

Table 2 Patient's demographics and backgrounds

	Number	On-scene time (min) Median (IQR)	p Value
Total	11 585	17 (13–23)	
Age (years)			
15–65	3446	17 (13–24)	<0.001
65–85	5261	17 (13–23)	
85+	2878	17 (13–24)	
Gender			
Male	6627	17 (13–23)	<0.001
Female	4958	18 (13–24)	
Day of week			
Weekday	8249	17 (13–23)	0.86
Weekend	3336	17 (13–23)	
Time of the day			
Night shift	2676	18 (13–24)	<0.001
Day shift	4792	17 (13–22)	
Evening shift	4117	17 (13–23)	
Geographical area			
North	2293	19 (15–27)	<0.001
Middle	5035	18 (13–24)	
South	4257	15 (12–20)	
Disease name as diagnosed at emergency departments			
Cardiopulmonary arrest	3678	15 (12–19)	<0.001
External cause			
Trauma	1164	22 (16–31)	<0.001
Burn injury	43	23 (18–30)	<0.001
Intoxication	160	23 (18–30)	<0.001
Other external cause*	163	18 (14–24)	0.26
Internal cause			
Central neurological disease	1536	18 (14–23)	<0.001
Respiratory disease	1436	18 (14–25)	<0.001
Cardiovascular disease	1431	16 (12–22)	<0.001
Gastrointestinal disease	756	18 (14–25)	<0.001
Renal and urogenital disease	85	17 (13–20)	0.88
Other internal disease†	1142	19 (15–26)	<0.001
Minor disease‡	172	20 (14–29)	<0.001

*Other external causes include heat stroke, hypothermia, hanging, asphyxia, drowning and foreign body in an airway.

†Other internal causes included disturbance of consciousness and shock of unknown origin, haematological disease, immunological disease, endocrine metabolic disease and neuromuscular disease.

‡Minor diseases included eye disease, skin disease, nose and throat disease, obstetrical and gynaecological disease, psychiatric disorders, breast disease and orthopaedic disease (except trauma).

likely to have psychiatric disorders. Furthermore, psychiatric disorders were included in our minor disease category, and this category was also related to prolonged on-scene times over 30 min. These findings suggest that on-scene times for drug overdose patients and those with psychiatric disorders were longer even in critical cases.

However, a few studies appear to contradict our results regarding geographical area, patient age and gender, and time of the day.^{11–14} Although our results showed that geographical area was associated with prolonged on-scene time over 30 min, a population-based observational study in Canada showed that there was no relation between on-scene time and the area of the city where the study took place. They reported that significant predictors of prolonged on-scene time for patients with

chest pain were age, gender and the presence of an advanced life support (ALS) crew.¹² In Japan, to the best of our knowledge, no study has shown the relationship between the geographical area of a city and on-scene time. One reason for the discrepancy between our finding and the Canadian study could well be the fundamental differences of the EMS systems in North America and Japan. In North America, all emergency patients are transferred to EDs in hospitals that provide emergency medicine, where emergency physicians see the emergency patients regardless of their symptoms or severity of their illnesses. On the other hand, in Japan, emergency patients are transferred to hospitals which the EMS personnel select on the basis of the severity of illnesses of patients, which requires the EMS personnel to call ahead to appropriate hospitals to ask if they can

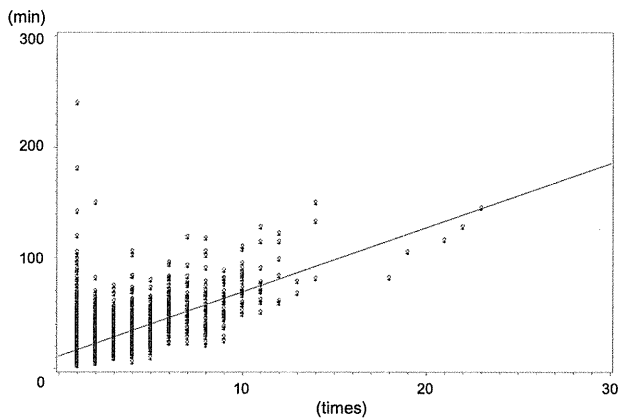


Figure 2 The relationship between on-scene time and number of phone calls to hospitals from emergency medical service personnel.

accommodate the patient. Another reason for the discrepancy between our result and those of the other study could well be due to the differences in the emergency medical systems of hospitals in Japan. For example, at some hospitals, the emergency physicians get a call directly from the EMS personnel, and at other hospitals, information clerks or nurses receive the call first and then ask each medical specialist if he/she can see and treat the emergency patient. Therefore, the talk time between the EMS personnel and the hospital in this latter case is likely to be longer than in the former case. Furthermore, in Japan, there are regional

differences in the EMS and treatment offered at different hospitals. Several studies, for example, have reported differences in on-scene time between metropolitan cities and rural areas, and the survival outcomes of out-of-hospital cardiac arrest among seven different geographic regions of the country.^{14–16} Similar to Kawasaki city, it is possible that the differences in the emergency medical systems of tertiary care emergency centres and acute care hospitals in Kawasaki city affect on-scene time of geographical area.

In our study, using multivariable logistic regression, we found that age, gender and time of the day were not related to on-scene times over 30 min. However some previous studies have shown that age (per decade), gender (female) and time of the day (night shift) were related to prolonged on-scene time.^{11–14} These differences might be caused by differences in study population, outcome variables, statistical analysis and covariates. Our study included only critical patients, defined the outcome variable as on-scene time over 30 min, and conducted multivariable statistical analysis for the outcome variable. The influence of age, gender and time of the day on on-scene time may decrease in more specific cases as in our study.

Significance and implications

A survey made by the Japanese Fire and Disaster Management Agency reports that the number of patients transported by ambulances has increased year by year. The number of patients transported by ambulances in 2012 was 5.25 million people, the highest number ever, and an increase of 67 thousand people from 2011.¹ A possible cause for this increase could be a rise in the number of mild and moderately ill patients who were transported by ambulances.¹ However, in Japan, there is a concurrent annual decrease in the number of emergency medical facilities which will accept such patients.¹⁷ Therefore, mild and moderately ill patients may be transported to tertiary care hospitals, which may affect on-scene time for EMSs to transport critical patients due to overcrowding.

Strengths and limitations

To the best of our knowledge, this study is the first to focus on prolonged on-scene time of ambulance transportation for critical emergency patients in a big city. The results of our study showed that in a big city the difference in geographical area affected on-scene time over 30 min for critical patients. It also showed that intoxication and the number of phone calls to hospitals from EMS personnel were related to prolonged on-scene time, even for critical patients.

Our study has a number of limitations. First, our results are considered to be useful with regard to big cities in Japan, as a few studies conducted in other big cities have reported similar results.^{7–10} However, our results may not adapt to rural districts and other countries. This study would be useful for big cities in other

Table 3 Multivariable logistic regression analysis for on-scene time over 30 min

	OR (95% CI)	p Value
Age (years)	1.00 (0.99 to 1.01)	0.32
Gender		
Male	0.92 (0.80 to 1.05)	0.22
Disease name as diagnosed at emergency departments		
Cardiopulmonary arrest	0.30 (0.24 to 0.38)	<0.001
Trauma	1.19 (0.94 to 1.51)	0.15
Intoxication	1.82 (1.15 to 2.87)	0.011
Other external cause	0.58 (0.33 to 1.02)	0.058
Central neurological disease	0.48 (0.37 to 0.61)	<0.001
Respiratory disease	0.63 (0.49 to 0.80)	<0.001
Cardiovascular disease	0.37 (0.28 to 0.48)	<0.001
Gastrointestinal disease	0.68 (0.51 to 0.91)	0.010
Minor disease	1.65 (1.06 to 2.57)	0.023
Time of the day		
Night shift	1.15 (0.96 to 1.36)	0.068
Evening shift	0.98 (0.84 to 1.15)	0.24
Day shift	1.00	
Phone calls to hospitals	2.57 (2.43 to 2.72)	<0.001
Geographical area		
North	3.20 (2.65 to 3.87)	<0.001
Middle	2.20 (1.85 to 2.61)	0.003
South	1.00	

countries because they might enhance the welfare as universal coverage and free service for ambulance like Japan in future. Second, this study's participants were critical patients who had various diseases because illness-specific, injury mechanism-specific and on-scene specific aspects could affect on-scene time. Third, it is possible that our study population might include patients who were not critical, due to the fact that the definition of a critical patient used in this study (those who are expected to be hospitalised for more than 3 weeks or are confirmed dead by a doctor), in accordance with the national criteria, is somewhat vague. Fourth, the severity of a patient's condition might not reflect the severity at that time when the ambulance was called, because the assessment of the severity of the patient's condition was conducted after arrival at the hospital. Some patients might deteriorate during transportation and be assessed as critically ill at the hospitals. Therefore, it is possible that some patients in our study were misclassified, and further study is perhaps needed with a more defined selection of symptom severity.

CONCLUSIONS

Our study, based in a big city in Japan, has shown that for ambulance transport for critical emergency patients the number of phone calls to hospitals from EMS personnel, intoxication, minor diseases and geographical area were factors related to prolonged on-scene times of over 30 min. To reduce on-scene time, it is vital to redesign our emergency system and important to develop a system that accommodates critical patients with intoxication and minor diseases and furthermore to reduce the number of phone calls to hospitals from EMS personnel.

Author affiliations

¹Graduate School of Comprehensive Human Sciences, Majors of Medical Sciences, University of Tsukuba, Tsukuba, Japan

²Department of Critical Care Medicine, Yokohama City Minato Red Cross Hospital, Yokohama, Japan

³Graduate School of Public Health, Teikyo University, Tokyo, Japan

⁴Department of Emergency and Critical Care Medicine, Tsukuba Medical Center Hospital, Tsukuba, Japan

⁵Department of Health Services Research, Faculty of Medicine, University of Tsukuba, Tsukuba, Japan

Acknowledgements The authors would like to acknowledge the Kawasaki Fire Department, and Thomas D Mayers for his English language manuscript revision.

Contributors IN collected the data, conceived the study, participated in its design and performed the statistical analysis, and also wrote the manuscript. TA contributed to the design of the study and drafted the manuscript. YN and NT contributed to the design of the study and critically revised the manuscript. All the authors read and approved the final manuscript.

Funding This study was supported by the Ministry of Health, Labour and Welfare (H27-seisaku-senryaku-012).

Competing interests None declared.

Ethics approval The Ethics Committee of Teikyo University.

Provenance and peer review Not commissioned; externally peer reviewed.

Data sharing statement No additional data are available.

Open Access This is an Open Access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>

REFERENCES

1. Ministry of Internal Affairs and Communications (2012). (Retrieved 25 Feb 2015). http://www.fdma.go.jp/neuter/topics/houdou/h25/2512/251218_1houdou/01_houdoushiryoku.pdf (In Japanese).
2. Kosaka S, Yoshioka T. Importance of emergency transport for patients with acute cardiac failure: the relationship between arrival time at hospital and short-term prognosis. *ICU CCU* 2010;34:833–4 (In Japanese).
3. Kelly AM, Kerr D, Patrick I, *et al.* Call-to-needle times for thrombolysis in acute myocardial infarction in Victoria. *Med J Aust* 2003;178:381–5.
4. Kamila SF, John AP, Jacob S. On-scene time and outcome after penetrating trauma: an observational study. *Emerg Med J* 2011;28:797–801.
5. Kohama A. Worrying phenomenon of EMS system in metropolitan areas—the ambulance times from call to hospital are prolonged. *JJSEM* 2007;10:509–16 (In Japanese).
6. Kawasaki City. Retrieved 5 March 2015. <http://www.city.kawasaki.jp/shisei/category/51-43-3-0-0-0-0-0.html>, <http://www.city.kawasaki.jp/200/page/0000009567.html> (In Japanese).
7. Ito T, Takei T, Fujisawa M, *et al.* Analysis of the rejection of transportation to other hospitals before coming to our hospital. *JJSEM* 2010;13:1–7 (In Japanese).
8. Yamamoto T, Suzuki N, Imaki S, *et al.* Present condition of transportation for patients calling for emergency medical service in Yokohama city and its problem. *JJSEM* 2011;14:1–6 (In Japanese).
9. Kitamura T, Iwami T, Kawamura T, *et al.* Ambulance calls and prehospital transportation time of emergency patients with cardiovascular events in Osaka City. *Acute Med Surg* 2014;1:135–44.
10. Kubota Y, Hasegawa K, Taguchi H, *et al.* Characteristics and trends of emergency patients with drug overdose in Osaka. *Acute Med Surg* 2015;2:237–43.
11. Kurosawa N, Kimura T, Arima K, *et al.* The survey about the stay time of psychiatric related emergency in the eastern Saitama area. *JJSEM* 2013;16:671–6 (In Japanese).
12. Schull MS, Morrison LJ, Vermeulen M, *et al.* Emergency department overcrowding and ambulance transport delays for patients with chest pain. *CAMJ* 2003;168:277–83.
13. Sullivan AL, Beshansky JR, Ruthazer R, *et al.* Factors associated with longer time to treatment for patients with suspected acute coronary syndromes: a cohort study. *Circ Cardiovasc Qual Outcomes* 2014;7:86–94.
14. Kumada K, Toyoda I, Ogura S, *et al.* The relationship between the EMS transportation time and the number of emergency facilities; Situation of two city. *JJSEM* 2011;14:431–6 (In Japanese).
15. Tsubouchi I, Kohama A, Sakurai A, *et al.* Comparison of emergency medical service (EMS) between rural area Tottori and capital city Tokyo. *JJSEM* 2010;13:487–92 (In Japanese).
16. Hasegawa K, Tsugawa Y, Camargo CA Jr, *et al.* Regional variability in survival outcomes of out-of-hospital cardiac arrest: the All-Japan Utstein Registry. *Resuscitation* 2013;84:1099–107.
17. Minister of Health, Labour and Welfare (2010). (Retrieved 5 March 2015). <http://www.mhlw.go.jp/toukei/saikin/hw/hoken/kiso/21.html> (In Japanese).



Factors related to prolonged on-scene time during ambulance transportation for critical emergency patients in a big city in Japan: a population-based observational study

Isao Nagata, Toshikazu Abe, Yoshinori Nakata and Nanako Tamiya

BMJ Open 2016 6:

doi: 10.1136/bmjopen-2015-009599

Updated information and services can be found at:
<http://bmjopen.bmj.com/content/6/1/e009599>

These include:

References

This article cites 14 articles, 2 of which you can access for free at:
<http://bmjopen.bmj.com/content/6/1/e009599#BIBL>

Open Access

This is an Open Access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>

Email alerting service

Receive free email alerts when new articles cite this article. Sign up in the box at the top right corner of the online article.

Topic Collections

Articles on similar topics can be found in the following collections

Emergency medicine (154)
Health services research (847)

Notes

To request permissions go to:
<http://group.bmj.com/group/rights-licensing/permissions>

To order reprints go to:
<http://journals.bmj.com/cgi/reprintform>

To subscribe to BMJ go to:
<http://group.bmj.com/subscribe/>

RESEARCH ARTICLE

How Possibly Do Leisure and Social Activities Impact Mental Health of Middle-Aged Adults in Japan?: An Evidence from a National Longitudinal Survey

Fumi Takeda^{1*}, Haruko Noguchi², Takafumi Monma¹, Nanako Tamiya³

1 Faculty of Health and Sport Sciences, University of Tsukuba, Ibaraki, Japan, **2** Faculty of Political Science and Economics, Waseda University, Tokyo, Japan, **3** Faculty of Medicine, University of Tsukuba, Ibaraki, Japan

* takeda@taiiku.tsukuba.ac.jp



Abstract

Objectives

This study aimed to investigate longitudinal relations between leisure and social activities and mental health status, considering the presence or absence of other persons in the activity as an additional variable, among middle-aged adults in Japan. This study used nationally representative data in Japan with a five-year follow-up period.

Methods

This study focused on 16,642 middle-aged adults, age 50–59 at baseline, from a population-based, six-year panel survey conducted by the Japanese Ministry of Health, Labour and Welfare. To investigate the relations between two leisure activities ('hobbies or cultural activities' and 'exercise or sports') and four social activities ('community events', 'support for children', 'support for elderly individuals' and 'other social activities') at baseline and mental health status at follow-up, multiple logistic regression analysis was used. We also used multiple logistic regression analysis to investigate the association between ways of participating in these activities ('by oneself', 'with others', or 'both' (both 'by oneself' and 'with others')) at baseline and mental health status at follow-up.

Results

Involvement in both leisure activity categories, but not in social activities, was significantly and positively related to mental health status in both men and women.

Furthermore, in men, both 'hobbies or cultural activities' and 'exercise or sports' were significantly related to mental health status only when conducted 'with others'. In women, the effects of 'hobbies or cultural activities' on mental health status were no differences regardless of the ways of participating, while the result of 'exercise or sports' was same as that in men.

OPEN ACCESS

Citation: Takeda F, Noguchi H, Monma T, Tamiya N (2015) How Possibly Do Leisure and Social Activities Impact Mental Health of Middle-Aged Adults in Japan?: An Evidence from a National Longitudinal Survey. *PLoS ONE* 10(10): e0139777. doi:10.1371/journal.pone.0139777

Editor: Toshiyuki Ojima, Hamamatsu University School of Medicine, JAPAN

Received: March 30, 2015

Accepted: September 17, 2015

Published: October 2, 2015

Copyright: © 2015 Takeda et al. This is an open access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Data Availability Statement: All the data underlying the findings in the study are not available upon request because of the legal restrictions by Japanese Article 33 (Provision of Questionnaire Information) of Statistics Act, by the Statistic Bureau, Ministry of Internal Affairs and Communications. The data used in this study are conducted by the Ministry of Health, Labour and Welfare (MHLW) in Japan and therefore, users of these data are strictly limited to those who have obtained official permission from the Minister of Health, Labour and Welfare. By law, it is not permitted for data-applicants to take the data out of Japan.

Those who want to use the data for any purpose should contact the Statistics and Information Department of the MHLW. Please refer to the following URL: <http://www.mhlw.go.jp/toukei/sonota/chousahyo.html>.

Funding: This study was supported by the Ministry of Health, Labour and Welfare (H27-seisaku-senryaku-012).

Competing Interests: The authors have declared that no competing interests exist.

Conclusions

Leisure activities appear to benefit mental health status among this age group, whereas specific social activities do not. Moreover, participation in leisure activities would be effective especially if others are present. These findings should be useful for preventing the deterioration of mental health status in middle-aged adults in Japan.

Introduction

Recently, the prevalence rate of mental disorders has been increasing in Japan. The total number of people with mood disorders (including bipolar disorder) was estimated as 958,000 in 2011, of whom 426,000 people were middle-aged adults aged 40 to 64 [1]. Mental health problems are an important contributor to the risk of suicide [2], which was the third most common cause of death (after cancer and heart disease) among middle-aged Japanese adults in 2013 [3].

Growing evidence has indicated that leisure activities (e.g. hobbies, cultural activities, exercise and sports) and social activities (e.g. volunteering and community activities) benefit mental health status among middle-aged and older adults. For example, some cross-sectional and longitudinal studies have reported positive relations between certain types of hobbies or cultural activities, such as going to the cinema or reading newspapers or books, and mental health status among middle-aged and older adults [4, 5]. A cross-sectional study in Japan, Wada et al. reported that regular leisure activity was associated with a reduction in depressive symptoms among workers age 20 to 69 [6], and Wakui et al., using two-year longitudinal data, reported that doing leisure activities at least once per week was inversely related with depression among middle-aged and older caregivers [7].

With regard to exercise and sports activities, considerable evidence exists about their effects on mental health status, and some previous meta-analyses have indicated that exercise interventions were effective in sustaining good mental health status among middle-aged and older adults [8–11].

For social activities, some studies have investigated longitudinal relations between volunteering and mental health status. For example, Li and Ferraro reported that formal voluntary activity was good for mental health status among people aged 60 or older [12]. Potočník and Sonnentag showed that volunteering improved retirees' quality of life over a period of two years [13]. In a study of middle-aged Japanese men, those who engaged in more hours of volunteer work had fewer depressive symptoms [14].

Furthermore, the presence of other persons when one is doing these activities can also help to sustain mental health status by providing social relationships. Some meta-analyses have suggested that interventions addressing social relationships can reduce depression [15, 16]. Longitudinal studies with large populations have shown similar findings. One 10-year follow-up study reported that lack of social relationships was a major risk factor for depression among American adults age 25 to 75 [17]. In an 18-year follow-up study, participation in group leisure or social activities was found to benefit the mental health status of older adults [18]. These findings suggest the possibility that doing activities with other persons may have additional positive effects that are not achieved if one engages in leisure activities alone.

However, the effects of leisure and social activities on mental health status among middle-aged adults are still unclear in Japan. No study considering a broad range of leisure and social activities has been conducted, nor has any study investigated whether causal relations between these activities and mental health status are affected by the presence of other persons.

Thus, this study aimed to investigate longitudinal relations between leisure and social activities and mental health status among middle-aged adults, using nationally representative data in Japan, while also considering, as an additional variable, the presence or absence of other persons in those activities.

Methods

Study population and procedure

This study used panel data extracted from a nationwide, population-based survey, the 'Longitudinal Survey of Middle-aged and Elderly Persons (LSMEP)' conducted once a year on the first Wednesday of November as of 2005 by the Ministry of Health, Labour and Welfare (MHLW) in Japan. Respondents to the survey were extracted randomly through a stratified two-stage sampling. First, 2,515 districts were selected at random from the entire 5,280 districts surveyed by a population-based 'Comprehensive Survey of the Living Conditions of People on Health and Welfare' conducted by the MHLW in 2004. Second, 40,877 residents were chosen randomly from those aged 50 to 59 living in each selected district, in proportion to the population size.

In 2005, the first year of the survey, the questionnaires were drop off to the respondents' homes by enumerators. Then, the enumerators collected the self-completed questionnaire several days later. As of 2006, the method had changed from a "drop-off" to mail survey and so the questionnaire was mailed only to those who had responded to the first survey in 2005. 'LSMEP' has not recruited new samples since the first year of survey.

We used data from the first and sixth surveys in 2005–2010. Of the 40,877 people who received a self-administered questionnaire, 34,240 responded to the survey in 2005 (response rate: 83.8%) and these respondents were followed up thereafter. In 2010, the number of respondents decreased to 26,220 (response rate: 64.1%). Out of these, we excluded respondents who had missing values in K6 scale and those who had bad mental health status (K6 total score of 5 points or above). Furthermore, respondents who had some difficulties in activities of daily living were also excluded because they could potentially not do some leisure or social activities, especially exercise or sports. Finally this study used 16,642 respondents (valid response rate was 63.5%).

We obtained an official permission to use 'LSMEP' by the MHLW on the basis of Article 32 of the Statistics Act. An ethical review of 'LSMEP' was not required, based on the 'Ethical Guidelines for Epidemiological Research' of the Japanese government [19].

Measurements

Mental health status. Mental health status was assessed using the Japanese version of the Kessler 6 (K6) scale [20], a screening scale for psychological distress that can effectively discriminate between cases and non-cases of Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) disorders [21]. Respondents answered six items on a 5-point Likert scale, and responses on each item were transformed to scores ranging from 0 to 4 points. A higher total score corresponds to a poorer mental health condition. All respondents were split into two groups, 'good mental health status' (scores below 5 points) or 'bad mental health status' (5 points or above); the 5-point mark has been identified as the optimal cut-off point for screening mood and anxiety disorders in Japan (100% sensitivity and 68.7% specificity), and it has been used in previous Japanese studies [22, 23]. The Japanese version of the K6 has been validated [20], and the internal consistency reliability (Cronbach's alpha) of the scale in this study was 0.88.

Leisure and social activities. The respondents were asked whether they participated in two types of leisure activities ('hobbies or cultural activities' and 'exercise or sports') and four types of social activities ('community events', 'support for children', 'support for elderly individuals' and 'other social activities') within the past one year from the date of the survey. Those who answered 'yes' to each of these question were categorized as 'active', and those who answered 'no' were categorized 'inactive'. Those who participated in each of these activities were also asked to indicate in what way they 'mainly' participated in the activity ('by oneself', 'with families or friends', 'with co-workers (including former co-workers)', 'in a neighbourhood community association' or 'in a non-profit organization or corporation in the public interest'). For the purposes of this study, respondents were categorized into three groups: 'by oneself', 'with others' or 'both' (both 'by oneself' and 'with others').

Demographic and socioeconomic status. Demographic and socioeconomic status included age (calculated from the month and year of birth), gender, living arrangement (spouse, child or children, father, mother, father-in-law and mother-in-law), job status (employed or unemployed), personal income and family care provision.

Chronic diseases. Respondents answered the presence of chronic diseases (diabetes, heart diseases, cerebral stroke, high blood pressure, hyperlipidemia and cancer). They were rated on a dichotomized scale (yes or no).

Health behaviour. Health behaviour included smoking status (smoker or non-smoker) and drinking alcohol status (drinker or nondrinker).

Statistical analysis

We used the multiple imputation by chained equations to handle missing data in this study. Analysis of imputed datasets reduces the potential bias introduced by missing data. This method assumes that data are missing at random, whereby any systematic differences between the missing and observed values can be explained by differences in observed data [24]. Missing values were imputed according to a model consisting of other all variables, and we used multiple imputation to create and analyse 10 multiply imputed datasets. Imputed data were analysed by gender.

At first, in order to investigate the relations between leisure and social activities in the baseline survey and mental health status in the follow-up survey, two kinds of multiple logistic regression models were applied as follows. Model 1 included the six types of leisure and social activities as independent variables, separately ('hobbies or cultural activities', 'exercise or sports', 'community events', 'support for children', 'support for elderly individuals' and 'other social activities'); Model 2 included the two types of leisure activities ('hobbies or cultural activities' and 'exercise or sports') and a summary index which indicates the involvement in at least one of the four social activities ('community events', 'support for children', 'support for elderly individuals' and 'other social activities') as independent factors.

Furthermore, we used a multiple logistic regression analysis to investigate the association between the ways of participating in those leisure and social activities ('inactive', 'by oneself', 'with others' or 'both') in the baseline survey and mental health status in the follow-up survey.

These multiple logistic regression analyses were adjusted for demographic and socioeconomic status, physical health condition, health behaviour and mental health status at the baseline. The level of significance for all analyses was set at $p < 0.05$. All statistical analyses were performed using IBM SPSS version 23.0.

Results

Descriptive statistics of the characteristics are shown in Table 1. The K6 score increased significantly from the baseline to the follow-up survey periods in both men and women (using paired t-test: $p < 0.001$).

One thousand three hundred fifty three (16.6%) of men, and 1,677 (19.8%) of women were categorized into the group of bad mental health status in the follow-up surveys. The proportion of people who had bad mental health status in women was larger than that in men.

Table 1. Characteristics of respondents after multiple imputation of missing values.

	Men (n = 8175)		Women (n = 8467)		p
	Mean (SE)	n (%)	Mean (SE)	n (%)	
Demographic and socioeconomic status					
Age (years)	54.76 (0.03)		54.73 (0.03)		0.446 ^a
Living arrangement					
Spouse (Presence)		7193 (88.0)		7189 (84.9)	<0.001 ^b
Child(ren) (Presence)		5206 (63.7)		5213 (61.6)	0.005 ^b
Father (Presence)		874 (10.7)		271 (3.2)	<0.001 ^b
Mother (Presence)		1948 (23.8)		680 (8.0)	<0.001 ^b
Father-in-law (Presence)		208 (2.5)		526 (6.2)	<0.001 ^b
Mother-in-law (Presence)		464 (5.7)		1317 (15.5)	<0.001 ^b
Job status (Employment)		7858 (96.1)		6051 (71.5)	<0.001 ^b
Personal income (thousand yen)	52.13 (0.80)		30.65 (0.60)		<0.001 ^a
Family care provision (Yes)		435 (5.3)		759 (9.0)	<0.001 ^a
Chronic diseases					
Diabetes (Presence)		662 (8.1)		331 (3.9)	<0.001 ^b
Heart diseases (Presence)		238 (2.9)		100 (1.2)	<0.001 ^b
Cerebral stroke (Presence)		72 (0.9)		50 (0.6)	0.028 ^b
High blood pressure (Presence)		1504 (18.4)		1247 (14.7)	<0.001 ^b
Hyperlipidemia (Presence)		739 (9.0)		725 (8.6)	0.277 ^b
Cancer (Presence)		81 (1.0)		126 (1.5)	0.004 ^b
Health behaviour					
Smoking status (Smoker)		3774 (46.2)		886 (10.5)	<0.001 ^b
Drinking alcohol status (Drinker)		2033 (24.9)		5874 (69.4)	<0.001 ^b
Leisure and social activities					
Hobbies or cultural activities (Active)		4784 (58.5)		5533 (65.3)	<0.001 ^b
Exercise or sports (Active)		3971 (48.6)		3835 (45.3)	<0.001 ^b
Community events (Active)		2490 (30.5)		2494 (29.5)	0.158 ^b
Support for children (Active)		436 (5.3)		558 (6.6)	0.001 ^b
Support for elderly individuals (Active)		476 (5.8)		761 (9.0)	<0.001 ^b
Other social activities (Active)		909 (11.1)		1038 (12.3)	0.022 ^b
Mental health status					
Baseline	0.98 (0.02)		1.14 (0.02)		<0.001 ^a
Follow-up	2.06 (0.03)		2.43 (0.04)		<0.001 ^a
Bad mental health at follow-up		1353 (16.6)		1677 (19.8)	<0.001 ^b

^a Independent t-test

^b Chi-square test.

doi:10.1371/journal.pone.0139777.t001

Table 2. Multiple logistic regression analyses for the relations between leisure and social activities and mental health status at the follow-up period.

		Model 1 ^a			Model 2 ^a		
		AOR	95% CI	<i>p</i>	AOR	95% CI	<i>p</i>
Men							
Hobbies or cultural activities	Active (ref. Inactive)	0.85	0.74–0.98	0.023	0.84	0.73–0.98	0.028
Exercise or sports	Active (ref. Inactive)	0.85	0.74–0.98	0.029	0.86	0.74–0.99	0.034
Community events	Active (ref. Inactive)	1.01	0.87–1.18	0.855			
Support for children	Active (ref. Inactive)	0.89	0.60–1.31	0.550			
Support for elderly individuals	Active (ref. Inactive)	1.32	0.94–1.87	0.110			
Other social activities	Active (ref. Inactive)	0.85	0.65–1.13	0.263			
Social activities	Active (ref. Inactive)				0.98	0.86–1.12	0.740
Women							
Hobbies or cultural activities	Active (ref. Inactive)	0.72	0.63–0.83	0.000	0.71	0.61–0.84	0.000
Exercise or sports	Active (ref. Inactive)	0.88	0.77–1.00	0.042	0.88	0.78–1.01	0.069
Community events	Active (ref. Inactive)	0.96	0.81–1.13	0.578			
Support for children	Active (ref. Inactive)	1.18	0.86–1.62	0.294			
Support for elderly individuals	Active (ref. Inactive)	1.16	0.86–1.58	0.320			
Other social activities	Active (ref. Inactive)	0.88	0.63–1.22	0.420			
Social activities	Active (ref. Inactive)				1.01	0.90–1.14	0.852

^a Adjusted for demographic and socioeconomic status, physical health condition, chronic diseases and mental health status at the baseline.

AOR: Adjusted odds ratio; CI: Confidence interval.

doi:10.1371/journal.pone.0139777.t002

The number of respondents who participated in each of leisure and social activities at the baseline was as follows: 4,784 (58.5%) of men and 5,533 (65.3%) of women in ‘hobbies or cultural activities’, 3,971 (48.6%) of men and 3,855 (45.3%) of women in ‘exercise or sports’, 2,490 (30.5%) of men and 2,494 (29.5%) of women in ‘community events’, 436 (5.3%) of men and 558 (6.6%) of women in ‘support for children’, 476 (5.8%) of men and 761 (9.0%) of women in ‘support for elderly individuals’ and 909 (11.1%) of men and 1038 (12.3%) of women in ‘other social activities’. The proportion of people who participated in ‘hobbies or cultural activities’, ‘support for children’, ‘support for elderly individuals’ and ‘other social activities’ in women was larger than that in men, whereas that of people who participated in ‘exercise or sports’ in men larger than that in women.

Table 2 shows the results of multiple logistic regression analyses. In regard to men, the result of Model 1 showed that ‘hobbies or cultural activities’ (OR 0.85, 95% CI 0.74–0.98, $p < 0.05$) and ‘exercise or sports’ (OR 0.85, 95% CI 0.74–0.98, $p < 0.05$) were significantly related to mental health status at the follow-up period. Model 2 also showed a similar result to Model 1, such that ‘hobbies or cultural activities’ (OR 0.84, 95% CI 0.73–0.98, $p < 0.05$) and ‘exercise or sports’ (OR 0.86, 95% CI 0.74–0.99, $p < 0.05$) had a significant relation with mental health status in the follow-up survey.

In regard to women, the result of Model 1 showed that ‘hobbies or cultural activities’ (OR 0.72, 95% CI 0.63–0.83, $p < 0.001$) and ‘exercise or sports’ (OR 0.88, 95% CI 0.77–1.00, $p < 0.05$) significantly associated with mental health status, as was the case with men. By contrast, Model 2 showed that ‘hobbies or cultural activities’ were significantly related only to mental health status at the follow-up period (OR 0.71, 95% CI 0.61–0.84, $p < 0.001$).

Furthermore, the relations between the ways of participating in ‘hobbies or cultural activities’ or ‘exercise or sports’ and mental health status were investigated in both men and women.

Table 3 shows the results when the ‘in active’ category as reference was selected. Regarding men, both ‘hobbies or cultural activities’ and ‘exercise or sports’ were significantly related to mental health status only when conducted ‘with others’ (‘hobbies or cultural activities’: OR 0.83, 95% CI 0.71–0.97, $p < 0.05$; ‘exercise or sports’: OR 0.84, 95% CI 0.73–0.98, $p < 0.05$). Regarding women, ‘exercise or sports’ was significantly related to mental health status only when conducted ‘with others’ (OR 0.86, 95% CI 0.75–0.99, $p < 0.05$), whereas significant ORs for ‘hobbies or cultural activities’ were observed in all of three categories (‘by oneself’: OR 0.74, 95% CI 0.62–0.90, $p < 0.01$; ‘with others’: OR 0.76, 95% CI 0.67–0.87, $p < 0.001$; ‘Both’: OR 0.55, 95% CI 0.33–0.93, $p < 0.05$).

Additionally, when the ‘with others’ category as reference was selected, the significant OR was observed only in the ‘inactive’ category (‘hobbies or cultural activities’: OR 1.21, 95%CI 1.03–1.41, $p < 0.05$ in men, OR 1.32, 95%CI 1.16–1.50, $p < 0.01$ in women; ‘exercise or sports’ OR 1.18, 95%CI 1.02–1.38, $p < 0.05$ in men, OR 1.16, 95%CI 1.01–1.34, $p < 0.05$ in women).

Discussion

The main objective of this study was to investigate relations between leisure and social activities and mental health status among middle-aged adults in Japan using nationally representative data. The results show that participation in leisure activities such as ‘hobbies or cultural activities’ and ‘exercise or sports’ at the baseline would be positively related to mental health status at the period after five-year follow-up in both men and women. Therefore, that is consistent to some previous cross-sectional and longitudinal studies which have reported relations between involvement in hobbies or cultural activities and mental health status in middle-aged and older adults [4–7]. Moreover, some meta-analyses have found physical activity interventions to be effective in sustaining mental health status within the same age cohort [8–11]. Leisure activities could play a role in benefitting overall well-being and providing a buffer against stress. This benefit may occur by promoting a variety of social and physical resources that enable individuals to feel refreshed and to cope adequately with stress [25, 26].

In contrast, this study observed no benefits of the participation in social activities at the baseline on mental health status in the follow-up survey in both men and women. Several previous studies reported the longitudinal relations between social activities and mental health status. Li and Ferraro found that volunteer work had beneficial effects on mental health status among older adults [12]. A previous study in Japan suggested that volunteer work was associated with reduced depressive symptoms among adults in later middle age, even after controlling for pre-existing depressive symptoms, socioeconomic factors and physical health [14].

Table 3. Multiple logistic regression analyses for the relations between the way of participation and mental health status at the follow-up periods.

		Men				Women			
		n	AOR ^a	95% CI	p	n	AOR ^a	95% CI	p
Hobbies or cultural activities (ref: Inactive)	By oneself	1350	0.96	0.81–1.15	0.683	1107	0.74	0.62–0.90	0.002
	With others	3317	0.83	0.71–0.97	0.018	4291	0.76	0.67–0.87	0.000
	Both	116	0.85	0.39–1.86	0.689	135	0.55	0.33–0.93	0.024
Exercise or sports (ref: Inactive)	By oneself	1283	0.93	0.77–1.11	0.408	1310	0.89	0.75–1.05	0.158
	With others	2560	0.84	0.73–0.98	0.030	2405	0.86	0.75–0.99	0.039
	Both	126	0.79	0.33–1.89	0.596	120	0.97	0.59–1.56	0.887

^a Adjusted for demographic and socioeconomic status, physical health condition, health behaviour and mental health status at baseline.

AOR: Adjusted odds ratio, CI: confidence interval.

However, these studies did not control the influence of activities other than social activities. Our findings showed no longitudinal relation between social activities and mental health status when the effects of leisure activities were considered.

One previous study reported that social activities were associated with longitudinal changes in mental health status even after considering the influence of leisure activities [27]; however, respondents in that study were much older than those in our study. Because the perceived value of life tends to decrease gradually with age [28], maintaining social activities may be especially important to sustain good mental health status among older adults. However, because our respondents were still relatively young in their fifties, and 96.4% of men and 71.5% of women had a job at the baseline period, almost all of them had other forms of regular social involvement. This could be one reason why our results indicate that leisure activities contribute to mental health status in middle-aged adults, whereas specific social activities do not.

Furthermore, this study investigated the relations between the presence of other persons in leisure activities and mental health status. Our results showed that hobbies or cultural activities in men and exercise or sports in both men and women would reduce such risk only when conducted with others, whereas hobbies or cultural activities in women might have effects on mental health regardless of the presence of others.

These results suggested that social relationships through leisure activities would be the key factor of preventing the deterioration of mental health status regardless of gender differences. Some previous studies have suggested that the improvements in mental health status following exercise or sports could be partially because of the social relations that can be experienced through participating in these activities with others [29, 30]. However, in this study, no relation existed between doing exercise or sports by oneself and mental health status. The previous study in Japan suggested that, even when exercise was performed once a week or more, incident of functional disability might be better prevented if the person participated in a sports organization than if they did not [31]. Our result suggests that the psychological effects of social relations may be especially needed in not only the case of exercise or sports, but also the case of hobbies or cultural activities. On the other hand, we found no significant difference between 'by oneself' or 'both' category and 'with others' category. Thus, the effect of the presence of others may need to be carefully considered.

This is the first study to show a longitudinal relation between leisure and social activities and mental health status among middle-aged adults in Japan. The study has several particular strengths. First, it used a good set of nationally representative data. Second, unlike previous studies of middle-aged adults in Japan, our study encompassed a wide range of leisure and social activities. Finally, our study indicated further details about the appropriate way of doing leisure activities to maintain good mental health status while approaching old age (i.e. whether it is effective to do these activities alone or only with others).

The study also has several limitations. First of all, this study might not completely identify the pure effects of the participation into leisure and social activities on mental health status, because the data in the baseline period must suffer from reversed causality problem between the participation and mental health status. In another word, those who are in better mental health status are more likely to involve into various social activities. Second, although the multiple imputation was used to try to reduce impact of missing variables, our study would still have some selection bias. About 6,000 people did not respond a questionnaire in the baseline survey, and almost 8,000 respondents were dropped out in the follow-up study. Thus, generalization of the results in our study should be done carefully. Third, the participation in leisure and social activities was indicated on a dichotomized scale, and thus, the frequency or variety of participation was not assessed. Forth, questionnaires about leisure and social activities were self-reported and retrospective, rendering them somewhat inaccurate. Finally, 'LSMEP'

excluded patients in hospitals and clinics and residents of long-term elderly care facilities. These people might have a higher-than-average rate of bad mental health status and might not have been likely to engage in leisure and social activities. Therefore, possibly, the positive relations between leisure and social activities and mental health status were underestimated.

In conclusion, this study indicates that leisure activities might contribute to good mental health status among middle-aged adults in Japan, whereas social activities would provide no mental health status benefit. Moreover, participation in leisure activities would be effective especially if others are present. These findings may be useful for preventing the deterioration of mental health status in middle-aged adults in Japan.

Acknowledgments

This study was conducted as part of the project: 'Theoretical and Empirical Studies on Evaluations of Social Welfare Policies toward Emerging Risks Caused by Demographic Changes' at the National Institute of Population and Social Security Research in 2012–2015 and supported by the Ministry of Health, Labour and Welfare (H27-seisaku-senryaku-012).

Author Contributions

Conceived and designed the experiments: FT. Analyzed the data: FT. Wrote the paper: FT HN NT TM. Reviewing of the manuscript: HN NT TM.

References

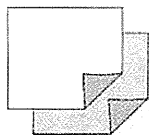
1. Ministry of Health, Labour and Welfare. 2012. 2011 Summary of Patient Survey. Available: http://www.mhlw.go.jp/english/database/db-hss/sps_2011.html. Accessed 2015 January 20.
2. Director General for Policies on Cohesive Society, Cabinet Office. 2013. 2013 White paper on Suicide Prevention. Available: <http://www8.cao.go.jp/jisatsutaisaku/whitepaper/en/w-2013/summary.html>. Accessed 2015 January 13.
3. Ministry of Health, Labour and Welfare. 2014. Vital Statistics. Available: <http://www.mhlw.go.jp/toukei/list/81-1.html>. Accessed 2015 January 20 (in Japanese).
4. Barcelos-Ferreira R, Nakano EY, Steffens DC, Bottino CM. Quality of life and physical activity associated to lower prevalence of depression in community-dwelling elderly subjects from Sao Paulo. *J Affect Disord*. 2013; 150: 616–622. doi: 10.1016/j.jad.2013.02.024 PMID: 23499164
5. Lee CT, Yeh CJ, Lee MC, Lin HS, Chen VC, Hsieh MH, et al. Leisure activity, mobility limitation and stress as modifiable risk factors for depressive symptoms in the elderly: results of a national longitudinal study. *Arch Gerontol Geriatr*. 2012; 54: e221–229. doi: 10.1016/j.archger.2011.06.014 PMID: 21821296
6. Wada K, Satoh T, Tanaka K, Tsunoda M, Aizawa Y. Associations of depressive symptoms with regular leisure activity and family social support among Japanese workers. *Ind Health*. 2007; 45: 181–185. PMID: 17284892
7. Wakui T, Saito T, Agree EM, Kai I. Effects of home, outside leisure, social, and peer activity on psychological health among Japanese family caregivers. *Aging Ment Health*. 2012; 16: 500–506. doi: 10.1080/13607863.2011.644263 PMID: 22360698
8. Conn VS. Anxiety outcomes after physical activity interventions: meta-analysis findings. *Nurs Res*. 2010; 59: 224–231. doi: 10.1097/NNR.0b013e3181dbb2f8 PMID: 20410849
9. Netz Y, Wu MJ, Becker BJ, Tenenbaum G. Physical activity and psychological well-being in advanced age: a meta-analysis of intervention studies. *Psychol Aging*. 2005; 20: 272–284. PMID: 16029091
10. Park SH, Han KS, Kang CB. Effects of exercise programs on depressive symptoms, quality of life, and self-esteem in older people: A systematic review of randomized controlled trials. *Appl Nurs Res*. 2014; 27: 219–26. doi: 10.1016/j.apnr.2014.01.004 PMID: 24602398
11. Windle G, Hughes D, Linck P, Russell I, Woods B. Is exercise effective in promoting mental well-being in older age? A systematic review. *Aging Ment Health*. 2010; 14: 652–669. doi: 10.1080/13607861003713232 PMID: 20686977
12. Li Y, Ferraro KF. Volunteering and depression in later life: social benefit or selection processes? *J Health Soc Behav*. 2005; 46: 68–84. PMID: 15869121

13. Potočnik K, Sonnentag S. A longitudinal study of well-being in older workers and retirees: The role of engaging in different types of activities. *J Occup Organ Psychol*. 2013; 86: 497–521.
14. Sugihara Y, Sugisawa H, Shibata H, Harada K. Productive roles, gender, and depressive symptoms: evidence from a national longitudinal study of late-middle-aged Japanese. *J Gerontol B Psychol Sci Soc Sci*. 2008; 63: P227–P234. PMID: 18689764
15. Pfeiffer PN, Heisler M, Piette JD, Rogers MA, Valenstein M. Efficacy of peer support interventions for depression: a meta-analysis. *Gen Hosp Psychiatry*. 2011; 33: 29–36. doi: 10.1016/j.genhosppsych.2010.10.002 PMID: 21353125
16. Barbato A, D'Avanzo B. Efficacy of couple therapy as a treatment for depression: a meta-analysis. *Psychiatr Q*. 2008; 79: 121–132. doi: 10.1007/s11126-008-9068-0 PMID: 18259866
17. Teo AR, Choi H, Valenstein M. Social relationships and depression: ten-year follow-up from a nationally representative study. *PLoS One*. 2013; 8: e62396. doi: 10.1371/journal.pone.0062396 PMID: 23646128
18. Chiao C, Weng LJ, Botticello AL. Social participation reduces depressive symptoms among older adults: an 18-year longitudinal analysis in Taiwan. *BMC Public Health*. 2011; 11: 292. doi: 10.1186/1471-2458-11-292 PMID: 21569285
19. National Institute of Public Health. 2002. Ethical Guidelines for Epidemiological Research. Available: <http://www.niph.go.jp/wadai/ekigakurinri/ethical-gl/guidelines.htm>. Accessed 2014 October 3.
20. Furukawa TA, Kawakami N, Saitoh M, Ono Y, Nakane Y, Nakamura Y, et al. The performance of the Japanese version of the K6 and K10 in the World Mental Health Survey Japan. *Int J Methods Psychiatr Res*. 2008; 17: 152–158. doi: 10.1002/mpr.257 PMID: 18763695
21. Kessler RC, Andrews G, Colpe LJ, Hiripi E, Mroczek DK, Normand SL, et al. Short screening scales to monitor population prevalences and trends in non-specific psychological distress. *Psychol Med*. 2002; 32: 959–976. PMID: 12214795
22. Inoue A, Kawakami N, Tsuchiya M, Sakurai K, Hashimoto H. Association of occupation, employment contract, and company size with mental health in a national representative sample of employees in Japan. *J Occup Health* 2010; 52: 227–240. PMID: 20526043
23. Sakurai K, Kawakami N, Yamaoka K, Ishikawa H, Hashimoto H. The impact of subjective and objective social status on psychological distress among men and women in Japan. *Soc Sci Med*. 2010; 70: 1832–1839. doi: 10.1016/j.socscimed.2010.01.019 PMID: 20303205
24. Sterne JA, White IR, Carlin JB, Spratt M, Royston P, Kenward MG, et al. Multiple imputation for missing data in epidemiological and clinical research: potential and pitfalls. *BMJ*. 2009; 338: b2393. doi: 10.1136/bmj.b2393 PMID: 19564179
25. Iwasaki Y, Mannell RC. Hierarchical dimensions of leisure stress coping. *Leisure Sci*. 2000; 22: 163–181.
26. Iwasaki Y, Schneider IE. Leisure, stress and coping: an evolving area of inquiry. *Leisure Sci*. 2003; 25: 107–113.
27. Hong SI, Hasche L, Bowland S. Structural relationships between social activities and longitudinal trajectories of depression among older adults. *Gerontologist*. 2009; 49: 1–11. doi: 10.1093/geront/gnp148 PMID: 19903893
28. Aoki K. The factor structure of 'Scale for the Feeling that Life is Worth Living among the Aged' and its scores of the elderly living at home. *Archives of Yamaguchi Prefectural University*. 2009; 2: 100–107 (in Japanese).
29. Eyigor S, Karapolat H, Durmaz B. Effects of a group-based exercise program on the physical performance, muscle strength and quality of life in older women. *Arch Gerontol Geriatr*. 2007; 45: 259–271. PMID: 17303264
30. Timonen L, Rantanen T, Timonen TE, Sulkava R. Effects of a group-based exercise program on the mood state of frail older women after discharge from hospital. *Int J Geriatr Psychiatry*. 2002; 17: 1106–1111. PMID: 12461758
31. Kanamori S, Kai Y, Kondo K, Hirai H, Ichida Y, Suzuki K, et al. Participation in sports organizations and the prevention of functional disability in older Japanese: the AGES Cohort Study. *PLOS ONE*. 2012; 7: e51061. doi: 10.1371/journal.pone.0051061 PMID: 23226458

論

療養場所移動時におけるケアの質確保への取り組み

壇



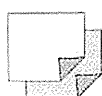
東京都健康長寿医療センター研究所
福祉と生活ケア研究チーム 石崎達郎

抄録

要介護高齢者は、療養場所を移動することがしばしば発生する。療養場所を移動する前後の時期は移行期とよばれ、この時期にさまざまなトラブルが生じやすい。移行期におけるケアの質を確保するプログラムが欧米で導入されているが、わが国では包括的な移行期ケアプログラムは確立していない。わが国で要介護高齢者の退院時の移行期ケアプログラムを開発する場合、その主な内容は、退院前は、①病棟訪問、②入院医療に関する情報収集、③退院後に必要となる療養体制の整備、退院後は、④退院後の療養生活の評価と調整、⑤訪問指導、と考えられる。さらに、⑥ケアマネジャーとの情報交換と⑦医療・介護サービス提供者との意見交換は、移行期全体を通じて必要となろう。移行期における医療・介護の連携がより進展するためにも、わが国の制度・環境に適した移行期ケアプログラムの開発とその導入が必要である。

Key words : 要介護高齢者, 長期ケア, 移行期ケア, 連携

老年社会科学, 37 (3):347-352, 2015



I. はじめに

要介護高齢者は、医学的理由、非医学的理由から、療養場所を移動することがしばしば発生する。療養場所を移動する前後の時期は移行期とよばれ、この時期に高齢者はさまざまなリスクにさらされることから¹⁾、欧米では移行期における安全とケアの質を確保する「移行期ケアプログラム (transitional care program)」がケアの現場に導入されている。本稿では、要介護高齢者の療養場所移動をめぐる状況と移行期ケアプログラムを紹介し、医療と介護の連携について考察する。



II. 移行期に発生しやすい有害事象

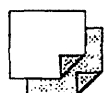
介護保険制度創設前の1990年代、いわゆる「老人病院」では、患者の入院日数が長くなると診療報酬が減額される通減制が導入されていた。一部の老人病院では入院料通減制への対抗措置として、入院日数が90日に達した患者を他の病院や老人保健施設等に転院させていた。その結果、要介護高齢者が数か月ごとに老人病院や施設を転々とする現象が一部のマスコミに取り上げられ、「病院めぐり」や「ピンポン現象」とよばれた。当時は、要介護高齢者の療養場所をどう確保するのか、施設ケアの利便性に関する議論が中心であった。介護保険制度が施行された現在、要介護高齢者の療養場所は多岐にわたり、自宅、居住系施設、病院、介護老人保健施設、特別養護老人ホーム等々、数多く

Tatsuro Ishizaki
〒173-0015 東京都板橋区栄町 35-2

の移動パターンがあると予想される。

療養場所が変わることは、それが病院から自宅への退院、同一病院内における一般病棟からリハビリテーション病棟への移動であっても、要介護高齢者の心身に大きな負荷となる。要介護高齢者は環境の変化への適応力が低下しているため、療養場所の移動は、認知機能の低下、せん妄発症や認知症周辺症状の悪化、転倒発生の増加など、有害事象発生リスクを高めるといわれている。

他方、移行期は、ケアを提供する医療・介護スタッフ側に起因するトラブルを生じることがある。たとえば、退院(退所)サマリ情報の伝達が遅延し、入院(入所)中に変更された処方内容が次の療養先のスタッフに伝わらないと、誤投薬につながるおそれがある。さらにサマリ情報提供の遅れは、療養生活面に関する注意事項の伝達遅延を生じ、ケアの継続性が損なわれる。わが国の長期ケアの場において、移行期に発生しやすい有害事象を予防し、高齢者のケアの質を確保する手だてが、医療施設、介護施設、居宅等に講じられる必要がある。

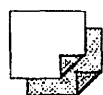


Ⅲ. 再入院の予防

前述のとおり療養場所の移動には、さまざまな種類があるが、回避しなくてはならない移動のひとつは「再入院」である。欧米では療養場所の移動、とくに、救急外来受診の予防や急性期病院への再入院予防に関する研究が多数報告されている²⁾。アメリカの医療では、医療費節減の観点から入院期間がきわめて短く管理されており、重症患者は数日間で急性医療機関を退院する。そのようななか、全米レベルで高齢患者の再入院発生の実態把握を行った Jencks らの研究³⁾は、大きな反響をよんだ。この研究は、高齢者の公的医療保険 Medicare (メディケア) の被保険者のうち、2003年10月～2004年12月の間に入院した1,186万人を対象に再入院の発生を把握した。その結果、全体の20%は30日以内に再入院しており、半年以内に再入院した者は34%に達していた³⁾。さらに、再入院の9割は計

画外の再入院であり、その費用は年間174億ドルと推計された。後述する米国医学研究所 (Institute of Medicine; 以下, IOM) のレポートの影響も相まって、再入院を予防し高齢者医療を安全かつ効率よく提供するために、退院後のフォローアップ体制の整備がよりいっそう求められるようになった。

わが国でも入院日数の短縮化に伴い、再入院の発生が多くなっているという声が聞かれる。厚生労働省は、診断群分類 (Diagnosis Procedure Combination ; 以下, DPC) に基づく急性期医療に対する包括点数評価の適用病院を対象に、医療の質の評価のひとつとして再入院発生割合を、予定再入院と予期しない再入院とを区別して把握している。しかしDPC適用病院以外の医療機関では、厚生省の患者調査で退院後30日以内の再入院の有無を集計するに留まっているため、急性と慢性期を含め、高齢者医療における再入院の詳細な実態把握が求められる。



Ⅳ. アメリカにおける移行期ケアプログラムの開発

移行期に提供される一連のケアは「移行期ケア (transitional care)」とよばれており、米国老年医学会は、移行期ケアを「transitional care is defined as a set of actions designed to ensure the coordination and continuity of health care as patients transfer between different locations or different levels of care within the same location.」と定義している⁴⁾。

長期ケアにおけるヘルスサービス研究の嚆矢であるミネソタ大学の Kane は、アメリカのナーシングホーム利用者を対象に、病院、療養施設、自宅への移動確率を報告し、「長期ケアにおいては、療養場所の移動前後のケアの継続性確保、繰り返される療養場所の移動を連続的に捉え、医療と介護の両面からケアのあるべき姿を検討することが必要である」と訴えた⁵⁾。

アメリカでは、急性期病院退院後、多くの高齢

患者は亜急性期ケア棟を有するナーシングホームに入所する。ナーシングホーム入所後に再入院する高齢者が多く、退院判断の適切性や退院前に退院後の療養計画等を立案していたかどうかといった、移行期におけるケアの内容とその質が問われている。要介護高齢者の医療と介護を巡る問題は深刻であり、移行期におけるケアの質を保証する取り組みとその効果の検証が求められている。

IOMは、全米科学アカデミーと並列的に存在する公的学術機関で、健康政策や医療政策に関する報告書を発行することで連邦政府や議会へ大きな影響を与えている。IOMは2001年に報告したレポート『Crossing Quality Chasm』のなかで、医療の質確保のための方策として「継続的な癒しの関係を基本とする医療ケア」を提言し、切れ目のないサービス提供とケアの連続性の保証を求めた⁶⁾。

オバマ政権による医療制度改革においても、「ケアの連続性の保証」が重要視されている。米国保健福祉省高齢者対策局 (Administration on Aging) は、無作為化比較対照試験 (randomized controlled trial ; 以下, RCT) 等、内的妥当性の高い研究デザインで効果が確認された移行期ケアプログラム6種類を「Evidence Based Care Transitions Program」と位置づけ⁷⁾、通常の高齢者ケアの場においてもこれらのプログラムが有効であるかどうか、実地における有効性評価を促した(表1)。2011年、アメリカのCMS (Centers for Medicare and Medicaid Services) は、全国各地でEvidence Based Care Transitions Programのモデル事業「Community-based Care Transitions Program (CCTP)」を募集し、5年間で5億ドルの補助金をつけて、移行期ケアプログラムの橋渡し研究を推進した。

次に、これらのなかから代表的な2つのプログラムの概要を紹介する。どちらも退院後の再入院を予防するプログラムで、生活機能が自立している高齢者も対象となる。また、「Evidence Based Care Transitions Program」に含まれないが、ナーシングホームに入所している虚弱な高齢者を対象

表1 Evidence Based Care Transition Program ⁷⁾

- ・ Care Transitions Intervention
- ・ Transitional Care Intervention
- ・ Bridge Program
- ・ Project BOOST (Better Outcomes for Older Adults through Safe Transitions)
- ・ GRACE (Geriatric Resources for Assessment and Care of Elders)
- ・ Guided Care

表2 Care Transitions Interventionの概要^{8, 9)}

- ・ 4本柱
服薬管理, 患者中心の療養録, 主治医・専門医のフォロー, Red Flagsの理解
Transition Coachが担当
- ・ 4週間の介入
退院前: 病棟訪問
退院後: 自宅訪問, 週一回の電話
- ・ アウトカム
再入院・薬剤有害事象の予防

に、その入院予防・急性期疾患発生への対応を目的とするプログラムINTERACTを併せて紹介する。

1. Care Transitions Intervention

Care Transitions Interventionは、コロラド大学の医師、Colemanによって開発された(表2)^{8, 9)}。プログラムの4本柱は、服薬管理指導、患者中心の療養記録(Personal Health Record)作成、主治医・専門医のフォローアップ、Red Flags(レッドフラッグ)の明確化である。Red Flagsとは、患者の容態が悪化したことを示す赤信号サインのことで、早期に医療機関への受診・相談が必要とされる状態を明確にすることで患者・家族の理解を促し、危険な兆候の見落としや過剰な受診の予防を目的とする。プログラムはTransitions Coachとよばれる専門家(看護師やソーシャルワーカー)が患者・家族と対応し、プログラム提供期間は4週間である。

患者の退院が決まると、Transitions Coachは病棟を訪問し、退院準備と退院後の流れ、診療情報や退院後の療養について、患者、家族、医療スタッフと情報を共有する。退院後は3日以内に自宅を訪問し、退院後の療養状況、処方薬の受け取り、

表3 Transitional Care Modelの概要^{10, 11)}

<ul style="list-style-type: none"> ・要素 患者と介護者の理解促進, 患者の自己管理促進, 服薬調整・管理, フォローアップ Transitional Care Nurseが担当 (Advanced Practice Nurse) ・1~3か月間の介入 退院前: 病棟訪問 (毎日) 退院後: 自宅訪問, かかりつけ医の受診, 電話による支援 ・アウトカム 再入院・薬剤有害事象の予防・医療費削減
--

表4 INTERACT (Interventions to Reduce Acute Care Transfers) の概要^{12, 13)}

<ul style="list-style-type: none"> ・全身状態が悪化したナースィングホーム入所者のケアの向上プログラム ・入院の予防 (avoidable, preventable, unnecessary) ・入院が必要な状態の場合は速やかに入院 ・重症化の予防 ・ナースィングホームにおける全身管理 ・Advanced Care Planningの改善

退院後に新たに生じた問題点の有無を確認し, 移行直後の療養を調整する。その後は, 週1回, 電話でフォローアップを行う。このプログラムによって, 再入院の予防 (4割減), 薬剤有害事象予防がRCTで確認されている⁸⁾。

2. Transitional Care Model

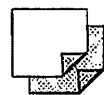
Transitional Care Model (表3) は, ペンシルベニア大学の看護師, Naylorによって開発された^{10, 11)}。こちらも4つの要素で構成されているが, 患者と介護者の疾病に関する理解の促進が基本姿勢である。退院後のフォローアップによって, 患者の自己管理促進, 疾病の悪化予防, 服薬の調整・管理による薬剤有害事象の予防を目的とし, Transitional Care Nurse (Advanced Practice Nurse) とよばれる専門看護師がプログラムを進める。

介入期間は対象者の状態によって異なり, 1~3か月間である。対象患者の退院が決まると, Transitional Care Nurseは病棟を毎日訪問し, 患者・家族から情報収集すると同時に, 退院後の療養について情報提供・情報交換を行う。患者退院

後, 自宅を訪問し, 退院後に顕在化した療養上の問題点, 処方薬入手状況, 体調変化の有無を把握する。その後, 電話によって療養支援を行うが, 患者がかかりつけ医を受診する際は, Transitional Care Nurseが付き添い, 退院後の療養生活を調整する。このプログラムもRCTによって, 再入院や薬剤有害事象の予防, それによる医療費削減が確認されている¹¹⁾。

3. INTERACT

INTERACT (Interventions to Reduce Acute Care Transfers) は, ナースィングホーム入所者のうち, 急性期病院に入院したことのある要介護高齢者を対象とするプログラムである。フロリダ・アトランティック大学の医師, Ouslanderが開発し (表4)^{12, 13)}, 急性期病院への入院予防を主たる目的としている。このプログラムは, 全身状態の悪化・重症化予防のために, ナースィングホームの介護スタッフが, 入所者のバイタルサインを適切なタイミングで測定し, 医療スタッフに報告するためのさまざまな対応指針 (ケアパス) が具体的に提示されている。そのほか, 急変時や終末期における医療処置等について事前の意向把握等を含むアドバンス・ケア・プランニング (advance care planning) を円滑に進めることも目的とされている。



V. アメリカの公的医療保険における移行期ケアプログラムの適用

「Evidence Based Care Transitions Program」の成果を踏まえ, CMSは, 2013年1月, Medicareによる移行期ケアプログラム (Transitional Care Management Program; 以下, TCMプログラム) の給付を開始した¹⁴⁾。退院後30日間限定のプログラムで, 医師, 専門看護師, ナース・プラクティショナー等が参画する。

医療機関がTCMプログラムの費用をMedicareに請求するためには, 次の実践が必要である。第一は, 退院後2日以内に, 電話・電子メール・訪問などで患者・家族とコンタクトをとる。その際, 退院

後の状況や服薬状況等について情報を交換し、病院スタッフから適切な療養のための指示を患者・家族へ伝達する。第二に、入院中に提供された医療と退院後の診療計画の確認・調整を行う。ここでは、退院サマリの確認、入院中に実施できなかった検査・治療の確認とそのフォローアップ計画の検討、入院中の問題点に関する医療専門職との意見交換、退院後に利用するサービスの提供者への報告、患者の居住地で利用可能な資源の同定、退院後の治療計画や療養生活に関する患者・家族への指導、服薬状況の把握と指導について、医師の指示に従って患者とコンタクトをとる。そして第三は、退院後7日または14日以内に訪問面接の実施である。退院後の治療方針を決定するために、治療上考慮すべき疾患の把握、入院中の療養記録・検査結果の情報収集と評価、重大な合併症・疾患・死亡等のリスク評価を行う。この訪問面接までに、退院時処方薬を評価し、退院後に処方を見直す必要があるかどうか検討しておかなければならない。



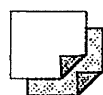
VI. 移行期ケアプログラムの日本への導入可能性

わが国で要介護高齢者退院時の移行期ケアプログラムを構築する場合、その内容として退院前は、①病棟訪問、②入院医療に関する情報収集、③退院後に必要となる療養体制の整備、退院後は、④退院後のフォローアップ、⑤退院後の訪問指導、が挙げられる。さらに、⑥ケアマネジャーとの情報交換と⑦医療・介護サービス提供者との意見交換は、移行期全体を通じて必要となろう。

現行の診療報酬点数表(2014年改定)に記載されている項目で退院準備に係るものには、「退院前訪問指導料」「退院時リハビリテーション指導料」「退院時共同指導料」「介護支援連携指導料」「退院調整加算」等がある¹⁵⁾。要介護高齢者が退院するとき、それぞれの指導料がどのくらいの頻度で請求されているのか、詳細は不明である。これらは出来高制で個別に請求されるため、Medicareの

TCMプログラムのように、患者・家族への指導や退院支援計画策定、退院後の療養環境の調整等をパッケージ化し、包括的に提供されることが望ましい。

移行期ケアの調整役を特定の職種に限定する必要はないが、外来・病棟の医師・看護師の行動を把握できる職種、バイタルサインを測定しその値を評価できる職種が理想である。また、医療保険制度のほかに介護保険制度の内容や手続き、ケアマネジャーと円滑なコミュニケーションが可能であることを考慮すると、在宅ケアの経験を有する看護師が調整役として適任と考える。



VII. 「連携」がかけ声倒れに終わらないために

わが国の地域包括ケアシステムは5つの柱で構成され、そのなかに「医療と介護の連携」がある。要介護状態となった高齢者が、住み慣れた地域で最期まで自分らしい生活を継続するためには、医療サービス、介護サービスが途切れることなく継続的に、そして、両者が一体的に提供される必要がある。「連携」という単語は、使いやすい単語である半面、具体的にどのような行動を示すのか、明示されることは少ないように感じる。「レンケイしましょう」「よいレンケイを築きましょう」といわれても、なにをどうすれば「連携」したことになるのか、具体的にわからない。そのため、「レンケイ」と聞いてイメージされる行動は、職種や個人によって異なっている可能性がある。要介護高齢者の医療、介護にかかわる人たちが、それぞれ異なった「レンケイ」をイメージしては「よい連携」を構築することはむずかしい。

「連携」という単語が多用されている文章では、「連携」を「情報交換」に置き換えると、その内容がみえてくる場合がある。しかし、「連携」は「情報交換」だけではない。McDonaldらが集約したcare coordination(ケアの連携)の構成要素¹⁶⁾によると、「連携」が適切に実施されるためには、①連携に関わる参加者の役割が明確になっているこ

と、②各参加者の役割について参加者間で共通認識が得られていること、③参加者間で相互の協力関係が築かれていること、④参加者間で連携のゴールが明確に設定されていること、⑤各参加者が必要とする情報を漏れなく適切なタイミングで正確に伝達すること、の5点が重要である。「連携」という行動の構成要素が理解され、移行期における医療・介護の連携がより進展するためにも、わが国の制度・環境に適した移行期ケアプログラムの開発とその導入が必要である。

本研究は科研費（課題番号24590834）、厚生労働科学研究費補助金（H27-政策-戦略-012）の助成を受けたものです。

文 献

- 1) Coleman EA : Falling through the cracks ; challenges and opportunities for improving transitional care for persons with continuous complex care needs. *Journal of the American Geriatrics Society*, 51 : 549-555 (2003).
- 2) Jenq G, Tinetti M : The journey across the health care (dis) continuum for vulnerable patients. *Journal of American Medical Association*, 307 : 2157-2158 (2012).
- 3) Jencks SF, Williams MV, Coleman EA : Rehospitalizations among patients in the Medicare Fee-for-Service Program. *New England Journal of Medicine*, 360 : 1418-1428 (2009).
- 4) Coleman EA, Boulton C : The American Geriatrics Society Health Care Systems Committee ; Improving the quality of transitional care for persons with complex care needs. *Journal of the American Geriatrics Society*, 51 : 556-557 (2003).
- 5) Lewis MA, Cretin S, Kane RL : The natural history of nursing home patients. *Gerontologist*, 25 : 382-388 (1985).
- 6) Institute of Medicine : Crossing the Quality Chasm ; a New Health System of the 21st Century. National Academy Press, Washington, DC (2001).
- 7) Administration on Aging : The Aging Network and Care Transitions ; Preparing Your Organization (http://aoa.acl.gov/AoA_Programs/HCLTC/ADRC_CareTransitions/Toolkit/index.aspx, 2015.9.29).
- 8) Coleman EA, Parry C, Chalmers S, et al. : The Care Transitions Intervention ; Results of a randomized controlled trial. *Archives of Internal Medicine*, 166 : 1822-1828 (2006).
- 9) Coleman EA, Smith JD, Frank JC, et al. : Preparing patients and caregivers to participate in care delivered across settings ; The Care Transitions Intervention. *Journal of the American Geriatrics Society*, 52 : 1817-1825 (2004).
- 10) Naylor M, Broton D, Jones R, et al. : Comprehensive discharge planning for the hospitalized elderly. *Annals of Internal Medicine*, 120 : 999-1006 (1994).
- 11) Naylor M, Broton D, Campbell R, et al. : Comprehensive discharge planning and home follow-up of hospitalized elders. *Journal of American Medical Association*, 281 : 613-620 (1999).
- 12) Ouslander J, Bonner A, Herndon L, et al. : The Interventions to Reduce Acute Care Transfers (INTERACT) Quality Improvement Program ; an overview for medical directors and primary care clinicians in long term care. *Journal of Post-Acute and Long-Term Care Medicine*, 15 : 162-170 (2014).
- 13) Ouslander J, Lamb G, Tappen R, et al. : Interventions to reduce hospitalizations from nursing homes ; evaluation of the INTERACT II Collaborative Quality Improvement Project. *Journal of the American Geriatrics Society*, 59 : 745-753 (2011).
- 14) Centers for Medicare and Medicaid Services : Transitional Care Management Services (<http://www.nacns.org/docs/TransCareMgmtFAQ.pdf>, 2015.9.29) (2013).
- 15) 医学通信社編 : 診療報酬点数早見表 2014年版. 医学通信社, 東京 (2014).
- 16) McDonald KM, Sundaram V, Bravata DM, et al. : Closing the Quality Gap ; A Critical Analysis of Quality Improvement Strategies : Volume 7-Care Coordination. Eds. by Shojania KG, McDonald KM, Wachter RM, et al., Technical Review 9. AHRQ Publication No. 04(07)-0051-7, Agency for Healthcare Research and Quality, Rockville, MD (2007).