

Title: Association between long-term care insurance certification and early home-visit nursing frequency in older patients with heart failure in Japan

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Declaration of conflicting interest

The authors declare no conflicts of interest related to this work.

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Ethical approval and informed consent statements

This study was approved by the Ethics Committee of the Japan Association for Home Care Medicine (Approval No. 2024-01). As this was a retrospective study, information regarding the study was posted on the facility's website in accordance

with the opt-out policy, and informed consent was deemed not required.

Data availability statement

The datasets generated and analyzed during the current study are not publicly available because of institutional policy but are available from the corresponding author upon reasonable request.

Abstract

Home-visit nursing can reduce early readmissions and improve quality of life in older patients with heart failure (HF). In Japan, allocation of home-visit nursing often depends on Long-Term Care Insurance (LTCI) certification, which is determined primarily by functional status within budgets. This study examined whether LTCI certification is associated with the frequency of early home-visit nursing. We retrospectively analyzed 88 patients with HF who initiated home-visit nursing at a single agency between 2014 and 2024. The outcome was the number of visits within the initial two weeks comparing patients with and without LTCI.

Negative binomial regression estimated incidence rate ratios (IRR), adjusting for age, sex, activities of daily living (ADL), physician-issued special direction, and eligibility under Separate Tables 7 and 8 of the medical insurance system. The median age was 86 years [IQR 82–90], and 74 patients (84.1%) were LTCI-certified. Cross-tabulation showed no significant association between LTCI certification and ADL level ($\chi^2 = 6.60$, $df = 3$, $p = 0.086$). LTCI certification was associated with fewer visits (IRR = 0.67, 95% CI 0.49–0.91, $p = 0.011$). Compared with ADL “independent,” the “bed-bound” category received more visits (IRR = 1.99, 95% CI 1.28–3.10, $p = 0.002$). Physician-issued special direction was associated with higher visit frequency (IRR = 3.39, 95% CI 2.59–4.48, $p < 0.001$). These findings suggest that function-based, budget-capped frameworks may under-allocate nursing intensity for medically complex HF patients. Aligning visit planning with medical risk in the early post-discharge period may improve equity and care quality.

Keywords

Heart failure; Home-visit nursing; Long-Term Care Insurance; Activities of daily living; Healthcare policy; Resource allocation

Introduction

Heart failure (HF) remains a major public health challenge worldwide. Recent reviews estimate that > 64 million people live with HF globally, and although incidence appears stable or declining in some high-income settings, prevalence continues to increase because of population aging and improved survival from cardiovascular disease.¹ Japan, one of the most rapidly super-aged societies, is experiencing a similar trend. Contemporary data show high HF burden in older adults—for example, a regional population-based study reported a mean age of 82 years among first HF hospitalizations and an age-adjusted incidence of 105 per 100,000 person-years.² National claims analyses further suggest that HF prevalence increased in Japan between 2014 and 2019, highlighting the need for scalable post-discharge management in community settings.³

Home-visit nursing supports monitoring, early detection, education, and end-of-life care.⁴ Early home-visit nursing reduces readmissions and improves quality of life.⁵ Because readmission and mortality peak shortly after discharge, the early post-discharge period is critical for timely, intensive nursing input.^{6,7} Several studies have emphasized that this immediate post-discharge “vulnerable phase”

requires close monitoring and timely intervention.^{8,9} Home-visit nursing can provide medication management, fluid balance monitoring, and patient education, which have been shown to decrease early readmissions and mortality.⁹

To situate this study within the existing evidence, we conducted a focused literature search in PubMed using the keywords “home-visit nursing,” “home health care,” “heart failure,” and “Japan,” without restriction on publication year. Six relevant studies were identified, most of which described interprofessional collaboration programs or transitional care initiatives under the Long-Term Care Insurance (LTCI) framework in Japan.^{10,11} These studies have demonstrated benefits in readmission reduction among older adults with HF, but none examined the association between LTCI certification and the actual intensity of nursing visits. In contrast, a U.S. home health study reported that higher visit intensity predicted greater improvement in ADL and dyspnea status among HF patients.¹² In Japan, relatively short hospital stays further emphasize the need to bridge inpatient and community care through early home-visit nursing. However, home-visit nursing is provided under medical insurance or LTCI, which decreases out-of-pocket costs but constrains visit volume under capped budgets.¹³ LTCI needs certification is largely based on a standardized, function-focused, computer-aided assessment

reviewed by municipal committees,^{14,15} so allocation is tied to functional status rather than medical complexity. Activities of Daily Living (ADL) impairment increases hospitalization risk; however, Nguyen, Dang, Burns, et al.¹⁶ reported that 24.8% of patients without ADL impairment were also hospitalized, indicating that functional assessments alone may miss clinically important needs. This pattern is consistent with policy priorities that have emphasized cost containment within LTCI.¹⁷

Japan's LTCI framework allows for additional nursing visits under special provisions (Separate Table 7 for specified diseases and Separate Table 8 for specified medical conditions within the medical insurance system). However, their actual applicability is limited, and their relevance to HF care remains under-explored.¹⁸ Agency- and system-level constraints under LTCI tariffs have also been described, including closures of home-visit nursing agencies and muted uptake relative to social care services.¹⁹ Therefore, this study examined the association between LTCI certification and the number of home-visit nursing visits during the initial two weeks after service initiation in patients with HF, hypothesizing that LTCI-certified patients would receive fewer visits than their non-certified counterparts even after adjusting for ADL.

Methods

Study Design and Setting

This retrospective study was conducted at the Nana-r Home-Visit Nursing Station, Osaka, Japan. It analyzed patients whose physician-issued instructions listed HF as a diagnosis and who initiated home-visit nursing at a single station between 2014 and 2024, excluding those with no visits or services ending within two weeks.

LTCI in Japan

Japan introduced a government-sponsored LTCI system in 2000 to provide universal coverage for long-term care needs among older adults. Individuals aged ≥ 65 years and those aged 40–64 years with age-related diseases are eligible for services based on certified care-need levels. Certification is not automatic; individuals must apply to their municipal government to undergo a standardized assessment of physical and cognitive function. LTCI covers a wide range of services, including home-visit nursing, personal care, day services, short-stay respite care, rehabilitation, and institutional care. Services are provided through

municipal governments and financed by both taxes and insurance premiums.

Consequently, some older adults with mild or moderate functional decline may remain uncertified if they have not applied for LTCI benefits. The LTCI system was designed to shift care from family-based support to social solidarity and to integrate long-term medical and welfare services.²⁰

Sampling

During the study period (2014–2024), a total of 730 patients completed home-visit nursing services at the Nana-r Home-Visit Nursing Station. Among them, 96 patients (13.2%) had HF listed as a diagnosis on their physician-issued home-visit nursing instructions. After excluding patients with no visits or those whose services ended within two weeks, 88 patients (91.7% of those with HF diagnoses) were included in the final analysis.

Variables

Patient characteristics included age, sex, LTCI certification status, ADL, physician-issued special direction for intensive nursing care, and eligibility under Separate Table 7 (special categories for specified diseases) and Separate Table 8

(special categories for specified medical conditions) of the Japanese medical insurance system. ADL was categorized into four groups: Independent (Levels 1–2), House-bound (Levels 3–4), Chair-bound (Levels 5–6), and Bed-bound (Levels 7–8). These categories were based on the physician’s functional assessment documented on the initial home-visit nursing order at service initiation. The outcome variable was the number of home-visit nursing visits within the initial two weeks after initiation. LTCI certification status was defined based on whether patients had an active Long-Term Care Insurance certification at the time of service initiation, as confirmed in the physician-issued home-visit nursing order and agency records.

Statistical Analysis

Descriptive statistics were expressed as medians [IQR] or percentages. Patients were divided into two groups according to LTCI certification status (with and without LTCI). The association between LTCI certification and ADL category was examined using the chi-square test. The relationship between LTCI certification and the number of home-visit nursing visits was analyzed using negative binomial regression, as likelihood ratio testing indicated over-dispersion (LRT $\chi^2 = 27.42$, df

= 1, $p < 0.001$). No multicollinearity was detected (all variance inflation factors <

2). Explanatory variables included LTCI certification, age, sex, ADL category, special direction, and Separate Tables 7 and 8 eligibilities.

Results are presented as incidence rate ratios (IRR) with 95% confidence intervals (CI), derived from exponentiated regression coefficients, along with p-values. Statistical significance was set at 0.05. Model fit was assessed using Akaike Information Criterion (AIC) and McFadden's R^2 . There were no missing data in the variables used for analysis. Analyses were performed using Python version 3.11.

Results

A total of 88 patients were analyzed. Patients were compared according to LTCI certification status (with and without LTCI). The median age was 86 years [IQR: 82–90], and the median number of home-visit nursing visits during the initial two weeks was 5 [IQR: 2–10]. Among the patients, 74 (84.1%) were certified for LTCI (Table 1). The cohort included 41 males (46.1%). Forty patients (44.9%) received physician-issued special directions. Eligibility under Separate Table 7 and Separate Table 8 was observed in 10 (11.2%) and 33 (37.1%) patients, respectively.

Regarding ADL, 19 (21.6%) were Independent, 43 (48.9%) House-bound, 19

(21.6%) Chair-bound, and 8 (9.1%) Bed-bound. Patients without LTCI certification tended to have more visits in the initial two weeks (median 8 [IQR: 4–14]) compared with those with certification (median 4 [IQR: 2–8]). The distribution of other baseline characteristics was broadly similar between groups (Table 1).

Cross-tabulation analysis indicated no significant association between LTCI certification and ADL level ($\chi^2 = 6.60$, $df = 3$, $p = 0.086$). Negative binomial regression analysis revealed that LTCI certification was associated with a significantly lower number of home-visit nursing visits (IRR = 0.67, 95% CI: 0.49–0.91, $p = 0.011$) (Table 2). Compared to patients classified as “Independent” in ADL, those classified as “Bed-bound” received significantly more visits (IRR = 1.99, 95% CI: 1.28–3.10, $p = 0.002$). Special direction was also strongly associated with a higher number of visits (IRR = 3.39, 95% CI: 2.59–4.48, $p < 0.001$).

Other variables, including age, sex, and Separate Table 8 eligibility, were not significantly associated with visit frequency. Separate Table 7 eligibility showed a trend toward higher visit frequency (IRR = 1.40, 95% CI: 0.97–2.03, $p = 0.072$), though this did not reach statistical significance. Model fit was acceptable (AIC = 449.82; McFadden’s pseudo- $R^2 = 0.181$).

Discussion

This study demonstrated that LTCI certification was associated with fewer home-visit nursing visits in the initial two weeks of care for older patients with HF, even after adjusting for ADL. This potentially reflects constraints of the capped LTCI budgets, limiting the number of nursing visits or leading to different resource allocation.

Policy and system-level implications

Our finding that LTCI-certified patients received fewer early home-visit nursing visits can be understood in light of how services are planned once certification is granted. The Japanese LTCI system, introduced in 2000, was designed to finance home- and community-based services with benefit entitlements determined mainly by functional status rather than acute medical risk.²¹ While the program substantially reduces out-of-pocket costs, services are delivered within budget ceilings, and plans often allocate hours across multiple long-term care modalities (personal care, day services, etc.), which may limit the intensity of nursing visits even when medical needs are high.²² Evaluations of LTCI use also suggest that service ceilings can constrain intensity for certified enrollees, regardless of clinical

complexity.²³ In contrast, patients without LTCI certification more commonly rely on the medical insurance pathway, which routinely allows up to three visits per week, and can be further extended with physician-issued special directions. By comparison, certified patients receive services mainly within LTCI, where visit frequency is constrained by functional status-based care plans and budget ceilings. In conditions such as HF, where medical needs are high but ADL impairment is modest, this framework may result in fewer visits unless temporary increases are authorized through physician orders. This structural difference helps explain why certified patients in our study received fewer visits, whereas non-certified patients were more likely to receive intensive early nursing. There have been reports of patients with advanced medical needs, such as continuous intravenous catecholamine infusion, receiving home-visit nursing under the medical insurance system without applying for LTCI.²⁴

Many HF patients are functionally independent but still require close monitoring. Although impaired ADL is associated with worse outcomes, Nguyen, Dang, Burns, et al.¹⁶ reported that about one-quarter of patients without ADL impairment were also hospitalized. In our sample, even among non-certified patients, a considerable proportion were Chair- or Bed-bound. This suggests that

certification based mainly on function may not adequately reflect true medical need. Earlier policy analyses have noted that LTCI's orientation toward cost control and standardized benefits can limit flexibility to respond to short-term medical risks.¹⁷ The observed increase in visits under physician-issued special directions in our cohort further suggests that the medical insurance system temporarily compensates for this gap, but such compensation is not systematically guaranteed.

From a broader policy perspective, aligning visit allocation more closely with medical complexity—especially in the early post-discharge window—could help reduce under-provision among LTCI-certified patients. This could include adjustments to certification criteria, or better coordination between physician-issued special directions and LTCI care plans. International evidence supports this approach: in the U.S., HF patients who utilized post-discharge home health care had more favorable outcomes,²⁵ and models of high-value home health care emphasize early, intensive visits to optimize outcomes and cost-effectiveness.²⁶ Comparative analyses similarly emphasize that when long-term care systems prioritize functional status over clinical severity, medically complex patients may be underserved.^{22,27} Adjusting LTCI to account for medical risk could therefore

ensure more equitable and clinically appropriate allocation of nursing visits.

Clinical Implications

This study has several implications for clinical practice in home-visit nursing for HF. Adequate visit frequency in the early post-discharge period is critical, as nurse-led programs focusing on close monitoring and education in the first weeks have been associated with improved outcomes.^{7,28} Our findings indicate that when visit numbers are constrained by LTCI certification, important opportunities for intensive follow-up may be missed.

Individualized assessment beyond functional status is also needed. Many patients remain functionally independent yet have high medical risk; structured home-health interventions tailored to clinical complexity can reduce unnecessary hospital use.^{26,29} Integrating clinical risk into visit planning may better align resources with patient needs.

Finally, the interplay between medical insurance and LTCI suggests that bridging mechanisms are needed to avoid gaps in service delivery. Temporary increases in visit frequency through physician-issued special directions may compensate for LTCI limitations, but they are not a sustainable solution.

Strengthening coordination between medical and long-term care frameworks may help ensure continuous and appropriate nursing support for patients with both medical and functional needs, consistent with work showing that structured linkages between healthcare and long-term care systems can address fragmentation in Japan.³⁰

Limitations and Future Directions

This study has several limitations that should be considered when interpreting the findings. It was conducted at a single site with a relatively small sample, which limits generalizability. However, the demographic profile of our participants appears broadly consistent with national data. Large Japanese registry studies have shown that the mean age at hospitalization for HF is approximately 80 to 82 years, with a nearly equal sex distribution.^{31,32} Although these figures represent in-hospital populations, the age profile is likely similar to that of patients requiring home-visit nursing after discharge, given that such services are typically introduced in advanced stages of chronic HF. Although national statistics directly comparing LTCI-certified and non-certified home-visit nursing users are limited, administrative data under the LTCI system indicate that circulatory diseases

account for a substantial proportion of certified care recipients, suggesting that our sample composition is broadly consistent with national patterns of care needs among older adults with HF.¹⁸ Our analysis focused on the first two weeks of home-visit nursing, a critical post-discharge period, but did not capture longer-term outcomes such as readmission or mortality. In addition, important clinical factors—including HF severity, medication management, and cognitive function—were not available. Prior research has shown that cognitive impairment is associated with greater intensity of home health services,^{33,34} suggesting that omission of cognitive data may have biased our estimates toward underestimating, rather than overestimating, the association between LTCI certification and visit frequency. We also could not observe the use of other long-term care services under LTCI (e.g., personal care, day services, rehabilitation). Such services could substitute for or complement nursing within benefit ceilings and thereby influence visit counts; if certified patients received more non-nursing services, the estimated association may partly reflect cross-service substitution rather than nursing needs alone. We also did not assess the content or quality of nursing visits, which may differ even if visit counts are similar.

Despite these limitations, the findings highlight an important structural gap

between functional-status–based certification and medical need. Addressing this will require larger and more comprehensive studies. Prospective multicenter research could help disentangle causal effects and capture patient outcomes beyond visit counts. Combining home-visit nursing records with LTCI claims for other services would enable quantification of substitution or complementarity across service types, and national health or long-term care insurance datasets could then be used to examine policy changes over time and across regions. Moreover, establishing large-scale registries of home-visit nursing in HF—incorporating functional, cognitive, and clinical data—would provide the evidence base needed to guide integration of medical and long-term care systems. Such efforts could clarify how visit allocation translates into patient outcomes and inform more flexible policies that align services with both medical and functional needs.

Conclusions

LTCI certification was independently associated with fewer home-visit nursing visits among older patients with HF. These findings suggest that the current framework, with its functional status-based assessments and capped budgets, may not fully accommodate the medical complexity of this population. Policy reforms,

including revising eligibility for Separate Tables 7 and 8 and integrating medical complexity into certification, may support more equitable and clinically appropriate access to home-visit nursing.

Statements and declarations

Ethical considerations

This study was approved by the Ethics Committee of the Japan Association for Home Care Medicine (Approval No. 2024-01). As this was a retrospective study, information regarding the study was disclosed on the facility's website in accordance with the opt-out policy, and informed consent was waived.

Consent to participate

Not applicable.

Consent for publication

Not applicable.

Declaration of conflicting interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding statement

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Data availability

The datasets generated and analyzed during the current study are not publicly available because of institutional policy but are available from the corresponding author upon reasonable request.

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Tables

Table 1. Characteristics of participants according to LTCI certification status

	All (n = 88)	With LTCI certification (n = 74)	Without LTCI certification (n = 14)
Age (years)	86 [82-90]	86 [82-90]	85 [73-89]
Number of home-visit nursing visits (initial 2 weeks)	5 [2-10]	4 [2-8]	8 [4-14]
Male, n (%)	41 (46.1%)	35 (46.7%)	6 (42.9%)
Special direction, n (%)	40 (44.9%)	32 (42.7%)	8 (57.1%)
Separate Table 7 applicable, n (%)	10 (11.2%)	7 (9.3%)	3 (21.4%)
Separate Table 8 applicable, n (%)	33 (37.1%)	24 (32.0%)	9 (64.3%)
ADL, n (%)			
Independent	19 (21.6%)	13 (17.3%)	6 (42.9%)
House-bound	43 (48.9%)	40 (53.3%)	3 (21.4%)
Chair-bound	19 (21.6%)	16 (21.3%)	3 (21.4%)
Bed-bound	8 (9.1%)	6 (8.0%)	2 (14.3%)

Abbreviations: ADL, activities of daily living; LTCI, Long-Term Care Insurance.

ADL was categorized into four groups for reporting simplicity: Independent (Levels 1–2), House-bound (Levels 3–4), Chair-bound (Levels 5–6), and Bed-bound (Levels 7–8).

“Special direction” indicates physician-issued instructions for intensive home-visit nursing.

“Separate Table 7” and “Separate Table 8” reflect criteria under the Japanese medical insurance system for enhanced home-visit nursing.

Data are presented as median [interquartile range] or n (%).

Table 2. Associations between LTCI certification and the number of home-visit nursing visits within the initial 2 weeks:

Negative binomial regression analysis

Variables	IRR (95% CI)	Coefficient (β)	p-value
LTCI certification (Yes vs No)	0.67 (0.49–0.91)	−0.40	0.011
ADL (House-bound vs Independent)	0.97 (0.70–1.34)	−0.03	0.867
ADL (Chair-bound vs Independent)	1.26 (0.87–1.82)	0.23	0.220
ADL (Bed-bound vs Independent)	1.99 (1.28–3.10)	0.69	0.002
Age (Years)	0.99 (0.98–1.00)	−0.01	0.173
Sex (Male)	1.17 (0.90–1.51)	0.16	0.233
Special direction (Yes vs No)	3.39 (2.59–4.48)	1.22	< 0.001
Separate Table 7 applicable (Yes vs No)	1.40 (0.97–2.03)	0.34	0.072
Separate Table 8 applicable (Yes vs No)	0.90 (0.69–1.19)	−0.10	0.480

Abbreviations: LTCI, Long-Term Care Insurance; ADL, activities of daily living; IRR, incidence rate ratio; CI, confidence interval.

ADL was categorized into four groups for reporting simplicity: Independent (Levels 1–2), House-bound (Levels 3–4), Chair-bound (Levels 5–6), and Bed-bound (Levels 7–8).

“Special direction” indicates physician-issued instructions for intensive home-visit nursing.

“Separate Table 7” and “Separate Table 8” reflect criteria under the Japanese medical insurance system for enhanced home-visit nursing.

Data are presented as median [interquartile range] or n (%).

Negative binomial regression was performed because of overdispersion. “Yes vs No” indicates the presence or absence of the factor. Coefficients represent log count estimates. Model fit: AIC = 449.82; McFadden’s pseudo- $R^2 = 0.181$.