2024 Doctoral Dissertation (Abstract)

Development of a Heat Illness Risk Assessment Tool for Older People

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Ⅰ. Background

Approximately 80% of all heat illness deaths occur among the elderly aged 65 and older. Older people at high risk of heat illness should take preventative measures as early as possible. Currently, there is no tool available for the identification and assessment of older people at high risk of developing heat illness. This research aimed to develop a heat illness risk assessment tool for older people.

Ⅱ. Study 1

Development of a Heat Illness Risk Assessment Tool for Older People: Content validity and Creation of the Questionnaire Items

This research aimed to create questionnaire items as a first step in developing a heat illness risk assessment tool for older people. The paper's methodology consisted of the following procedure: (1) drafting the questionnaire, (2) modifying the questions through focus group interviews, (3) examining the questions using the item-level content validity index (I-CVI), and (4) preliminary testing.

Following a literature review on the risk factors of heat illness and focus group interviews, we prepared a draft questionnaire containing 58 questions. After examining the I-CVI, 38 questions had an I-CVI of 0.78 or higher, and 20 questions had an I-CVI of less than 0.78. Based on the discussion results, the questionnaire was revised to include 43 questions. The preliminary test results showed that 33 questions had a correct response rate of 90% or higher. The ten questions with a correct response rate of less than 90% were revised, and three new questions were added. Based on the results, the questionnaire was revised to include a final total of 46 questions. We thus drafted 46 questions for a heat illness risk assessment tool among older people.

Ⅲ. Study 2

Reliability of the Questionnaire Items in a Heat Illness Risk Assessment Tool for Older People

This research aimed to verify the reliability of the questionnaire items in a Heat Illness Risk Assessment Tool for Older People. We conducted a self-administered questionnaire survey by mail from July to August 2023, using the draft questions in the tool. Stratified random sampling was used to select 1,000 households with older people aged 65 years or above from the Basic Resident Registers of Ward A, Tokyo. The target population for the Heat Illness Risk Assessment Tool for Older People was elderly people aged 65 years and older, while the

respondents of the questionnaire were family members or caregivers of these individuals. The following item analysis was conducted to confirm reliability and to carefully select the questionnaire items: (1) confirmation of the pass rate and the non-response rate, and (2) conducting a Good-Poor Analysis. The statistical significance level was set at 5%.

A total of 445 questionnaires were collected. We excluded 97 cases in which the respondents were elderly individuals themselves or did not respond to the questions. Thus, 348 cases were used in the analysis. The pass rate was defined as the rate at which the item was deemed risk-free. Items with a pass rate of 50% or less, or 95% or more, were considered inadequate. Ten items had a pass rate of 50% or less, and four items had a pass rate of 95% or more. Items with a non-response rate of 10% or higher were also judged to be inappropriate. The number of items with a non-response rate of 10% or higher was three.

The group was divided into two: one with higher-than-average scores and the other with lower-than-average scores. The question items were scored as 1 point for no risk and 0 point for risk, based on a Heat Illness Risk Assessment Tool for Older People. A t-test was performed to assess the difference between groups for each item. Items in which no significant differences were found were judged to be inappropriate. There were 10 items in which no significant differences were found. The mean scores of all items with significant differences were significantly higher in the high-scoring group than in the low-scoring group. Ultimately, 24 questions were adopted for the tool.

Ⅲ. Study 3

Assessment of Heat Illness Risk Using the Heat Illness Risk Assessment Tool for Older People: A Cross-Sectional Survey of Older People Living in the Community

In Study 2, we conducted a cross-sectional survey using the Heat Illness Risk Assessment Tool for Older People on elderly individuals living in the local community. Based on these results, Study 3 aimed to assess the risk of heat illness and to evaluate the status of heat illness prevention initiatives among older people. The number of subjects analyzed in this study was 265 after excluding 83 cases with missing values from the 348 cases analyzed in the second study. Among the 265 subjects, two cases were selected for further examination. These individuals required support levels 1 or 2 and either lived alone or with an elderly spouse.

To assess the tendency and risk of heat illness among individuals with a history of heat illness, we cross-tabulated all 46 questions (24 of which were from the Heat Illness Risk Assessment Tool for Older People) with the presence or absence of a history of heat illness. Next, to evaluate their efforts to prevent recurrence of heat illness, we cross-tabulated the 24 items from the tool with the prevention efforts of individuals with a history of heat illness.

Finally, to evaluate the status of heat illness prevention efforts among the entire study population, we cross-tabulated the 24 items from the tool with the prevention efforts of individuals with a history of heat illness. Statistical comparisons between the two groups were performed using the $\chi 2$ test for significance test. Items with expected frequencies of less than 5 in the $\chi 2$ test were compared using Fisher's exact test. Adjusted residuals were calculated for items in which significant differences were found. An absolute value of 1.96 or greater for the adjusted residuals was considered a significant difference. The statistical significance level was set at 5%. Through case studies, we identified the risk of heat illness using the Heat Illness Risk Assessment Tool for Older People and evaluated the challenges of current prevention efforts. Based on the results, we examined whether the tool could be used to propose specific preventive measures suited to each individual.

To assess the status of efforts to prevent recurrent heat illness among individuals with a history of heat illness, we examined the association between these prevention efforts and the questions from the Heat Illness Risk Assessment Tool for Older People. The results showed no significant association between efforts to prevent recurrence of heat illness and any of the questionnaire items among individuals with a history of heat illness. However, even among those who reported taking steps to prevent recurrence, the use of air conditioning during the night and at bedtime remained a concern. This issue was also observed when examining the heat illness prevention efforts of the entire study population. Through the case study, we were able to identify the risk of heat illness, evaluate the shortcomings in current prevention efforts, and propose specific preventive measures tailored to each individual.