

# A cross-sectional study of the knowledge, attitude, and practice of patients aged 50 years or above towards herpes zoster in an out-patient setting

Anthony CY Lam \*, MY Chan, HY Chou, SY Ho, HL Li, CY Lo, KF Shek, SY To, KK Yam, Ian Yeung

## ABSTRACT

**Introduction:** There has been limited research on the knowledge of and attitudes about herpes zoster in the Hong Kong population. This study aimed to investigate the knowledge, attitude, and practice of patients aged 50 years or above towards herpes zoster and its vaccination.

**Methods:** This was a cross-sectional study in the format of a structured questionnaire interview carried out in Sai Ying Pun Jockey Club General Out-patient Clinic in Hong Kong. Knowledge of herpes zoster and its vaccination was assessed, and patient attitudes to and concerns about the disease were evaluated. Factors that affected a decision about vaccination against herpes zoster were investigated.

**Results:** A total of 408 Hong Kong citizens aged 50 years or above were interviewed. Multiple regression analysis revealed that number of correct responses regarding knowledge about herpes zoster was positively correlated with educational attainment ( $B=0.313$ ,  $P=0.026$ ) and history of herpes zoster ( $B=0.408$ ,  $P=0.038$ ), and negatively correlated with age ( $B=-0.042$ ,  $P<0.001$ ) and male gender ( $B=-0.396$ ,  $P=0.029$ ). Answers to several questions revealed a sizable number of misconceptions about the disease. Among all respondents, 35% stated that they were worried about getting the disease, and 17% would consider vaccination against herpes zoster.

**Conclusions:** Misconceptions about herpes zoster were notable in this study. More health education is needed to improve the understanding and heighten awareness of herpes zoster among the general public. Although the majority of participants indicated that herpes zoster would have a significant impact on their health, a relatively smaller proportion was actually worried about getting the disease. Further studies on this topic should be encouraged to gauge the awareness and knowledge of herpes zoster among broader age-groups.

Hong Kong Med J 2017;23:365–73

DOI: 10.12809/hkmj165043

ACY Lam \*  
MY Chan  
HY Chou  
SY Ho  
HL Li  
CY Lo  
KF Shek  
SY To  
KK Yam  
I Yeung

*Li Ka Shing Faculty of Medicine, The University of Hong Kong, Pokfulam, Hong Kong*

\* Corresponding author: hrp20152016@gmail.com

This article was published on 7 Jul 2017 at www.hkmj.org.

### New knowledge added by this study

- Certain misconceptions about herpes zoster persist among Hong Kong people.
- While a majority of participants indicated that herpes zoster would have a significant impact on their health, a relatively smaller proportion of respondents were actually worried about getting the disease.
- Vaccination against herpes zoster is currently not common among Hong Kong people.

### Implications for clinical practice or policy

- More health education should be provided to improve knowledge about herpes zoster and clarify misconceptions about the disease among Hong Kong people.
- Health promotion that includes treatment and/or prevention of herpes zoster can be explored.

## Introduction

Varicella zoster virus (VZV) is a member of the Herpesviridae family and is an enveloped double-stranded DNA virus. Primary infection with VZV causes varicella, commonly known as chickenpox. The virus migrates to the sensory ganglia and establishes latency, by which the affected individual becomes asymptomatic. Reactivation of the virus

causes herpes zoster (HZ), also known as shingles.<sup>1</sup>

Infection with VZV is the highest reported notifiable infectious disease in Hong Kong, with 8879 cases reported in 2016.<sup>2</sup> A study in 1994 showed that antibodies against VZV were found in more than 90% of children by 8 years of age,<sup>3</sup> illustrating that latent infection was highly prevalent. These individuals would be at risk of HZ.

## 對帶狀疱疹的認識、態度與行為：針對五十歲或以上人士的橫斷面研究

林卓賢、陳文裕、周濬楊、何雪弦、李凱琳、羅澤銳、石琪峯、陶心怡、任嘉琪、楊溢

**引言：**有關香港市民對帶狀疱疹的知識和態度的研究很有限。本文旨在探討五十歲或以上人士對帶狀疱疹（俗稱「生蛇」）的認識、態度與行為，以及對接種帶狀疱疹疫苗的看法。

**方法：**我們於香港西營盤賽馬會普通科門診診所內進行橫斷面問卷調查。研究受訪者對帶狀疱疹和接種帶狀疱疹疫苗的知識，並評估他們對此病症的態度和關注程度，以及找出他們考慮接種帶狀疱疹疫苗的因素。

**結果：**是次研究共訪問408名五十歲或以上的香港居民。根據多元迴歸分析，在有關帶狀疱疹疾病知識的問題中，正確答案數目與受訪者的教育程度（ $B=0.313$ ， $P=0.026$ ）和帶狀疱疹病史（ $B=0.408$ ， $P=0.038$ ）呈正面相關，但與受訪者的年齡（ $B=-0.042$ ， $P<0.001$ ）和性別為男性（ $B=-0.396$ ， $P=0.029$ ）呈負面相關。問卷調查中，部分問題反映有相當數目的受訪者對帶狀疱疹方面存有誤解。有35%受訪者表示擔心會患上帶狀疱疹，而17%受訪者會考慮接種帶狀疱疹疫苗。

**結論：**是次研究發現市民對帶狀疱疹認識不足，因此有需要加強公眾教育，以提升市民對帶狀疱疹的關注和了解。雖然大部分受訪者表示帶狀疱疹對生活有很大影響，然而只有較少受訪者表示擔心會患上此病。研究認為可以進一步探討其他年齡層對帶狀疱疹的關注和認識程度。

Studies report the lifetime prevalence of HZ to be approximately 10% to 32%.<sup>1,4</sup> The University of Hong Kong estimated the prevalence of HZ to be 16.8%.<sup>5</sup> The incidence of HZ is positively correlated with age.<sup>6</sup> Individuals who are immunocompromised<sup>7</sup> or have a chronic disease<sup>8</sup> may be at a greater risk of having HZ.

The viral disease HZ presents with a rash with dermatomal distribution, accompanied by vesicular eruption and neuropathic pain.<sup>7</sup> A number of complications can result from HZ.<sup>9</sup> Post-herpetic neuralgia, a persistent neuropathic pain in the area affected by HZ, can develop particularly in older adults.<sup>9,10</sup> Other serious sequelae include HZ ophthalmicus, HZ oticus and bacterial skin infections, all of which adversely affect the quality of life of patients.<sup>9</sup> These also place a significant economic burden on the health care system.<sup>11</sup> In 2009, a study estimated the cost of treating new HZ cases in the US to be over one billion US dollars each year.<sup>12</sup> Active HZ can be treated by antiviral therapy, such as acyclovir.<sup>7,13</sup>

The vaccine for HZ is a live vaccine approved by the Food and Drug Administration (FDA) of the US in 2006 for the prevention of HZ in immunocompetent patients aged 60 years or

above.<sup>14</sup> The vaccine has been approved for use in Hong Kong since 2007.<sup>13</sup> The FDA approved the use of the vaccine in individuals aged 50 to 59 years in 2011.<sup>15</sup> According to the Shingles Prevention Study,<sup>16</sup> HZ vaccine lowered the incidence of HZ by 51% and reduced the pain and discomfort of post-herpetic neuralgia by 66% when compared with placebo. Similar studies to assess public awareness of HZ and its vaccination were then carried out. The Herpes Zoster Global Awareness Survey from 22 countries<sup>17</sup> and a knowledge, attitude, and practice study in South Korea<sup>18</sup> were conducted in 2009 and 2015, respectively. Factors promoting or limiting the prevalence of vaccination against HZ were also investigated in the latter study.<sup>18</sup>

There has been limited research conducted in the Hong Kong population to assess the knowledge of and attitudes towards HZ and the practice of vaccination. This study aimed to explore these areas.

## Methods

### Setting and participants

A cross-sectional survey was conducted in 11 clinic sessions during 24 July to 12 August 2015 at the Sai Ying Pun Jockey Club General Outpatient Clinic (GOPC). The GOPC is open to the general public and serves all patients who comprise mainly those with chronic or episodic disease. There were 6330 patients attending the clinic during the study period, of which approximately three quarters aged 50 years or above. These patients in the waiting area of the clinic were selected by convenience sampling to participate in this study. No additional criteria were set to allow for a higher degree of generalisability. Participants were asked to complete a face-to-face questionnaire after giving written informed consent. They were allowed to either complete the questionnaire themselves, or listen to the researcher reading the questions aloud without any additional interpretation, then answer the question verbally. Approval was obtained from the Institutional Review Board of the University of Hong Kong/Hospital Authority Hong Kong West Cluster and the GOPC prior to commencement of this study.

### Research instrument

A questionnaire consisting of 30 items was designed; this included questions on demographics ( $n=3$ ), medical history ( $n=4$ ), whether the respondent had heard about HZ ( $n=1$ ), knowledge of HZ ( $n=8$ ) and HZ vaccination ( $n=6$ ); attitudes towards preventing HZ ( $n=7$ ); and whether the respondent would consider vaccination against HZ ( $n=1$ ).

### Statistical analysis

To estimate the proportions of participant responses to the questions about knowledge of HZ, for 95%

confidence level with an expected true proportion of 50% and 5% margin of error, a sample size of 385 was obtained using the formula:

$$N = Z^2 p(1-p) / C^2$$

where N=sample size, Z=Z value, p=population variance, and C=margin of error

To analyse the number of correct responses associated with five demographic factors with an effect size ( $f^2$ ) of 0.15 and a statistical power of 0.8, an a-priori analysis was employed to obtain the sample size of 92 to achieve a 5% margin of error, using G\*Power (version 3.1.9.2) and the following formulae<sup>19</sup>:

$$N = \lambda / f^2 \text{ and } N = v + u + 1$$

where N=sample size,  $\lambda$ =non-centrality parameter,  $f^2$ =effect size, v=degree of freedom of the denominator of the F ratio, and u=number of predictors

Statistical analysis was performed with SPSS (Windows version 23.0; IBM Corp, Armonk [NY], US). Demographic data, medical history, respondents' attitude towards preventing HZ and decision about HZ vaccination were analysed by descriptive statistics. Regarding knowledge of HZ, the number of correct responses out of eight questions was calculated. Multiple linear regression analysis was used to evaluate the association of the number of correct responses with age, gender, educational attainment, history of HZ, and history of chronic diseases. Chi squared tests were applied to evaluate the associations in giving correct response to each question among the same five variables. A P value of <0.05 was considered significant.

## Results

### Demographics

A total of 496 persons were invited to participate in the study, of whom 430 agreed which corresponded to a response rate of 87%; 408 valid responses were collected. The sample was not weighted by the population because the male-to-female ratio was similar to that of the population (48:52).<sup>20</sup> The demographic data are shown in Table 1. Approximately 40% of respondents did not know their history of chickenpox despite its high prevalence, whereas over 95% had heard of the condition of HZ. Although some respondents did not understand the medical terminology "herpes zoster", most of them knew the Cantonese colloquial name (生蛇).

### Knowledge of herpes zoster

Table 2 summarises the responses to the eight questions pertaining to the knowledge of HZ, in which 16 respondents who had never heard of the condition were excluded. Only 29.6% knew that chickenpox and HZ are related. Over half were unsure of the lifetime prevalence of HZ. Immunocompromised state was a well-known risk factor of HZ (84.7%). Over 70% were aware that

VZV can reactivate in young ages. Rash, blisters, and neuropathic pain were the most commonly known symptoms of HZ, identified by 85.7% of respondents. Nonetheless 13.3% did not know the symptoms of HZ even though they had heard of the disease.

There is a saying in Chinese society that death will ensue when the rash of HZ circumvents the body. Worryingly, only slightly less than half (48.7%) knew that this was untrue, 18.9% thought the statement was true and the remaining were unsure. Additionally, 69.6% gave the correct response that contacts of HZ patients could not acquire HZ infection directly, and 72.2% knew that HZ was treatable.

Respondents scored a mean ( $\pm$ standard deviation [SD]) of 4.96 ( $\pm$ 1.72) correct responses out of eight. Over half of all subjects answered five or six questions correctly.

Of 392 participants who had heard of HZ, 11 respondents who were uncertain of their history of HZ were excluded from the multivariate regression analysis regarding the knowledge of HZ (Table 3a). The number of correct responses was positively correlated with educational attainment ( $P=0.026$ ) and history of HZ ( $P=0.038$ ), but negatively correlated with age per year ( $P<0.001$ ) and male gender ( $P=0.029$ ).

The results of the Chi squared tests and the corresponding odds ratios are shown in Table 3b. Respondents aged 65 years or above were half as likely as those aged 50-64 years to give correct responses regarding the relationship between chickenpox and HZ ( $P=0.007$ ), the higher risk of HZ among immunocompromised individuals ( $P=0.027$ ), and the misconception of death associated with a circumventing rash ( $P=0.003$ ). In contrast, participants with higher educational attainment were more likely than those without to give appropriate answers to the latter two questions ( $P=0.008$  and  $P<0.001$ , respectively).

Respondents with a history of HZ ( $P=0.001$ ) and those with higher educational attainment ( $P=0.028$ ) were more likely to correctly identify the symptoms of HZ.

### Knowledge of herpes zoster vaccination

Of 392 respondents, 148 (37.8%) had heard of the HZ vaccine. Only this subgroup was asked to answer four additional questions about the vaccine (Table 4). One respondent who did not answer the questions was excluded. On average, 1.73 ( $\pm$ 1.00) out of four responses were correct.

Nearly half of these respondents (46.9%) correctly identified the target age-group for HZ vaccination and 24.5% thought there was no age limit. Most subjects did not know that vaccination is possible regardless of history of chickenpox or HZ. Around two thirds (68.0%) were aware that the vaccine can significantly reduce the incidence of HZ,

TABLE I. Demographics of respondents

Demographics	No. (%) of respondents*			P value†
	Aged 50-64 years	Aged ≥65 years	Total (n=408)	
Age-group (years)				
50-64	-	-	208 (51.0)	-
≥65	-	-	200 (49.0)	
Mean (± SD)	-	-	64.9 ± 8.7	
Sex				
Male	85 (40.9)	104 (52.0)	189 (46.3)	0.024
Female	123 (59.1)	96 (48.0)	219 (53.7)	
Educational attainment				
Primary or below	36 (17.3)	60 (30.0)	96 (23.5)	0.010
Secondary	132 (63.5)	106 (53.0)	238 (58.3)	
Tertiary or above	40 (19.2)	34 (17.0)	74 (18.1)	
History of chronic diseases (self-reported)				
Hyperlipidaemia	47 (22.6)	64 (32.0)	111 (27.2)	
Hypertension	98 (47.1)	133 (66.5)	231 (56.6)	
Diabetes mellitus	46 (22.1)	57 (28.5)	103 (25.2)	
Allergic rhinitis	16 (7.7)	17 (8.5)	33 (8.1)	
Chronic obstructive pulmonary disease	3 (1.4)	1 (0.5)	4 (1.0)	
Coronary artery disease	4 (1.9)	14 (7.0)	18 (4.4)	
Depression	7 (3.4)	7 (3.5)	14 (3.4)	
Hypothyroidism	16 (7.7)	8 (4.0)	24 (5.9)	
Osteoarthritis	7 (3.4)	15 (7.5)	22 (5.4)	
Rheumatoid arthritis	4 (1.9)	4 (2.0)	8 (2.0)	
Gout	12 (5.8)	10 (5.0)	22 (5.4)	
Any of the above diseases reported	150 (72.1)	171 (85.5)	321 (78.7)	0.001
None of the above diseases reported	58 (27.9)	29 (14.5)	87 (21.3)	
History of chickenpox				
Yes	88 (42.3)	87 (43.5)	175 (42.9)	0.837
No	39 (18.8)	33 (16.5)	72 (17.6)	
Unsure/do not know	81 (38.9)	80 (40.0)	161 (39.5)	
Has the respondent ever heard about "herpes zoster" or "shingles" (生蛇)?				
Yes	202 (97.1)	190 (95.0)	392 (96.1)	0.271
No	6 (2.9)	10 (5.0)	16 (3.9)	
History of HZ (self-reported) [n=392]				
Yes	49 (24.3)	51 (26.8)	100 (25.5)	0.199
No	150 (74.3)	131 (68.9)	281 (71.7)	
Unsure/do not know	3 (1.5)	8 (4.2)	11 (2.8)	
Mean (± SD) age (years) of first episode of HZ (n=88)	-	-	56.2 ± 13.74	-

Abbreviations: HZ = herpes zoster; SD = standard deviation

\* Unless otherwise stated

† Chi squared test

but only 49.7% knew that the vaccine is not indicated for treatment of active disease.

### Attitudes and practice

Table 5 gives a breakdown of the seven questions

about attitudes of respondents to HZ. Over half (52.2%) of 391 respondents (with one participant who did not answer the questions being excluded) thought they had an insufficient understanding of HZ. Almost two thirds were interested in learning

TABLE 2. Responses to questions regarding the knowledge of herpes zoster (HZ)\*

Question	Aged 50-64 years (n=202)			Aged ≥65 years (n=190)			Total (n=392)		
	Answered "True"	Answered "False"	Do not know	Answered "True"	Answered "False"	Do not know	Answered "True"	Answered "False"	Do not know
1. If an individual had chickenpox, he/she will be at risk of HZ	72 (35.6)	46 (22.8)	84 (41.6)	44 (23.2)	48 (25.3)	98 (51.6)	116 (29.6)	94 (24.0)	182 (46.4)
2. The lifetime risk of having HZ is up to one third	69 (34.2)	26 (12.9)	107 (53.0)	62 (32.6)	24 (12.6)	104 (54.7)	131 (33.4)	50 (12.8)	211 (53.8)
3. Immunocompromised individuals are at a higher risk of HZ	179 (88.6)	6 (3.0)	17 (8.4)	153 (80.5)	9 (4.7)	28 (14.7)	332 (84.7)	15 (3.8)	45 (11.5)
4. Young people will not have HZ	19 (9.4)	154 (76.2)	29 (14.4)	22 (11.6)	129 (67.9)	39 (20.5)	41 (10.5)	283 (72.2)	68 (17.3)
5. If the rash of HZ circumvents the body, the individual will die	38 (18.8)	113 (55.9)	51 (25.2)	36 (18.9)	78 (41.1)	76 (40.0)	74 (18.9)	191 (48.7)	127 (32.4)
6. Individuals who have contact with HZ patients will acquire HZ	24 (11.9)	143 (70.8)	35 (17.3)	16 (8.4)	130 (68.4)	44 (23.2)	40 (10.2)	273 (69.6)	79 (20.2)
7. There are no drugs available for treating HZ	21 (10.4)	147 (72.8)	34 (16.8)	23 (12.1)	136 (71.6)	31 (16.3)	44 (11.2)	283 (72.2)	65 (16.6)
8. Do you know any symptoms of HZ ( <i>more than one can be selected except the last choice</i> )									
Rash, blisters, neuropathic pain		178 (88.1)			158 (83.2)			336 (85.7)	
Blindness		27 (13.4)			21 (11.1)			48 (12.2)	
Hearing loss		16 (7.9)			8 (4.2)			24 (6.1)	
Death		42 (20.8)			16 (8.4)			58 (14.8)	
Do not know		21 (10.4)			31 (16.3)			52 (13.3)	

\* Respondents who had never heard of HZ were excluded (n=16)

more about the disease (66.2%) and its prevention (66.0%). A similar percentage of subjects (64.5%) remarked that there were inadequate channels to learn about prevention of the disease. While 76.7% believed that HZ could affect their health significantly, only 35.0% were worried about getting the disease. Almost one third (30.4%) said that they could afford the HZ vaccine.

Among the subgroup who had heard of the HZ vaccine, 140 (94.6%) replied that their doctor had not mentioned or recommended the vaccine.

This study compared the vaccination rate for HZ with that of influenza and pneumococcus. The latter two vaccines are recommended by the Centre for Health Protection for those aged above 65 years and are included in the Elderly Vaccination Subsidy Scheme.<sup>21</sup> Enquiry revealed that 26.9% and 14.3% of 391 respondents had taken the influenza vaccine in the past year and pneumococcal vaccine in the past 5 years, respectively. The figures were much higher than that for HZ vaccination (2.8%).

When asked about the reasons for not having HZ vaccination, approximately half (47.1%) replied that they were unaware of its availability. This was followed by inadequate promotion from doctors and public education (32.4%), the relatively high cost of the vaccine (28.4%), and good self-perceived health (20.3%). Lastly, 17.2% replied that they would consider HZ vaccination in the future.

## Discussion

This study attempted to investigate the knowledge, awareness, and attitudes towards HZ and its vaccination among citizens aged 50 years or above in Hong Kong. The results were informative. They revealed that the general public do not have adequate knowledge about the diseases caused by VZV or awareness regarding the prevention of HZ. This corroborates the general opinion of having an inadequate understanding of the disease. Similar findings have been observed in other countries according to a global survey,<sup>17</sup> in which around 67% subjects stated they had little or no knowledge about HZ.

Few respondents in this study knew that chickenpox (varicella zoster) and shingles (HZ) are caused by the same virus. Similar results have been reported by the Public Opinion Programme, the University of Hong Kong (HKUPOP).<sup>5</sup> Certain misconception about the disease persists—death from a rash circumventing the body—is still a commonly believed myth among the middle-aged and the elderly people. This study found that the proportions of respondents who were aware of HZ and its vaccination were comparable with those reported by a study in South Korea.<sup>18</sup>

There was a significant association between educational attainment and the correct responses



TABLE 3. (a) Multiple regression analysis between the number of correct responses to questions regarding the knowledge of herpes zoster (HZ)\* and selected demographic factors (n=381). (b) Results from Chi squared tests showing odds ratios of giving correct responses to questions on knowledge regarding HZ (n=381)

(a)

	Independent variable				
	Age (per year)	Sex (0=female; 1=male)	Educational attainment (1= $\leq$ primary; 2=secondary; 3= $\geq$ tertiary)	History of HZ (0=positive history; 1=no history)	History of chronic diseases (0=positive history; 1=no history)
Estimate	-0.042	-0.396	0.313	0.408	-0.070
Standard error	0.010	0.181	0.140	0.196	0.207
95% Confidence interval	-0.062 to -0.021	-0.753 to -0.040	0.038 to 0.588	0.023 to 0.793	-0.478 to 0.338
P value	<0.001	0.029	0.026	0.038	0.737

(b)

Question	Odds ratio (95% confidence interval, $\chi^2$ value, P value)				
	Age: $\geq$ 65, vs 50-64 years	Sex: male, vs female	Educational attainment: $\geq$ secondary, vs $\leq$ primary	Positive history of HZ, vs none	Positive history of chronic diseases, vs none
If an individual had chickenpox, he/she will be at risk of HZ	0.541 (0.345-0.849, 7.236, 0.007)	0.657 (0.419-1.031, 3.364, 0.067)	1.271 (0.737-2.191, 0.748, 0.387)	0.958 (0.580-1.582, 0.028, 0.867)	0.682 (0.408-1.141, 2.140, 0.144)
The lifetime risk of having HZ is up to one third	0.950 (0.621-1.452, 0.057, 0.812)	0.599 (0.388-0.925, 5.380, 0.020)	0.720 (0.438-1.184, 1.682, 0.195)	1.259 (0.783-2.024, 0.908, 0.341)	1.262 (0.746-2.135, 0.755, 0.385)
Immunocompromised individuals are at higher risk of HZ	0.530 (0.301-0.935, 4.911, 0.027)	1.195 (0.680-2.100, 0.383, 0.536)	2.228 (1.224-4.056, 7.107, 0.008)	1.473 (0.746-2.906, 1.259, 0.262)	0.603 (0.283-1.284, 1.747, 0.186)
Young people will not have HZ	0.645 (0.411-1.012, 3.665, 0.056)	0.657 (0.419-1.030, 3.374, 0.066)	1.579 (0.943-2.644, 3.042, 0.081)	1.057 (0.633-1.765, 0.046, 0.831)	1.337 (0.790-2.262, 1.172, 0.279)
Do you know any symptoms of HZ	0.662 (0.369-1.188, 1.926, 0.165)	1.253 (0.693-2.264, 0.559, 0.455)	2.003 (1.068-3.757, 4.823, 0.028)	5.069 (1.780-14.436, 11.121, 0.001)	0.702 (0.328-1.505, 0.834, 0.361)
If the rash of HZ circumvents the body, the individual will die	0.543 (0.362-0.816, 8.700, 0.003)	0.916 (0.611-1.373, 0.181, 0.671)	4.436 (2.535-7.762, 30.074, <0.001)	1.273 (0.806-2.011, 1.072, 0.301)	0.620 (0.380-1.014, 3.654, 0.056)
Individuals who have contact with HZ patients will acquire HZ	0.901 (0.583-1.393, 0.220, 0.639)	0.738 (0.477-1.143, 1.861, 0.173)	0.797 (0.466-1.365, 0.685, 0.408)	1.116 (0.677-1.841, 0.186, 0.666)	0.658 (0.376-1.150, 2.180, 0.140)
There are no drugs available for treating HZ	0.908 (0.579-1.423, 0.179, 0.672)	0.575 (0.366-0.905, 5.789, 0.016)	0.968 (0.563-1.665, 0.014, 0.907)	1.380 (0.810-2.348, 1.412, 0.235)	1.683 (1.002-2.827, 3.918, 0.048)

\* Dependent variable: number of correct responses out of the eight questions listed in Table 2

regarding knowledge of HZ. The positive correlation between a history of HZ and the number of correct responses, however, was only marginally significant. There may be several reasons. Physicians may not have given patients enough information about the disease with consequent persistence of misconceptions. Patients who have had the disease should not be presumed to have a better understanding than those who have not. Moreover, participants might be relatively less aware of HZ due to its less life-interfering nature: only 35% were concerned about getting the disease. Despite the relatively low perceived risk, approximately 77% opined that HZ would have a significant effect on their health, whilst 66% admitted an interest in knowing more about the disease and its prevention. Similar observations have been reported in other countries,<sup>17</sup> where 26% predicted that they were likely to have HZ in the

future, and 70% indicated that they would ask their doctors about HZ vaccination.

This study found that over 60% of respondents showed disagreement regarding whether there was sufficient accessibility to information about the prevention of HZ. This may contribute to a lack of awareness of the HZ vaccine as the most common reason in our study for non-vaccination. This serves to emphasise the substantial role of doctors in health promotion regarding HZ in future.

According to the study conducted in South Korea,<sup>18</sup> although 85.8% of participants would consider vaccination against HZ initially, the figure fell to 59.6% when they took account of the associated cost. On the contrary, HZ vaccination was considered by 17.2% and 36.0% of respondents in this study and in the survey led by HKUPOP,<sup>5</sup> respectively, suggesting that HZ vaccination is

TABLE 4. Responses to questions regarding the knowledge of herpes zoster (HZ) vaccination

Question	No. (%) of respondents (n=147*)
HZ vaccine can reduce the incidence of disease by >50%	
Answered "True"	100 (68.0)
Answered "False"	3 (2.0)
Do not know	44 (29.9)
HZ vaccine can treat active HZ	
Answered "True"	32 (21.8)
Answered "False"	73 (49.7)
Do not know	42 (28.6)
Which age-group (in years) is approved for vaccination against HZ?	
No age limit	36 (24.5)
13-26	1 (0.7)
≥18	3 (2.0)
≥50	69 (46.9)
Do not know	38 (25.9)
HZ vaccination can be taken by which group(s) of people (more than one can be selected except the last two choices)	
Did not have/unsure of history of chickenpox	49 (33.3)
Had chickenpox, but no HZ	66 (44.9)
Had HZ before	34 (23.1)
All of the above	14 (9.5)
Do not know	56 (38.1)

\* Of 148 respondents who have heard of the HZ vaccine, one participant did not answer the questions

TABLE 5. Responses to questions regarding the attitude towards prevention of herpes zoster (HZ)

Question	No. (%) of respondents (n=391*)								
	Aged 50-64 years (n=202)			Aged ≥65 years (n=189*)			Total (n=391*)		
	Highly disagree/Disagree	Neutral	Highly agree/Agree	Highly disagree/Disagree	Neutral	Highly agree/Agree	Highly disagree/Disagree	Neutral	Highly agree/Agree
I have adequate understanding of HZ	97 (48.0)	67 (33.2)	38 (18.8)	107 (56.6)	48 (25.4)	34 (18.0)	204 (52.2)	115 (29.4)	72 (18.4)
HZ has a significant effect on health	23 (11.4)	26 (12.9)	153 (75.7)	19 (10.1)	23 (12.2)	147 (77.8)	42 (10.7)	49 (12.5)	300 (76.7)
I am worried of having HZ	87 (43.1)	40 (19.8)	75 (37.1)	100 (52.9)	27 (14.3)	62 (32.8)	187 (47.8)	67 (17.1)	137 (35.0)
I am interested in knowing more about HZ	34 (16.8)	32 (15.8)	136 (67.3)	48 (25.4)	18 (9.5)	123 (65.1)	82 (21.0)	50 (12.8)	259 (66.2)
I have adequate channels in knowing how to prevent HZ	115 (56.9)	40 (19.8)	47 (23.3)	137 (72.5)	17 (9.0)	35 (18.5)	252 (64.5)	57 (14.6)	82 (21.0)
I am interested in knowing more about the prevention of HZ	38 (18.8)	27 (13.4)	137 (67.8)	51 (27.0)	17 (9.0)	121 (64.0)	89 (22.8)	44 (11.3)	258 (66.0)
I can afford the HZ vaccine	108 (53.5)	23 (11.4)	71 (35.1)	118 (62.4)	23 (12.2)	48 (25.4)	226 (57.8)	46 (11.8)	119 (30.4)

\* Of 392 respondents who have heard of HZ, one participant did not answer the questions

currently not widely accepted by the community. The situations in Hong Kong and South Korea are similar to some degree since participants expressed some interest in vaccination but associated cost and recommendations from doctors were key influences on a decision about whether or not to vaccinate.

## Limitations

This study could be subject to selection bias because participants were recruited via convenience sampling in one clinic only. The results obtained from this study may have limited generalisability to the GOPC setting and the general population. In future studies, representative samples may be recruited from clinics in various districts and specialties to achieve a more diverse group of people and to further confirm the associations.

Several survey responses were invalidated. For instance, some people claimed that they had not had chickenpox before but had had HZ. This is biologically implausible and may be because most people got chickenpox as an infant or child.<sup>1,3,8</sup> This hinders accurate recall unless family member can help. Recall bias is another recognised limitation of this study. Patients with a history of HZ or other chronic diseases usually pay greater attention to their health. Their medical history was subject to self-reported bias since such information could not be retrieved from their medical records.

Another source of bias comes from non-response. Those who refused to participate in the survey (13%) stated that they were unfamiliar with the disease. The results of this study may also be affected by responses that were speculative, as reflected by the observation that some respondents tended to guess rather than answer “uncertain or do not know”. These factors may overvalue the level of understanding of the disease among the general public that could have been improved by a pilot study to design questions with clear wordings and simple language. A pilot study would help identify respondents’ strategies in answering specific questions that required recall, to better evaluate their understanding of HZ, and establish the limits of recollection, with the effect of minimising bias, and enhancing accuracy and response completeness.

Further studies may be initiated to investigate the epidemiology of HZ in Hong Kong, and clarify whether there are significant associations of HZ knowledge with specific socio-demographic groups. Similar studies should also be conducted in younger adults.

Since 2014, the varicella zoster vaccine has been incorporated into the Hong Kong Childhood Immunisation Programme, under which children will be vaccinated against chickenpox at 1 year of age and during their first year of primary education.<sup>22,23</sup> While this may offer protection against chickenpox and HZ for future generations, more studies are needed to determine whether it is also cost-effective to offer HZ vaccination to the population aged 50 years or above. This may have notable implications for its acceptance and practice.

## Conclusions

Hong Kong people generally have some knowledge about the symptoms of HZ, and are aware that treatment is available for active disease. Nonetheless, there remains unsatisfactory understanding of the disease progression from chickenpox to HZ, and misconceptions about the disease remain prevalent, particularly in the older age-group. The lack of knowledge that HZ is preventable may be pertinent to the relatively low awareness and acceptance of the HZ vaccine compared with that for vaccines for other important diseases such as influenza and pneumococcal pneumonia. Further public education about varicella zoster and HZ, covering both disease features and effective prevention, will help to empower health, rectify misconceptions, and reduce disease burden in Hong Kong.

## Acknowledgements

The authors would like to thank Dr Wendy WS Tsui and Dr Alfred SK Kwong from the Department of Family Medicine and Primary Health Care, Queen Mary Hospital, for their kind permission to conduct the study in the Sai Ying Pun GOPC. We thank Dr LW Tian from the Division of Epidemiology and Biostatistics, School of Public Health, the University of Hong Kong, for his invaluable feedback and support. This study was conducted by medical students as a Health Research Project submitted to the School of Public Health, Li Ka Shing Faculty of Medicine, the University of Hong Kong.

## Declaration

All authors have disclosed no conflicts of interest.

## References

1. Straus SE, Ostrove JM, Inchauspé G, et al. NIH conference. Varicella-zoster virus infections. Biology, natural history, treatment, and prevention. *Ann Intern Med* 1988;108:221-37.
2. Number of notifiable infectious diseases by month in 2016. Centre for Health Protection, Department of Health, Hong Kong SAR Government. Available from: <http://www.chp.gov.hk/en/data/1/10/26/43/5128.html>. Accessed 11 May 2017.
3. Kangro HO, Osman HK, Lau YL, Heath RB, Yeung CY, Ng MH. Seroprevalence of antibodies to human herpesviruses in England and Hong Kong. *J Med Virol* 1994;43:91-6.
4. Harpaz R, Ortega-Sanchez IR, Seward JE, Advisory Committee on Immunization Practices (ACIP) Centers for Disease Control and Prevention (CDC). Prevention of herpes zoster: recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR Recomm Rep* 2008;57(RR-5):1-30.
5. Survey on herpes zoster vaccine. Public Opinion Programme, The University of Hong Kong; 2013. Available from: <https://www.hkpopop.hku.hk/english/report/prppl/>



- index.html. Accessed 29 Dec 2015.
6. Dworkin RH, Johnson RW, Breuer J, et al. Recommendations for the management of herpes zoster. *Clin Infect Dis* 2007;44 Suppl 1:S1-26.
  7. Gnann JW Jr, Whitley RJ. Clinical practice. Herpes zoster. *N Engl J Med* 2002;347:340-6.
  8. Joesoef RM, Harpaz R, Leung J, Bialek SR. Chronic medical conditions as risk factors for herpes zoster. *Mayo Clin Proc* 2012;87:961-7.
  9. Sampathkumar P, Drage LA, Martin DP. Herpes zoster (shingles) and postherpetic neuralgia. *Mayo Clin Proc* 2009;84:274-80.
  10. Johnson RW, Wasner G, Saddier P, Baron R. Postherpetic neuralgia: epidemiology, pathophysiology and management. *Expert Rev Neurother* 2007;7:1581-95.
  11. Panatto D, Bragazzi NL, Rizzitelli E, et al. Evaluation of the economic burden of Herpes Zoster (HZ) infection. *Hum Vaccin Immunother* 2015;11:245-62.
  12. Yawn BP, Itzler RF, Wollan PC, Pellissier JM, Sy LS, Saddier P. Health care utilization and cost burden of herpes zoster in a community population. *Mayo Clin Proc* 2009;84:787-94.
  13. Compendium of pharmaceutical products 2015. Drug Office, Department of Health, Hong Kong SAR Government; 2015.
  14. FDA licenses new vaccine to reduce older Americans' risk of shingles. US Food and Drug Administration; 2006. Available from: <http://www.fda.gov/NewsEvents/Newsroom/PressAnnouncements/2006/ucm108659.htm>. Accessed 29 Dec 2015.
  15. FDA approves Zostavax vaccine to prevent shingles in individuals 50 to 59 years of age. US Food and Drug Administration; 2011. Available from: <http://www.fda.gov/NewsEvents/Newsroom/PressAnnouncements/ucm248390.htm>. Accessed 29 Dec 2015.
  16. Oxman MN, Levin MJ, Johnson GR, et al. A vaccine to prevent herpes zoster and postherpetic neuralgia in older adults. *N Engl J Med* 2005;352:2271-84.
  17. Paek E, Johnson R. Public awareness and knowledge of herpes zoster: results of a global survey. *Gerontology* 2010;56:20-31.
  18. Yang TU, Cheong HJ, Song JY, Noh JY, Kim WJ. Survey on public awareness, attitudes, and barriers for herpes zoster vaccination in South Korea. *Hum Vaccin Immunother* 2015;11:719-26.
  19. Faul F, Erdfelder E, Buchner A, Lang AG. Statistical power analyses using G\*Power 3.1: tests for correlation and regression analyses. *Behav Res Methods* 2009;41:1149-60.
  20. 2011 Population Census summary results. Census and Statistics Department, Hong Kong SAR Government; 2012.
  21. Elderly Vaccination Subsidy Scheme. Centre for Health Protection, Department of Health, Hong Kong SAR Government; 2015. Available from: [http://www.chp.gov.hk/tc/view\\_content/21839.html](http://www.chp.gov.hk/tc/view_content/21839.html). Accessed 29 Dec 2015.
  22. Chickenpox vaccine recommended for Childhood Immunisation Programme. Information Services Department, Hong Kong SAR Government; 2013. Available from: <http://www.info.gov.hk/gia/general/201302/25/P201302250272.htm>. Accessed 29 Dec 2015.
  23. Hong Kong Childhood Immunisation Programme. Family Health Service, Department of Health, Hong Kong SAR Government; 2015. Available from: [http://www.fhs.gov.hk/english/main\\_ser/child\\_health/child\\_health\\_recomm.html](http://www.fhs.gov.hk/english/main_ser/child_health/child_health_recomm.html). Accessed 29 Dec 2015.