A retrospective cohort study on the risk assessment of newly certificated long-term care need of elderly individuals in a community: Basic checklist and specific health checkup

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Abstract

Objective: This study aimed to examine the factors influencing the requirement of a certificate of long-term care using a basic checklist and items listed in the Special Health Checkup.

Method: This study included 7,820 individuals living in Uji city, who were selected from among 8,000 elderly individuals who, in 2008, underwent a specific health checkup (hereafter referred to as the ‘specific health checkup for the old-old elderly individuals’) for those aged 75 years and above. They answered questions from basic checklists at the time, and 180 individuals were excluded as they had already qualified for requiring the certificate of long-term care at the time of the checkup. The follow-up period extended from the day of the specific health checkup for the old-old elderly individuals to March 31, 2013. The data were analyzed using the certificate of needing long-term care as the response variable. The explanatory variables were the basic attributes, items listed in the specific health checkup for the old-old elderly individuals, interview sheets, and basic checklists. Cox proportional hazards regression analysis was conducted.

Results: In total, 1,280 elderly individuals qualified for requiring the certificate of needing long-term care. The risk factors for the young-old elderly individuals aged 65 to 74 years were as follows: hepatic dysfunction (hazard ratio {HR}=1.69), the presence of subjective symptoms (HR=1.41), an above-normal abdominal circumference (HR=1.36), old age (HR=1.13), a reduced frequency of going out since the previous year (HR=1.87), the use of support for standing up after being seated on a chair (HR=1.86), no deposit or withdrawals made (HR=1.84), the anxiety of falling down (HR=1.50), an inability to climb stairs without holding a railing or wall (HR=1.49), as well as an increased difficulty in eating tough food items compared with 6 months prior (HR=1.44). The risk factors for the old-old elderly individuals were as follows: a positive reaction on proteinuria (HR=1.27), anemia (HR=1.18), old age (HR=1.10), inability to travel on a bus or train by themselves (HR=1.53), the inability to climb stairs without holding a railing or wall (HR=1.48), weight loss (HR=1.36), a reduced sense of appreciation of the activities they had previously participated in, over a span of 2 weeks (HR=1.30), the use of support for standing up after being seated on a chair (HR=1.23), and the anxiety of falling down (HR=1.20).

Conclusion: The items listed in the specific medical checkup as well as the basic checklists were found to be risk factors for both the young-old elderly individuals and the old-old elderly individuals, indicating the need to utilize these lists for the prevention of nursing even in the late stages of life. Moreover, these results suggest the importance of screening elderly individuals suffering from hyperkinesis using the basic checklist and conducting preventive interventions in order to maintain and improve their physical functions.

Key words: newly certificated long-term care need, basic checklist, specific health checkup, cohort study, community elders
Introduction

The number of elderly people in Japan has been on the rise, and in 2011, it was reported that there were 29.75 million elderly residents in the country, accounting for 23.3% of the total population.

While the total population of Japan is on the decline, the population of the elderly people was expected to reach 33.95 million in 2015 when those in the “baby boom generation” were 65 years of age or older, and this was likely to continue\(^1\). As this aging of the population progresses, an increasing number of people are certified as requiring assistance or long-term care. In particular, the number of recipients of low-level nursing care services (care needs assessment levels 1 and 2) is on the rise\(^2\). Therefore, in Japan, which is now a hyper-aged society, the extension of healthy life expectancy through preventive health intervention is an important and pressing issue.

The 2013 Comprehensive Survey of Living Conditions of the People on Health and Welfare found that the need for the Support Required 1 level or higher long-term care was the result of, in descending order, cerebrovascular disease (18.5%), dementia (15.8%), weakness due to old age (13.4%), fractures and falls (11.8%), or arthritic disorders (10.9%). When only people certified as requiring nursing support were considered, the most common reasons for that assistance were arthritic disorders followed by physical weakness, fractures and falls, and cerebrovascular disease\(^3\). With the increase in the number of elderly people certified as requiring low-level care, it is important to direct attention to the decline in vital function with aging as well as to identify and thus prevent the risks that give rise to the need for assistance.

To prolong healthy life expectancy, Japan has implemented two measures: preventive care to reduce the need for long-term care and measures directed against lifestyle-related diseases. In the current system, designated checkups and a basic checklist are the two main sources from which the administration obtains information regarding the health of the elderly individuals. If the Japanese government can gain a better understanding of the health of its elderly population by combining the results of the basic checklist and designated health checkups, a more efficient screening for appropriate candidates for its preventive care program will be possible. This way, care can be customized to the intended target population. However, previous studies\(^4,5\) have used either a basic checklist or a health examination (a basic or designated health examination) to analyze the risk factors that lead to the need for long-term care among the elderly individuals.

This study aims to investigate the factors underlying the need for long-term care among elderly people in Japan by using a combination of the items in the basic checklist and the designated checkups, as no previously conducted studies have used this combination.

Research Methods

Research participants

The participants were 8,000 elderly people, aged 65 years or above, who lived in Uji city and underwent either a designated checkup or a ‘specific health checkup for the old-old elderly individuals’ for those aged 75 years or above. They answered questions from a basic checklist at the time of the designated checkup. Of the 8,000 participants, we analyzed the data from 7,820 elderly people who had not been certified as requiring long-term care at the time of cohort enrollment.

Research design and follow-up period

This was a retrospective cohort study in which elderly participants being certified to receive services under the long-term care insurance system was a study event. We followed these elderly individuals from the date of the designated checkup or the ‘specific health checkup for the old-old elderly individuals’ in 2008 through to March 31, 2013, to identify those who were newly certified for long-term care and to obtain data for the study.

Response variable

In our analysis, the response variable was whether an elderly participant obtained certification to receive long-term care of the Support Required 1 level or above. The follow-up was terminated if participants died or moved out of the city, and their death or move were confirmed by the care needs assessment data from nursing care insurers as well as the notifications of death or change of address reports. The date of the incident that gave rise to the need for long-term care was defined as the date of application for certification showing the need for care (if the need for Support Required 1 or above was granted).

Explanatory variables

The explanatory variables included basic attributes; test items examined in the designated checkups or designated checkups for the old-old elderly individuals, participants’ answers to the medical examinations by interviews, and answers to the questions on the basic checklist.

The basic attributes included age, sex, region of residence (daily living area), and whether or not the participant was a beneficiary of the government’s primary prevention project (i.e., 2007 and 2008 governmental projects to pre-
vent motor function decline).

The test items in the designated checkups and the examinations by interviews were only used if the examinations were conducted in Uji.

The participants were grouped into categories using data from the designated checkup or designated checkup for the old-old elderly people, based on the criteria determined by the specific health guidance or the Japanese Society of Human Dry Dock⁷,8). The respective target levels for the control of blood pressure, blood lipids, and blood sugar were set in reference to the target levels specified by the Japan Atherosclerosis Society and the Japan Diabetes Society⁹⁻¹⁰).

Analysis method

Univariate analysis: The elderly individuals who received a long-term care certificate during the follow-up period were assigned to the certified group, and all others were assigned to the non-certified group. Differences between the two groups for age, body mass index (BMI), abdominal circumference, high-density lipoprotein cholesterol, low-density lipoprotein cholesterol, hemoglobin Alc, albumin, hemoglobin content, hemoglobin, red blood cell count, and checklist scores were examined using the Student’s t-test if normally distributed or the Mann–Whitney test if not normally distributed. Chi-square tests were performed to determine if the observed differences in the frequencies of the values of the following variables occurred by chance: sex, the result of each test, past medical history, symptoms observed by a doctor, subjective symptoms, taking medicine (yes or no), an increase in weight by 3 kg or more in the past year (yes or no), and each test item on the basic checklist. Chi-square tests and residual analyses were used for the place of residence, blood pressure categories, alcohol intake frequency, and whether or not the participant was identified as a target of the government’s secondary prevention project.

Multivariate analysis: Cox proportional hazard regression analysis was used to obtain the hazard ratio (HR) for elderly people being approved to receive long-term care. The analysis was first performed on the data for the entire sample and then on the data for the young-old and the old-old elderly individuals separately. The explanatory variables were a total of 25 items, including age, residential area, whether or not the participant took advantage of the nursing prevention project, and items in the designated health checkup.

Ethical considerations

To protect the personal identity of the participants, the information used in the analysis was provided by Uji city without names and with addresses only at the regional level; therefore, individual participants were not personally identifiable. In addition, this study was conducted with the approval (E1756) of the ethics committee of the Graduate School of Medicine and Faculty of Medicine, Kyoto University as well as the Kyoto University Hospital.

Results

Participants’ attributes (Tables 1, 2, and 3)

The average follow-up period was 1,495 ± 380 days. The probability of elderly people being eligible for long-term care during the 5 years of the study was 18.8%. Of those who were eligible for care, 64.2% were from the young-old elderly population, 39.5% were female (60.5% male), and the average age was 72.8 ± 5.5 years.

The results of the designated checkup demonstrated that the average BMI was within the normal range (22.6 ± 3.0), 38.0% of the participants had level 1 high blood pressure or above, and 43.3% were on medication for the treatment of the same. Of those who underwent the designated checkup, including those with and without risk, it was found that 69.3% did not need to receive health guidance, 1.2% were at the level requiring the provision of information, 13.3% were at the level of requiring motivational support, and 16% were at the level of requiring aggressive support.

The results of the basic checklist demonstrated that of all the research participants, 51.0% exhibited no hypo-function, 27.5% revealed partial hypo-function, and 21.5% needed to be admitted to the secondary prevention project (15.8% of young-old elderly individuals and 31.7% of old-old elderly individuals were recommended for the secondary prevention project).

Factors influencing the need for long-term care (Tables 4, 5, 6 and 7)

(i) Entire dataset

Of the test items in the designated checkup that exhibited a statistically significant difference between the certified and non-certified groups, those with a HR > 1.00 were, in descending order, positive urinary sugar level (HR = 1.42), abnormal liver function (HR = 1.28), exhibiting subjective symptoms (HR = 1.28), urinary protein (HR = 1.18), anemia (HR = 1.17), and older age (HR = 1.12). The items in the basic checklist with an HR of 1.0 or above were “inability to climb stairs without holding on to handrails or walls” (HR = 1.50), “going out less frequently in comparison with 6 months prior” (HR = 1.39), “inability to enjoy what used to be fun, in the past two weeks” (HR = 1.37), “the use of support for standing up after being seated on a chair” (HR = 1.30), “inability to travel on a bus or train alone” (HR = 1.30), “being emaciated” (HR = 1.26), “having high levels of anxiety about falling down” (HR = 1.23), and “having fallen
Table 1  The list of categories

| Variable                  | Category                        | Detail                                           |
|---------------------------|---------------------------------|--------------------------------------------------|
| The designated check-up   |                                 |                                                  |
| BMI                       | being emaciated BMI < 18.5      |                                                  |
|                           | standard figure 18.5 ≤ BMI < 25 |                                                  |
|                           | fatness 25 ≤ BMI                |                                                  |
| Abdominal circumference   | no particular male: < 85 cm,   |                                                  |
|                           | female: < 90 cm                 |                                                  |
|                           | over male: ≥ 85 cm, female: ≥ 90 cm |                                                  |
| Level of health           | not required to receive health | This group had no particular item in abdominal   |
| guidance                  | guidance (with no risk)         | circumference, BMI, blood pressure, blood lipid  |
|                           | not required to receive health  | and blood sugar.                                  |
|                           | guidance (with risk)            |                                                  |
|                           | the level requiring provision  | This group had no particular item in abdominal   |
|                           | of information                  | circumference or BMI, and had a problem in       |
|                           | the level requiring provision   | blood pressure, blood lipid, and blood sugar.    |
|                           | motivational support            |                                                  |
|                           | the level requiring aggressive  | Either of the following (A or B) was true for   |
|                           | support (with risk)             | this group.                                       |
|                           |                                  | A: Their abdominal circumference was low and    |
|                           |                                  | they were non-smokers. They had a problem in    |
|                           |                                  | blood pressure, blood lipid, or blood sugar.    |
|                           |                                  | B: Their BMI suggested being overweight and they |
|                           |                                  | were smokers. They had one or two problems in   |
|                           |                                  | blood pressure, blood lipid, or blood sugar.    |
| Blood pressure control    | no particular systolic pressure | This group had no particular item in abdominal   |
|                           | < 130 and diastolic pressure < 85 without medication | circumference, BMI, blood pressure, blood lipid  |
|                           | good control systolic pressure  | and blood sugar.                                  |
|                           | < 140 and diastolic pressure < 90 with medication |                                                  |
|                           | bad control no medication, or   |                                                  |
|                           | systolic pressure ≥ 140 or      |                                                  |
|                           | diastolic pressure ≥ 90 with    |                                                  |
|                           | medication                       |                                                  |
| Blood lipid control       | no particular triglyceride < 150 mg/dl and HDL cholesterol ≥ 40 mg/dl without medication | This group had no particular item in abdominal   |
|                           | good control triglyceride < 150 mg/dl and HDL cholesterol ≥ 40 mg/dl and LDL cholesterol < 160 mg/dl with medication | circumference, BMI, blood pressure, blood lipid  |
|                           | bad control no medication, or   | and blood sugar.                                  |
|                           | triglyceride ≥ 150 mg/dl or HDL cholesterol < 40 mg/dl, or LDL cholesterol ≥ 160 mg/dl with medication |                                                  |
| Blood sugar control       | no particular HbA1c < 5.2%      | This group had no particular item in abdominal   |
|                           | good control HbA1c < 6.0% with  | circumference, BMI, blood pressure, blood lipid  |
|                           | bad control no medication, or   | and blood sugar.                                  |
|                           | HbA1c ≥6.0% with medication     |                                                  |
| AST                       | no particular ≤ 30 U/L          | AST and ALT were no particular                    |
|                           | over > 30 U/L                   | AST or/and ALT                                    |
| ALT                       | no particular ≤ 30 U/L          |                                                  |
|                           | over > 30 U/L                   |                                                  |
| γ-GTP                     | no particular ≤ 50 U/L          |                                                  |
|                           | over > 50 U/L                   |                                                  |
| Liver function            | no particular AST and ALT were  |                                                  |
|                           | over AST or/and ALT             |                                                  |
| Albumin                   | no particular ≥ 4.0 g/dl        |                                                  |
|                           | under < 4.0 g/dl                |                                                  |
| Anemia                    | no particular male: hemoglobin | male: hemoglobin content ≥ 13.1, female:        |
|                           | content ≥ 13.1, female:         | hemoglobin content ≥ 12.1                        |
|                           | hemoglobin content ≥ 12.1       |                                                  |
| eGFR (ml/minute/1.73 m²)  | no particular ≥ 60              |                                                  |
|                           | under < 60                      |                                                  |
| Sugar in urine            | no particular –                |                                                  |
|                           | over ≥ ±                        |                                                  |
| Protein in urine          | no particular –                |                                                  |
|                           | over ≥ ±                        |                                                  |
| Occult blood in urine     | no particular –                |                                                  |
|                           | over ≥ ±                        |                                                  |
down in the past year” (HR = 1.18). The items with an HR < 1.00 were a good control of blood lipids (HR = 0.79) and “not visiting friends’ homes” (HR = 0.79).

(2) The young-old elderly individuals

Of the items for which a statistically significant difference was observed between the certified and non-certified groups, those in the designated checkups with an HR > 1.0 were, in descending order, abnormal liver function (HR = 1.69), exhibiting subjective symptoms (HR = 1.41), abdominal circumference greater than the normal range (HR = 1.36), and older age (HR = 1.13). The items in the basic checklist were “going out less frequently than in the preceding year” (HR = 1.87), “the use of support for standing up after being seated on a chair” (HR = 1.86), “not being able to deposit or withdraw cash to and from their bank accounts” (HR = 1.84), “having high levels of anxiety about falling down” (HR = 1.50), “inability to climb stairs without holding on to handrails or walls” (HR = 1.49), and “difficulty in eating solid foods in comparison with 6 months prior” (HR = 1.44). The items with an HR < 1.00 were, in ascending order, male sex (HR = 0.64) and positive urine occult blood (HR = 0.76).

(3) The old-old elderly individuals

Of the items for which a statisticaally significant difference was observed between the certified and non-certified groups, those in the designated checkups with an HR > 1.0 were, in descending order, positive for urinary protein (HR = 1.27), anemia (HR = 1.18), and older age (HR = 1.10). Items in the basic checklist with an HR > 1.00 were “not able to go on a bus or train alone” (HR = 1.53), “inability to climb stairs without holding on to handrails or walls” (HR = 1.48), being emaciated (HR = 1.36), “being unable to enjoy what used to be fun, in the preceding two weeks” (HR = 1.30), “the use of support for standing up after being seated on a chair” (HR = 1.23), and having high levels of anxiety (HR = 1.20). The items with an HR < 1.00 were “not visiting friends’ homes” (HR = 0.74) and a good control of blood lipids (HR = 0.77).

| Variable Category | Detail |
|-------------------|--------|
| ADL               | this group was defined as elderly participants with 9 or less negative conditions in questions 1–20 |
| Physical strength | this group was defined as elderly participants with 2 or less negative responses to questions 6–10 |
| Nutritional status| this group was assessed by positive answers to questions 11 or 12 |
| Oral function     | this group was defined as elderly participants with 1 or 0 negative responses to questions 13–15 |
| Being housebound  | this group referred to elderly participants who answered “yes” to question 16 |
| Cognitive function| this group referred to elderly participants who had at least 1 or more negative conditions in questions 18–20 |
| Depression        | this group referred to elderly participants who had 1 or less negative responses to questions 21–25 |
| Risk for long-term care | this group did not have these lower functions |

Table 1 (continued)
Discussion

There have been many studies conducted worldwide, including in Japan, that have evaluated the factors related to care needs assessment\(^4\)–\(^6\),\(^12\)–\(^16\) and the frail elderly individuals\(^17\)–\(^25\). However, many of these studies pertained to the evaluation of motor function\(^1\), cognitive function\(^\)\(^12\),\(^17\), financial conditions\(^12\),\(^14\), educational history\(^12\),\(^14\), and living conditions\(^12\),\(^17\) or used questionnaires that are not usually employed by the administration\(^20\)–\(^25\). Because the data used in these studies were not those commonly held by the administration, the results could not be effectively reflected in government projects or the activities of nursing staff. Therefore, it is important to search for methods to effectively utilize the health information available to the administration, to develop preventive measures aimed at reducing the need for long-term care.

Risk factors leading to approval for long-term care that are common in the elderly individuals of all ages

The factors that increased the need for long-term care among all elderly participants (the young-old and old-old el-
elderly people) were three items in the basic checklist that are related to motor function. Motor function declines at an accelerated rate as a person grows older and this increases the risk of incidents that give rise to the need for long-term care. Our study indicated the importance of preventive interventions to maintain and improve motor function, as a rising number of elderly people now have locomotive syndrome. Of the elderly people certified as requiring long-term care

| Items                                      | Total          | Young-old elderly | Old-old elderly |
|--------------------------------------------|----------------|-------------------|-----------------|
| **Level of health guidance**               |                |                   |                 |
| not required to receive health guidance    | 639 8.2%       | 449 8.9%          | 191 6.8%        |
| (without risk)                             | 4776 61.1%     | 2731 54.4%        | 2060 73.6%      |
| not required to receive health guidance    | 93 1.2%        | 80 1.6%           | 12 0.4%         |
| (with risk)                                | 1037 13.3%     | 537 10.7%         | 489 17.5%       |
| requiring provision of information         | 1273 16.3%     | 1221 24.3%        | 48 1.7%         |
| requiring motivational support             |                |                   |                 |
| requiring aggressive support               |                |                   |                 |
| **Blood pressure control**                 |                |                   |                 |
| no particular                              | 2063 26.4%     | 1489 29.7%        | 574 20.5%       |
| good control                               | 1756 22.5%     | 1015 20.2%        | 741 26.4%       |
| bad control                                | 3999 51.2%     | 2514 50.1%        | 1485 53.0%      |
| **Lipid control**                          |                |                   |                 |
| no particular                              | 4172 53.4%     | 2702 53.8%        | 1470 52.5%      |
| good control                               | 1484 19.0%     | 895 17.8%         | 589 21.0%       |
| bad control                                | 2164 27.7%     | 1421 28.3%        | 743 26.5%       |
| **Blood sugar control**                    |                |                   |                 |
| no particular                              | 4923 63.0%     | 2552 50.9%        | 2371 84.6%      |
| good control                               | 147 1.9%       | 83 1.7%           | 64 2.3%         |
| bad control                                | 2749 35.2%     | 2383 47.5%        | 366 13.1%       |
| **BMI**                                    | 22.6 ± 3.0     | 22.7 ± 3.0        | 22.4 ± 3.1      |
| **Blood pressure**                         |                |                   |                 |
| systolic pressure                          | 133.8 ± 17.2   | 132.9 ± 16.9      | 135.6 ± 17.4    |
| diastolic pressure                         | 76.4 ± 10.2    | 77.2 ± 10.1       | 75.2 ± 10.2     |
| **History of stroke**                      |                |                   |                 |
| no                                         | 7442 95.2%     | 4836 96.6%        | 2606 93.7%      |
| yes                                        | 344 4.4%       | 168 3.4%          | 176 6.3%        |
| **History of heart disease**               |                |                   |                 |
| no                                         | 6936 88.7%     | 4565 91.3%        | 2371 85.6%      |
| yes                                        | 833 10.7%      | 433 8.7%          | 400 14.4%       |
| **History of chronic renal failure**       |                |                   |                 |
| no                                         | 7704 98.5%     | 4950 99.0%        | 2754 98.7%      |
| yes                                        | 85 1.1%        | 48 1.0%           | 37 1.3%         |
| **Subjective symptom**                     |                |                   |                 |
| no                                         | 6052 77.4%     | 3914 78.0%        | 2138 76.3%      |
| yes                                        | 1767 22.6%     | 1103 22.0%        | 664 23.7%       |
| **Objective symptom**                      |                |                   |                 |
| no                                         | 6898 88.2%     | 4469 89.1%        | 2429 86.7%      |
| yes                                        | 921 11.8%      | 548 10.9%         | 373 13.3%       |
| **On medication to lower blood pressure**  |                |                   |                 |
| no                                         | 4436 56.7%     | 3069 61.1%        | 1372 49.0%      |
| yes                                        | 3384 43.3%     | 1954 38.9%        | 1430 51.0%      |
| **On medication to lower blood glucose**   |                |                   |                 |
| no                                         | 7316 93.6%     | 4705 93.8%        | 2611 93.2%      |
| yes                                        | 504 6.4%       | 313 6.2%          | 191 6.8%        |
| **On medication to lower cholesterol**     |                |                   |                 |
| no                                         | 5626 71.9%     | 3672 73.1%        | 1954 69.7%      |
| yes                                        | 2194 28.1%     | 1346 26.8%        | 848 30.3%       |
| **Regular smoker**                         |                |                   |                 |
| no                                         | 7165 91.6%     | 4542 90.7%        | 2613 93.3%      |
| yes                                        | 655 8.4%       | 466 9.3%          | 189 6.7%        |
| **Weight gain or loss of ≥ 3 kg over the** |                |                   |                 |
| past year                                  | 6784 86.8%     | 4360 86.9%        | 2424 87.7%      |
| no                                         | 997 12.7%      | 658 13.1%         | 339 12.3%       |
| yes                                        | 1696 21.7%     | 1183 23.9%        | 513 18.8%       |
| **Alcohol consumption**                    |                |                   |                 |
| rarely (can’t drink)                       | 4545 58.1%     | 2773 56.1%        | 1772 64.8%      |
| sometimes                                  | 1437 18.4%     | 988 20.0%         | 449 16.4%       |
| every day                                  | 1696 21.7%     | 1183 23.9%        | 513 18.8%       |
in our study, more than half were in the “Support required” levels or “care level 1”, and the main factors associated with their care needs certification were fractures and/or falls (38.9% of all certifications). This suggests that items related to motor function cause a significant increase in the risk of the elderly people being in situations that lead to the need for long-term care.

Differences in the risk factors based on age

We used slightly different sets of explanatory variables for the young-old and old-old elderly individuals because the designated checkups are different for the two groups. Nevertheless, differences were observed between the two groups in terms of the risk factors for the need for long-term care. While being emaciated was one of the risk factors for the entire sample population as well as the late elderly subset, visceral fat accumulation was uniquely identified as a risk factor among the young-old elderly participants. The 2010 Comprehensive Survey of the Living Conditions of the People on Health and Welfare found that cerebrovascular disease accounted for 40.0% of all events that caused the young-old elderly people to become dependent on long-term care; this was far more than in the case of the old-old elderly people (16.6%). This suggests a higher probability of the young-old elderly requiring long-term care due to lifestyle-related diseases. Visceral fat accumulation was the main risk factor for young-old elderly people becoming dependent on nursing care. This knowledge can be applied to take advantage of the outcomes of the designated checkup to prevent the need for long-term care among the young-old elderly people. Alternately, for the effective preventive intervention among the old-old elderly individuals, signs of emaciation are of particular importance. Furthermore, the young-old elderly individuals differed from the old-old elderly people in that “falls in the preceding year” and “difficulty in eating solid foods in comparison with 6 months prior” in the basic checklist indicated risk in the old-old elderly people. If a young-old elderly person experiences these symptoms, he/she is experiencing a higher level of hypo-function than expected for his/her actual age. Recent changes in behavior, with respect to going out less frequently than usual, that is once a week or less26), also presented a higher risk in the old-old elderly individuals. This suggests that elderly people who feel that they go out less frequently now than before face a higher risk than those who tended to stay in their homes for some time. Staying at home is recognized as a reason elderly people need long-term care, and the government has recommended the implementation of preventive measures for elderly people who are confined to their homes26). However, very few cross-sectional studies15, 16) have investigated the well-being of withdrawn elderly people after they entered long-term care. In addition, there are some inconsistencies among these previous studies15, 16) in terms of the definition of “withdrawal.” No study has followed up on the elderly people identified as being withdrawn, with the definition of “withdrawal” being “going out once a week or less.” Withdrawal defined in this way has not

| Table 4 | Results of the basic checklist |
|---------|-------------------------------|
|         | Total n (%) | Young-old elderly n (%) | Old-old elderly n (%) |
|         |             | n (%) | n (%) | n (%) |
| ADL     | no particular | 7559 97.6% | 4916 98.9% | 2643 95.2% |
|        | score of more than 9 out of 1-20 items | 186 2.4% | 54 1.1% | 132 4.8% |
| Physical strength | no particular | 6819 88.0% | 4595 92.5% | 2224 80.1% |
|        | lower physical strength | 926 12.0% | 375 7.5% | 551 19.9% |
| Nutritional status | no particular | 7655 98.8% | 4933 98.3% | 2722 98.1% |
|        | lower nutritional status | 90 1.2% | 37 0.7% | 53 1.9% |
| Oral function | no particular | 6792 87.7% | 4483 90.2% | 2309 83.2% |
|        | lower oral function | 952 12.3% | 487 9.8% | 465 16.8% |
| Being housebound | no particular | 7071 91.6% | 4578 92.4% | 2493 90.2% |
|        | housebound | 646 8.4% | 376 7.6% | 270 9.8% |
| Cognitive function | no particular | 5399 69.7% | 3602 72.5% | 1797 64.8% |
|        | lower cognitive function | 2346 30.3% | 1368 27.3% | 978 35.2% |
| Depression | no particular | 6284 81.2% | 4244 84.6% | 2040 73.6% |
|        | depression risk | 1457 18.8% | 724 14.4% | 733 26.4% |
| Risk for long-term care | non-risk group 1 | 3946 51.0% | 2809 56.5% | 1137 41.0% |
|        | non-risk group 2 | 2131 27.5% | 1374 27.7% | 757 27.3% |
|        | risk group | 1667 21.5% | 786 15.8% | 881 31.7% |
been previously identified as a risk factor. This suggests a need to re-evaluate the criteria to identify the state of withdrawal in the basic checklist.

Results for the old-old elderly people were similar to those of previous studies; anemia, urinary protein levels, and emaciation were identified as risk factors. Anemia and emaciation are factors considered to promote feebleness among elderly people, thereby increasing the risk of incidents that give rise to the need for long-term care. Although the basic checklist indicates whether an elderly person is emaciated, the designated checkup provides a more objective, and therefore, a more effective measure of emaciation. In addition, data on anemia and urinary protein levels can only be obtained from the designated checkup. Therefore, a combination of the basic checklist and the designated health checkup is required to identify elderly people who need preventive health intervention even in the case of old-old elderly people. In addition, melancholia or depression in the old-old elderly people, as represented by the variable “being unable to enjoy what used to be fun in the past two weeks,” increases the risk of the need for care. It is well known that elderly people live longer when they have something to live for. In fact, the present study suggests a link between the loss of “something to live for” and the likelihood of the occurrence of incidents that give rise to the need for long-term care.

Importance of longitudinal evaluation

Of the 25 items in the basic checklist, those identified as risk factors were the items that indicate recent changes in behavior or physical capacity, such as “difficulty in eating solid foods when compared to 6 months prior,” “going out less frequently than the preceding year,” and “becoming unable to enjoy what used to be fun in the past 2 weeks.” These items help to evaluate the progression of loss of function in elderly people and are useful in identifying those who are likely to need long-term care. The checkup items pertaining to the present conditions of the elderly individuals could not provide information on the changes or deterioration in their function. However, evaluating the items in the basic checklist every year and comparing the results with the previous year can help identify a decline in physical function. A longitudinal examination of the items in the basic checklist determines whether there has been a loss in function, thereby providing a better screening process to accurately identify the elderly people who need preventive health intervention. In the future, changes in the basic checklist items must be incorporated when examining the risk factors that give rise to the need for long-term care.

Factors that reduced the risk of needing long-term care

The factors that reduced the need for long-term care were positive urine occult blood for the young-old elderly people and good lipid control and “not visiting friends’ homes” for the old-old elderly people. Good lipid control was identified as a factor reducing the need for long-term care in the entire elderly participant population as well as in old-old elderly participants because, for elderly individuals, low total cholesterol values are a risk factor and good control with a slightly high level of serum lipid reduces the risk of needing care. The effect of the variables “not visiting friends’ homes” and positive results for urine occult blood observed in our study is inconsistent with previous studies and warrants further investigation.

Effect of the primary prevention project

Participation in the primary prevention project was not recognized as a factor leading to a significant improvement in terms of the need for care. Our research included only a small number of elderly people in the project (55), which may explain the insignificant effect. However, the HR was 0.13 (p = 0.063) for the young-old elderly people, and it is possible that the project had a preventive effect for that group. Further analysis of its impact is necessary.

Limitations of the study

Because our research was based on data from elderly people who answered the basic health checklist and underwent the designated checkup in Uji, a bias toward the health-conscious is highly likely.

In addition, only items that were available in the basic checklist and designated checkups were used as explanatory variables. Therefore, the study did not consider some factors that were considered in previous studies, such as educational history, financial condition, family structure, subjective health awareness, and the role in the family.

Furthermore, because abdominal circumference, serum uric acid, and estimated glomerular filtration rate are not measured in the designated checkup for the old-old elderly people, only BMI was used to determine the visceral fat level at the health guidance level. Therefore, there is a difference in the criteria between the young-old and old-old elderly individuals.

In the present study, the response variable indicates the occurrence of an elderly person getting certified as requiring assistance or long-term care. Although we treated approvals for assistance or long-term care of any level in the same manner, the factors contributing to the need for assistance, long-term care in general, and long-term care of level 3 or higher are considered to be significantly different. In our study, more than half of the participants ap-
| Variables                       | Categories | HR    | 95% CI      | P-value |
|--------------------------------|------------|-------|-------------|---------|
| Sex                            | female     | 1.00  |             |         |
|                                | male       | 0.91  | 0.78–1.07   | 0.255   |
| Age                            |            | 1.12  | 1.11–1.14   | 0.000   |
| settlement                     | C area     | 1.00  |             |         |
|                                | A area     | 0.93  | 0.74–1.18   | 0.576   |
|                                | B area     | 0.96  | 0.78–1.19   | 0.736   |
|                                | D area     | 0.88  | 0.71–1.08   | 0.213   |
|                                | E area     | 0.87  | 0.71–1.08   | 0.215   |
|                                | F area     | 0.98  | 0.81–1.20   | 0.877   |
| Care prevention service        | not used   | 1.00  |             |         |
|                                | used       | 0.54  | 0.17–1.69   | 0.286   |
| Blood pressure control         | no particular | 1.00 |             |         |
|                                | good control | 0.99 | 0.82–1.19   | 0.915   |
|                                | bad control | 0.90  | 0.77–1.06   | 0.204   |
| Lipid control                  | no particular | 1.00 |             |         |
|                                | good control | 0.79 | 0.67–0.94   | 0.007   |
|                                | bad control | 0.88  | 0.76–1.02   | 0.089   |
| Blood sugar control            | no particular | 1.00 |             |         |
|                                | good control | 0.95 | 0.61–1.48   | 0.817   |
|                                | bad control | 0.90  | 0.77–1.06   | 0.199   |
| Liver function                 | no particular | 1.00 |             |         |
|                                | particular | 1.27  | 1.08–1.50   | 0.004   |
| Anemia                         | no particular | 1.00 |             |         |
|                                | anemia     | 1.17  | 1.02–1.34   | 0.030   |
| Sugar in urine                 | no particular | 1.00 |             |         |
|                                | over       | 1.42  | 1.10–1.85   | 0.008   |
| Protein in urine               | no particular | 1.00 |             |         |
|                                | over       | 1.18  | 1.01–1.38   | 0.036   |
| Subjective symptom             | no         | 1.00  |             |         |
|                                | yes        | 1.24  | 1.08–1.43   | 0.003   |
| Objective symptom              | no         | 1.00  |             |         |
|                                | yes        | 1.02  | 0.86–1.21   | 0.828   |
| History of stroke              | no         | 1.00  |             |         |
|                                | yes        | 1.14  | 0.88–1.47   | 0.315   |
| History of heart disease       | no         | 1.00  |             |         |
|                                | yes        | 1.13  | 0.95–1.35   | 0.173   |
| History of chronic renal failure | no     | 1.00  |             |         |
|                                | yes        | 1.19  | 0.74–1.90   | 0.472   |
| Regular smoker                 | no         | 1.00  |             |         |
|                                | yes        | 1.24  | 0.98–1.56   | 0.072   |
| Weight gain or loss of ≥ 3 kg over the past year | no | 1.00 |             |         |
|                                | yes        | 1.11  | 0.89–1.37   | 0.348   |
| Alcohol consumption            | rarely (can’t drink) | 1.00 |             |         |
|                                | sometimes  | 0.89  | 0.74–1.06   | 0.197   |
|                                | every day  | 1.02  | 0.85–1.23   | 0.816   |
| Variables                                                                 | Categories | HR   | 95% CI       | P-value |
|--------------------------------------------------------------------------|------------|------|--------------|---------|
| 1. Do you go on buses or trains by yourself?                             | yes        | 1.00 |              |         |
|                                                                           | no         | 1.30 | 1.02–1.64    | 0.030   |
| 2. Do you go shopping to buy daily necessities by yourself?              | yes        | 1.00 |              |         |
|                                                                           | no         | 1.20 | 0.90–1.62    | 0.218   |
| 3. Do you manage your own deposits and savings at the bank?             | yes        | 1.00 |              |         |
|                                                                           | no         | 0.97 | 0.78–1.21    | 0.792   |
| 4. Do you sometimes visit your friends?                                  | yes        | 1.00 |              |         |
|                                                                           | no         | 0.79 | 0.65–0.97    | 0.024   |
| 5. Do you turn to your family or friends for advice?                    | yes        | 1.00 |              |         |
|                                                                           | no         | 1.06 | 0.86–1.30    | 0.598   |
| 6. Do you normally climb stairs without using handrails or walls?       | yes        | 1.00 |              |         |
|                                                                           | no         | 1.50 | 1.29–1.74    | 0.000   |
| 7. Do you normally stand up from a chair without aid?                   | yes        | 1.00 |              |         |
|                                                                           | no         | 1.30 | 1.10–1.54    | 0.002   |
| 8. Do you normally walk continuously for 15 minutes?                    | yes        | 1.00 |              |         |
|                                                                           | no         | 1.10 | 0.89–1.36    | 0.386   |
| 9. Have you experienced a fall in the past year?                        | no         | 1.00 |              |         |
|                                                                           | yes        | 1.18 | 1.02–1.38    | 0.030   |
| 10. Do you have a fear of falling while walking?                        | no         | 1.00 |              |         |
|                                                                           | yes        | 1.23 | 1.06–1.42    | 0.005   |
| 11. Have you lost 2 kg or more in the past 6 months?                     | no         | 1.00 |              |         |
|                                                                           | yes        | 0.95 | 0.77–1.17    | 0.635   |
| 12. BMI (Body Mass Index)                                                | standard figure | 1.00 |              |         |
|                                                                           | being emaciated | 1.26 | 1.02–1.55    | 0.033   |
|                                                                           | fatness    | 0.98 | 0.83–1.15    | 0.773   |
| 13. Do you have any difficulties eating tough foods compared to 6 months ago? | no        | 1.00 |              |         |
|                                                                           | yes        | 0.94 | 0.81–1.10    | 0.450   |
| 14. Have you choked on your tea or soup recently?                       | no         | 1.00 |              |         |
|                                                                           | yes        | 0.90 | 0.76–1.06    | 0.209   |
| 15. Do you often experience having a dry mouth?                         | no         | 1.00 |              |         |
|                                                                           | yes        | 1.08 | 0.94–1.25    | 0.283   |
| 16. Do you go out at least once a week?                                 | yes        | 1.00 |              |         |
|                                                                           | no         | 0.98 | 0.79–1.20    | 0.829   |
| 17. Do you go out less frequently compared to last year?                | yes        | 1.00 |              |         |
|                                                                           | no         | 1.39 | 1.20–1.62    | 0.000   |
| 18. Do your family or your friends point out your memory loss? e.g., “You ask the same question over and over again.” | no        | 1.00 |              |         |
|                                                                           | yes        | 1.04 | 0.88–1.23    | 0.671   |
| 19. Do you make calls by looking up phone numbers?                      | yes        | 1.00 |              |         |
|                                                                           | no         | 1.13 | 0.92–1.40    | 0.249   |
| 20. Do you find yourself not knowing today’s date?                      | yes        | 1.01 | 0.86–1.18    | 0.903   |
|                                                                           | no         | 1.00 |              |         |
| 21. In the last 2 weeks have you felt a lack of fulfillment in your daily life? | no        | 1.00 |              |         |
|                                                                           | yes        | 1.07 | 0.87–1.31    | 0.525   |
| 22. In the last 2 weeks have you felt a lack of joy when doing the things you used to enjoy? | no        | 1.00 |              |         |
|                                                                           | yes        | 1.37 | 1.10–1.69    | 0.004   |
| 23. In the last 2 weeks have you felt difficulty in doing what you could do easily before? | no        | 1.00 |              |         |
|                                                                           | yes        | 0.98 | 0.82–1.16    | 0.794   |
| 24. In the last 2 weeks have you felt helpless?                         | no         | 1.00 |              |         |
|                                                                           | yes        | 0.98 | 0.82–1.17    | 0.822   |
| 25. In the last 2 weeks have you felt tired without a reason?           | no         | 1.00 |              |         |
|                                                                           | yes        | 0.98 | 0.83–1.16    | 0.799   |

HR: Hazard Ratio, 95%CI: 95% Confidence Interval.
| Variable                         | Categories     | HR  | 95% CI          | P-value |
|---------------------------------|----------------|-----|-----------------|---------|
| Sex                             | female         | 1.00|                 |         |
|                                 | male           | 0.64| 0.45–0.90       | 0.010   |
| Age                             |                | 1.13| 1.08–1.18       | 0.000   |
| Settlement                       | C area         | 1.00|                 |         |
|                                 | A area         | 0.71| 0.44–1.14       | 0.153   |
|                                 | B area         | 0.92| 0.63–1.36       | 0.689   |
|                                 | D area         | 0.68| 0.46–1.01       | 0.056   |
|                                 | E area         | 0.80| 0.54–1.19       | 0.267   |
|                                 | F area         | 0.85| 0.58–1.25       | 0.409   |
| Care prevention service         | not used       | 1.00|                 |         |
|                                 | used           | 0.13| 0.02–1.12       | 0.063   |
| Abdominal circumference         | no particular  | 1.00|                 |         |
|                                 | over           | 1.36| 1.00–1.86       | 0.049   |
| Blood pressure control          | no particular  | 1.00|                 |         |
|                                 | bad control    | 0.84| 0.63–1.11       | 0.580   |
| Lipid control                   | no particular  | 1.00|                 |         |
|                                 | bad control    | 0.78| 0.59–1.03       | 0.242   |
| Blood sugar control             | no particular  | 1.00|                 |         |
|                                 | bad control    | 0.87| 0.68–1.11       | 0.518   |
| Liver function                  | no particular  | 1.00|                 |         |
|                                 | particular     | 1.69| 1.27–2.24       | 0.000   |
| Anemia                          | no particular  | 1.00|                 |         |
|                                 | anemia         | 1.00| 0.73–1.36       | 0.998   |
| Albumin                         | no particular  | 1.00|                 |         |
|                                 | under          | 1.52| 0.95–2.43       | 0.080   |
| Uric acid                       | no particular  | 1.00|                 |         |
|                                 | under          | 2.03| 0.47–8.67       | 0.341   |
|                                 | over           | 0.81| 0.49–1.34       | 0.412   |
| eGFR                            | no particular  | 1.00|                 |         |
|                                 | under          | 0.86| 0.60–1.24       | 0.413   |
| Sugar in urine                  | no particular  | 1.00|                 |         |
|                                 | over           | 1.38| 0.87–2.21       | 0.173   |
| Protein in urine                | no particular  | 1.00|                 |         |
|                                 | over           | 1.09| 0.79–1.52       | 0.594   |
| Occult blood in urine           | no particular  | 1.00|                 |         |
|                                 | over           | 0.76| 0.58–1.00       | 0.050   |
| Subjective symptom              | no             | 1.00|                 |         |
|                                 | yes            | 1.41| 1.08–1.83       | 0.011   |
| Objective symptom               | no             | 1.00|                 |         |
|                                 | yes            | 1.21| 0.88–1.68       | 0.242   |
| History of stroke               | no             | 1.00|                 |         |
|                                 | yes            | 0.94| 0.54–1.64       | 0.831   |
| History of heart disease        | no             | 1.00|                 |         |
|                                 | yes            | 1.03| 0.69–1.52       | 0.901   |
| History of chronic renal failure| no             | 1.00|                 |         |
|                                 | yes            | 1.46| 0.52–4.13       | 0.473   |
| Regular smoker                  | no             | 1.00|                 |         |
|                                 | yes            | 1.15| 0.76–1.74       | 0.503   |
| Weight gain or loss of ≥ 3 kg over the past year | no | 1.00 |     |         |
|                                 | yes            | 1.19| 0.79–1.81       | 0.407   |
| Variable                                                                 | Categories          | HR      | 95% CI    | P-value |
|-------------------------------------------------------------------------|---------------------|---------|-----------|---------|
| Alcohol consumption                                                     | rarely (can’t drink)| 1.00    | 0.61–1.15 | 0.282   |
|                                                                        | sometimes           | 0.84    | 0.61–1.15 | 0.282   |
|                                                                        | every day           | 0.99    | 0.69–1.41 | 0.949   |
| 1. Do you go on a bus or train by yourself?                              | yes                 | 1.00    |           |         |
|                                                                        | no                  | 1.23    | 0.72–2.10 | 0.458   |
| 2. Do you go shopping to buy daily necessities by yourself?              | yes                 | 1.00    |           |         |
|                                                                        | no                  | 0.84    | 0.42–1.65 | 0.606   |
| 3. Do you manage your own deposits and savings at the bank?              | yes                 | 1.00    |           |         |
|                                                                        | no                  | 1.84    | 1.20–2.82 | 0.005   |
| 4. Do you sometimes visit your friends?                                  | yes                 | 1.00    |           |         |
|                                                                        | no                  | 0.96    | 0.64–1.45 | 0.861   |
| 5. Do you turn to your family or friends for advice?                     | yes                 | 1.00    |           |         |
|                                                                        | no                  | 1.03    | 0.65–1.63 | 0.895   |
| 6. Do you normally climb stairs without using handrails or walls for support? | yes                | 1.00    |           |         |
|                                                                        | no                  | 1.49    | 1.12–1.98 | 0.007   |
| 7. Do you normally stand up from a chair without any aid?                | yes                 | 1.00    |           |         |
|                                                                        | no                  | 1.86    | 1.31–2.63 | 0.001   |
| 8. Do you normally walk continuously for 15 minutes?                     | yes                 | 1.00    |           |         |
|                                                                        | no                  | 1.09    | 0.71–1.68 | 0.684   |
| 9. Have you experienced a fall in the past year?                         | yes                 | 1.00    |           |         |
|                                                                        | no                  | 1.30    | 0.96–1.76 | 0.087   |
| 10. Do you have a fear of falling while walking?                         | yes                 | 1.00    |           |         |
|                                                                        | no                  | 1.50    | 1.16–1.95 | 0.002   |
| 11. Have you lost 2 kg or more in the past 6 months?                      | yes                 | 1.00    |           |         |
|                                                                        | no                  | 1.09    | 0.72–1.65 | 0.687   |
| 12. BMI (Body Mass Index)                                                | standard figure     | 1.00    |           |         |
|                                                                        | emaciated           | 1.15    | 0.72–1.85 | 0.554   |
|                                                                        | overweight          | 1.03    | 0.74–1.44 | 0.849   |
| 13. Do you have any difficulties eating tough foods compared to 6 months ago? | no                 | 1.00    |           |         |
|                                                                        | yes                 | 1.44    | 1.06–1.95 | 0.021   |
| 14. Have you choked on your tea or soup recently?                        | no                  | 1.00    |           |         |
|                                                                        | yes                 | 1.03    | 0.73–1.44 | 0.866   |
| 15. Do you often experience having a dry mouth?                          | no                  | 1.00    |           |         |
|                                                                        | yes                 | 1.30    | 0.98–1.73 | 0.065   |
| 16. Do you go out at least once a week?                                  | yes                 | 1.00    |           |         |
|                                                                        | no                  | 0.90    | 0.58–1.38 | 0.616   |
| 17. Do you go out less frequently compared to the past year?             | no                  | 1.00    |           |         |
|                                                                        | yes                 | 1.87    | 1.39–2.53 | 0.000   |
| 18. Do your family or your friends point out your memory loss? e.g., “You ask the same question over and over again.” | no                 | 1.00    |           |         |
|                                                                        | yes                 | 1.19    | 0.86–1.65 | 0.297   |
| 19. Do you make calls by looking up phone numbers?                       | yes                 | 1.00    |           |         |
|                                                                        | no                  | 0.97    | 0.61–1.53 | 0.890   |
| 20. Do you find yourself not knowing today’s date?                       | no                  | 1.00    |           |         |
|                                                                        | yes                 | 0.90    | 0.65–1.24 | 0.529   |
| 21. In the past 2 weeks have you felt a lack of fulfillment in your daily life? | no               | 1.00    |           |         |
|                                                                        | yes                 | 1.38    | 0.95–2.00 | 0.089   |
| 22. In the past 2 weeks have you felt a lack of joy when doing the things you used to enjoy? | no                | 1.00    |           |         |
|                                                                        | yes                 | 1.17    | 0.76–1.78 | 0.479   |
| 23. In the past 2 weeks have you felt difficulty in doing what you could do easily before? | no               | 1.00    |           |         |
|                                                                        | yes                 | 0.99    | 0.71–1.38 | 0.954   |
| 24. In the past 2 weeks have you felt helpless?                          | no                  | 1.00    |           |         |
|                                                                        | yes                 | 0.92    | 0.63–1.34 | 0.652   |
| 25. In the past 2 weeks have you felt tired without a reason?            | no                  | 1.00    |           |         |
|                                                                        | yes                 | 0.96    | 0.70–1.33 | 0.813   |

HR: Hazard Ratio, 95%CI: 95% Confidence Interval.
| Variables               | Categories          | HR  | 95% CI       | P-value |
|------------------------|---------------------|-----|--------------|---------|
| Sex                    | female              | 1.00|              |         |
|                        | male                | 0.97| 0.80–1.18    | 0.777   |
| Age                    |                     | 1.10| 1.08–1.12    | 0.000   |
| settlement             | C area              | 1.00|              |         |
|                        | A area              | 1.01| 0.76–1.34    | 0.946   |
|                        | B area              | 0.97| 0.76–1.26    | 0.843   |
|                        | D area              | 0.92| 0.71–1.18    | 0.506   |
|                        | E area              | 0.88| 0.67–1.15    | 0.348   |
|                        | F area              | 0.97| 0.76–1.25    | 0.837   |
| Care prevention service| unused              | 1.27|              |         |
|                        | used                | 1.00| 0.31–5.21    | 0.743   |
| Blood pressure         | no particular       | 1.00|              |         |
|                        | good control        | 1.03| 0.81–1.32    | 0.809   |
|                        | bad control         | 0.91| 0.72–1.13    | 0.387   |
| Lipid control          | no particular       | 1.00|              |         |
|                        | good control        | 0.77| 0.62–0.94    | 0.012   |
|                        | bad control         | 0.87| 0.72–1.05    | 0.145   |
| Blood sugar control    | no particular       | 1.00|              |         |
|                        | good control        | 1.13| 0.67–1.89    | 0.645   |
|                        | bad control         | 0.96| 0.74–1.25    | 0.790   |
| Liver function         | no particular       | 1.00|              |         |
|                        | particular          | 1.09| 0.88–1.35    | 0.419   |
| Anemia                 | no particular       | 1.00|              |         |
|                        | anemia              | 1.18| 1.00–1.39    | 0.043   |
| Sugar in urine         | no particular       | 1.00|              |         |
|                        | over                | 1.25| 0.90–1.73    | 0.181   |
| Protein in urine       | no particular       | 1.00|              |         |
|                        | over                | 1.27| 1.06–1.53    | 0.011   |
| Subjective symptom     | no                  | 1.00|              |         |
|                        | yes                 | 1.12| 0.94–1.33    | 0.222   |
| Objective symptom      | no                  | 1.00|              |         |
|                        | yes                 | 0.96| 0.77–1.19    | 0.694   |
| History of stroke      | no                  | 1.00|              |         |
|                        | yes                 | 1.04| 0.77–1.40    | 0.820   |
| History of heart disease| no                  | 1.00|              |         |
|                        | yes                 | 1.12| 0.91–1.37    | 0.300   |
| History of chronic renal failure | no   | 1.00|              |         |
|                        | yes                 | 1.29| 0.74–2.26    | 0.368   |
| Regular smoker         | no                  | 1.00|              |         |
|                        | yes                 | 1.16| 0.86–1.57    | 0.330   |
| Weight gain or loss of ≥ 3 kg over the past year | no | 1.00|              |         |
|                        | yes                 | 1.14| 0.87–1.49    | 0.335   |
| Alcohol consumption    | rarely (can’t drink)| 1.00|              |         |
|                        | sometimes           | 0.92| 0.74–1.15    | 0.483   |
|                        | every day           | 1.08| 0.86–1.36    | 0.502   |
### Table 7 (continued)

| Variables                                                                 | Categories | HR     | 95% CI       | P-value |
|---------------------------------------------------------------------------|------------|--------|--------------|---------|
| 1. Do you go on a bus or train by yourself?                               | yes        | 1.00   |              |         |
|                                                                            | no         | 1.53   | 1.17–1.99    | 0.002   |
| 2. Do you go shopping to buy daily necessities by yourself?               | yes        | 1.00   |              |         |
|                                                                            | no         | 1.36   | 0.97–1.91    | 0.073   |
| 3. Do you manage your own deposits and savings at the bank?              | yes        | 1.00   |              |         |
|                                                                            | no         | 0.84   | 0.64–1.10    | 0.203   |
| 4. Do you sometimes visit your friends?                                  | yes        | 1.00   |              |         |
|                                                                            | no         | 0.74   | 0.58–0.94    | 0.013   |
| 5. Do you turn to your family or friends for advice?                     | yes        | 1.00   |              |         |
|                                                                            | no         | 1.05   | 0.82–1.33    | 0.717   |
| 6. Do you normally climb stairs without using handrails or walls for support? | yes        | 1.00   |              |         |
|                                                                            | no         | 1.48   | 1.23–1.77    | 0.000   |
| 7. Do you normally stand up from a chair without any aid?                | yes        | 1.00   |              |         |
|                                                                            | no         | 1.23   | 1.00–1.50    | 0.045   |
| 8. Do you normally walk continuously for 15 minutes?                     | yes        | 1.00   |              |         |
|                                                                            | no         | 1.13   | 0.87–1.45    | 0.367   |
| 9. Have you experienced a fall in the past year?                         | no         | 1.00   |              |         |
|                                                                            | yes        | 1.15   | 0.96–1.39    | 0.138   |
| 10. Do you have a fear of falling while walking?                          | no         | 1.00   |              |         |
|                                                                            | yes        | 1.20   | 1.01–1.44    | 0.042   |
| 11. Have you lost 2 kg or more in the past 6 months?                      | no         | 1.00   |              |         |
|                                                                            | yes        | 0.89   | 0.69–1.15    | 0.378   |
| 12. BMI (Body Mass Index)                                                 | standard figure | 1.00 |              |         |
|                                                                            | emaciated  | 1.36   | 1.06–1.73    | 0.014   |
|                                                                            | overweight | 0.90   | 0.74–1.11    | 0.339   |
| 13. Do you have any difficulties eating tough foods compared to 6 months ago? | no         | 1.00   |              |         |
|                                                                            | yes        | 0.96   | 0.80–1.15    | 0.638   |
| 14. Have you choked on your tea or soup recently?                         | no         | 1.00   |              |         |
|                                                                            | yes        | 0.86   | 0.70–1.05    | 0.136   |
| 15. Do you often experience having a dry mouth?                           | no         | 1.00   |              |         |
|                                                                            | yes        | 1.04   | 0.88–1.24    | 0.630   |
| 16. Do you go out at least once a week?                                   | yes        | 1.00   |              |         |
|                                                                            | no         | 1.03   | 0.80–1.33    | 0.793   |
| 17. Do you go out less frequently compared to the past year?             | no         | 1.00   |              |         |
|                                                                            | yes        | 1.19   | 0.99–1.43    | 0.053   |
| 18. Do your family or your friends point out your memory loss? e.g., “You ask the same question over and over again.”  | no         | 1.00   |              |         |
|                                                                            | yes        | 0.97   | 0.79–1.19    | 0.771   |
| 19. Do you make calls by looking up phone numbers?                        | yes        | 1.00   |              |         |
|                                                                            | no         | 1.12   | 0.86–1.44    | 0.403   |
| 20. Do you find yourself not knowing today’s date?                        | no         | 1.00   |              |         |
|                                                                            | yes        | 1.13   | 0.94–1.37    | 0.205   |
| 21. In the past 2 weeks have you felt a lack of fulfillment in your daily life? | no         | 1.00   |              |         |
|                                                                            | yes        | 1.02   | 0.80–1.31    | 0.847   |
| 22. In the past 2 weeks have you felt a lack of joy when doing the things you used to enjoy? | no         | 1.00   |              |         |
|                                                                            | yes        | 1.30   | 1.00–1.68    | 0.049   |
| 23. In the past 2 weeks have you felt difficulty in doing what you could do easily before? | no         | 1.00   |              |         |
|                                                                            | yes        | 0.97   | 0.79–1.19    | 0.778   |
| 24. In the past 2 weeks have you felt helpless?                           | no         | 1.00   |              |         |
|                                                                            | yes        | 1.02   | 0.82–1.26    | 0.860   |
| 25. In the past 2 weeks have you felt tired without a reason?             | no         | 1.00   |              |         |
|                                                                            | yes        | 1.00   | 0.81–1.23    | 0.993   |

HR: Hazard Ratio, 95%CI: 95% Confidence Interval.
proved for long-term care were certified for assistance-level care, which may have obscured the factors that gave rise to the need for higher-level long-term care. In future analyses, the occurrence of certification for long-term care or higher-level long-term care should be used as response variables.

**Conclusion**

This study demonstrates that preventive healthcare should focus on the prevention of lifestyle related diseases in the young-old elderly individuals and on the prevention of emaciation and reduced muscular strength in the old-old elderly people.

The results indicate that it is essential to review the criteria for the secondary preventive project and identify separate sets of criteria that are each suited to the young-old and old-old elderly populations.

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