 years and above who face heightened risk.

Recently, HZ vaccination was included in Japan's National Immunization Program (NIP) for individuals aged 65 years and for those aged 60-64 years with compromised immunity due to human immunodeficiency virus (HIV) infection [24]. Despite this step, Japan's long-standing vaccine hesitancy could limit widespread adoption. Past safety concerns raised by both the public and health authorities regarding multiple vaccines have contributed to Japan's low ranking in vaccine confidence worldwide [25, 26].

Until now, only a small number of studies have examined knowledge, attitudes, and practices (KAP) regarding HZ and HZ vaccination among Japanese adults aged 50 years and above [15]. These suggest that the true burden of HZ and the benefits of prevention are not fully appreciated. Beyond personal factors that affect vaccination decisions, clear and effective dialogue with healthcare professionals (HCPs) plays a vital role in raising awareness and encouraging people to seek vaccination [27, 28]. The Capability-Opportunity-Motivation-Behavior (COM-B) model of behavioral change provides a practical framework for understanding the drivers of HZ vaccination. This model, widely applied in designing and reviewing behavioral interventions and policies, indicates that lasting change happens when capability, opportunity, and motivation are all appropriately addressed [29].

Accordingly, the present study applied the COM-B model to examine KAP regarding HZ and HZ vaccination among the general public and physicians in Japan, and to examine how these aspects differ across various respondent groups. The insights are expected to help develop targeted public health measures to prevent HZ in the country. This research builds on an earlier Asia-Pacific study conducted in Hong Kong, the Republic of Korea, Singapore, and Taiwan, which identified important knowledge gaps and cognitive biases that warrant attention to enhance HZ-related behaviors across the region [30].

Materials and Methods

Study design

The investigation used a mixed-methods design, executed in two stages, with participants in Japan. Phase 1 took place between January and March 2023 and involved one-to-one online interviews conducted in Japanese. Each session lasted roughly 45 minutes and included members of the general public and practicing physicians. A detailed interview outline was developed after examining published research on knowledge, attitudes, and practices (KAP) regarding herpes zoster (HZ) and HZ vaccination. It was supplemented by advice from a Japanese expert who reviewed the study documents. Responses from these interviews were examined to extract main themes related to KAP regarding HZ and its vaccine, and the COM-B model was applied to identify specific behavioral shortcomings or obstacles [29]. More extensive descriptions of the Phase 1 approach and analytical procedures appear in an earlier publication [30].

These Phase 1 themes were numerically confirmed in Phase 2, which consisted of a self-completed cross-sectional questionnaire lasting approximately 30 minutes. The survey ran from April to May 2023 and reached a considerably larger pool of participants. Questions were constructed around the themes uncovered in Phase 1 and grouped under the COM-B framework, addressing aspects such as knowledge levels, motivating factors, and enabling conditions, as well as overall attitudes and actions toward HZ and available HZ vaccines (Supplementary Appendix S1, S2). Findings from the background literature review and specialist recommendations were also integrated. The full questionnaire was translated into Japanese before being distributed and completed online by all participants. Summary statistics were generated for all items, broken down by participant category and subgroup, and reported as frequencies, percentages, averages, and standard deviations, depending on the nature of each question. Statistical tests comparing groups and subgroups included Pearson's Chi-square tests for categorical data and one-way analyses of variance (ANOVAs) for continuous measures.

An amendment to the previously cleared regional protocol was forwarded to the central Institutional Review Board (IRB), Pearl IRB, requesting the addition of Japan. The amendment received an exemption from complete review (#21-CERN-104). Every eligible

candidate received an electronic informed consent document, and consent was secured digitally for both phases of the project.

Study population

Participants comprised members of the Japanese general public (non-physicians) and licensed physicians. Earlier mixed-methods investigations unrelated to HZ [31–33] indicated that interviewing 24–30 public participants in phase 1 would be enough to surface important themes suitable for quantitative testing in phase 2. For the survey phase, prior HZ-focused research [34–36] indicated a suitable public sample of 450-600 individuals; sample sizes for public subgroups and the physician cohort were set within realistic recruitment limits.

Public participants in both phases were drawn from the Kantar Profiles panel and associated databases through deliberate purposive sampling. Screening for suitability was conducted by telephone or email during phase 1 and via a web-based form in phase 2, following the fixed inclusion and exclusion criteria. Four distinct public subgroups were enrolled: (i) adults 50 years and older who had never received any HZ vaccine, (ii) adults 50 years and older who had received either the live zoster vaccine or recombinant zoster vaccine (RZV), (iii) adults 50 years and older who had experienced HZ either currently or in the past, and (iv) employed or financially self-sufficient adults between 30 and 49 years old whose parents were aged 50 or above. Group (iv), labeled "adult children," was deliberately added because adult offspring frequently influence medical decisions and provide financial assistance to elderly parents within many Asian cultural contexts [37].

Physicians were selected through purposive sampling from combined databases assembled from Japanese hospital websites and open healthcare professional registries. Recruitment focused on general practitioners (GPs), pain specialists, and dermatologists who satisfied the predefined eligibility requirements.

Anyone who joined the phase 1 exploratory interviews was barred from taking part in the phase 2 online survey.

Results and Discussion

Phase 1 (Concept elicitation)

Demographics

Interviews were completed by 24 public participants and 6 physicians. The public group breakdown included 6 non-HZ-vaccinated adults aged 50 years or older, 6 HZ-vaccinated adults aged 50 years or older, 6 current or former HZ patients aged 50 years or older, and 6 working or financially independent adults aged 30–49 years who had parents aged 50 years or older (subsequently called "adult children"). Among older adults (aged 50 years and above), exactly half were 65 years or older. The physician sample consisted of 2 general practitioners (GPs), 2 pain clinicians, and 2 dermatologists.

The public

People from the general public had only moderate familiarity with herpes zoster (HZ). This awareness mostly came from hearing about the experiences of relatives or friends who had gone through the illness, as well as from media coverage. Their overall grasp of HZ symptoms, contributing risk factors, possible long-term complications, and existing treatment options was fairly limited. In every discussion group, at least one individual held inaccurate ideas about the disease.

The vast majority of participants knew very little about vaccines designed to prevent HZ, and even those who had previously had HZ showed only limited understanding. Still, many expressed genuine eagerness to learn more about both the disease itself and the vaccination option. They specifically wanted details on the vaccine's advantages and drawbacks, the groups of people it is intended for, and the practical steps needed to get vaccinated. Medical doctors and official government channels were considered dependable sources of information and were thought to strongly influence whether people ultimately decided to be vaccinated. Respondents also noted that hearing firsthand accounts from family members or friends who had experienced HZ helped shape their opinions about the illness and the value of vaccination, which subsequently influenced their actual vaccination behavior.

In all surveyed groups, the strongest motivations for pursuing HZ vaccination centered on escaping the pain and preventing the enduring complications that the disease can cause. Even so, the substantial expense of the vaccine emerged as a major deterrent. Adult children of older parents, along with those who had already completed HZ vaccination, highlighted government financial assistance as a significant factor in their decision to proceed with immunization.

Physicians

Doctors displayed considerable expertise regarding herpes zoster, including its characteristic symptoms,

long-term consequences, the population groups most at risk, and the likelihood of recurrence. They were also well equipped to evaluate the available HZ vaccines based on factors such as composition, situations in which they should not be used, potential adverse reactions, and overall pricing. In daily practice, physicians tend to focus their vaccination recommendations on diseases that occur more frequently or are considered more serious (such as pneumococcal infection and seasonal influenza), or on patient requests. Key obstacles to more active promotion of the HZ vaccine included concerns about the direct financial burden on patients and the impression that many patients felt hesitant or unwilling to receive it. The doctors agreed that assistance from the government—particularly through clear official communications and funding—would help guide their clinical decisions regarding HZ prevention.

Phase 2 (Quantitative validation): The public

Demographics

Once individuals who had never heard of HZ or had declined preventive vaccines were screened out, the study enrolled 550 older adults and 50 adult children **(Table 1)**. Among older adults, 13.1% reported receiving the HZ vaccine, and 36.4% were either currently experiencing or had previously experienced HZ. A majority (56.7%) were ≥ 60 years old and reported making their own healthcare decisions (69.3%). Among the 50 participating adult children, 92.0% had parents aged 60 or older, and 60.0% came from families with a prior history of HZ. Furthermore, 32.0% stated that their parents had been vaccinated against HZ, and 42.0% reported that their parents had either a current or past diagnosis of the disease. Slightly more than half of these adult children (54.0%) described themselves as the primary decision-makers for their parent(s)' health choices. Recruitment of both older adults and adult children was evenly distributed across Japan's regions.

Table 1. Demographic and characteristic data for public respondents (older adults and adult children) in Japan (2023).

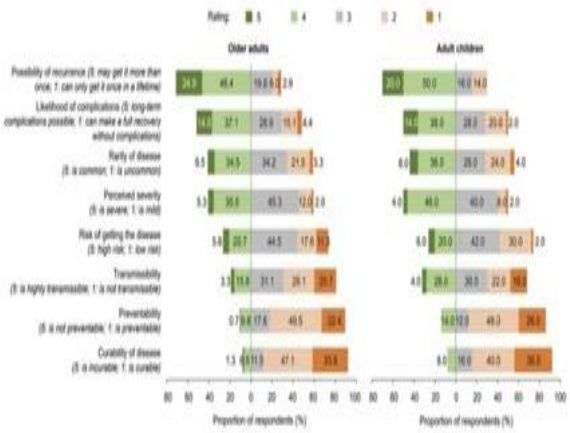
Characteristic	Non-vaccinated (n = 478)		Vaccinated (n = 72)		Older adults– overall (n = 550)		Adult children – overall (n = 50)		HZ-naïve (n = 350)		HZ cases (n = 200)	
	n	%	n	%	n	%	n	%	n	%	n	%
Sex												
Male	38	57.8	318	58.6	280	52.8						
Female	34	42.2	232	41.4	198	47.2						
Age distribution												
30–35 years	N/A	N/A	N/A	N/A	N/A	N/A						
36–40 years	N/A	N/A	N/A	N/A	N/A	N/A						
41–44 years	N/A	N/A	N/A	N/A	N/A	N/A						
45–49 years	N/A	N/A	N/A	N/A	N/A	N/A						
50–55 years	15	22.9	126	23.2	111	20.8						
56–60 years	16	20.4	112	20.1	96	22.2						
61–64 years	13	17.1	94	16.9	81	18.1						
≥65 years	28	39.6	218	39.7	190	38.9						
Parent age (reported by adult children)												
50–54 years	N/A	N/A	N/A	N/A	N/A	N/A						
55–59 years	N/A	N/A	N/A	N/A	N/A	N/A						
60–64 years	N/A	N/A	N/A	N/A	N/A	N/A						
≥65 years	N/A	N/A	N/A	N/A	N/A	N/A						
Educational attainment												
Primary or secondary school	14	20.9	115	21.1	101	19.4						
Vocational training	11	15.3	84	15.3	73	15.3						

University degree or higher	47	63.3	348	63.0	301	65.3
Declined to respond	0	0.5	3	0.6	3	0
Employment situation (adult children)						
Working	N/A	N/A	N/A	N/A	N/A	N/A
Not working but financially secure	N/A	N/A	N/A	N/A	N/A	N/A
Co-residence with a parent aged ≥ 50 years						
Yes	N/A	N/A	N/A	N/A	N/A	N/A
No	N/A	N/A	N/A	N/A	N/A	N/A
HZ vaccination status						
Vaccinated	72	13.1	72	0	0	100.0
Not vaccinated	0	86.9	478	100.0	478	0
HZ diagnosis status						
Previous HZ (recovered)	20	34.5	190	35.6	170	27.8
Current HZ infection	2	1.8	10	1.7	8	2.8
No history of HZ	50	63.6	350	62.8	300	69.4
HZ severity (valid n = 200)	22		200		178	
Mild	4	50.0	100	53.9	96	18.2
Moderate	16	46.0	92	42.7	76	72.7
Severe	2	4.0	8	3.4	6	9.1
Family history of HZ						
Yes	25	30.0	165	29.3	140	34.7
No	47	70.0	385	70.7	338	65.3
Decision-making role						
Primarily responsible	61	69.3	381	66.9	320	84.7
Shared family decision-making	11	30.5	168	32.8	157	15.3
Decisions made by children	0	0.2	1	0.2	1	0

Older adults (aged ≥ 50 years) and adult children (aged 30–49 years, with parents aged ≥ 50 years) who participated in the study were aware of HZ and open to preventive vaccination. Data were rounded to the first decimal place, and the sum of the values may not equal 100%. Disease severity was assessed only among current/former older adult patients with HZ. HZ: herpes zoster; N/A: not applicable.

KAP related to HZ

All members of the public recognized herpes zoster when its symptoms were explained using ordinary, everyday language common in their region. A minority (older adults: 7.1%; adult children: 6.0%) remained unaware of the official medical name for the condition. Most participants (older adults: 71.3%; adult children: 70.0%) understood that HZ has the potential to recur, and nearly half realized that it could lead to long-term complications (51.6%; 50.0%) **(Figure 1a)**. When asked about personal risk, 26.5% of older adults and 26.0% of adult children felt that they or their parents faced a high chance of developing HZ, whereas 28.9% and 32.0%, respectively, considered the risk to be low. The clear majority accepted that HZ could have a serious negative influence on quality of life (QoL) (older adults: 83.1%; adult children: 84.0%) and agreed that providing care for someone with HZ tends to be demanding and stressful (64.5%; 70.0%) **(Figure 1b)**. Notably larger percentages of those older adults who had already been vaccinated against HZ—compared with those who had not—correctly understood that advancing age raises the likelihood of long-term complications (87.5% versus 75.5%, p = 0.0299) and that HZ can substantially lower QoL (91.7% versus 81.8%, P = 0.0411).



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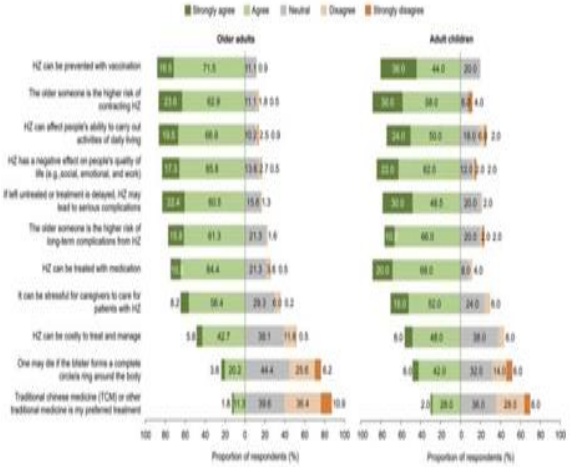

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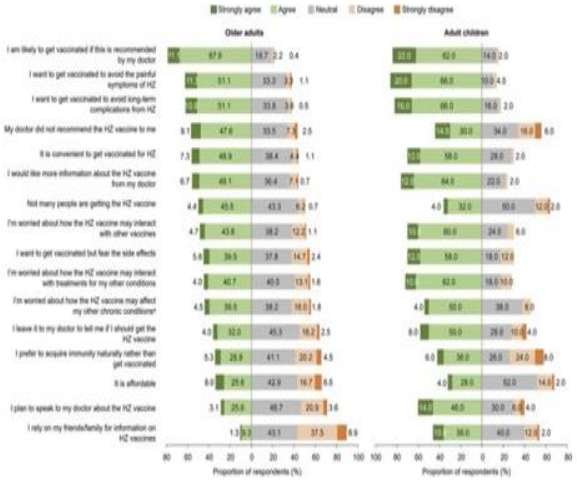

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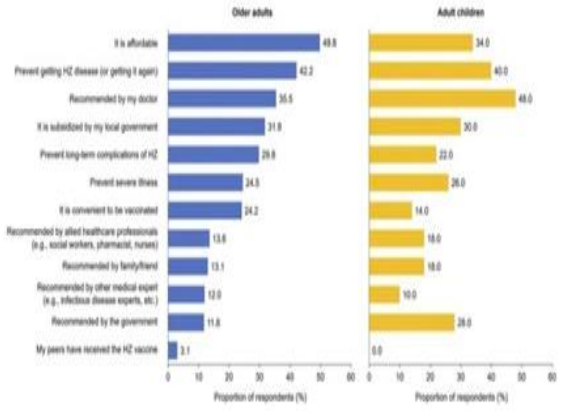


d)

Figure 1. (a) Public understanding of herpes zoster, (b) general sentiments toward herpes zoster, (c) general sentiments toward the herpes zoster vaccine, and (d) primary motivators for receiving the herpes zoster vaccine, among community members (older adults aged ≥ 50 years and adult children aged 30–49 years with parents aged ≥ 50 years) (Japan, 2023). Examples include diabetes, hypertension, and high cholesterol. Survey questions asked of the public participants (every statement shown exactly as presented): (a) "Here are some statements others have said about HZ (shingles) as an illness. Please select a rating that is closest to how you feel about each statement (Japan, 2023)." (b) "Here are some other statements others have said about HZ. To what extent do you agree/disagree with these statements?" (c) "The following are statements about what people think and feel about HZ (shingles) vaccine. To what extent do you agree/disagree with these statements?" (d) "Which of the following factors are most important when deciding whether to take the HZ (shingles) vaccine for yourself/your elderly parents?" Data were rounded to the first decimal place, and the sum of the values may not equal 100%. Abbreviation: HZ = herpes zoster.

Public respondents identified reduced immunity (older adults: 72.4%; adult children: 68.0%) and emotional stress (50.4%; 48.0%) as the two most important risk factors for HZ. Fewer than half mentioned advanced age (≥50 or 65 years) as a contributing risk (35.5%–40.0%; 38.0%–40.0%). Although the clear majority correctly named pain (older adults: 82.7%; adult children: 74.0%) and skin rash (74.7%; 76.0%) as typical signs of HZ, under half recognized itchiness combined with dryness (42.2%; 44.0%) or skin numbness (30.9%; 30.0%) as

symptoms. Persistent nerve pain (54.9%; 50.0%) and skin infection or scarring (45.8%; 56.0%) were the most commonly identified long-term complications. HZ-vaccinated older adults consistently demonstrated stronger awareness of these long-term issues than their non-vaccinated counterparts. In particular, knowledge regarding complications such as vision loss (P = 0.0003), hearing loss (P = 0.0127), mood-related disorders (P = 0.0029), and facial nerve paralysis (P = 0.0040) was markedly higher among those who had received the vaccine.

Virtually all current or former HZ patients (97.0%) sought medical attention at a clinic or hospital. Of the 81 patients who first consulted a primary care doctor, about one-third (37.0%) postponed their visit for 4 days or more after the rash started. Most of these patients explained the delay by saying they thought their symptoms did not appear serious enough (73.3%).

KAP related to vaccination

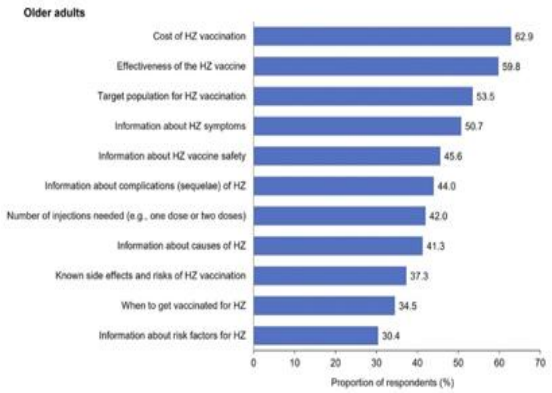
The large majority of public respondents knew that HZ vaccine(s) exist (older adults: 80.4%; adult children: 76.0%). They most frequently indicated that the vaccine is necessary for individuals with low or weakened immunity (71.1%; 62.0%), people who have never been vaccinated against HZ (54.7%; 42.0%), and adults aged 65 years or older (46.9%; 54.0%).

Most members of the public said they would probably pursue HZ vaccination for themselves or their parents if a physician advised it (older adults: 78.7%; adult children: 84.0%). Other major reasons included the desire to escape the painful effects of HZ (62.4%; 86.0%) and to prevent its lasting complications (62.0%; 82.0%) **(Figure 1c)**. Compared with non-vaccinated older adults, those who had already been vaccinated showed significantly greater willingness to follow a doctor's recommendation (90.3% versus 77.0%, P = 0.0365), to avoid painful symptoms (97.2% versus 57.1%, p < 0.0001), and to steer clear of long-term complications (95.8% versus 56.9%, P < 0.0001). Fewer than half of the older adults expressed concern that HZ vaccines might interfere with medications for other health issues (44.7%), interact with other immunizations (48.5%), worsen existing medical conditions (44.0%), or trigger side effects (45.1%). These worries were noticeably more widespread among adult children (72.0%, 70.0%, 54.0%, and 70.0%, respectively) **(Figure 1c)**.

Among older adults who remained unvaccinated against HZ and adult children whose elderly parents had not received the vaccine, only 12.6% and 18.2%, respectively, said they intended to get vaccinated or arrange vaccination for their parents. Roughly half were still unsure (older adults: 49.4%; adult children: 57.6%). The strongest influences on deciding to receive the vaccine were its affordability (older adults: 49.8%; adult children: 34.0%), protection against developing HZ (42.2%; 40.0%), and guidance from a doctor (35.5%; 48.0%) **(Figure 1d)**. Just 12.4% of older adults and 28.0% of adult children recalled ever receiving a recommendation for HZ vaccination from a physician or other healthcare provider. Financial support from local government programs was seen as an important incentive by nearly three out of every ten respondents (older adults: 31.8%; adult children: 30.0%).

Information sources and influence

Local media ranked as the most widespread channel for learning about HZ and its vaccine among all participants (older adults: 40.0%–47.6%; adult children: 36.0%). Healthcare professionals, however, were viewed as the most reliable (79.1%; 70.0%) and the most favored (72.2%; 60.0%) source of information. When asked what they wanted to know more about, older adults placed the highest priority on the price of the HZ vaccine (62.9%), how well it works (59.8%), and which groups should receive it (53.5%) **(Figure 2a)**. Adult children expressed very similar interests: vaccine cost (52.0%), recommended target groups (50.0%), and the number of shots required (50.0%) **(Figure 2b)**.



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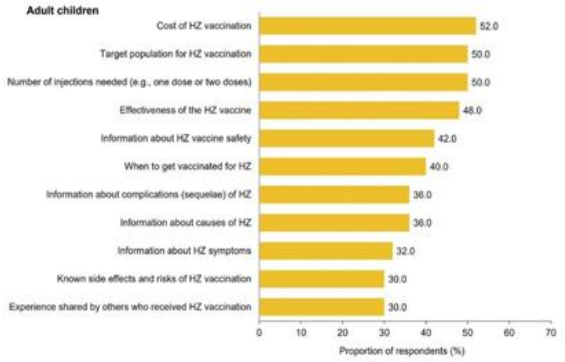

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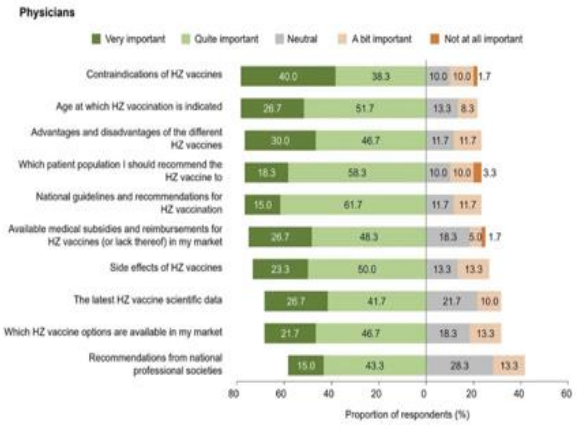


c)

Figure 2. Information on herpes zoster and herpes zoster vaccination is of interest/importance to the public and physicians. (a) Topics of interest among older adults aged ≥ 50 years, (b) Topics of interest among adult children aged 30–49 years with parents aged ≥ 50 years, and (c) Topics of importance among physicians (Japan, 2023). (a, b) Survey question for public respondents: "What topics would you like to be provided with to help you learn more about HZ (shingles) disease and vaccination? Please select all that apply." Statements surveyed that were selected by ≥30% of respondents are presented (Japan, 2023). (c) Survey question for physician respondents: "Here are some statements that other clinicians have told us are important to know about the herpes zoster vaccine. Please rate the importance for you personally." Percentages are the sum of respondents who indicated "Very important" and "Quite important" to each statement. Data were rounded to the first decimal place, and the sum of the values may not equal 100%. Abbreviation: HZ = herpes zoster.

Phase 2 (Quantitative validation): Physicians Demographics

The study enrolled 60 physicians, comprising 20 general practitioners (33.3%), 20 pain specialists (33.3%), and 20 dermatologists (33.3%) **(Table 2)**. The clear majority (81.7%) possessed 16 or more years of hands-on clinical practice. Recruitment of these physicians was evenly distributed across Japan.

Table 2. Demographics and characteristics of physician respondents (Japan, 2023).

Characteristic	Total sample (n = 60)	
	Percentage (%)	Count (n)
Sex		
Male	86.7%	52
Female	13.3%	8
Age group		
< 50 years	48.3%	29
≥ 50 years	51.7%	31
Medical specialty		
General practitioners	33.3%	20
Dermatologists	33.3%	20
Pain specialists	33.3%	20
Professional experience		
< 16 years	18.3%	11
≥ 16 years	81.7%	49
Monthly HZ patient volume		
0–3 patients	30.0%	18
5–10 patients	33.3%	20
15–90 patients	36.7%	22
Type of healthcare facility		
University hospitals	18.3%	11
National/public hospitals	30.0%	18
Other settings (e.g., clinics, private or municipal hospitals)	51.7%	31
Vaccines are routinely administered or prescribed		
Influenza vaccine	76.7%	46
Pneumococcal vaccine	71.7%	43
COVID-19 vaccine	68.3%	41
Herpes zoster vaccine	86.7%	52

Data were rounded to the first decimal place, and the sum of the values may not equal 100%. COVID-19: coronavirus disease; HZ: herpes zoster.

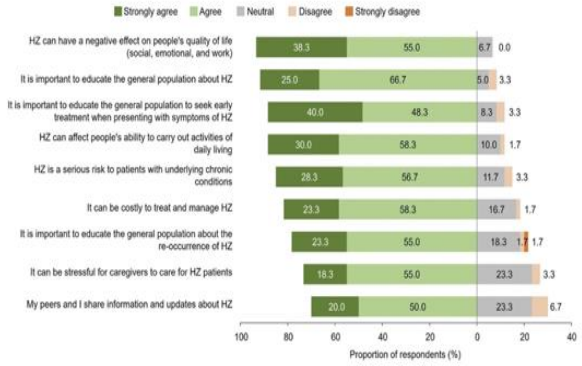
KAP related to HZ

Physicians generally demonstrated a good understanding of the primary risk factors for HZ. Over three-quarters correctly pointed to the use of immunosuppressive drugs (85.0%), being 50 years of age or older (78.3%), and living with chronic illnesses (76.7%) as major

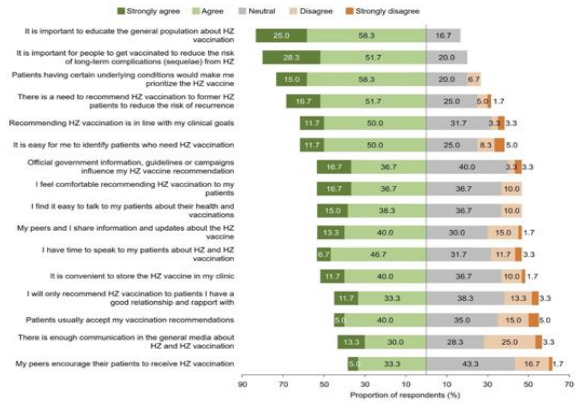
contributors. Although almost all (96.7%) identified post-herpetic neuralgia (PHN) and facial nerve paralysis as possible lasting effects, fewer than half knew about other potential complications, such as vision impairment (46.7%) or skin infections and scarring (46.7%).

Knowledge of the actual incidence rate of HZ in their region was limited. Overall, 13.3% said they had no idea of the rate, while 28.3% (GPs: 30.0%; pain clinicians: 25.0%; dermatologists: 30.0%) estimated it at around 10 cases per 1,000 patient-years. Similar shares thought the rate was either higher or lower than this.

Nearly all physicians (93.3%) concurred that HZ can seriously harm patients' overall quality of life. They also strongly endorsed the idea of increasing public education about the nature of the disease (91.7%), and the value of encouraging people to seek medical help promptly once symptoms emerge (88.3%)**(Figure 3a)**.



a)



b)

Figure 3. Perceived importance of (a) herpes zoster-related and (b) herpes zoster vaccine-related statements among physicians (Japan, 2023). Survey questions for physician respondents: (a) "Here are some statements about HZ disease. To what extent do you agree/disagree with the statements? Please answer using the following scale: strongly agree, agree, neutral, disagree, strongly disagree." (b) "Here are some statements about HZ vaccination. To what extent do you agree/disagree with the statements? Please answer using the following scale: strongly agree, agree, neutral, disagree, strongly disagree." Data are presented here for all physician respondents; all statements surveyed are presented. Data were rounded to the first decimal place, and the sum of the values may not equal 100%. Abbreviation: HZ = herpes zoster.

KAP related to vaccination

A substantial majority of physicians (85.0%) believed it was important to recommend HZ vaccination for patients aged 50 or older. Within the six months leading up to the survey, 78.3% had actually recommended, written prescriptions for, or given the vaccine to patients in that age bracket. The top considerations before making such a recommendation included the degree of immune suppression or severity of other medical conditions (70.0%), the patient's personal readiness or desire to get vaccinated (68.3%), and the patient's current age (66.7%).

Physicians ranked the following HZ vaccine-related subjects as especially critical: situations in which the vaccine should not be used (78.3%) and the appropriate ages for HZ vaccination (78.3%) **(Figure 2c)**. More than three-quarters (76.7%) also placed a high value on national guidelines and official recommendations concerning HZ vaccines.

Most physicians supported the importance of informing the wider public about HZ vaccination (83.3%), the role of vaccination in cutting the chance of prolonged complications from HZ (80.0%), and giving priority to patients who have specific underlying health issues when offering the vaccine (73.3%) **(Figure 3b)**. Of note, 53.3% stated that clear official government materials, guidelines, or awareness campaigns would play a role in shaping their own decisions to recommend HZ vaccination.

Physician-patient communication

Physicians reported starting discussions about HZ and its vaccine with an average of 25.3% of their patients aged 50 years and older during the year before the survey. They cited the vaccine's cost (51.7%) and patients' reluctance to receive it (51.7%) as the two biggest obstacles to initiating these conversations with patients in this age group **(Figure 4)**. Additional hurdles included

insufficient consultation time (41.7%) and patients' limited understanding of the illness (40.0%).

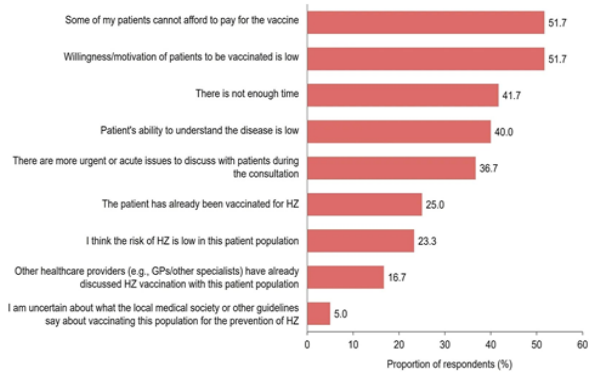


Figure 4. Perceived barriers among physicians when communicating with patients about herpes zoster and herpes zoster vaccination (Japan, 2023). Survey question for physician respondents: "Under what circumstances do you not initiate conversations with adult patients aged ≥ 50 years regarding HZ vaccination?" Data are presented here for all physician respondents; all options surveyed are presented. Abbreviations: GP = general practitioner; HZ = herpes zoster.

This research ranks among the earliest investigations to examine knowledge, attitudes, and practices (KAP) regarding HZ and HZ vaccination among the general public and physicians in Japan. Although the results revealed strong awareness (> 75%) of HZ and the available vaccines among the public, understanding remained weak in areas such as symptoms, long-term complications, overall risk, contributing risk factors, and proper management. These patterns align with findings reported in other nations [35, 38, 39]. Individuals who had already received the HZ vaccine demonstrated significantly greater awareness and deeper knowledge of risk factors and long-term complications. This pattern suggests that knowledge gaps may contribute to people's hesitation to get vaccinated against HZ. Earlier research has similarly noted that non-vaccinated people were more inclined to believe HZ could be managed without a vaccine [39]. In contrast, stronger knowledge of the disease correlated with greater acceptance of the vaccine [40].

Even though more than three-quarters of respondents recognized the serious negative effects of HZ on quality of life, only about 1 in 10 older adults and roughly 3 in 10 parents of older adults (as reported by adult children) had actually completed HZ vaccination. Among those who remained unvaccinated, the willingness to receive the vaccine or to arrange it for their parents was also minimal. This mismatch between recognizing the disease burden and actual vaccination behavior likely stems from obstacles such as insufficient doctor recommendations and the high cost of the vaccine — both of which emerged as major influences on whether people chose to vaccinate.

Physician recommendations stood out as a central element shaping the public's decision to seek HZ vaccination. Previous studies have likewise demonstrated that advice from a doctor markedly boosts acceptance of the vaccine and can even overcome outright refusal [36, 38–42]. In addition, the clear alignment observed in Japan between recommendation rates and vaccination status (66.7% of HZ-vaccinated older adults had received a suggestion from family, friends, physicians, or other healthcare providers, compared with only 15.5% of non-vaccinated older adults) points to the powerful role recommendations can play in driving uptake. Another earlier study found that people who had been vaccinated against HZ were more likely to have received encouragement from vaccinated relatives, friends, or healthcare professionals than those who had not [39].

Nevertheless, perceived obstacles among physicians appear to limit discussions with patients about HZ and its vaccine. Notably, only about one-quarter of physicians had begun such conversations during patient visits in the year preceding the survey. Roughly half may have held back from recommending the vaccine because they sensed low patient motivation or because of worries over its cost. In line with this, a systematic review and meta-analysis worldwide identified financial concerns as a common reason for reluctance, with only half of the people willing to receive the HZ vaccine [42]. In the present study, the public's limited intention to vaccinate may also stem from incomplete knowledge of HZ's long-term complications — only about half realized the disease could lead to prolonged issues. Physicians themselves showed gaps in this area, with fewer than half aware of complications beyond PHN and facial nerve paralysis. Since avoiding long-term complications is a strong motivator for the public to seek vaccination and is viewed by physicians as a key reason to recommend it, enhancing understanding of HZ's harmful effects could prompt doctors to start relevant conversations more often and boost patients' readiness to pursue vaccination.

Furthermore, the cost and affordability of the vaccine ranked as the leading area of interest and the strongest influence on vaccine acceptance among members of the public. These observations align with earlier research showing limited readiness to cover the full expense of vaccines that receive no government support [35, 36, 38, 40, 43]. Since nearly one-third of public participants viewed local government financial assistance as an important incentive for receiving the HZ vaccine, these subsidies could help increase vaccination rates at the community and healthcare provider levels. When the study was conducted, HZ vaccination had not yet been added to Japan's National Immunization Program (NIP). Its recent addition to the NIP in April 2025 is expected to boost uptake by making the vaccine more readily available to the population. Nevertheless, the subsidies only partly offset the vaccine price and apply solely to adults aged ≥ 65 years, together with those aged 60–64 years who are immunocompromised because of HIV infection and cannot manage daily activities independently. As a result, financial obstacles to HZ vaccination are likely to persist for many people.

In addition to offering subsidies, it will be essential to increase public awareness of these support programs through government-led initiatives and direct communication from healthcare professionals. Clear official government materials, guidelines, and awareness campaigns focused on HZ could guide physicians in recommending the vaccine more consistently and help raise overall vaccination rates. Public participants also noted that local media served as their most frequent source of information on HZ and the associated vaccine. In contrast, healthcare professionals remained the most trusted and preferred channel. Because public confidence in government authorities, public health organizations, conventional news media, and primary care doctors has been a major driver of COVID-19 vaccine acceptance in Japan [44, 45], these same channels could be effective in promoting better practices for preventing and managing HZ.

Compared with the earlier regional study (unpublished manuscript), knowledge, attitudes, and practices regarding HZ and its vaccination in Japan showed differences of varying magnitudes. For instance, vaccine cost posed a greater obstacle to initiating conversations about HZ and HZ vaccination among Japanese physicians (51.7%) than among physicians in the regional study (33.6%). By contrast, dealing with more pressing or immediate medical issues during appointments worried Japanese physicians less (36.7%; regional study: 83.6%). In both studies, however, doctors highlighted patients' apparent unwillingness to receive the vaccine as a significant barrier to making recommendations.

Limitations

Because this was a self-administered, self-reported survey, no cause-and-effect relationships can be established. Recall bias may have influenced the results, since answers could not be verified or cross-checked against other sources. For example, differences in how HZ awareness was assessed during screening (using everyday symptom descriptions in the local language) versus in the main survey (using a list of disease names) could have led to reporting bias. In particular, the medical terminology presented in the survey may have caused cognitive overload, resulting in a small number of public respondents (older adults: 7.1%; adult children: 6.0%) who understood HZ as an illness but did not recognize its formal medical name. Even so, the screening process confirmed that every public participant was familiar with HZ as a disease before proceeding to the full survey.

In addition, the study deliberately left out individuals who had never heard of HZ or who generally refused preventive vaccines, as many of the questions would not have applied to them. The online survey format also excluded people without sufficient digital skills. Consequently, this targeted sampling approach may have introduced selection bias, potentially leading the findings not to fully reflect the broader Japanese population.

Finally, the physician sample was restricted to general practitioners, dermatologists, and pain specialists, since these are the specialties most often involved in treating HZ cases. Because knowledge, attitudes, and practices regarding HZ and HZ vaccination can vary across different medical fields, the results may not represent the views of all physicians practicing in Japan.

Conclusion

This study identified the capability, opportunity, and motivation elements that could be targeted to reduce the obstacles preventing greater HZ vaccine uptake among patients aged 50 years and older in Japan. In summary, the public had limited knowledge of HZ, while the vaccine's high cost hindered both physician recommendations and vaccination rates. Expanding government-supported educational initiatives to deepen

understanding of HZ — especially its long-term complications — could stimulate more conversations between patients and doctors and promote greater willingness to seek vaccination, particularly given the strong influence of physician advice. Improving access to the HZ vaccine by offering subsidies and actively informing the public about their availability could further support shared decision-making between patients and physicians aimed at preventing HZ.

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Ethics Statement: This study involving humans was approved by Pearl Institutional Review Board (IRB). The study was conducted in accordance with local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

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