Prevalence and Factors Associated with Caregivers’ Hesitancy in Immunizing Dependent Older Adults with COVID-19 Vaccines: A Cross-Sectional Survey

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Abstract: Background: Coronavirus disease 2019 (COVID-19) vaccinations have been proven to prevent hospitalization and mortality. However, some caregivers may be hesitant to authorize COVID-19 vaccination of people under their care. Our study aimed to evaluate factors associated with caregiver hesitancy to authorize vaccination of dependent older adults. Method: We conducted a cross-sectional telephone survey of vaccine hesitancy among caregivers of dependent older patients in the geriatric clinic of Ramathibodi Hospital. Caregivers were contacted and interviewed by trained interviewers from 20 June to 25 July 2021. Results: The study enrolled 318 participants with a mean age of 55.9 years. The majority of the participants were the patients’ children (86.5%). In total, 39.9% of participants were hesitant to authorize COVID-19 vaccination of the older adults under their care. Factors associated with caregiver vaccine hesitation were uneasiness, anxiety, agitation, sadness, and worry in association with social distancing, refusal to receive a COVID-19 vaccine, and concern about vaccine manufacturers. Conclusion: The prevalence of caregiver hesitancy to allow older adults to undergo COVID-19 vaccination was relatively high, and several factors associated with this vaccine hesitancy were identified. These findings may aid efforts toward COVID-19 vaccination of dependent older adults.

Keywords: vaccine hesitancy; COVID-19 vaccine; caregiver; dependent; older adult

1. Introduction

The coronavirus disease 2019 (COVID-19) pandemic began in January 2019 [1], and over 400 million people worldwide had been infected by March 2022 [2]. Some of those people developed the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infections, leading to high morbidity and mortality rates. In Thailand, there have been 2.9 million confirmed COVID-19 cases and over 22,000 deaths as of 2 March 2022 [3]. The elderly are among the most vulnerable groups in terms of SARS-CoV-2 infection [4–7]. According to a report by the World Health Organization (WHO), the COVID-19 mortality rate of older people in Thailand was 7.4%, compared with 0.98% for the general population [8]. COVID-19 vaccinations can prevent infection, hospitalization, and mortality [9–11]. However, as SARS-CoV-2 evolved over time, from the wild-type to the now-predominant Omicron variant [12], COVID-19 vaccine effectiveness seemed to wane, and booster doses were required [13,14]. Despite the efficacy of the vaccines and the higher mortality rates of COVID-19, some older adults were still hesitant to receive one. The Strategic Advisory Group of Experts on Immunization of the WHO defined vaccine hesitancy as a delay in
acceptance of vaccination, or refusal of vaccination despite the availability of vaccination services [15,16]. One systematic review and meta-analysis reported prevalence rates of unwillingness and uncertainty to receive a COVID-19 vaccine of 27.0% and 19.3%, respectively, in older adults. In a US study, factors associated with vaccine unwillingness were a low income, low level of education, and Hispanic ethnicity [17].

In our previous study, the prevalence of COVID-19 vaccine hesitancy among Thai seniors was relatively high; 44.3% of this group were hesitant to get the COVID-19 vaccine [18]. In our geriatric clinic, it was observed that some older patients depend on their caregivers due to underlying conditions. Thus, they lack the capacity to make their own vaccination decisions. In such cases, the caregivers, who are typically family members, need to make the decision regarding COVID-19 vaccination on behalf of the patient [19]. However, some caregivers refuse to authorize COVID-19 vaccination of patients under their supervision. The goal of this study is to determine the factors that contribute to hesitancy among caregivers to authorize vaccination for the dependent older adults under their care. The findings of this study could improve COVID-19 vaccination rates among dependent older adults.

2. Materials and Methods

2.1. Setting and Study Design

The Human Research Ethics Committee of the Faculty of Medicine, Ramathibodi Hospital, Mahidol University (COA. No. MURA2021/1063) approved the study protocol. We conducted a cross-sectional telephone survey of vaccine hesitancy (as defined above) among caregivers of older patients in the geriatric clinic of Ramathibodi Hospital, which provides tertiary care for this group. Patients aged ≥60 years who visited a geriatric clinic in the past 2 years were identified in the hospital database. Patients who were independent and could make their own decisions to undergo COVID-19 vaccination were excluded from the study. The dependent patients were older patients with physical and mental dependence, as well as cognitive impairment. Caregivers of dependent patients who identified themselves as the patients’ representatives, responsible for making COVID-19 vaccination decisions on their behalf, were invited to take part in this study. All participants provided verbal informed consent, which was obtained according to the approved verbal informed consent protocol of the Human Research Ethics Committee of the Faculty of Medicine, Ramathibodi Hospital, Mahidol University. We did not obtain written informed consent because we conducted a telephone survey, and it was inconvenient for participants to sign written informed consent forms and handle documents during the pandemic. The consenting participants were interviewed by a trained interviewer. The survey was performed by telephone from 20 June to 25 July 2021. The study was conducted according to the Declaration of Helsinki and Good Clinical Practice guidelines [20].

2.2. Questionnaire

The questionnaire used in this study was developed after a review of the literature [21–33]. A consensus was reached among experts, including psychiatrists and geriatricians. The questionnaire was divided into five sections: caregiver sociodemographic data, patient sociodemographic data, medical history, COVID-19 pandemic-related information, and COVID-19 vaccine-related information. A pilot study (n = 10) was performed to improve the linguistic clarity of the survey items. The pilot data were not included in any subsequent analyses. The final version of the questionnaire typically required 30–45 min to complete. The questionnaire was originally developed in the Thai language.

2.2.1. Caregiver Sociodemographic Characteristics

Participants were asked about their sociodemographic characteristics, including age, gender, marital status, education, relationship with patient, employment status, monthly income, income loss due to COVID-19, and vaccination history [including the influenza, pneumococcal, zoster, and diphtheria-tetanus-pertussis (DTP) vaccines].
2.2.2. Patient Sociodemographic Characteristics and Medical History

The sociodemographic characteristics of the patients were collected in a similar manner as for the caregivers. In addition, the participants were asked to report the patients’ medical history, including body mass index (BMI), ambulation, hearing problems, visual problems, history of smoking and alcohol drinking, food and drug allergies, underlying diseases, cognitive complaints, hospitalization in the previous year, and perceived overall health status.

2.2.3. COVID-19 Pandemic-Related Information

Participants were questioned regarding their general knowledge of COVID-19, their primary source of information on COVID-19, confidence in governmental and public health agency information about COVID-19, confidence regarding the capacity of Thailand’s healthcare system to care for COVID-19 patients, confidence regarding governmental measures to control COVID-19 infection, self-perceived risk of being infected with COVID-19, self-perceived risk of developing a severe COVID-19 infection, attitudes toward social distancing, and intention to be vaccinated against COVID-19.

2.2.4. COVID-19 Vaccine-Related Information

Participants were questioned regarding their hesitancy to authorize COVID-19 vaccination of the patients under their care. They were asked if they knew people who had had a severe reaction to the COVID-19 vaccine, whether they intended to be vaccinated themselves, whether they had already received a COVID-19 vaccination, and whether they wanted those under their care to be vaccinated for COVID-19. They were also asked if they based their decision regarding their elderly dependents getting vaccinated on the manufacturer of the vaccine. Finally, the participants were also asked if they would still want their patients to receive a vaccination if the manufacturer was not that highly anticipated.

Respondents who were hesitant to allow their patients to receive a COVID-19 vaccine were questioned as to why that was the case, as were those willing to authorize vaccination.

2.3. Statistical Analysis

Nominal data, such as the presence of underlying disorders, are summarized as numbers and percentages of patients. Depending on the normality of the data distribution, continuous variables such as age are summarized as mean ± standard deviation (SD). To analyze categorical variables, the chi-square test or Fisher’s exact test was used, while an independent t test was used for continuous variables. Binary logistic regression was used to identify influencing factors. Only statistically significant factors in the univariable logistic regression model were included in the multivariable logistic regression model. SPSS for Windows software (ver. 26.0; IBM Corp., Armonk, NY, USA) was used for all statistical analyses. Statistical significance was defined as a p value < 0.05.

3. Results

Of the 1095 patients contacted, 318 (29.0%) had caregivers who declared themselves as the patients’ representatives; these caregivers were enrolled in the study (Figure 1). Among the 318 participants, 127 (39.9%) were hesitant to authorize COVID-19 vaccination for the dependent older adults under their care, whereas 191 (60.1%) showed no hesitancy.

3.1. Sociodemographic Characteristics

The sociodemographic data of the caregivers are shown in Tables 1 and 2. The participants ranged in age from 26 to 91 years (mean ± SD age = 55.9 ± 11.5 years; age information was provided by 313 caregivers). Most of the caregivers were female (76.4%) and married (53.8%), with a bachelor’s degree or higher (87.1%). In total 86.5% of the caregivers were the children of the patients, while 9.1% were spouses and 4.4% were siblings.
1,095 patients were called by the interviewers.

- 347 patients were unable to contact.
- 282 patients were able to give the interview by themselves.
- 75 patients refused to participate.
- 73 patients were death.

318 eligible caregivers of older patients gave the interview.

Figure 1. Study flow diagram.

Table 1. Baseline characteristics of the caregivers (N = 318).

| Baseline Characteristics | n  | %   |
|--------------------------|----|-----|
| Age (y) (n = 313)        |    |     |
| <40                      | 27 | 8.5 |
| 40–59                    | 160| 50.3|
| ≥60                      | 126| 39.6|
| Females                  | 243| 76.4|
| Marital status           |    |     |
| Single                   | 129| 40.6|
| Married                  | 171| 53.8|
| Divorced                 | 5  | 1.6 |
| Widow                    | 13 | 4.1 |
| Education level          |    |     |
| Elementary school or lower| 12 | 3.8 |
| High school              | 29 | 9.1 |
| Bachelor’s degree or higher| 277| 87.1|
| Current residence        |    |     |
| Bangkok                  | 201| 63.2|
| Other province           | 117| 36.8|
| Relationship with patient|    |     |
| Spouse                   | 29 | 9.1 |
| Child                    | 275| 86.5|
| Sibling                  | 14 | 4.4 |
| Employment status        |    |     |
| Unemployed               | 54 | 17  |
| Part-time                | 65 | 20.4|
| Full-time                | 28 | 8.8 |
| Retired                  | 171| 53.8|
| Monthly income (baht) (n = 239) |    |     |
| ≤10,000                  | 37 | 15.5|
| 10,001–20,000            | 50 | 20.9|
| 20,001–50,000            | 108| 45.2|
| ≥50,001                  | 44 | 18.4|
| Income loss due to COVID | 95 | 29.9|
| History of vaccination   |    |     |
| Influenza vaccine        | 70 | 22  |
| Zoster vaccine           | 295| 92.8|
| Pneumococcal vaccine    | 276| 86.8|
| DTP vaccine              | 130| 40.9|

n, number; DTP, diphtheria-tetanus-pertussis.
Table 2. Baseline characteristics of caregivers: comparison between the vaccine acceptance and vaccine hesitancy groups.

| Characteristics                  | Acceptance (n = 191) | Hesitancy (n = 127) | χ² | p Value |
|----------------------------------|----------------------|---------------------|----|---------|
|                                 | n    | %    | N     | %    |        |
| Age (y) (n = 313)               |      |      |       |      |        |
| <40                             | 13   | 6.90%| 14    | 11.30%| 2.56   | 0.278  |
| 40–59                           | 95   | 50.30%| 65    | 52.40%|        |        |
| ≥60                             | 81   | 42.90%| 45    | 36.30%|        |        |
| Female                          | 143  | 74.90%| 100  | 78.70%| 0.634  | 0.426  |
| Marital status                  |      |      |       |      |        |
| Single                          | 73   | 38.30%| 56    | 44.10%| 1.11   | 0.775  |
| Married                         | 107  | 56.00%| 64    | 50.40%|        |        |
| Divorced                        | 3    | 1.60% | 2     | 1.60% |        |        |
| Widow                           | 8    | 4.20% | 5     | 3.90% |        |        |
| Education level                 |      |      |       |      |        |
| Elementary school or lower      | 6    | 3.10% | 6     | 4.70% | 0.561  | 0.755  |
| High school                     | 18   | 9.40% | 11    | 8.70% |        |        |
| Bachelor’s degree or higher     | 167  | 87.40%| 110   | 86.60%|        |        |
| Current residence               |      |      |       |      |        |
| Bangkok *                       | 129  | 67.50%| 72    | 56.70%| 3.859  | 0.049  |
| Other province                  | 62   | 32.50%| 55    | 43.30%|        |        |
| Relationship with patient       |      |      |       |      |        |
| Spouse                          | 21   | 11.00%| 8     | 6.30% | 2.047  | 0.359  |
| Child                           | 162  | 84.80%| 113   | 89.00%|        |        |
| Sibling                         | 8    | 4.20% | 6     | 4.70% |        |        |
| Employment status               |      |      |       |      |        |
| Unemployed                      | 33   | 17.30%| 21    | 16.50%| 0.442  | 0.932  |
| Part-time                       | 41   | 21.50%| 24    | 18.90%|        |        |
| Full-time                       | 16   | 8.40% | 12    | 9.40% |        |        |
| Retired                         | 101  | 52.90%| 70    | 55.10%|        |        |
| Monthly income (baht) (n = 239) |      |      |       |      |        |
| ≤10,000                         | 23   | 16.10%| 14    | 14.60%| 0.362  | 0.948  |
| 10,001–20,000                   | 31   | 21.70%| 19    | 19.80%|        |        |
| 20,001–50,000                   | 64   | 44.80%| 44    | 45.80%|        |        |
| ≥50,001                         | 25   | 17.50%| 19    | 19.90%|        |        |
| Income loss due to COVID        | 51   | 26.70%| 44    | 34.60%| 2.298  | 0.13   |
| History of vaccination          |      |      |       |      |        |
| Influenza vaccine               | 42   | 22.00%| 28    | 22.00%| 0      | 0.99   |
| Zoster vaccine                  | 176  | 92.10%| 119   | 93.70%| 0.275  | 0.6    |
| Pneumococcal vaccine            | 168  | 88.00%| 108   | 85.00%| 0.567  | 0.451  |
| DTP vaccine                     | 82   | 42.90%| 48    | 37.70%| 0.833  | 0.361  |

N, number; χ², chi-squared; DTP, diphtheria-tetanus-pertussis. * p < 0.05.

3.2. Sociodemographic Characteristics and Medical History of Dependent Older Adults

The sociodemographic data of the dependent older patients are shown in Tables 3 and 4. The mean ± SD age was 83.8 ± 8.4 years (range: 60–107 years). Most of the patients were female (73.6%) and of Thai ethnicity (93.1%). In total, 45.0% were married and 63.2% lived in Bangkok. Regarding health status, 19.2% of the patients were bedbound and 10.1% depended on tube feeding. Moreover, 84.6% of the patients had cognitive complaints, 31.4% had experienced a fall, and 30.2% were admitted to hospital at least once in the previous year.
Table 3. Baseline characteristics of the dependent older adults (n = 318).

| Baseline Characteristics                        | n   | %   |
|------------------------------------------------|-----|-----|
| Age (y)                                        |     |     |
| 60–69                                          | 18  | 5.7 |
| 70–79                                          | 77  | 24.2|
| 80–89                                          | 144 | 45.3|
| ≥90                                            | 79  | 24.8|
| Female                                         | 234 | 73.6|
| Ethnicity                                      |     |     |
| Thai                                           | 296 | 93.1|
| Chinese                                        | 22  | 6.9 |
| Marital status                                 |     |     |
| Single                                         | 19  | 6   |
| Married                                        | 143 | 45  |
| Divorced                                       | 8   | 2.5 |
| Widow                                          | 148 | 46.5|
| Children living in the same home               | 36  | 11.3|
| Education                                      |     |     |
| Elementary school or lower                     | 178 | 56  |
| High school                                    | 61  | 19.2|
| Bachelor’s degree or higher                    | 79  | 24.8|
| Accommodation                                  |     |     |
| House/condominium                              | 308 | 96.9|
| Nursing home                                   | 10  | 3.1 |
| BMI (n = 298)                                   |     |     |
| <18.5                                          | 42  | 13.2|
| 18.5–22.9                                      | 124 | 39  |
| 23–24.9                                        | 65  | 20.4|
| 25–30                                          | 58  | 18.2|
| >30                                            | 9   | 2.8 |
| Ambulation                                     |     |     |
| Bedbound                                       | 61  | 19.2|
| Ambulation                                     | 257 | 80.8|
| Feeding                                        |     |     |
| Oral                                           | 286 | 89.9|
| Tube feeding                                   | 32  | 10.1|
| Hearing impairment                              | 109 | 34.3|
| Visual problems                                |     |     |
| Blindness                                      | 30  | 9.4 |
| Visual impairment                              | 74  | 23.3|
| Normal                                         | 214 | 67.3|
| History of smoking                             | 49  | 15.4|
| History of alcohol consumption                 | 5   | 1.6 |
| Food allergy                                   | 13  | 4.1 |
| Drug allergy                                   | 88  | 27.7|
| History of vaccination                         |     |     |
| Influenza vaccine                              | 288 | 90.6|
| Zoster vaccine                                 | 49  | 15.4|
| Pneumococcal vaccine                           | 134 | 42.1|
| DTP vaccine                                    | 140 | 44  |
Table 3. Cont.

| Baseline Characteristics                  | n   | %   |
|-------------------------------------------|-----|-----|
| Underlying disease                        |     |     |
| Diabetes                                  | 91  | 28.6|
| Chronic kidney disease                    | 34  | 10.7|
| Respiratory disease                       | 37  | 11.6|
| Psychiatric illness                       | 40  | 12.6|
| Subjective cognitive complaints           | 269 | 84.6|
| Dementia diagnosis                        | 194 | 61  |
| History of falls in the past year         | 100 | 31.4|
| Hospitalization in the past year          | 96  | 30.2|
| Perceived overall health status           |     |     |
| Worst/bad                                 | 40  | 12.6|
| Average                                   | 125 | 39.3|
| Good/best                                 | 153 | 48.1|

n, number; BMI, body mass index; DTP, diphtheria-tetanus-pertussis.

Table 4. Baseline characteristics of dependent older adults associated with caregiver hesitancy to authorize COVID-19 vaccination.

| Characteristics                  | Acceptance (n = 191) | Hesitancy (n = 127) | χ²  | p Value |
|----------------------------------|----------------------|---------------------|-----|---------|
| Age (y)                          |                      |                     |     |         |
| 60–69                            | 11 5.80%             | 7 5.50%             | 3.132 | 0.372  |
| 70–79                            | 41 21.50%            | 36 28.30%           |     |         |
| 80–89                            | 86 45.00%            | 58 45.70%           |     |         |
| ≥ 90                             | 53 27.70%            | 26 20.50%           |     |         |
| Female                           | 140 73.30%           | 94 74.00%           | 0.2 | 0.887  |
| Ethnicity                        |                      |                     |     |         |
| Thai                             | 175 91.60%           | 121 95.30%          | 1.58 | 0.209  |
| Chinese                          | 16 8.40%             | 6 4.70%             |     |         |
| Marital status                   |                      |                     |     |         |
| Single                           | 10 5.20%             | 9 7.10%             | 0.846 | 0.839  |
| Married                          | 87 45.50%            | 56 44.10%           |     |         |
| Divorced                         | 4 2.10%              | 4 3.10%             |     |         |
| Widow                            | 90 47.10%            | 58 45.70%           |     |         |
| Children living in the same home | 21 11.00%            | 15 11.80%           | 0.051 | 0.822  |
| Education level                  |                      |                     |     |         |
| Elementary school or lower       | 108 56.50%           | 70 55.10%           | 0.227 | 0.893  |
| High school                      | 35 18.30%            | 26 20.50%           |     |         |
| Bachelor’s degree or higher      | 48 25.10%            | 31 24.40%           |     |         |
| Accommodation                    |                      |                     |     |         |
| House/condominium                | 187 97.90%           | 121 95.30%          | 1.733 | 0.206  |
| Nursing home                     | 4 2.10%              | 6 4.70%             |     |         |
| BMI (n = 298)                    |                      |                     |     |         |
| <18.5                            | 25 13.70%            | 17 14.70%           | 1.595 | 0.81   |
| 18.5–22.9                        | 75 41.20%            | 49 42.20%           |     |         |
| 23–24.9                          | 40 22.00%            | 25 21.60%           |     |         |
| 25–30                            | 38 20.90%            | 20 17.20%           |     |         |
| >30                              | 4 2.20%              | 5 4.30%             |     |         |
Table 4. Cont.

| Characteristics                  | Acceptance | Hesitancy | \( \chi^2 \) | \( p \) Value |
|----------------------------------|------------|-----------|---------------|---------------|
|                                  | (\( n = 191 \)) | (\( n = 127 \)) | \( \chi^2 \) | \( p \) Value |
| Ambulation Bedbound              | 30         | 15.70%    | 31            | 24.40%        | 3.727        | 0.054        |
| Ambulation                       | 161        | 84.30%    | 96            | 75.60%        |              |              |
| Feeding                          |            |           |               |               |              |              |
| Oral                             | 174        | 91.10%    | 112           | 88.20%        | 0.714        | 0.398        |
| Tube feeding                     | 17         | 8.90%     | 15            | 11.80%        |              |              |
| Hearing impairment               | 65         | 34.00%    | 44            | 34.60%        | 0.013        | 0.91         |
| Visual problems                  |            |           |               |               |              |              |
| Blindness                        | 17         | 8.90%     | 13            | 10.20%        | 1.202        | 0.548        |
| Visual impairment                | 41         | 21.50%    | 33            | 26.00%        |              |              |
| Normal                           | 133        | 69.60%    | 81            | 63.80%        |              |              |
| History of smoking               | 28         | 14.70%    | 21            | 16.50%        | 0.206        | 0.65         |
| History of alcohol consumption   | 4          | 2.10%     | 1             | 0.80%         | 0.842        | 0.652        |
| Food allergy                     | 8          | 4.20%     | 5             | 3.90%         | 0.012        | 0.912        |
| Drug allergy                     | 52         | 27.20%    | 36            | 28.30%        | 0.048        | 0.827        |
| History of vaccination           |            |           |               |               |              |              |
| Influenza vaccine                | 174        | 91.10%    | 114           | 89.80%        | 0.159        | 0.69         |
| Zoster vaccine                   | 34         | 17.80%    | 15            | 11.80%        | 2.1          | 0.147        |
| Pneumococcal vaccine             | 87         | 45.50%    | 47            | 37.00%        | 2.283        | 0.131        |
| DTP vaccine                      | 89         | 46.60%    | 51            | 40.20%        | 1.284        | 0.257        |
| Underlying disease               |            |           |               |               |              |              |
| Diabetes                         | 57         | 29.80%    | 34            | 26.80%        | 0.352        | 0.553        |
| Chronic kidney disease           | 23         | 12.00%    | 11            | 8.70%         | 0.913        | 0.339        |
| Respiratory disease              | 22         | 11.50%    | 15            | 11.80%        | 0.006        | 0.936        |
| Psychiatric illness              | 21         | 11.00%    | 19            | 15.00%        | 1.091        | 0.296        |
| Subjective cognitive complaints  | 158        | 82.70%    | 111           | 87.40%        | 1.281        | 0.258        |
| Dementia diagnosis               | 112        | 58.60%    | 82            | 64.60%        | 1.127        | 0.288        |
| History of falls in the past year| 57         | 29.80%    | 43            | 33.90%        | 0.57         | 0.45         |
| Hospitalization in the past year | 56         | 29.30%    | 40            | 31.50%        | 0.171        | 0.679        |
| Perceived overall health status  |            |           |               |               |              |              |
| Worst/bad                        | 19         | 9.90%     | 21            | 16.50%        | 4.737        | 0.094        |
| Average                          | 72         | 37.70%    | 53            | 41.70%        |              |              |
| Good/best                        | 100        | 52.40%    | 53            | 41.70%        |              |              |

\( n \), number; \( \chi^2 \), chi-squared; BMI, body mass index; DTP, diphtheria-tetanus-pertussis.

3.3. COVID-19 Pandemic-Related Information

The results for the questionnaire items pertaining to COVID-19 pandemic-related information are provided in Table 5. Most of the participants (52.5%) thought that they knew “quite a lot” or “a lot” about COVID-19, and 43.4% stated that their source of COVID-19 information was television/radio. Caregivers who sometimes felt uneasy, anxious, agitated, sad, or worried when practicing social distancing were more hesitant to authorize COVID-19 vaccination of the dependent older adults under their care [odds ratio (OR) = 2.508; 95% confidence interval (CI): 1.400–4.491, \( p = 0.002 \) (Table 6).
Table 5. Associations of COVID-19 pandemic and vaccine-related information with caregiver hesitancy to authorize COVID-19 vaccination of the dependent older adults under their care.

| COVID-19 Pandemic and Vaccine-Related Information | Acceptance $(n = 191)$ | Hesitancy $(n = 127)$ | $\chi^2$ | $p$ Value |
|--------------------------------------------------|------------------------|----------------------|---------|-----------|
| How much do you know about COVID-19?             |                        |                      |         |           |
| Nothing                                          | 24 (12.60%)            | 15 (11.80%)         | 0.096   | 0.992     |
| Little                                           | 57 (29.80%)            | 39 (30.70%)         |         |           |
| Quite a lot                                      | 100 (52.40%)           | 67 (52.80%)         |         |           |
| A lot                                            | 10 (5.20%)             | 6 (4.70%)           |         |           |
| What is your primary source of COVID-19 information? |                      |                      |         |           |
| Television, radio                                | 81 (42.40%)            | 57 (44.90%)         | 7.022   | 0.219     |
| Newspapers                                       | 1 (0.50%)              | 3 (2.40%)           |         |           |
| Friends                                          | 33 (17.30%)            | 16 (12.60%)         |         |           |
| News websites                                     | 24 (12.60%)            | 15 (11.80%)         |         |           |
| Social networks                                   | 44 (23.00%)            | 35 (27.60%)         |         |           |
| Other                                            | 8 (4.20%)              | 1 (0.80%)           |         |           |
| What is your level of confidence in governmental and public health information on COVID-19? |                      |                      |         |           |
| Not confident *                                   | 24 (12.60%)            | 22 (17.30%)         | 9.898   | 0.019     |
| Quite unconfident                                 | 35 (18.30%)            | 31 (24.40%)         |         |           |
| Quite confident                                   | 106 (55.50%)           | 69 (54.30%)         |         |           |
| Confident                                         | 26 (13.60%)            | 5 (3.90%)           |         |           |
| How confident are you in Thailand’s healthcare system’s ability to treat COVID-19 patients? |                      |                      |         |           |
| Not confident                                     | 17 (8.90%)             | 12 (9.40%)          | 7.647   | 0.054     |
| Quite unconfident                                 | 21 (11.00%)            | 28 (22.00%)         |         |           |
| Quite confident                                   | 110 (57.60%)           | 65 (51.20%)         |         |           |
| Confident                                         | 43 (22.50%)            | 22 (17.30%)         |         |           |
| How effective are the government’s measures for controlling COVID-19 infection? |                      |                      |         |           |
| Insufficient                                      | 74 (38.70%)            | 68 (53.50%)         | 6.885   | 0.076     |
| Somewhat insufficient                             | 71 (37.20%)            | 36 (28.30%)         |         |           |
| Somewhat sufficient                               | 43 (22.50%)            | 22 (17.30%)         |         |           |
| Sufficient                                        | 3 (1.60%)              | 1 (0.80%)           |         |           |
| What is your risk of being infected with COVID-19? |                      |                      |         |           |
| Very low                                          | 24 (12.60%)            | 11 (8.70%)          | 3.974   | 0.264     |
| Low                                               | 89 (46.60%)            | 59 (46.50%)         |         |           |
| High                                              | 58 (30.40%)            | 35 (27.60%)         |         |           |
| Very high                                         | 20 (10.50%)            | 22 (17.30%)         |         |           |
| What are the chances that you will experience a severe COVID-19 infection or associated life-threatening condition? |                      |                      |         |           |
| Very low                                          | 20 (10.50%)            | 5 (3.90%)           | 6.933   | 0.074     |
| Low                                               | 84 (44.00%)            | 57 (44.90%)         |         |           |
| High                                              | 61 (31.90%)            | 38 (29.90%)         |         |           |
| Very high                                         | 26 (13.60%)            | 27 (21.30%)         |         |           |
| Do you feel uneasy/anxious/agitated/sad/worried when you have to practice social distancing? |                      |                      |         |           |
| Never *                                           | 145 (75.90%)           | 78 (61.40%)         | 7.859   | 0.049     |
| Sometimes                                         | 38 (19.90%)            | 42 (33.10%)         |         |           |
| Often                                             | 6 (3.10%)              | 5 (3.90%)           |         |           |
| Always                                            | 2 (1.00%)              | 2 (1.60%)           |         |           |
| Do you know anyone who has had a severe reaction to the COVID-19 vaccine? |                      |                      |         |           |
| No                                                | 171 (89.50%)           | 107 (84.30%)        | 1.932   | 0.165     |
| Yes                                               | 20 (10.50%)            | 20 (15.70%)         |         |           |
Table 5. Cont.

| COVID-19 Pandemic and Vaccine-Related Information | Acceptance | Hesitancy | $\chi^2$ | $p$ Value |
|-------------------------------------------------|------------|-----------|---------|-----------|
| (n = 191) | (n = 127) |           |         |           |
| **Do you know anyone who has had a severe reaction to the COVID-19 vaccine?** |           |           |         |           |
| No | 171 | 89.50% | 107 | 84.30% | 1.932 | 0.165 |
| Yes | 20 | 10.50% | 20 | 15.70% | 1.932 | 0.165 |
| **Do you intend to be vaccinated against COVID-19?** |           |           |         |           |
| No | 4 | 2.10% | 8 | 6.30% | 3.714 | 0.071 |
| Yes | 187 | 97.90% | 119 | 93.70% | 3.714 | 0.071 |
| **Have you already been vaccinated against COVID-19?** |           |           |         |           |
| No * | 37 | 19.40% | 37 | 29.10% | 4.071 | 0.044 |
| Yes | 154 | 80.60% | 90 | 70.90% | 4.071 | 0.044 |
| **Do you refuse to authorize COVID-19 vaccination for the older adults under your care?** |           |           |         |           |
| No * | 175 | 91.60% | 100 | 78.70% | 10.827 | 0.001 |
| Yes | 16 | 8.40% | 27 | 21.30% | 10.827 | 0.001 |
| **Did the manufacturer influence your decision to authorize COVID-19 vaccination for the older adults under your care?** |           |           |         |           |
| No * | 100 | 52.40% | 28 | 22.00% | 29.137 | <0.001 |
| Yes | 91 | 47.60% | 99 | 78.00% | 29.137 | <0.001 |
| **Would you authorize COVID-19 vaccination for the older adults under your care if the manufacturer was different from what you expected?** |           |           |         |           |
| No * | 33 | 17.30% | 32 | 25.20% | 11.606 | 0.003 |
| Yes | 128 | 67.00% | 61 | 48.00% | 11.606 | 0.003 |
| Unsure | 30 | 15.70% | 34 | 26.80% | 11.606 | 0.003 |

$n$, number; $\chi^2$, chi-squared. * $p < 0.05$.

Table 6. Results of logistic regression analysis of caregiver hesitancy to authorize COVID-19 vaccination of the dependent older adults under their care.

| Variable | Univariate | Multivariate |
|----------|------------|--------------|
|          | OR | 95% CI | $p$ Value | aOR | 95% CI | $p$ Value |
| Current residential area | | | | | | |
| Bangkok | Ref | | | | | |
| Other province | 1.589 | 1.000–2.527 | 0.05 | 1.476 | 0.877–2.486 | 0.143 |
| What is your level of confidence in governmental and public health information on COVID-19? | | | | | | |
| Not confident | Ref | | | | | |
| Quite unconfident | 0.966 | 0.455–2.053 | 0.929 | 1.126 | 0.483–2.627 | 0.784 |
| Quite confident | 0.71 | 0.370–1.365 | 0.304 | 1.26 | 0.598–2.656 | 0.543 |
| Confident | 0.21 | 0.069–0.642 | 0.006 | 0.374 | 0.111–1.258 | 0.112 |
| Do you feel uneasy/anxious/agitated/sad/worried when you have to practice social distancing? | | | | | | |
| Never | Ref | | | | | |
| Sometimes * | 2.055 | 1.224–3.449 | 0.006 | 2.508 | 1.400–4.491 | 0.002 |
| Often | 1.549 | 0.458–5.238 | 0.481 | 1.54 | 0.392–6.048 | 0.536 |
| Always | 1.859 | 0.257–13.453 | 0.539 | 1.331 | 0.176–10.083 | 0.782 |
| Have you already had a COVID-19 vaccination? | | | | | | |
| No | 1.711 | 1.013–2.892 | 0.045 | 1.287 | 0.697–2.376 | 0.419 |
| Yes | Ref | | | | | |
### Table 6. Cont.

| Variable                                                                 | Univariate          | Multivariate       |
|-------------------------------------------------------------------------|---------------------|--------------------|
| Do you refuse to authorize COVID-19 vaccination for the older adults under your care? |                     |                    |
| No                        | Ref                 |                    |
| Yes *                     | 2.953               | 1.518–5.745        | 0.001              |
| Did the manufacturer influence your decision to authorize COVID-19 vaccination for the older adults under your care? * |                     |                    |
| No *                      | 0.257               | 0.155–0.427        | <0.001             |
| Yes                       | Ref                 |                    |
| Would you authorize COVID-19 vaccination for the older adults under your care if the manufacturer was different from what you expected? |                     |                    |
| No                        | 2.035               | 1.146–3.612        | 0.015              |
| Yes                       | Ref                 |                    |
| Unsure                    | 2.378               | 1.334–4.239        | 0.003              |

OR, odds ratio; aOR, adjusted odds ratio; CI, confidence interval; Ref, reference group. * p < 0.05.

#### 3.4. COVID-19 Vaccine-Related Information

As shown in Table 5, 39.9% of the caregivers were hesitant to authorize COVID-19 vaccination of the older adults under their care, and 13.5% refused to authorize vaccination. In total, 96.2% of the caregivers intended to be vaccinated against COVID-19 themselves, while 76.7% had already been vaccinated. The most common reasons for COVID-19 vaccine hesitancy among the caregivers were concerns regarding adverse effects (40.2%), possible complications caused by an underlying disease (18.9%), and the belief that the vaccines are not effective for preventing COVID-19 infection (7.9%) (Figure 2). The most common reasons for supporting vaccination of older adults were as follows: COVID-19 vaccines can prevent severe infection and death (45.3%); dependent older adults are a vulnerable group (18.2%); and COVID-19 vaccines can prevent COVID-19 infection in older adults (14.5%) (Figure 3). Compared with caregivers exhibiting vaccine acceptance, those who refused to authorize COVID-19 vaccination of the dependent older adults under their care were more likely to show vaccine hesitancy (OR = 3.779; 95% CI: 1.652–8.648, p = 0.002). Caregivers who stated that the manufacturer of the COVID-19 did not influence their decision to authorize vaccination were less likely to exhibit vaccine hesitancy (OR = 0.267; 95% CI: 0.152–0.471, p < 0.001).

![Figure 2](image-url) Reasons cited by caregivers for hesitancy to authorize COVID-19 vaccination of the older adults under their care.
Figure 2. Reasons cited by caregivers for hesitancy to authorize COVID-19 vaccination of the older adults under their care.

4. Discussion

To our knowledge, this study is the first study to investigate the hesitancy of caregivers to authorize COVID-19 vaccination for the dependent older adults under their care. In total, 318 caregivers were contacted and interviewed. We discovered that 39.9% of the participants were hesitant to allow the older persons under their care to be vaccinated. Caregivers who sometimes felt uneasy, anxious, agitated, sad, or worried when they practiced social distancing were more hesitant to authorize vaccination, as were caregivers who themselves refused COVID-19 vaccination. As expected, an unexpected vaccine manufacturer also contributed to hesitancy.

The proportion of caregivers hesitant to authorize COVID-19 vaccination of the older adults under their care was high. Practicing social distancing and anxiety have been linked with COVID-19 vaccine hesitancy [34–36], as has low compliance with social distancing [34,35]. This is in line with our finding that caregivers with anxiety were more vaccine-hesitant. We also found that COVID-19 vaccine refusal was associated with greater vaccine hesitancy among the caregivers. Caregivers who themselves refused to be vaccinated showed stronger intentions not to authorize vaccination of the older adults under their care, which is a barrier to achieving herd immunity. In some studies, patterns of COVID-19 vaccine hesitancy and refusal/rejection were relatively similar [37,38].

An unexpected vaccine manufacturer was among the factors associated with caregiver hesitancy to authorize vaccination. When this study was conducted, Thailand was facing the emerging Delta COVID-19 variant, which caused a surge in cases [39]. Two COVID-19 vaccines were available: the Oxford- ChAdOx1 nCoV-19 vaccine (ChAdOx1 nCoV-19; AstraZeneca) and inactivated SARS-CoV-2 vaccine (CoronaVac). However, only ChAdOx1 nCoV-19 had proven efficacy against the Delta variant [40]. This could explain why the COVID-19 vaccine manufacturer affected the caregivers’ decisions. In this respect, the results of this study were similar to those of our previous study on older adults’ attitudes toward vaccines [18].

A recent systematic review and meta-analysis found that a low income and low levels of education were associated with higher vaccine hesitancy in older adults [17]; however, we could not replicate this finding. This may be explained by the income of most of the participants in our study being higher than the average of Thai people [41]. Furthermore, the majority of our caregivers (87.1%) had a bachelor’s degree or higher. In other words, our participants had a better baseline socioeconomic status than the general Thai population. Moreover, the factors influencing vaccine hesitancy might not be the same between caregivers and dependent older adults.

The main strength of our study was that it was the first to analyze the attitudes of caregivers toward COVID-19 vaccination of the older adults under their care. Given that
caregivers play a crucial role in medical decision-making for dependent older adults, understanding caregiver attitudes is important for promoting COVID-19 vaccination among older adults. Our study also had some limitations. First, we enrolled participants from the hospital database of a geriatric clinic in a university hospital. Thus, the results should be interpreted with caution, especially as some participants refused to provide sensitive information such as their incomes, leading to missing data. Finally, although we demonstrated that various factors were associated with caregiver hesitancy to authorize vaccination of the older adults under their care, we could not demonstrate causality.

5. Conclusions
The proportion of caregivers in this study hesitant to authorize vaccination of the older adults under their care was relatively high. Feeling uneasy, anxious, agitated, sad, or worried when practicing social distancing, a refusal to be vaccinated against COVID-19, and an unexpected vaccine manufacturer were all linked to vaccine hesitancy among caregivers. These findings may aid efforts to vaccinate dependent older adults against COVID-19. Strategies to help people cope with anxiety, vaccines with high efficacy in terms of preventing infection, and the provision of accurate information regarding the benefits of vaccination are necessary to improve vaccine acceptance.

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Institutional Review Board Statement: The study protocol was approved by the Human Research Ethics Committee of the Faculty of Medicine, Ramathibodi Hospital, Mahidol University (COA No. MURA2021/1063). The study was conducted according to the Declaration of Helsinki and Good Clinical Practice guidelines.

Informed Consent Statement: All participants provided verbal informed consent, which was recorded according to a verbal informed consent protocol approved by the Human Research Ethics Committee of the Faculty of Medicine, Ramathibodi Hospital, Mahidol University. We did not obtain written informed consent because we conducted a telephone survey and it was inconvenient for participants to sign informed consent forms and handle documents during the COVID-19 pandemic.

Data Availability Statement: The datasets used and analyzed during the current study are available from the corresponding author upon reasonable request.

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