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Characteristics of visiting nurse agencies with high home death rates: A prefecture-wide study in Japan

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Aim: The purpose of the present study was to identify characteristics of visiting nurse agencies (VNA) in Japan with high home death rates by a prefecture-wide survey.

Methods: A cross-sectional study of visiting nurse agencies (n = 101) in Ibaraki Prefecture, Japan, was completed. Data included the basic characteristics of each VNA, the type of services provided, level of coordination with other service providers, total number of VNA patients who died per year and place of death and contractual relationship with home-care supporting clinics providing end-of-life care services in the home 24 h a day. The VNA characteristics were analyzed by logistic regression, using the home death rate per VNA as a dependent variable.

Results: A total 69 agencies, excluding those that did not report number of deaths (n = 14) and those without deaths during the year (n = 6), were analyzed. The median home death rate of the 69 VNA was 29.8%. The results of logistic regression analysis showed that higher home death rate was significantly associated with lack of attachment to a hospital, existence of a contractual relationship with home-care supporting clinics and existence of an interactive information exchange through telephone/face-to-face communication with attending physicians.

Conclusions: In order to increase the home death rate of people using VNA, policymakers must consider establishing home-based service systems within the community that can provide home end-of-life care services 24 h a day, and support the interactive exchange of information between the visiting nurse and the attending physician. **Geriatr Gerontol Int 2015; 15: 936–943.**

Keywords: home care supporting clinic, home death rate, home end-of-life care, home-visiting nursing services, visiting nurse agency.

Introduction

There is a discrepancy between patients' wishes to die at home and the actual place of death.[1,2] Many patients who wished to die at home actually died in hospitals.[2]

In Japan, the world's number one aging country, approximately 60% of people want home end-of-life care, whereas just 12.5% actually die at home (or approximately 156 000 of the total 1.25 million deaths occurred at home in 2011). More than 80% of deaths occur in hospitals.[3] In Japan, 2038 is projected to be a peak year for deaths at 1.7 million.[3] The Japanese government attempted to reduce the number of hospital beds as a measure to contain healthcare expenditure for the elderly. It is anticipated that the number of hospital beds will not increase in the future. This means that 800 000 people, more than fourfold the current number (156 000), will have to find a place of death either at home or at other facilities for elderly people.

The Japanese government made an effort to promote home deaths as an important healthcare/long-term care policy by expanding visiting nurse agency (VNA) services. In 2000, the Public Long Term Care Insurance System was introduced, and the coverage of VNA services was also integrated in this insurance system.[4] In 2006, attending physicians at home care supporting clinics (HCSC) were reimbursed higher fees for end-of-life care including a death diagnosis, compared with those provided to general clinics. HCSC were introduced in April 2006 with the aim of playing a central role in providing home end-of-life care services 24 h a

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day in cooperation with VNA, hospitals and care managers, and to ensure emergency hospital admission only if necessary.[5,6] Each HCSC is requested to submit an annual activity report to the Japanese Ministry of Health, Labor and Welfare, including items such as the number of patients who died at home.[7] However, the home death rate in Japan has not changed a great deal since the inception of HCSC: 12.2% in 2006, 12.3% in 2007, 12.7% in 2008, 12.4% in 2009, 12.6% in 2010 and 12.5% in 2011.[3] These policy changes did not have a dramatic effect on the rate of home deaths in Japan.

Does the use of the VNA services increase the rate of home deaths? The Ministry of Health, Labor and Welfare reported in 2011 that the home death rate was higher in the prefectures where the elderly used more VNA services.[7] Studies have also shown that VNA service users,[8] especially users of nurse educational services for patients and caregivers regarding pain management and bedsore treatment and prevention,[9] were more likely to die at home. Studies in developing countries (not in Japan) also reported that home visits by nurses are a factor related to home deaths.[10–12] However, studies on home death rates of VNA have been limited.

As far as we know, there are two empirical studies published in Japanese on home death rates of VNA in Japan and the characteristics of VNA with high home death rates. According to a survey of 259 VNA in eight municipalities in Japan, the mean home death rate was 32.5%.[13] This survey classified the home death rate into two groups (high or low) by the mean, and found that factors related to higher home death rates were the attending physician working in an HCSC and the availability of 24-h VNA home care services. However, the questionnaire return rate of that study was low (16.2%). In addition, it used only bivariate analysis, which might not have been able to identify the characteristics of VNA with high home death rates. Another study analyzed 1114 VNA in Japan, and explored the factors associated with home death rates.[14] The results showed that higher home death rates per VNA were associated with a positive physician attitude toward home end-of-life care, physician confirmation of the patient's end-of-life preferences, attending physicians working in clinics and difficulty in securing an emergency hospital bed. The mean home death rate was 47.2% in that study. That study also had low questionnaire return rates (38.2%).

These previous studies showed that characteristics of the attending physicians, such as the attending physician working in a clinic,[13,14] attitude toward home end-of-life care,[14] VNA characteristics such as the availability of 24-hour home care services,[13] and securing an emergency bed in any kind of hospital including collaborating hospital[14] were associated with home death rates per VNA. However, little is known about the relationship with VNA structure, such as attachment to hospitals, and processes for detailed nurse-physician coordination (e.g. joint meeting frequency or cooperation methods for interactive information exchange). In addition, the response rates in these previous studies were low. Therefore, these results would be difficult to generalize to another population.

Accordingly, we carried out a prefecture-wide survey of VNA, with the objective of identifying predictors of high home death rates, including these structural and process factors, using multiple analyses.

Methods

Study design and participants

This survey was carried out as part of projects by Ibaraki Prefecture, Japan, using a cross-sectional approach. Ibaraki Prefecture is located on the Pacific Ocean side in the central part of the Japanese archipelago, 30–150 km away from the nation's capital, Tokyo.[15] As of January 2011, its population was approximately 2.97 million, its elderly population was 22.4% (compared with 22.9% nationwide), and its home death rate was 11.3% (compared with 12.5% nationwide).[3]

Anonymous survey questionnaires were sent to all 101 VNA in the Ibaraki Prefecture in October 2006. Each VNA nurse manager was asked to respond to the questionnaire. The 2006 elderly population rate (Ibaraki 20.0%, nationwide 20.8%) and the 2006 home death rate (Ibaraki 11.4%, nationwide 12.2%) did not vary greatly from 2011.[3] The number of VNA (3.4 per 100 000 population) in 2006 was less than 4.4 in Japan nationwide. Deaths at home and the number of VNA were less in Ibaraki than nationwide.[3,16]

Questionnaire

The ultimate goal of the present study was to consider measures to increase the number of VNA users dying at home in the health service system. To improve the health service, Donabedian structural and process concepts should be suitable.[17] Therefore, we selected the structural and process predictors that might influence the outcome (e.g. the home death rate per VNA) as independent variables. The questionnaire items selected were based on previous studies and discussion with expert panel project members. The panel consisted of two researchers, four clinical experts in home-visit nursing and three policy makers.

1 Structural variables included: ownership of the agency, attachment to facilities (hospitals, clinics, long-term care medical treatment facility, skilled nursing facilities, nursing homes or care management agencies), contract with the HCSC and number of years since establishment of the agency.

2 Process variables included: the number of nurses converted to regular employees, rate of full-time nurses, employment of licensed practical nurses, employment of clerks, service provision 24 h a day, number of service users, rate of service users with medical insurance, VNA policy dealing with home end-of-life care, and systems of coordination with other service providers including coordination with the attending physicians, coordination with nurses in the healthcare facility, frequency of joint meetings with the attending physician, and frequency of interactive information exchange through telephone/face-to-face with the attending physician.
3 The home death rate per VNA was computed by the total number of service users who died in FY2005 and the number of service users who died at home in FY2005.

This survey protocol was reviewed and approved by the Survey Committee established by the Ibaraki Prefectural Government and the institutional review board of Tsukuba University where the primary author is affiliated.

Statistical analysis

The home death rate per VNA was calculated by dividing the number of service users who died at home by the total number of the service users who died per year, and multiplying by 100. Bivariate analyses were carried out to investigate the factors associated with the home death rate per VNA. Wilcoxon's rank sum test was used to examine the relationships between the VNA characteristics, the VNA service characteristics and the systems of coordination with other service providers. Next, stepwise multiple logistic regression analysis was completed to identify the predictors of home death rate per VNA. The home death rate per VNA (number of service users who died at home/total number of service users who died per year) was used as an outcome variable, and variables with *P*-values <0.20 in the bivariate analyses were used as independent variables, after no multicollinearity was confirmed. All data analyses were made using SAS statistical software package (SAS version 9.4; SAS Institute, Cary, NC, USA).

Results

Study sample

Of the 101 VNA that received the questionnaires, 89 returned the surveys. A total of 14 agencies that did not report the number of deaths were excluded. The primary subjects of analysis were 75 agencies (rate: 86.1%). Six agencies reporting no deaths during the past year were then excluded. The final subjects of analysis were 69 agencies.

The median home death rate per VNA was 29.8% (interquartile range 19.0–50.0; Table 1). Table 2 shows the basic characteristics of the VNA.

Factors associated with home death rate per VNA

The results of the bivariate analysis can be found in Table 3. Briefly, higher VNA home death rates were related to lack of attachment to a hospital, lack of attachment to long-term care medical treatment facilities, lack of attachment to a skilled nursing facility, presence of a contractual relationship with a local HCSC, and systems of interactive information exchange through telephone/face-to-face communication between VNA and attending physicians.

According to the results of our logistic regression, lack of attachment to a hospital, local HCSC contractual relationship and systems of interactive information exchange through telephone/face-to-face communication between attending physicians were significant factors in a higher home death rate per VNA (Table 4).

Discussion

The median home death rate per VNA was 29.8%, which was lower than the previous studies.[13,14] These numbers might have been artificially elevated because of the positive attitude toward home deaths in the VNA that did respond to the questionnaire in the previous studies. The response rate in the present study was 86.1%, which could have more accurately reflected the rate of home deaths in the VNA service users throughout the prefecture.

Table 1 Home death rate in visiting nurse agencies (n = 69)

	Median	Interquartile range
Total no. service users who died in FY2005	14	(9–22)
No. users who died at home in FY2005	4	(2–8)
Home death rate per visiting nurse agency	29.8	(19.0–50.0)

Table 2 Characteristics of the visiting nurse agencies (n = 69)

	n	%
Basic characteristics		
Ownership of the agency		
Medical	34	49.3
Public interest corporations (medical or nursing association)	15	21.7
Incorporated association or foundation	4	5.8
Social welfare	5	7.3
Federation of agricultural cooperatives or agricultural cooperatives	4	5.8
Profit corporation	5	7.3
Other	2	2.9
Attachment to facilities (multiple answers)		
Hospitals	36	52.2
Clinics	11	15.9
Long term care medical treatment facilities	10	14.5
Skilled nursing facilities	23	33.3
Special nursing home	10	14.5
Care management agencies	48	69.6
No. years since establishment of the agency		
<5 years	13	19.7
≥5 years and <10 years	33	50.0
≥10 years	20	30.3
Missing	3	
Visiting nurse agency service characteristics		
No. service users per nurse converted to regular employees		
<5	51	78.5
≥5 years and <10 years	13	20.0
≥10 years	1	1.5
Missing	4	
Rate of full-time nurses		
<50%	10	14.9
≥50%	57	85.1
Missing	2	
Employment of licensed practical nurses		
Employment	30	44.8
No employment	37	55.2
Missing	2	
Employment of administrative staff		
Employment	28	43.8
No employment	36	56.3
Missing	5	
Service provision 24 h a day		
Providing	58	84.1
Not providing	11	15.9
No. service users[†]	46	(32–64)
No. service users per nurse converted to regular employees		
<10	64	98.5
≥10	1	1.5
Missing	4	
Rate of service users with medical insurance (%)		
<20	44	66.7
≥20	22	33.3
Missing	3	

Table 2 *Continued*

	n	%
Contract with HCSC		
Yes	28	40.6
No	41	59.4
Policy dealing with home end-of-life care		
Anytime	23	33.3
Available depending on the situation	37	53.6
Not available	9	13.0
Systems of coordination with other service providers		
Attending physicians		
Good	16	23.2
Nearly good	43	62.3
Not good	10	14.5
Not at all	0	0.0
Nurses in healthcare facility such as hospital or clinic		
Good	7	10.1
Nearly good	39	56.5
Not good	23	33.3
Not at all	0	0.0
Frequency of joint meeting with the attending physician		
Almost	2	2.9
Modest	15	26.5
Not very well	24	35.3
Not at all	24	35.3
Missing	1	
Frequency of interactive information exchange with the attending physician		
Almost	20	29.0
Modest	28	40.6
Not very well	18	26.1
Not at all	3	4.4

†Median, 25–75 percentile. Interactive information exchange with the attending physician: through telephone/face-to-face communication. HCSC, with home-care supporting clinics.

We carried out the present study to identify the predictors associated with the home death rate per VNA. There are three predictors as follows: (i) structural factor of lack of attachment to a hospital; (ii) structural factor of contractual relationship with a local HCSC; and (iii) a process factor of systems of interactive information exchange through telephone/face-to-face communication between attending physicians. These findings were stronger than in the previous study due to the use of multivariate analysis.

We found that the structural factor of lack of attachment to a hospital was associated with higher home death rates. This was a new finding. The main reason for this is that the hospital-attached agencies have more accessibility to hospital beds. According to a 2004 nationwide survey on VNA service users who died within 1 month after hospitalization, 67.5% were hospitalized for "treatment of possible sudden change of the condition," and 26.5% were hospitalized for "end-of-life care."[18] Therefore, service users of hospital-attached VNA might be more likely to be admitted to the attached hospital immediately in case of an emergency, and then to die in the hospital. It will be important for future studies to clarify the services provided by VNA attached to hospitals.

Second, we also found that VNA with contractual relationships with local HCSC were associated with higher home death rates, consistent with previous findings.[13] The HCSC have to provide 24-h home-based care services in cooperation with VNA in order to be certified as HCSC. Therefore, the VNA with contracts with HCSC might enable 24-h home end-of-life care in cooperation with the attending physician. In addition, because the HCSC must submit an annual number of patients who died at home to the Japanese government, the HCSC might be quite positive about home deaths.[6] In fact, approximately 80% of the HCSC had some experience in home end-of-life care.[19] The findings of

Table 3 Factors associated with home death rate per visiting nurse agency (n = 69)

	n	Median	25–75%	P-value†
Ownership of the agency				
Medical	34	27.0	14.3–46.2	0.534
Other	35	31.6	21.1–46.2	
No. years since establishment of the agency				
<3 years	6	53.0	21.4–65.7	0.231
≥3 years	61	28.6	18.2–46.2	
Attachment to hospitals				
Yes	36	23.8	14.8–38.6	0.006**
No	33	40.0	25.0–61.7	
Attachment to clinics				
Yes	11	32.3	21.4–65.7	0.223
No	58	29.7	18.2–47.1	
Attachment to long-term care medical treatment facilities				
Yes	10	18.8	0.0–31.6	0.024*
No	59	32.3	20.0–55.6	
Attachment to skilled nursing facilities				
Yes	23	22.2	6.7–37.1	0.030*
No	46	36.2	21.4–55.6	
Attachment to nursing home				
Yes	10	17.7	0.0–25.0	0.052
No	59	32.3	20.0–52.6	
Attachment to care management agencies				
Yes	48	28.0	15.4–45.3	0.150
No	21	40.0	21.4–55.6	
No. nurses converted to regular employees				
<5	51	28.0	15.4–52.6	0.310
≥5	14	31.9	22.6–44.4	
Service provision 24 h a day				
Providing	58	29.1	20.0–50.0	0.750
Not providing	11	44.4	0.0–60.0	
No. service users per nurse converted to regular employees				
<10	16	4.5	2.0–7.5	0.615
≥10	48	4.5	1.5–10.0	
Contract with the HCSC				
Yes	28	36.8	26.1–54.4	0.021*
No	41	22.2	14.3–46.2	
Policy dealing with home end-of-life care				
Anytime	23	28.0	20.0–46.2	0.689
Other	46	31.9	18.2–53.3	
Rate of service users with medical insurance (%)				
<20	44	30.1	15.4–51.3	0.390
≥20	22	34.0	27.3–53.3	
System of coordination with attending physicians				
Good/nearly good	59	31.6	19.0–52.6	0.430
Not good	10	26.1	6.7–50.0	
System of coordination with nurses in healthcare facility				
Good/nearly good	46	27.7	19.0–44.4	0.243
Not good	23	37.5	15.4–55.6	
Frequency of joint meetings with the attending physician				
Almost/modest	20	28.5	20.5–42.6	0.490
Not very well/not at all	48	31.9	16.8–55.6	
Frequency of interactive information exchange with the attending physician				
Almost/modest	48	37.3	20.0–56.3	0.020*
Not very well/not at all	21	22.6	12.5–32.3	

†Wilcoxon rank sum test *P < 0.05 **P < 0.01. HCSC, with home-care supporting clinics.

Table 4 Factors associated with home death rate per visiting nurse agency: A stepwise multiple logistic regression analysis (n = 69)

	Odds ratio	95% Confidence interval	
Attachment to hospital (yes = 1, no = 0)	0.7	0.5	0.9
Attachment to long term care medical treatment facility (yes = 1, no = 0)	0.7	0.4	1.1
Contractual relationship with local HCSC (yes = 1, no = 0)	1.6	1.3	2.1
Interactive information exchange with the attending physician (almost/modest = 1, not very well/not at all = 0)	2.2	1.6	3.1
Hosmer and Lemeshow Goodness of Fit Test	$\chi^2 = 5.597$	$P = 0.347$	

HCSC, with home-care supporting clinics.

the present study suggest that policy makers should promote systematic collaboration between the HCSC and the VNA.

Next, we found that the process factor of interactive information exchange through telephone/face-to-face communication with the attending physician was associated with higher home death rates. No previous studies have investigated this issue. Physician–visiting nurse collaboration is essential, especially in the Japanese home care setting. There are reasons why VNA are organized separately from physician's offices, and methods of collaboration with the attending physician vary depending on the type of medical setting or individual physician.[20] Furthermore, it is important to continue an interactive exchange of information among healthcare professionals about patient health and prognosis, and preferred response in case of emergencies at the end of life.

The present study had several limitations. First, this study was carried out in one prefecture of Japan. At the time of the survey, the number of VNA per 100 000 population in Ibaraki was less than those in Japan overall.[3,7,16] Nevertheless, the nationwide result is not likely to be too different, considering that the rate of home deaths in Ibaraki Prefecture (i.e. 11.4%) was not very different from the national average of 11.9%.[3] In the future, a similar study should be carried out nationwide for verification purposes. Second, the present study did not show what nursing services were provided for end-of-life care. In this respect, a longitudinal study of individual VNA service users will be necessary.

In conclusion, it is important to establish home-based health delivery systems promoting the HCSC to provide home end-of-life care services effectively with systems to interactively share information between the visiting nurse and the attending physician in order to increase the rate of home deaths per VNA.

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Disclosure statement

The authors have no conflicts of interest to declare.

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