Facilitating the acceptance of employment of older registered nurses among Japanese female registered nurses younger than 65 years old

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Abstract

Objective: In Japan, policies to ensure employment for persons aged 65 and older are being implemented. To facilitate the employment of older registered nurses working in hospitals, the understanding of registered nurses younger than 65 is necessary. We investigated the factors associated with the acceptance of employment of older registered nurses among registered nurses younger than 65.

Materials and Methods: The subjects were female registered nurses younger than 65 working in 34 hospitals in Mie Prefecture. We distributed anonymous self-administered questionnaires. We conducted factor analyses of both respondents’ opinions on the employment of “Registered nurses aged 65–69” and “Registered nurses aged 70–74”. Multiple regression analysis was conducted to examine the associations between the “Acceptance of employing registered nurses aged 65–69” and “Opinions on the employment of registered nurses aged 65–69” (Statistical model 1). Moreover, multiple regression analysis was also conducted to examine the associations between the “Acceptance of employing registered nurses aged 70–74” and the “Opinions on the employment of registered nurses aged 70–74” (Statistical model 2).

Results: Using factor analyses, the same factors were extracted for both, “Registered nurses aged 65–69” and “Registered nurses aged 70–74”. These factors were: “Health and job performance”, “Utilization of the knowledge and experience of older registered nurses”, “Reducing the workload burden of registered nurses”, and “Manners of older registered nurses”. Using multiple regression analyses, “Health and job performance”, “Utilization of the knowledge and experience of older registered nurses”, and “Reducing the workload burden of registered nurses” were significantly associated with “Acceptance of employing registered nurses aged 65–69” (Statistical model 1). The same 3 factors were also significantly associated with “Acceptance of employing registered nurses aged 70–74” (Statistical model 2).

Conclusion: Hospital managers must pay careful attention to these 3 factors.

Key words: employment, hospitals, older registered nurses

Introduction

In Japan, policies to ensure employment of older persons are being implemented to maintain economic vitality amid a declining birthrate and an aging population¹ ². Employers are currently required to ensure that workers remain employed until the age of 65. Moreover, due to an amended law that went into effect on April 1, 2021, employers are required to do their best to ensure that if persons desire to work, they can be employed until the age of 70. Under these circumstances, it is necessary to facilitate the employment of older registered nurses aged 65 and older in the nursing department of hospitals.

There are strong points and week points concerning the employment of older persons in various industries³ ⁴. The strong points include their knowledge, experience, skills, techniques, and their ability to think ahead. The week points include their declining physical strength, eyesight, hearing, concentration, and motivation. In addition, the incidence of occupational accidents among workers aged 60 and older is high in Japan⁵ ⁶. Because occupational accidents tend to

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increase after the age of 60, further improvement in accident prevention is necessary to enable persons aged 65 and older to continue working. Furthermore, as the age of workers increases, health management in the workplace requires organizational improvement, as many of them may contract diseases and/or become frail. To facilitate the employment of registered nurses aged 65 and older, the cooperation of registered nurses younger than 65 will also become necessary. If hospital managers try to force the employment of registered nurses aged 65 and older without the understanding of those younger than 65, confusion in the workplace may likely ensue. However, to our knowledge, there have been no studies exploring the psychological factors associated with the acceptance of employing registered nurses aged 65 and older among registered nurses younger than 65.

Thus, among registered nurses younger than 65, there may be a variety of opinions on employing registered nurses aged 65 and older. For example, because older registered nurses have a wealth of clinical experience, that experience is likely to improve the quality of medical care. Moreover, an increase in the number of older registered nurses will reduce the heavy workload for all the other registered nurses. These opinions will lead to the acceptance of older registered nurses in the workforce. However, because their physical function declines with aging, the increase in the number of older registered nurses may likely lead to an increase of age-related occupational accidents. In addition, many people may become concerned that the health of older registered nurses will lead to poorer conditions due to their hard work. Thus, these negative opinions could lead to their nonacceptance of being employed.

Managers in the nursing department of hospitals need to consider effective ways of how to conduct management to be able to employ registered nurses aged 65 and older. In this study, we investigated the opinions on the employment of registered nurses aged 65 and older among registered nurses younger than 65. We then investigated the associations between their opinions and their acceptance of employing older registered nurses.

Materials and Methods

Subjects

Because the number of male registered nurses was significantly smaller than that of female registered nurses, males were excluded from the study. A total of 34 hospitals in Mie Prefecture, Japan, participated in this study. Therefore, the subjects were 5,756 female registered nurses who work in those hospitals.

Study period

The study was conducted from September 2019 through February 2020. Employers in Japan have been required to do their best to secure employment for workers until the age of 70, due to the amended law that went into effect on April 1, 2021. The data in this study were collected prior to that law going into effect.

Distribution and return of questionnaires

We distributed anonymous self-administered questionnaires (original version in Japanese), explanatory documents for this study, and return envelopes to the subjects. We asked the participants to insert and seal their completed questionnaires in the envelopes and put them into collection boxes in the hospitals.

Questionnaire items

The questionnaire asked about: 1. Respondents’ characteristics, 2. Employment of workers with disabilities in hospitals, 3. The concept concerning the “normalization” regarding people with disabilities, and 4. Employment of registered nurses aged 65 and older. All of the subjects, including registered nurses aged 65 and older, were asked to answer the questions about Topics 1 to 3, and only registered nurses younger than 65 were asked to respond to Topic 4. The focus of this study was on the employment of registered nurses aged 65 and older. Therefore, the answers to items about Topics 2 and 3 were not analyzed.

There are 21 items in Topic 4 (Appendix 1). The subjects were asked to indicate their opinions on the employment of registered nurses aged 65 and older (items 1–20 in Appendix 1) and the acceptance of employing older registered nurses (item 21 in Appendix 1).

In Japan, policies to ensure employment for persons aged 65 and older are being implemented. It is highly likely that the government will request employers in various industries to employ people aged 70 and older. It is also likely that managers in the nursing department of hospitals will be required to hire registered nurses aged 70 and older.

However, registered nurses younger than 65 may have differing opinions regarding the acceptance of employing older registered nurses, depending on the age range of the older registered nurses. For example, with regard to the acceptance of employing registered nurses aged 65 and older, registered nurses younger than 65 may accept the employment of those aged 65–69 but not for those aged 70 or older. The subjects of this study may have found it difficult to answer this question, unless we had set the age group of registered nurses as 65 and older.

Therefore, as shown in item 21 of Appendix 1, the “Acceptance of employing older registered nurses” was determined by, “I agree with the employment of registered nurses aged 65 and older in the nursing department of the hospital”.

The age ranges of “Registered nurses aged 65 and older” were specified as “Registered nurses aged 65–69” and
“Registered nurses aged 70–74”. Registered nurses younger than 65 were asked to respond to each of these questions. Answers to these questions were all rated on a 7-point scale from definitely disagree to definitely agree.

Similarly, registered nurses younger than 65 may have differing opinions on registered nurses aged 65 and older, depending on the age range of those older nurses. For each item regarding opinions on the employment of registered nurses aged 65 and older (items 1–20 in Appendix 1), the age ranges of “Registered nurses aged 65 and older” were also specified as “Registered nurses aged 65–69” and “Registered nurses aged 70–74”. Answers to these questions were all rated on a 7-point scale from definitely agree to definitely disagree.

It may become common to employ persons aged 75 and older. However, that remains an issue for further study. Accordingly, the present questionnaire did not ask questions about the employment of registered nurses aged 75 and older.

With regard to, “Opinions on the employment of registered nurses aged 65 and older”, we made a hypothesis that the same factors would be extracted by factor analyses for both, “Registered nurses aged 65–69” and “Registered nurses aged 70–74”. Moreover, we also made a hypothesis that the following factors would be extracted: “Utilization of the knowledge and experience of older registered nurses (items 1–4)”, “Manners of older registered nurses (items 5–8)”, “Remaining healthy to perform jobs (items 9–12)”, “Reducing the workload burden of registered nurses (items 13–16)”, and “Performing jobs properly (items 17–20)”.

The respondents’ characteristics were “Age” and “Employment status (full- or part-time worker)”. Data analyses

We asked the respondents for their opinions on the employment of “Registered nurses aged 65–69” and “Registered nurses aged 70–74” (items 1–20 in Appendix 1). Therefore, we conducted factor analysis (the principal factor method and promax rotation) of the opinions on the employment of “Registered nurses aged 65–69”, and we also conducted factor analysis (the principal factor method and promax rotation) for the opinions of “Registered nurses aged 70–74”. Factors with eigenvalues of ≥1 were retained. The Cronbach’s alpha of each factor extracted by factor analyses was also calculated.

Pearson correlation coefficients were calculated or the Mann-Whitney U test was conducted to examine the associations between the “Acceptance of employing registered nurses aged 65–69” and “Opinions on the employment of registered nurses aged 65–69” Thereafter, multiple regression analysis using the forced entry method was conducted. The “Acceptance of employing registered nurses aged 65–69” was a dependent variable. Age, employment status, and factors calculated by factor analysis of the “Opinions on the employment of registered nurses aged 65–69” were independent variables. The result of this multiple regression analysis was “Statistical model 1”.

Moreover, to examine the associations between the “Acceptance of employing registered nurses aged 70–74” and the “Opinions on the employment of registered nurses aged 70–74”, the same statistical analyses were conducted. The result of this multiple regression analysis was “Statistical model 2”.

To calculate Pearson correlation coefficients and standardized partial regression coefficients, the factor scores calculated by the factor analyses were used. The level of statistical significance was set at \(P<0.05\). IBM SPSS Statistics (Version 25.0) (Chicago, IL, USA) was used for all the analyses.

**Analyzed subjects**

Of the 5,756 questionnaires distributed, 4,698 were returned. We excluded the questionnaires returned by registered nurses that did not answer their age and those of registered nurses aged 65 and older from the analyses. Those who did not answer their employment status (full- or part-time worker) were also excluded from the analyses.

We excluded questionnaires with one or more missing values in the “Acceptance of employing registered nurses aged 65–69” and the “Opinions on the employment of registered nurses aged 65–69”. There were 4,161 subjects analyzed in Statistical model 1. The average age of these subjects was 38.43 (standard deviation [SD], 11.365). Their age range was 20–64 years old.

We also excluded questionnaires with one or more missing values in the “Acceptance of employing registered nurses aged 70–74” and the “Opinions on the employment of registered nurses aged 70–74”. There were 4,116 subjects analyzed in “Statistical model 2”. The average age of these subjects was 38.42 (SD, 11.369). Their age range was 20–64 years old.

**Ethics**

This study was conducted with approval from the Ethics Committee of Yokkaichi Nursing and Medical Care University (No. 141).

**Results**

Distributions of “Acceptance of employing registered nurses aged 65–69” and “Acceptance of employing registered nurses aged 70–74” are shown in Tables 1 and 2, respectively. The Mann–Whitney U tests show that there were significant differences in the employment status in both. As shown in Table 2, age significantly had a negative correlation with “Acceptance of employing registered nurses aged 70–74”.

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Table 1  Characteristics and distributions of "Acceptance of employing registered nurses aged 65–69"

| Variable           | definitely disagree | Disagree | Somewhat disagree | Neither agree nor disagree | Somewhat agree | Agree | Definitely agree | Total |
|--------------------|---------------------|----------|-------------------|---------------------------|----------------|-------|------------------|-------|
| Age 20–29          | 25                  | 40       | 80                | 473                       | 328            | 159   | 117              | 1,222 |
| (2.0%)             | (3.3%)              | (6.5%)   | (38.7%)           | (26.8%)                   | (13.0%)        | (9.6%)| (100.0%)         |
| 30–39              | 23                  | 23       | 59                | 388                       | 270            | 120   | 92               | 975   |
| (2.4%)             | (2.4%)              | (6.1%)   | (39.8%)           | (27.7%)                   | (12.3%)        | (9.4%)| (100.0%)         |
| 40–49              | 33                  | 42       | 59                | 415                       | 325            | 147   | 126              | 1,147 |
| (2.9%)             | (3.7%)              | (5.1%)   | (36.2%)           | (28.3%)                   | (12.8%)        | (11.0%)| (100.0%)         |
| 50–59              | 32                  | 25       | 30                | 277                       | 193            | 88    | 63               | 708   |
| (2.9%)             | (3.5%)              | (4.2%)   | (39.1%)           | (27.3%)                   | (12.4%)        | (8.9%)| (100.0%)         |
| 60–64              | 1                   | 5        | 4                 | 38                        | 24             | 20    | 17               | 109   |
| (0.9%)             | (4.6%)              | (3.7%)   | (34.9%)           | (22.0%)                   | (18.3%)        | (15.6%)| (100.0%)         |

Employment status

| Variable           | definitely disagree | Disagree | Somewhat disagree | Neither agree nor disagree | Somewhat agree | Agree | Definitely agree | Total |
|--------------------|---------------------|----------|-------------------|---------------------------|----------------|-------|------------------|-------|
| Full-time worker   | 103                 | 121      | 205               | 1,393                     | 982            | 443   | 344              | 3,591 |
| (2.9%)             | (3.4%)              | (5.7%)   | (38.8%)           | (27.3%)                   | (12.3%)        | (9.6%)| (100.0%)         |
| Part-time worker   | 11                  | 14       | 27                | 198                       | 158            | 91    | 71               | 570   |
| (1.9%)             | (2.5%)              | (4.7%)   | (34.7%)           | (27.7%)                   | (16.0%)        | (12.5%)| (100.0%)         |

Total

| definitely disagree | Disagree | Somewhat disagree | Neither agree nor disagree | Somewhat agree | Agree | Definitely agree | Total |
|--------------------|----------|-------------------|---------------------------|----------------|-------|------------------|-------|
| 114                | 135      | 232               | 1,591                     | 1,140          | 534   | 415              | 4,161 |
| (2.7%)             | (3.2%)   | (5.6%)            | (38.2%)                   | (27.4%)        | (12.8%)| (10.0%)         | (100.0%)|

Pearson’s correlation coefficient was calculated for age. The Mann–Whitney U test was conducted for employment status. For these analyses, concerning “Acceptance of employing registered nurses aged 65–69”, 1 to 7 points were given in the order from definitely disagree to definitely agree. Age was used as a continuous variable.

Table 2  Characteristics and distributions of “Acceptance of employing registered nurses aged 70–74”

| Variable           | definitely disagree | Disagree | Somewhat disagree | Neither agree nor disagree | Somewhat agree | Agree | Definitely agree | Total |
|--------------------|---------------------|----------|-------------------|---------------------------|----------------|-------|------------------|-------|
| Age 20–29          | 32                  | 48       | 83                | 499                       | 296            | 143   | 111              | 1,212 |
| (2.6%)             | (4.0%)              | (6.8%)   | (41.2%)           | (24.4%)                   | (11.8%)        | (9.2%)| (100.0%)         |
| 30–39              | 32                  | 34       | 80                | 428                       | 213            | 95    | 79               | 961   |
| (3.3%)             | (3.5%)              | (8.3%)   | (44.5%)           | (22.2%)                   | (9.9%)         | (8.2%)| (100.0%)         |
| 40–49              | 51                  | 54       | 80                | 478                       | 260            | 112   | 101              | 1,136 |
| (4.5%)             | (5.8%)              | (8.3%)   | (44.5%)           | (22.2%)                   | (9.9%)         | (8.9%)| (100.0%)         |
| 50–59              | 45                  | 31       | 50                | 315                       | 146            | 67    | 45               | 699   |
| (6.4%)             | (4.4%)              | (7.2%)   | (45.1%)           | (20.9%)                   | (9.6%)         | (6.4%)| (100.0%)         |
| 60–64              | 5                   | 6        | 6                 | 45                        | 25             | 10    | 11               | 108   |
| (4.6%)             | (5.6%)              | (5.6%)   | (41.7%)           | (23.1%)                   | (9.3%)         | (10.2%)| (100.0%)         |

Employment status

| Variable           | definitely disagree | Disagree | Somewhat disagree | Neither agree nor disagree | Somewhat agree | Agree | Definitely agree | Total |
|--------------------|---------------------|----------|-------------------|---------------------------|----------------|-------|------------------|-------|
| Full-time worker   | 146                 | 155      | 256               | 1,534                     | 825            | 358   | 284              | 3,558 |
| (4.1%)             | (4.4%)              | (7.2%)   | (43.1%)           | (23.2%)                   | (10.1%)        | (8.0%)| (100.0%)         |
| Part-time worker   | 19                  | 18       | 43                | 231                       | 115            | 69    | 63               | 558   |
| (3.4%)             | (3.2%)              | (7.7%)   | (41.4%)           | (20.6%)                   | (12.4%)        | (11.3%)| (100.0%)         |

Total

| definitely disagree | Disagree | Somewhat disagree | Neither agree nor disagree | Somewhat agree | Agree | Definitely agree | Total |
|--------------------|----------|-------------------|---------------------------|----------------|-------|------------------|-------|
| 165                | 173      | 299               | 1,765                     | 940            | 427   | 347              | 4,116 |
| (4.0%)             | (4.2%)   | (7.3%)            | (42.9%)                   | (22.8%)        | (10.4%)| (8.4%)          | (100.0%)|

Pearson’s correlation coefficient was calculated for age. The Mann–Whitney U test was conducted for employment status. For these analyses, concerning “Acceptance of employing registered nurses aged 70–74”, 1 to 7 points were given in the order from definitely disagree to definitely agree. Age was used as a continuous variable.
The results of factor analysis of the respondents’ opinions on the employment of “Registered nurses aged 65–69” are shown in Table 3. “Health and job performance (1st factor)”, “Utilization of the knowledge and experience of older registered nurses (2nd factor)”, “Reducing the workload burden of registered nurses (3rd factor)”, and “Manners of older registered nurses (4th factor)” were extracted by factor analysis. The eigenvalues of these factors were 10.420, 1.915, 1.608, and 1.148, respectively. These 4 factors accounted for 75.45% of the total variance of the 20 items prior to the rotation. The Cronbach’s alphas were 0.902 for “Health and job performance”, 0.935 for “Utilization of the knowledge and experience of older registered nurses”, 0.944 for “Reducing the workload burden of registered nurses”, and 0.927 for “Manners of older registered nurses”.

The results of factor analysis of the respondents’ opinions on the employment of “Registered nurses aged 70–74” are shown in Table 4. “Health and job performance (1st factor)”, “Utilization of the knowledge and experience of older registered nurses (2nd factor)”, “Reducing the workload burden of registered nurses (3rd factor)”, and “Manners of older registered nurses (4th factor)” were extracted by factor analysis. The eigenvalues of these factors were 10.440, 1.874, 1.668, and 1.163, respectively. These 4 factors accounted for 75.73% of the total variance of the 20 items prior to the rotation. The Cronbach’s alphas were 0.904 for “Health and job performance”, 0.936 for “Utilization of the knowledge and experience of older registered nurses”, 0.947 for “Reducing the workload burden of registered nurses”, and 0.927 for “Manners of older registered nurses”.

Factors associated with “Acceptance of employing registered nurses aged 65–69” (Statistical model 1) are shown in Table 5. “Health and job performance”, “Utilization of the knowledge and experience of older registered nurses”, “Reducing the workload burden of registered nurses”, and “Manners of older registered nurses”.

Table 3  Factor analysis of the respondents’ opinions on the employment of “Registered nurses aged 65–69” (n=4,161)

| Factor                                           | 1    | 2    | 3    | 4    |
|--------------------------------------------------|------|------|------|------|
| 1. Health and job performance (Cronbach’s alpha = 0.902) | 0.903 | −0.145 | −0.148 | 0.034 |
| 11. No physical health issues                    | 0.826 | −0.084 | −0.157 | 0.062 |
| 10. No mental health issues                      | 0.764 | 0.039  | 0.059  | −0.090 |
| 19. Ability to learn the procedures of new jobs quickly | 0.631 | 0.108 | 0.148 | −0.022 |
| 18. Ability to work without making mistakes      | 0.606 | 0.142  | 0.140  | −0.044 |
| 20. Concentration on work                        | 0.591 | 0.074  | 0.049  | 0.100 |
| 9. Adequate physical strength                    | 0.522 | −0.093 | 0.160  | 0.048 |
| 12. Not causing work-related injuries            | 0.429 | 0.155  | 0.373  | −0.035 |
| 17. Work efficiency                              | 0.407 | 0.985  | −0.041 | −0.021 |
| 2. Utilization of the knowledge and experience of older registered nurses (Cronbach’s alpha = 0.935) | −0.054 | 0.974 | −0.022 | −0.013 |
| 5. Wisdom to develop the hospital                | 0.038 | 0.819  | −0.024 | 0.051 |
| 1. Opportunities to learn valuable life experiences | −0.085 | 0.807 | 0.051  | 0.049 |
| 3. Reducing the workload burden of registered nurses (Cronbach’s alpha = 0.944) | −0.044 | −0.042 | 0.986 | 0.030 |
| 15. Reduction of fatigue of registered nurses younger than 65 | −0.035 | −0.033 | 0.983 | −0.016 |
| 14. Prevention of health impairment of registered nurses younger than 65 due to overwork | −0.051 | 0.038 | 0.870 | 0.017 |
| 13. Reduction of the workload of registered nurses younger than 65 | 0.047 | −0.011 | 0.805 | 0.026 |
| 16. Having free time                             | 0.011 | −0.078 | 0.019  | 0.984 |
| 7. Do not look down on registered nurses younger than 65 | −0.020 | 0.048 | 0.032  | 0.839 |
| 8. Respect for the opinions of registered nurses younger than 65 | 0.039 | 0.055 | −0.013 | 0.836 |
| 6. Politeness toward registered nurses younger than 65 | 0.084 | 0.068 | 0.005  | 0.709 |
| 5. No arrogance toward registered nurses younger than 65 | 0.595 | 0.574 | 0.560 | 1.000 |

Interfactor correlations

| Factor                                           | 1    | 2    | 3    | 4    |
|--------------------------------------------------|------|------|------|------|
| 1. Health and job performance                    | 1.000 |      |      |      |
| 2. Utilization of the knowledge and experience of older registered nurses | 0.554 | 1.000 |      |      |
| 3. Reducing the workload burden of registered nurses | 0.697 | 0.658 | 1.000 |      |
| 4. Manners of older registered nurses             | 0.595 | 0.574 | 0.560 | 1.000 |

The registered nurses younger than 65 were asked about their opinions on the employment of registered nurses aged 65–69. See items 1–20 in Appendix 1 and the Methods section. Factor analysis (the principal factor method and promax rotation) of these opinions was conducted. The Cronbach’s alpha of each factor extracted by the factor analysis was also calculated. For items 1–20 in Appendix 1, 1 to 7 points were given in the order from definitely disagree to definitely agree. Bold numbers indicate factor loadings of ≥0.4.
“Reducing the workload burden of registered nurses”, and “Manners of older registered nurses” significantly had correlations with “Acceptance of employing registered nurses aged 65–69”. However, multiple regression analysis shows that “Health and job performance”, “Utilization of the knowledge and experience of older registered nurses”, and “Reducing the workload burden of registered nurses” were significantly associated with “Acceptance of employing registered nurses aged 65–69”. The adjusted $R^2$ value was 0.590.

### Discussion

Factor analyses of the respondents’ opinions on the employment of “Registered nurses aged 65–69” and “Registered nurses aged 70–74” were conducted. The same factors were extracted for both. These factors were: “Health and job performance”, “Utilization of the knowledge and experience of older registered nurses”, “Reducing the workload burden of registered nurses”, and “Manners of older registered nurses”. As results of the multiple regression analyses, “Health and job performance”, “Utilization of the knowledge and experience of older registered nurses”, and “Reducing the workload burden of registered nurses” were significantly associated with “Acceptance of employing registered nurses aged 70–74”. The adjusted $R^2$ value was 0.590.
workload burden of registered nurses” were significantly associated with “Acceptance of employing registered nurses aged 65–69” (Statistical model 1). The same 3 factors were also significantly associated with “Acceptance of employing registered nurses aged 70–74” (Statistical model 2). Therefore, those 3 factors were essential to facilitate the employment of older registered nurses.

“Health and job performance” was the significant factor to facilitate the employment of older registered nurses. Registered nurses younger than 65 were concerned that older registered nurses were not able to perform their jobs properly due to their health issues. Because the jobs of registered nurses are to protect the health and lives of patients, we assume that they perform their jobs properly. Hospital managers must conduct management so that they can dispel such concerns.

One of the methods is to allow more flexible workstyles for older registered nurses to maintain their good health and good job performance. For example, night shifts and extended work hours are usually tiring for registered nurses, and such extended work loads can result in threatening patient safety\(^8\). In particular, because older workers can contract diseases and/or become frail\(^9,10\), they may feel extremely tired. Therefore, it is necessary to exempt older registered nurses from night shifts. In addition, if the number of working days and hours can be flexible, older registered nurses will be able to handle their workload. Such organizational efforts would dispel the concerns of registered nurses younger than 65 regarding employing older registered nurses.

In the long term, hospital managers need to encourage nurses, including nurses younger than 65, to practice preventive health behavior. For example, some nurses smoke cigarettes\(^9,10\). Although the jobs of nurses are to protect the life and health of their patients, not all of them practice preventive health behaviors themselves. So that nurses can continue working into their later years, it is important for hospital managers to encourage them to practice preventive health behavior in their daily health management.

“Utilization of the knowledge and experience of older registered nurses” was the significant factor to facilitate their employment. Older registered nurses have a wealth of clinical experiences. Such experiences are the intellectual

### Table 5
Factors associated with “Acceptance of employing registered nurses aged 65–69” (Statistical model 1, n=4,161)

| Variable                                                  | Pearson’s correlation coefficient | P       | Standardized partial regression coefficient | P       |
|-----------------------------------------------------------|----------------------------------|---------|---------------------------------------------|---------|
| Age                                                       | –                                | –       | 0.003                                        | 0.742   |
| Employment status (full- or part-time worker)             | –                                | –       | –0.009                                       | 0.376   |
| 1. Health and job performance                             | 0.617                            | <0.001  | 0.103                                        | <0.001  |
| 2. Utilization of the knowledge and experience of older registered nurses | 0.683                            | <0.001  | 0.327                                        | <0.001  |
| 3. Reducing the workload burden of registered nurses      | 0.728                            | <0.001  | 0.421                                        | <0.001  |
| 4. Manners of older registered nurses                     | 0.523                            | <0.001  | 0.011                                        | 0.419   |

To calculate standardized partial regression coefficients and Pearson’s correlation coefficients, the following system was used. Regarding “Acceptance of employing registered nurses aged 65–69”, 1 to 7 points were given in the order from definitely disagree to definitely agree. Age was a continuous variable. Regarding employment status, full-time worker was 1 and part-time worker was 0. For each factor, the factor scores were calculated and used for these analyses. See Table 3.

### Table 6
Factors associated with “Acceptance of employing registered nurses aged 70–74” (Statistical model 2, n=4,116)

| Variable                                                  | Pearson’s correlation coefficient | P       | Standardized partial regression coefficient | P       |
|-----------------------------------------------------------|----------------------------------|---------|---------------------------------------------|---------|
| Age                                                       | –                                | –       | –0.019                                       | 0.080   |
| Employment status (full- or part-time worker)             | –                                | –       | –0.004                                       | 0.682   |
| 1. Health and job performance                             | 0.638                            | <0.001  | 0.171                                        | <0.001  |
| 2. Utilization of the knowledge and experience of older registered nurses | 0.677                            | <0.001  | 0.318                                        | <0.001  |
| 3. Reducing the workload burden of registered nurses      | 0.716                            | <0.001  | 0.376                                        | <0.001  |
| 4. Manners of older registered nurses                     | 0.492                            | <0.001  | –0.009                                       | 0.508   |

To calculate standardized partial regression coefficients and Pearson’s correlation coefficients, the following system was used. Regarding “Acceptance of employing registered nurses aged 70–74”, 1 to 7 points were given in the order from definitely disagree to definitely agree. Age was a continuous variable. Concerning employment status, full-time worker was 1 and part-time worker was 0. For each factor, the factor scores were calculated and used for these analyses. See Table 4.
property in the nursing department of hospitals. Utilizing their experiences helps younger registered nurses develop their own skills. Hospital managers should provide opportunities for younger registered nurses to learn from older registered nurses. By providing such organizational opportunities, registered nurses younger than 65 may be willing to work with older registered nurses.

“Reducing the workload of registered nurses” was the significant factor to facilitate the employment of older registered nurses. Their heavy workload contributes to their emotional exhaustion. Moreover, Aiken et al. reported that high patient-to-nurse ratios result in the emotional exhaustion and job dissatisfaction among nurses. They also reported that high patient-to-nurse ratios increase mortality and failure-to-rescue. Therefore, hospital managers need to manage hospitals so that the workloads of nurses will not become too excessive. If older registered nurses are employed, the workloads of each registered nurse will decrease.

The workload of registered nurses can be reduced by employing nursing assistants who work effectively in the nursing department of hospitals. Because nursing assistants assist registered nurses, they are indispensable to the nursing department of hospitals. However, they have not received nursing education as professionals. Accordingly, registered nurses need to provide them with educational opportunities so that they can appropriately assist registered nurses.

However, because the registered nurses must instruct nursing assistants in various skills related to nursing, they need to provide nursing assistants with sufficient educational opportunities. Moreover, the nursing shortage in Japan has become a serious issue. Therefore, such education for nursing assistants can become a burden to registered nurses. In which case, older registered nurses can be asked to provide education to nursing assistants. Consequently, registered nurses younger than 65 could save time, and their workload would decrease. Furthermore, nursing assistants could receive sufficient educational opportunities, and their occupational skills would improve. As a result, nursing assistants would be able to assist registered nurses more efficiently by helping to reduce their workloads. We consider this important to aim toward creating such a virtuous cycle.

The first limitation of this study is that, because random sampling was not employed, the generalizability of the study’s results is limited. Another limitation is that, because a cross-sectional design was used, we could not identify causal relationships.

Employers in Japan have been required to make efforts to secure employment for workers until the age of 70, due to the amended law that went into effect on April 1, 2021. However, the data in this study were collected prior to that law going into effect. There is a high possibility that it will become common to employ older persons in various other industries as well. Accordingly, many registered nurses may think that opposing the employment of older registered nurses goes against the current of popular opinion. In which case, more nurses may approve the employment of older registered nurses. In future studies, it will be necessary to analyze such changes in registered nurses’ feelings. In the present study, we did not investigate the acceptance of the employment of registered nurses aged 75 and older among registered nurses younger than 65. Neither did we investigate their opinions on the employment of registered nurses aged 75 and older. Therefore, it will also be necessary to investigate these issues.

Other factors associated with the acceptance of employing older registered nurses will require investigation. For example, because there is a possibility that the employment of older persons will decrease the recruitment of younger persons, it is necessary to take measures to secure the employment of both older and younger persons. The subjects of the present study were registered nurses who were employed by hospitals at the time of this study. However, some registered nurses may be concerned that employing older registered nurses may jeopardize their jobs. In Japan, the nursing shortage has become a serious issue. Therefore, we believe that few younger registered nurses are worried about keeping their jobs. Future studies will warrant investigation of their attitudes concerning this issue.

In various industries, males, as compared to females, may have different attitudes toward the employment of older persons. In the medical industry, the number of male registered nurses is much smaller than that of female registered nurses. However, it remains necessary to investigate male registered nurses’ attitudes toward the employment of older registered nurses.

Conclusion

The “Health and job performance”, “Utilization of the knowledge and experience of older registered nurses”, and “Reducing the workload burden of registered nurses” were significantly associated with the acceptance of employing older registered nurses among registered nurses younger than 65. To facilitate the employment of older registered nurses, hospital managers must pay careful attention to these factors.

Conflicts of interest: None.

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Appendix 1 Regarding the employment of registered nurses aged 65 and older in the nursing department of hospitals (original version in Japanese)

1. Opportunities to learn valuable life experiences
   I am glad that I can have opportunities to learn valuable life experiences of registered nurses aged 65 and older if they are employed in the nursing department of the hospital.

2. Wisdom to raise the quality of healthcare
   I think that registered nurses aged 65 and older have considerable wisdom to be contributed toward raising the quality of healthcare.

3. Wisdom to develop the hospital
   I think that registered nurses aged 65 and older have considerable wisdom to be contributed toward the development of the hospital.

4. Wisdom to improve operations in the workplace
   I think that registered nurses aged 65 and older have considerable wisdom to be contributed toward the improvement of the operations in the workplace.

5. No arrogance toward registered nurses younger than 65
   I think that registered nurses aged 65 and older are not arrogant toward registered nurses younger than 65.

6. Politeness toward registered nurses younger than 65
   I think that registered nurses aged 65 and older are polite to registered nurses younger than 65.

7. Do not look down on registered nurses younger than 65
   I think that registered nurses aged 65 and older do not look down on registered nurses younger than 65.

8. Respect for the opinions of registered nurses younger than 65
   I think that registered nurses aged 65 and older respect the opinions of registered nurses younger than 65.

9. Adequate physical strength
   I think that registered nurses aged 65 and older have adequate physical strength to work in the nursing department of the hospital.

10. No mental health issues
    I think that registered nurses aged 65 and older do not harm their mental health due to working in the nursing department of the hospital.

11. No physical health issues
    I think that registered nurses aged 65 and older do not harm their physical health due to working in the nursing department of the hospital.

12. Not causing work-related injuries
    I do not think that registered nurses aged 65 and older are likely to cause work-related injuries.

13. Reduction of the workload of registered nurses younger than 65
    I think that the workload of registered nurses younger than 65 can be reduced when registered nurses aged 65 and older are employed.

14. Prevention of health impairment of registered nurses younger than 65 due to overwork
    I think that registered nurses younger than 65 can prevent the impairment of their health due to overwork when registered nurses aged 65 and older are employed.

15. Reduction of fatigue of registered nurses younger than 65
    I think that the accumulated fatigue of registered nurses younger than 65 can be reduced when registered nurses aged 65 and older are employed.

16. Having free time
    I think that I can have more free time when registered nurses aged 65 and older are employed.

17. Work efficiency
    I think that registered nurses aged 65 and older can work efficiently.

18. Ability to work without making mistakes
    I think that registered nurses aged 65 and older can work without making mistakes.

19. Ability to learn the procedures of new jobs quickly
    I think that registered nurses aged 65 and older can learn the procedures of new jobs quickly.

20. Concentration on work
    I think that registered nurses aged 65 and older can concentrate on their work.

21. Acceptance of employing older registered nurses
    I agree with the employment of registered nurses aged 65 and older in the nursing department of the hospital.