

Assessment of COVID-19 Vaccination Intention Among Community Health Workers: a Web-based Cross-sectional Survey During the First Wave of the Pandemic in India

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Research

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Abstract

Background: Vaccine hesitancy is of considerable concern as it threatens the great potential of a vaccine against COVID-19. Community health workers (CHWs) bridge the gap between the community and the health care system. Their intention to get vaccinated will not only affect them but will also affect the community's perception of the vaccine. This study aims to understand the intention to get vaccinated against COVID-19 among community health care workers in India and its determinants.

Methods: A web-based, cross-sectional study was conducted among 357 community health workers using snowball sampling. A self-administered anonymous questionnaire was shared with study participants across major geographical regions in India through social media during the first wave (November-December 2020).

Results: Among 357 community health workers, 208 (58%) responded positively regarding their intention to get a COVID-19 vaccine. Graduate [aOR 2.26 (95% CI: 1.27-4.01), $p=0.006$] and post-graduate participants [aOR 2.85 (95% CI: 1.43-5.68), $p=0.003$], those with lower risk perception [aOR 1.86 (95% CI: 1.03-3.35), $p=0.038$] and respondents who trusted the healthcare system [aOR 2.60 (95% CI: 1.59-4.26), $p<0.001$] were more likely to get vaccinated. Respondents who were exposed to COVID-19 cases were less likely to uptake the hypothetical vaccine [aOR 0.57 (95% CI: 0.34-0.96), $p=0.034$].

Conclusions: Increasing knowledge regarding the COVID-19 vaccine might not be enough to improve vaccine acceptance rates. Enhancing trust among community health workers in the healthcare system and regarding the available vaccines seem necessary. In addition, targeted interventions addressing socio-demographic determinants related to COVID-19 vaccination should help improve acceptance of the vaccine.

Background

The ongoing Coronavirus disease-2019 (COVID-19) pandemic has affected over 173 million people and caused more than 3.7 million deaths globally [1]. Imposing enormous morbidity and mortality burdens, the disease continues to disrupt societies and economies across the globe. Around ten million people have been affected in India alone [2]. Working on the frontline, thousands of healthcare workers (HCW) have been infected and lost their lives in the pandemic [3, 4]. Though exact numbers are not known, the Indian Medical Association (IMA) reported 665 physicians in India lost lives in the line of duty [5].

Over the past century, vaccines have become indispensable in eliminating and eradicating viral illnesses [6]. Besides preventing diseases among the immunized, vaccines have reduced infections in the population through herd immunity [7]. Following the much-awaited COVID-19 vaccine launch, an estimated one crore frontline health workers, including physicians, nurses, and community health workers, have been identified for receiving the vaccine in the first phase. The government's focus on COVID-19 immunization is palpable as the finance minister allocated a massive ₹35,000 crores exclusively for the vaccines to bring an end to the pandemic [8].

Vaccine hesitancy is defined as “delay in acceptance or refusal of vaccination despite the availability of vaccination services.” [9] It is of considerable concern as it threatens the great potential of a vaccine against COVID-19. The WHO has identified “vaccine hesitancy” as one of the top ten threats to public health in 2019, globally [10]. Hesitancy and misinformation prevent the achievement of required vaccination coverage in India and in other countries. The situation is even worse following the introduction of a new vaccine.[11] Vaccine safety and efficacy, adverse health outcomes, absence of trust in the health system and lack of knowledge are some of the reasons reported by numerous researchers [12, 13].

A systematic review reported the acceptance rate for H1N1 influenza pandemic vaccine varied between 8% and 67%[14]. Acceptance rate of the COVID-19 vaccine, as reported by a global survey, was 72%. High heterogeneity was observed between 90% in China and less than 55% in Russia [15]. Community health workers (CHWs) involved in planning, identifying target groups, community engagement, service delivery, tracking, and follow-up in healthcare delivery activities. They are critical in introducing a new vaccine. These grass-root level workers are vital interlocutors. The knowledge of “last mile” health service delivery, shared lived experience that fosters trust and credibility within communities, and previous experience in vaccination makes them indispensable to the COVID-19 vaccination drive[16]. Their intention to get vaccinated will not only affect them but will also affect the community’s perception about the vaccine. Understanding key factors influencing uptake of the vaccine by the CHWs may help policymakers to develop strategies for effective implementation. Since vaccine acceptance differs between countries, cultures, and due to the vaccine, itself, this study aims to understand the intention to get vaccinated against COVID-19 among community health care workers in India, and their determinants.

Methods

Study design, setting, and sample

A cross-sectional survey was conducted across major geographical regions in India during the first wave of the pandemic (November-December 2020). Community healthcare workers (N = 357) were contacted through snowball sampling. The sample size was calculated using the OpenEpi Version 3.01 with a hypothesized 65% ± 5% prevalence of vaccine acceptance at 95% confidence level. The design effect was kept one. The minimal sample size, which came on estimation at 95% confidence level, was 350. CHWs, aged 18 and above and willing to participate in the study were recruited for data collection.

Study Procedure

Web-based self-administered questionnaires were developed and shared with the participants through social media. The participants were requested to share the link with their peers in their circle. On clicking on the received link, the participants were auto-directed to the informed consent page. After providing informed consent, they were allowed to take the survey. The questionnaire consisted of sections on socio-

demographic details, questions to understand knowledge, perception of risk of getting infected with COVID-19, trust in the health system, and willingness to accept the COVID-19 vaccine, once available. Intention to get vaccinated was assessed by the question “Do you intend to get vaccinated against Coronavirus when the vaccine is available?” followed by the response options, “yes,” “no,” and “not sure.” Based on their response, they were asked why they intended/did not intend/were not sure to get vaccinated through pre-specified reasons followed by response options, “yes” and “no.”

Data analysis

Participant characteristics were summarized using frequency (percentage). Chi square test was used to examine the distribution of intention to accept COVID-19 vaccine with respondents’ socio-demographic characteristics. Logistic regression was used to identify association between independent variables and the intention to accept the vaccine. Odds ratios (OR) and their 95% confidence intervals (95% CI) were reported. A two tailed p-value < 0.05 was considered to be statistically significant. All data analysis was performed using STATA 13.0.

Results

Among 357 community health workers who completed the survey, 136 (38%) and 138 (39%) belonged to the age group 26–35 years, and above 35 years, respectively. The participants were mostly women (n = 308, 86%), and mainly belonged to the southern (n = 89, 25%), northern (n = 85, 24%), and eastern (n = 84, 24%) regions of the country. About half of them (n = 192, 54%) were from urban areas. A majority, 254 (71%) were from medium socioeconomic status, and 148 (41%) were graduates. More than half (n = 189, 53%) belonged to the general category, and most of them (n = 253, 71%) were Hindus. Most of them were single (n = 265, 74%), and had a family size of five and below (n = 215, 60%) [Table 1].

Table 1
Demographic characteristics of study
participants (N = 357)

Variables	n (%)
Age	
18–25	83 (23.25%)
26–35	136 (38.10%)
above 35	138 (38.66%)
Gender	
Male	49 (13.73%)
Female	308 (86.27%)
Highest education	
Diploma/High School	123 (34.45%)
Undergraduate	148 (41.46%)
Postgraduate	86 (24.09%)
Marital status	
Single	265 (74.23%)
Married	92 (25.77%)
Family size	
Six and above	142 (39.78%)
Five and below	215 (60.22%)
Family income	
below 10000	55 (15.41%)
11000–20000	52 (14.57%)
21000–50000	71 (19.89%)
above 50000	179 (50.14%)
Socio-economic status	
Low	28 (7.84%)
Medium	254 (71.15%)
High	75 (21.01%)

Variables	n (%)
Geographical residence	
Eastern	84 (23.53%)
Western	38 (10.64%)
Northern	85 (23.81%)
Southern	89 (24.93%)
North-east	41 (11.48%)
Central	20 (5.60%)
Place of residence	
Urban	192 (53.78%)
Rural	165 (46.22%)
Social caste	
General	189 (52.94%)
Other Backward Caste	115 (32.21%)
Scheduled Caste	33 (9.24%)
Scheduled Tribe	20 (5.60%)
Religion	
Hindu	253 (70.87%)
Muslim	44 (12.32%)
Christian	24 (6.72%)
Sikhs	36 (10.08%)

Of the total respondents, 208 (58%) intended to accept the vaccine once it was available while 149 (42%) reported vaccine hesitancy. Exposure to COVID-19 cases were reported by 131(37%), 348(97%) had knowledge about COVID-19 while 319(89%) had knowledge about development of the vaccine. History of vaccine hesitancy was present in 41 (11%), and 88 (25%) perceived COVID-19 infection as a risk. More than half the participants, 206 (58%) trusted the healthcare system while 197 (55%) had trust in domestic vaccines. Among those who intended to get vaccinated, 137 (66%) had no exposure to COVID-19 cases, 203 (98%) had knowledge about COVID-19, 199 (96%) had knowledge regarding the development of a COVID-19 vaccine, 188 (90%) did not have a history of vaccine hesitancy, 169 (81%) did not perceive COVID19 as a risk, 140 (67%) trusted the healthcare system, and 123 (59%) had trust in domestic

vaccines. Knowledge about development of COVID-19 vaccine ($p < 0.001$), risk perception ($p < 0.001$), and trust in healthcare system ($p < 0.001$) were associated with the intention to uptake COVID-19 vaccine [Table 2].

Table 2
Vaccination Knowledge, Vaccine complacency, and Vaccination confidence of the study participants
(stratified by their intention to uptake) (N=357)

Variables	No/Not sure (n = 149)	Yes (n = 208)	Total (357)	P-value
Exposed to COVID-19 cases				0.24
No	89 (59.73%)	137 (65.87%)	226 (63.31%)	
Yes	60 (40.27%)	71 (34.13%)	131 (36.69%)	
Knowledge about COVID19				0.87
No/Not Sure	4 (2.68%)	5 (2.40%)	9 (2.52%)	
Yes	145 (97.32%)	203 (97.60%)	348 (97.48%)	
Knowledge about development of the COVID19 vaccine				0.00
No/Not Sure	29 (19.46%)	9 (4.33%)	38 (10.64%)	
Yes	120 (80.54%)	199 (95.67%)	319 (89.36%)	
History of vaccine hesitancy				0.19
Yes	21 (14.09%)	20 (9.62%)	41 (11.48%)	
No	128 (85.91%)	188 (90.38%)	316 (88.52%)	
Risk perception				0.00
Yes	49 (32.89%)	39 (18.75%)	88 (24.65%)	
No	100 (67.11%)	169 (81.25%)	269 (75.35%)	
Trust in the healthcare system				0.00
No	83 (55.70%)	68 (32.69%)	151 (42.30%)	
Yes	66 (44.30%)	140 (67.31%)	206 (57.70%)	
Trust in domestic vaccines				0.08
No	75 (50.34%)	85 (40.87%)	160 (44.82%)	

Yes	74 (49.66%)	123 (59.13%)	197 (55.18%)
P-values by Chi2 test for binary/categorical variables.			

On logistic regression analysis, compared to those who completed high school or diploma, graduates and post-graduates were more likely to opt for vaccination with an aOR of 2.26 (95% CI: 1.27–4.01), and 2.85 (95% CI: 1.43–5.68) respectively. The association was statistically significant ($p < 0.05$). Participants who intended to uptake the hypothetical vaccine were less likely to be exposed to COVID19 cases (aOR: 0.57[95 % CI : 0.34–0.96], p value = 0.03). Those not concerned about getting infected with COVID-19 were 1.86 (95% CI: 1.03–3.35) times more inclined to get vaccinated. The association was statistically significant (p value = 0.04). The odds of participants to get vaccinated was 2.60 (95% CI: 1.59–4.26) times more among those who trusted the healthcare system as opposed to those who did not ($p < 0.001$) [Table 3].

Table 3
 Factors potentially associated with the intention to receive COVID-19 vaccine among community health workers, India (N = 357)

Variable	aOR [95% CI]	P-value
Exposed to COVID-19 cases		
No	1	
Yes	0.57 [0.34–0.96]	0.034
History of vaccine hesitancy		
Yes	1	
No	1.54 [0.73–3.23]	0.254
Risk perception		
Yes	1	
No	1.86 [1.03–3.35]	0.038
Trust in domestic vaccines		
No	Ref	
Yes	1.36 [0.81–2.27]	0.248
Trust in healthcare system		
No	1	
Yes	2.60 [1.59–4.26]	< 0.001
Age		
18–25	1	
26–35	0.64 [0.29–1.43]	0.277
above 35	1.52 [0.61–3.74]	0.367
Gender		
Male	1	
Female	1.41 [0.68–2.95]	0.360
Marital status		
Single	1	
Married	0.75 [0.33–1.69]	0.481

Variable	aOR [95% CI]	P-value
Highest education		
Diploma/High School	1	
Undergraduate	2.26 [1.27–4.01]	0.006
Postgraduate	2.85 [1.43–5.68]	0.003
Socio-economic status		
High	1	
Low	1.48 [0.53–4.14]	0.456
Medium	0.67 [0.36–1.26]	0.214
Place of residence		
Urban	1	
Rural	1.07 [0.67–1.70]	0.776

Discussions

This study is first of its kind to depict the COVID-19 vaccination intention among community health worker in India. Of the 357 community health workers, just over half responded positively regarding intention to uptake COVID-19 vaccination. Education, exposure to COVID-19 cases, perception of risk, and trust in the healthcare system were factors which affected intention to get vaccinated.

More than half (58%) of the respondents showed their intention of getting vaccinated in the current study, however, this level of acceptance might not be sufficient to break the chain of transmission [17, 18]. In a survey conducted among French healthcare workers, 77% declared they would intend to get vaccinated against COVID-19[19]. Rates of intention ranged from 92% in physicians, 65% among nurses, 70% among midwives and 67% in other HCWs [19]. Healthcare workers in Congo reported, around 28% were willing to get vaccinated [20]. In India, 86% planned to get COVID-19 vaccination whenever available, in a survey conducted among the general population [21]. The differences in study population and the time when the survey was conducted might explain the differences.

Having a graduate or a post-graduate degree was associated with higher intention of up taking the vaccine as compared to a diploma/ high school education in our study. This was similar to other studies who reported higher education was associated with greater uptake of the hypothetical vaccine [15, 22].

Those participants who were exposed to COVID-19 cases were less inclined to uptake the hypothetical vaccine in the current study. This was in contrast to studies conducted among healthcare workers in Canada and China, where exposure or suspected exposure to a COVID-19 patient was associated with higher intention of acceptance [23, 24].

Those who perceived they were not at risk of getting infected by COVID-19 were more likely to opt for a COVID-19 vaccine when it was available, in this study. Risk perceptions are central to many health behavior theories. Several studies have found positive association between risk perceptions and engagement in protective behavior like vaccination [19, 25, 26], while other studies have reported negative relationships [27]. It can be speculated that perceived control might have affected the study results. High levels of perceived control has been reported to be associated with lower health risk perception [28], and higher intentions towards protective behavior [29]. The role of perceived control as a moderator between perceived risk and vaccination intention could be explored in future studies.

In the current study, the odds of accepting the vaccine was almost three times more among those who trusted the healthcare system as compared to those who did not. A positive effect of trust in the health system and the government on vaccination intention and uptake has been reported previously [15, 30, 31].

This is the first study as per our knowledge which has examined the intention to accept COVID-19 vaccine among community health workers in India. However, it has a number of limitations. The study was cross-sectional in nature with convenience snowball sampling; the intention to uptake vaccine might change with time. Responses were recorded using an online survey which might have led to potential biases in reporting. Also, questions were available in English language and not in regional languages which might have prevented non-English speaking CHWs from participating.

Despite almost all participants having knowledge regarding the community circulation of the virus and the development of a COVID-19 vaccine, it is of considerable concern that just over half expressed their intention to uptake the vaccine once it's available. In a country like India, where community healthcare workers act as a bridge between the healthcare system and the general population, their recommendation plays an influential role in the general population's vaccination behavior. The grass-root level workers serve as an important source of information for the community, and their perception of COVID-19 vaccination can be a key factor in influencing the public's decision to get vaccinated. The low positive response regarding acceptance of a COVID-19 vaccine among the study participants is worrying. There is a significant need to address the CHW's vaccine related concerns and improve their trust in the healthcare system to increase acceptance rate of COVID-19 vaccine.

Conclusions

Increasing knowledge about COVID-19 disease and the vaccine is not enough to improve vaccine acceptance rates. It is necessary to improve trust in the country's health system and COVID-19 vaccines to win the fight against the disease. Vaccination campaigns should focus more on those with lower educational status.

Abbreviations

Declarations

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Authors' contributions

BKP, KG, MG and AKG conceptualized the study, designed the tools; BKP, KG, AS, PG, LJ, JV, PS, AN, BP, SSK, VC, RS, SP, SB, NR, VR, TK, BM, LS, MG, AKG conducted the study at national level, and collected the data. BKP, JV, and LJ analyzed the data. AS drafted the introduction, BKP drafted the methods and results, AS and KG drafted the discussion. MG and AKG provided guidance, particularly related to the strategy and recommendations. All authors reviewed drafts, provided edits, and approved the final submission.

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Availability of data and materials

Data is available upon request.

Ethics approval and consent to participate

The study protocol was reviewed and approved by the Institutional Ethical Committee of Post Graduate Institute of Medical Education and Research (PGIMER), Chandigarh, India. Informed consent was obtained from all participants. Anonymized data was used for interpretation and reporting.

Consent for publication

Not applicable.

Competing interests

The authors declare they have no competing interests.

References

1. World Health Organization. WHO Coronavirus (COVID-19) Dashboard. <https://covid19.who.int/>. Accessed 5 Feb 2021.

2. Government of India. Ministry of Health and Family Welfare. <https://www.mohfw.gov.in/>. Accessed 5 Feb 2021.
3. Erdem H, Lucey DR. Healthcare worker infections and deaths due to COVID-19: A survey from 37 nations and a call for WHO to post national data on their website. *Int J Infect Dis.* 2021;102:239–41.
4. Bandyopadhyay S, Baticulon RE, Kadhum M, Alser M, Ojuka DK, Badereddin Y, et al. Infection and mortality of healthcare workers worldwide from COVID-19: A systematic review. *BMJ Global Health.* 2020;5:3097.
5. Indian Medical Association. Sacrifice of 665 Indian Doctors in the fight against COVID-19. <https://www.ima-india.org/ima/free-way-page.php?pid=721>. Accessed 5 Feb 2021.
6. Hajj Hussein I, Chams N, Chams S, El Sayegh S, Badran R, Raad M, et al. Vaccines Through Centuries: Major Cornerstones of Global Health. *Front public Heal.* 2015;3:269.
7. Fine P, Eames K, Heymann DL. “Herd immunity”: A rough guide. *Clin Infect Dis.* 2011;52:911–6.
8. Government of India. Budget 2021-2022. 2021;:7. https://www.indiabudget.gov.in/doc/Budget_Speech.pdf. Accessed 5 Feb 2021.
9. MacDonald NE, Eskola J, Liang X, Chaudhuri M, Dube E, Gellin B, et al. Vaccine hesitancy: Definition, scope and determinants. *Vaccine.* 2015;33:4161–4.
10. World Health Organization. Ten threats to global health in 2019. World Health Organization. 2019. <https://www.who.int/news-room/spotlight/ten-threats-to-global-health-in-2019>. Accessed 5 Feb 2021.
11. Sankaranarayanan S, Jayaraman A, Gopichandran V. Assessment of vaccine hesitancy among parents of children between 1 and 5 years of age at a tertiary care hospital in Chennai. *Indian Journal of Community Medicine.* 2019;44:394–6.
12. Larson HJ, Jarrett C, Eckersberger E, Smith DMD, Paterson P. Understanding vaccine hesitancy around vaccines and vaccination from a global perspective: A systematic review of published literature, 2007-2012. *Vaccine.* 2014;32:2150–9.
13. Salmon DA, Dudley MZ, Glanz JM, Omer SB. Vaccine Hesitancy: Causes, Consequences, and a Call to Action. *Am J Prev Med.* 2015;49:S391–8.
14. Nguyen T, Henningsen K, Brehaut J, Hoe E, Wilson K. Acceptance of a pandemic influenza vaccine: a systematic review of surveys of the general public. *Infect Drug Resist.* 2011;4:197–207.
15. Lazarus J V., Ratzan SC, Palayew A, Gostin LO, Larson HJ, Rabin K, et al. A global survey of potential acceptance of a COVID-19 vaccine. *Nat Med.* 2021;27:225–8.
16. World Health Organization. The role of community health workers in COVID-19 vaccination. Implementation Support Guide. World Health Organization. 2021. <https://apps.who.int/iris/bitstream/handle/10665/340986/WHO-2019-nCoV-NDVP-%0ACHWs-role-2021.1-eng.pdf>. Accessed 10 Jun 2021.
17. World Health Organization. COVID-19: Science in 5: Episode #1 - Herd immunity. World Health Organization. <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/media->

- resources/science-in-5/episode-1. Accessed 7 Feb 2021.
18. Altmann DM, Douek DC, Boyton RJ. What policy makers need to know about COVID-19 protective immunity. *The Lancet*. 2020;395:1527–9.
 19. Gagneux-Brunon A, Detoc M, Bruel S, Tardy B, Rozaire O, Frappe P, et al. Intention to get vaccinations against COVID-19 in French healthcare workers during the first pandemic wave: a cross-sectional survey. *J Hosp Infect*. 2021;108:168–73.
 20. Kabamba Nzaji M, Kabamba Ngombe L, Ngoie Mwamba G, Banza Ndala DB, Mbidi Miema J, Luhata Lungoyo C, et al. Acceptability of Vaccination Against COVID-19 Among Healthcare Workers in the Democratic Republic of the Congo. *Pragmatic Obs Res*. 2020;11:103–9.
 21. Sharun K, Faslu Rahman CK, Haritha C V, Jose B, Tiwari R, Dhama K. Covid-19 vaccine acceptance: Beliefs and barriers associated with vaccination among the general population in india. *J Exp Biol Agric Sci*. 2020;8 Special Issue 1:S210-S.
 22. Fisher KA, Bloomstone SJ, Walder J, Crawford S, Fouayzi H, Mazor KM. Attitudes Toward a Potential SARS-CoV-2 Vaccine: A Survey of U.S. Adults. *Ann Intern Med*. 2020;173:964–73.
 23. Dzieciolowska S, Hamel D, Gadio S, Dionne M, Gagnon D, Robitaille L, et al. Covid-19 vaccine acceptance, hesitancy, and refusal among Canadian healthcare workers: A multicenter survey. *Am J Infect Control*. 2021.
 24. Wang K, Wong ELY, Ho KF, Cheung AWL, Chan EYY, Yeoh EK, et al. Intention of nurses to accept coronavirus disease 2019 vaccination and change of intention to accept seasonal influenza vaccination during the coronavirus disease 2019 pandemic: A cross-sectional survey. *Vaccine*. 2020;38:7049–56.
 25. Al-Mohaithef M, Padhi BK. Determinants of covid-19 vaccine acceptance in Saudi Arabia: A web-based national survey. *J Multidiscip Healthc*. 2020;13:1657–63.
 26. Harapan H, Wagner AL, Yufika A, Winardi W, Anwar S, Gan AK, et al. Acceptance of a COVID-19 Vaccine in Southeast Asia: A Cross-Sectional Study in Indonesia. *Front Public Heal*. 2020;8:381.
 27. Taghrir MH, Borazjani R, Shiraly R. COVID-19 and Iranian medical students; A survey on their related-knowledge, preventive behaviors and risk perception. *Arch Iran Med*. 2020;23:249–54.
 28. Lanciano T, Graziano G, Curci A, Costadura S, Monaco A. Risk Perceptions and Psychological Effects During the Italian COVID-19 Emergency. *Front Psychol*. 2020;11:2434.
 29. Sobkow A, Zaleskiewicz T, Petrova D, Garcia-Retamero R, Traczyk J. Worry, Risk Perception, and Controllability Predict Intentions Toward COVID-19 Preventive Behaviors. *Front Psychol*. 2020;11.
 30. Larson HJ, Clarke RM, Jarrett C, Eckersberger E, Levine Z, Schulz WS, et al. Measuring trust in vaccination: A systematic review. *Human Vaccines and Immunotherapeutics*. 2018;14:1599–609.
 31. Quinn SC, Jamison AM, An J, Hancock GR, Freimuth VS. Measuring vaccine hesitancy, confidence, trust and flu vaccine uptake: Results of a national survey of White and African American adults. *Vaccine*. 2019;37:1168–73.