

# The medical treatment needs and in-home care service utilization of the elderly: a population-based data analysis of long-term care insurance payments in Tokyo, Japan

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## Abstract

How can we improve in-home care for the elderly with medical treatment needs? The purpose of this study is to investigate medical treatment and examine the use of home care services. We analyzed the long-term care insurance service payments data in City A (n=18,882) as of January 2019 and checked 12 medical treatment care need items. The results showed that 10.1% (1913 of a total of 18,882) of people required medical treatment. The analysis was carried out by using a filter, "living in home" (n=15,320). We focused on urinary catheter and tube feeding. The study subjects are categorized into three groups: group 1 [both tubes (n=61)], group 2 [either tube (n=564)], and group 3 [no tube (n=14,698)]. The home help utilization rate was 27.9% in group 1, 29.9% in group 2, and 20.5% in group 3 (p<0.01). The home visit nursing utilization rate was 11.5% in group 1, 23.7% in group 2, and 8.1% in group 3 (p<0.01).

## Introduction

Japan is an aging society. The country's population exceeded the 125 million mark as of 2021. The elderly population was recorded at 36.2 million, which is approximately 29% of the total population.<sup>1</sup> This is the highest number in the world (according to the Ministry of Internal Affairs and Communication). The Long-Term Care Insurance Law (LTCI) was established in 2000. LTCI is public health insurance that covers all residents over 65 years of age. The system is managed by the local governments. LTCI was designed based on a private business model, yet it is managed publicly.<sup>2-5</sup> Many studies have been conducted on long-term care insurance payments.<sup>6-10</sup> However, we could not find any previous studies that analyzed which long-term care insurance service payments are used by those who require medical treatment care and how their care status and in-home service utilization overlapped. The LTCI long-term care certification process is as follows. The people who want to use LTCI services apply through the local government. An investigator (a specialist from the local government staff) visits the elderly person and assesses their care needs for long-term care by using a 74-item checklist, including 12 items of medical treatment. If we can analyze big assessment data, it is possible to determine the number of people by type of medical treatment, their place of residence, and the services they use. The unique feature of this study is that it analyzed all long-term care payments through a population-based analysis to determine the

current situation of people with medical treatment needs.<sup>11,12</sup> The number of elderly people requiring medical treatment has been increasing. The World Health Organization reports the concept of promoting the elderly living in their own house independently and comfortably as long as possible.<sup>13</sup> If medical treatment and social care are delivered at home, the elderly can stay home rather than relocate to specialized care institutions.

The Tokyo Metropolitan Government is a regional-encompassing government. Tokyo consists of 23 special local government wards and 39 municipalities, including islands. City A is one of the 23 special local government wards in Tokyo. The total population of Tokyo was approximately 13.1 million in 2019. The total population of City A was 351,976; the elderly population was 87,760, and the percentage of the elderly was 24.9% in January 2019.

We examined the current situation of medical-treatment care needs on a large scale by utilizing a population-based data analysis of all long-term care insurance payments data in City A (n=18,882) as of January 2019.

## Research questions

The research questions are: i) what are the medical treatment needs of the elderly certified as LTCI service users?; ii) what is the service utilization rate of home nursing, home help, and daycare?; iii) is the higher the level of medical dependency, the higher the rate of in-home service use?

## Materials and Methods

### Created data set for analysis

The target population consists of all users of long-term care insurance with valid certification as of January 2019 in City A, Japan (n=18,882). The data set was created for analysis in research cooperation with the local governments of City A. Long-term care insurance IDs were converted into dummy IDs, and data was anonymized to protect personal information by City A.

The care level is divided into seven stages as follows: “support 1,” “support 2,” “care 1,” “care 2,” “care 3,” “care 4,” and “care 5.” Medical treatment care consists of care provided to people who have been checked for 12 medical care needs items based on their latest certification of long-term care insurance: i) urine catheter; ii) pressure sore; iii) stoma; iv) monitoring measurement (blood pressure, heart rate, oxygen saturation); v) respirator; vi) tracheostomy; vii) tube feeding; viii) oxygen; ix) central venous nutrition; x) injection; xi) dialysis; xii) palliative care.<sup>11,12</sup>

Residence place consists of six codes: “in-home,” “nursing home,” “health facility,” “elderly home,” “sanatorium type ward,” and “new health facility.” Relevant City A codes were entered according to the long-term care insurance facility numbers. However, City A could not identify hospital codes due to the long-term care insurance and medical insurance being managed independently. Hence, in this study, those who could not specify their place of residence were assumed to be living at home. It is also possible that some of the people assigned the code “in-home” might be in the hospital.

In-home care service consists of three services: home help, home visit nursing, and daycare. We calculated the total frequency with which the service was used in one month, January 2019. The service frequency was identified by the long-term care service payment dates provided by the city. About daycare, we added daycare in a nursing home and daycare in a health facility, which were combined to form daycare. We entered data on 12 types of in-home

services, but for this study, we focused our analysis on three types of in-home services, as previously stated.

## Statistical analysis

The basic demographics of long-term care service users in City A were analyzed to determine the number of people based on the medical treatment they received. In addition, a cross-tabulation was conducted according to medical treatment items, place of residence, and care levels. Next, we focused on the most common medical treatment, “urinary catheter,” and the second medical treatment, “tube feeding.” The study subjects are categorized into three groups, as follows: i) group 1 (those who utilized both a urine catheter and tube feeding); ii) group 2 (those who utilized either a urine catheter or tube feeding); iii) group 3 (those who did not utilize either a urinary catheter or tube feeding). We carried out this procedure by using group analysis about the service utilization rate of home help, home visit nursing, and daycare. In addition, we calculated the total frequency with which the service was used in one month. The basic characteristics were compared with the Chi-square test. Windows edition SPSS 29.0 (IBM, Armonk, NY, USA) was used for the statistical analysis, and the significance level was determined to be less than 1%.

## Ethical considerations

This study was approved through an ethical review by the ethics committee of Toyo University (approval number L2020-005S). Given the research cooperation with the local governments of City A, the data were anonymized to protect the identities of the subjects.

## Results

### Place of residence by level of care

The number of people who assigned their residence place code as “in-home” was 15,320 (81.1%) out of 18,882. In-home, a breakdown by the level of care shows “support 1” and “support 2” were about 44%, “care 1” and “care 2” were about 33%, and “care 3” above was about 23% (Table 1).

### Number of people in need of medical treatment care

We calculated the number of people in need of medical treatment who have been checked for 12 items based on their latest certification of LTCI. The analysis revealed that there were 1913 subjects with medical treatment needs, which was 10.1% (n=1913) of the total number of respondents (n=18,882). Where do people with medical care needs live? The results are as follows: in-home 77.8% (n=1488), nursing home 7.9% (n=152), health facility 4.0% (n=77), elderly home 7.9% (n=152), sanatorium ward 1.9% (n=37), new health facility 0.4% (n=7) (Table 2).

## Medical treatment needs

Multiple responses for the items indicating medical treatment and care needs were calculated. The total number of people counted for the items of medical treatment care was 2612 (total number of duplicate medical needs). 77.8% (n=1488) of the respondents lived at home. The breakdown of medical treatment numbers is listed as follows: 417 urinary catheters, 341 dialysis, 267 oxygen, 266 tube feeding, 264 pressure sores, 176 monitor measurements, 89 central intravenous feeding, 89 infusions, 85 stomas, 28 respirators, and 23 palliative care (Table 3).

**Table 1.** Place of residence by level of care.

	Total (%)	In-home (%)	Nursing home (%)	Health facility (%)	Elderly home (%)	Sanatorium ward (%)	New health facility (%)
Total	18,882 (100)	15,320 (81.1)	1567 (8.3)	584 (3.1)	1333 (7.1)	70 (0.4)	8 (0)
<b>Breakdown by the level of care</b>							
Support 1	4260 (22.6)	4164 (27.2)	0 (0)	0 (0)	96 (7.2)	0 (0)	0 (0)
Support 2	2677 (14.2)	2595 (16.9)	0 (0)	0 (0)	82 (6.2)	0 (0)	0 (0)
Care 1	3233 (17.1)	2868 (18.7)	29 (1.9)	82 (14)	253 (19)	1 (1.4)	0 (0)
Care 2	2608 (13.8)	2195 (14.3)	72 (4.6)	95 (16.3)	246 (18.5)	0 (0)	0 (0)
Care 3	2092 (11.1)	1359 (8.9)	406 (25.9)	131 (22.4)	190 (14.3)	5 (7.1)	1 (12.5)
Care 4	2364 (12.5)	1259 (8.2)	577 (36.8)	186 (31.8)	303 (22.7)	37 (52.9)	2 (25.0)
Care 5	1648 (8.7)	880 (5.7)	483 (30.8)	90 (15.4)	163 (12.2)	27 (38.6)	5 (62.5)
Total	18,882 (100)	15,320 (100)	1567 (100)	584 (100)	1333 (100)	70 (100)	8 (100)

**Table 2.** Residence of people with medical treatment care needs.

<b>Medical treatment needs</b>			
Total	Yes, people with medical treatment needs who have been checked for the 12 items based on their latest certification of LTCI (%)		No (%)
Total	18,882	1913 (10.1)	16,969 (89.9)
<b>Breakdown by place of residence</b>			
In-home	15,320	1488 (77.8)	13,832 (81.5)
Nursing home	1567	152 (7.9)	1415 (8.3)
Health facility	584	77 (4)	507 (3)
Elderly home	1333	152 (7.9)	1181 (7)
Sanatorium ward	70	37 (1.9)	33 (0.2)
New health facility	8	7 (0.4)	1 (0)

LTCI, Long-Term Care Insurance Law.

**Table 3.** Characteristics by item of medical treatment care and place of residence.

	Total	In-home (%)	Nursing home (%)	Health facility (%)	Elderly home (%)	Sanatorium ward (%)	New health facility (%)
Total	1913	1488	152	77	152	37	7
Urinary catheters	559	417 (74.6)	52 (9.3)	28 (5)	53 (9.5)	8 (1.4)	1 (0.2)
Pressure sore	370	264 (71.4)	51 (13.8)	16 (4.3)	30 (8.1)	5 (1.4)	4 (1.1)
Stomas	105	85 (81)	6 (5.7)	3 (2.9)	10 (9.5)	0 (0)	1 (1)
Monitor (BP, pulse, pO <sub>2</sub> )	197	176 (89.3)	9 (4.6)	2 (1)	7 (3.6)	3 (1.5)	0 (0)
Respirators	29	28 (96.6)	0 (0)	0 (0)	1 (3.4)	0 (0)	0 (0)
Tracheotomy	60	57 (95)	0 (0)	0 (0)	3 (5)	0 (0)	0 (0)
Tube feeding	413	266 (64.4)	37 (9)	34 (8.2)	43 (10.4)	31 (7.5)	2 (0.5)
Oxygen	299	267 (89.3)	10 (3.3)	1 (0.3)	19 (6.4)	2 (0.7)	0 (0)
Central intravenous nutrition	98	89 (90.8)	3 (3.1)	0 (0)	6 (6.1)	0 (0)	0 (0)
Injections	98	89 (90.8)	3 (3.1)	0 (0)	6 (6.1)	0 (0)	0 (0)
Dialysis	360	341 (94.7)	2 (0.6)	5 (1.4)	12 (3.3)	0 (0)	0 (0)
Palliative care	24	23 (95.8)	0 (0)	0 (0)	1 (4.2)	0 (0)	0 (0)

BP, blood pressure; pO<sub>2</sub>, partial pressure of oxygen.

## Three-group classification by urinary catheter and tube feeding

The analysis was carried out by using a filter, “living in home” (n=15,320). All subjects lived in their homes with care levels ranging from “support 1”, “support 2” and “care 1” to “care 5.” The target population is people who require medical treatment, with a special focus on those who utilize urinary catheters and tube feeding. We thought it was important to focus on the daily lives of those who use two tubes for eating and toileting. They eat breakfast, lunch, and supper, and drink water through the tube instead of their mouth, and they output urine through a catheter as they cannot use a toilet or diaper. With two tubes always kept in their bodies, they need a lot of nursing support to move, wash, change clothes, and bathe. Are the people who use these two tubes receiving the social services they need? We decided to find out how much home helpers, home nursing, and daycare are being used. The target population was classified into three categories: group 1 (both tubes) consists of 61 people who used both tubes; ii) group 2 (either tube) comprises 561 people who used either urinary catheters (n=356) or tube feeding (n=205); iii) group 3 (no tube group) counts 14,698 people who did not use either urinary catheters or feeding tubes (Figure 1).

## Service utilization of “home help”, “home visit nursing” and “daycare” by group analysis

### Home help utilization rate

Of the total respondents [“living in home” (n=15,320)], 20.9% (n=3202) used home help. The home help utilization rate was 27.9% in group 1, 29.9% in group 2, and 20.5% in group 3 (p<0.001). The results showed that only 17 people of the 61 people in group 1 were using home help services. The breakdown in group 1 shows that 10 people used home help between 1-4 times in a month, and 7 people used it 5-8 times in a month. The statistical result showed that 44 people in group 1 were not home-help users. A Chi-square test was used to calculate the home help utilization rate in the 3-category group, and the result revealed significant differences [ $\chi^2(2)=30.802$ , p<0.001] (Table 4).

### Home visit nursing utilization rate

Of the total respondents [“living in home” (n=15,320)], 8.7% (n=1336) used home visit nursing. The home visit nursing utilization rate was 11.5% in group 1, 23.7% in group 2, and 8.1% in group 3 (p<0.001). The results showed that only 7 (11.5%) out of 61 people in group 1 were using home visit nursing despite having double tubes. Some of them may have been hospitalized. In group 2, 23.7% of people (n=133) used home visit nursing. However, the results showed that the utilization rate of home visit nursing is quite low. We conducted a Chi-square test for the home visit nursing utilization rate in the 3-category group, and the results revealed significant differences [ $\chi^2(2)=165.15$ , p<0.01] (Table 5).

### Daycare utilization rate

Of the total respondents [“living in home” (n=15320)], 21.6% (n=3313) used daycare. The daycare utilization rate was 9.8% in group 1, 17.8% in group 2, and 21.8% in group 3 (p<0.006). The utilization rate of daycare decreased with the medical treatment needs. After a Chi-square test for the daycare utilization rate in the 3-category group, the result revealed significant differences.

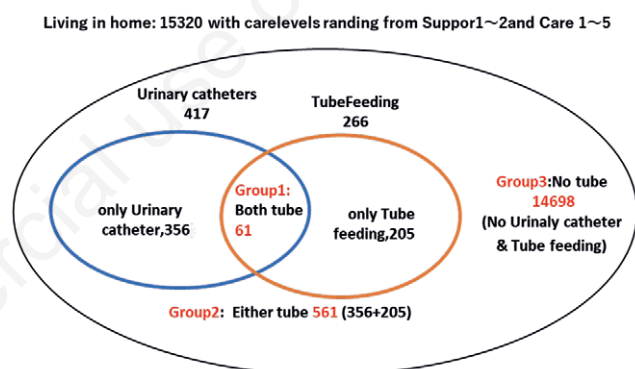


Figure 1. Grouping map.

Table 4. Home help utilization rate.

Home help	Living in home: total 15,320			Home help: number of services used in a month						
	No (%)	Yes (%)	Total (%)	0 (%)	1-4 (%)	5-8 (%)	9-12 (%)	13-16 (%)	≥17 (%)	Total (%)
Total	12,118 (79.1)	3202 (20.9)	15,320 (100)	12,118 (79.1)	2526 (16.5)	578 (3.8)	61 (0.4)	16 (0.1)	21 (0.1)	15,320 (100)
Group 1	44 (72.1)	17 (27.9)	61 (100)	44 (72.1)	10 (16.4)	7 (11.5)	0 (0)	0 (0)	0 (0)	61 (100)
Group 2	393 (70.1)	168 (29.9)	561 (100)	393 (70.1)	102 (18.2)	55 (9.8)	6 (1.1)	4 (0.7)	1 (0.2)	561 (100)
Group 3	11,681 (79.75)	3017 (20.5)	14,698 (100)	11,681 (79.75)	2414 (16.4)	516 (3.5)	55 (0.4)	12 (0.1)	20 (0.1)	14,698 (100)
$\chi^2(2)=30.802$ , p<0.001				$\chi^2(10)=101.455$ , p<0.001						

Table 5. Home visit nursing utilization rate.

Home visit nursing	Living in home: total 15,320			Home visit nursing: number of services used in a month					
	No (%)	Yes (%)	Total (%)	0 (%)	1-4 (%)	5-8 (%)	9-12 (%)	13-16 (%)	Total (%)
Total	13,984 (91.3)	1336 (8.7)	15,320 (100)	13,984 (91.3)	1196 (7.8)	132 (0.9)	7 (0)	1 (0)	15,320 (100)
Group 1	54 (88.5)	7 (11.5)	61 (100)	54 (88.5)	5 (8.2)	2 (3.3)	0 (0)	0 (0)	61 (100)
Group 2	428 (76.3)	133 (23.7)	561 (100)	428 (76.3)	94 (16.8)	39 (7)	0 (0)	0 (0)	561 (100)
Group 3	13,502 (91.9)	1196 (8.1)	14,698 (100)	13,502 (91.9)	1097 (7.5)	91 (0.6)	7 (0)	1 (0)	14,698 (100)
$\chi^2(2)=165.15$ , p<0.001				$\chi^2(8)=330.188$ , p<0.001					



However, the analysis of the total frequency with which that service was used in one month showed no significant differences.

## Discussion

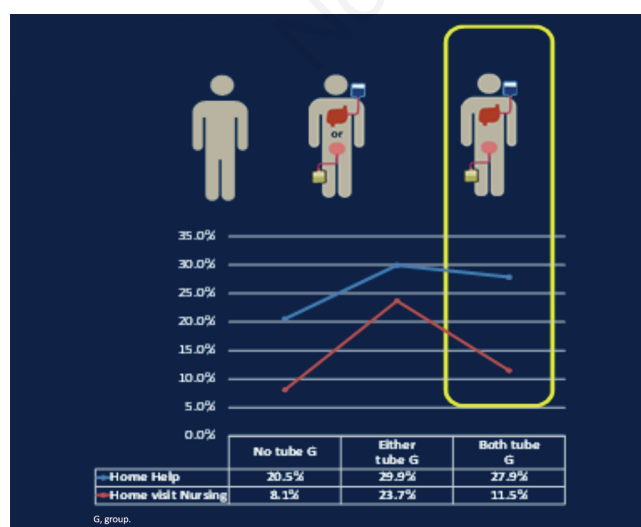
### Medical care needs and home care utilization rate

Of the total home help utilization rate in this research, 20.9% were respondents (3202 people out of 15,320) who were LTCI-certified and living at home. According to other previous studies in Japan, the home help utilization rate was 29.5% in City B,<sup>14</sup> and 10% in City C.<sup>15</sup> The home help utilization rate for the people with medical treatment care in this research was 22.1% in group 1, and 20.5% in group 2 compared to 52.6% of people with medical treatment care,<sup>16</sup> which was recorded below half the utilization rate.

The total home visit nursing utilization rate in this research was 8.7% (1336 people out of 15,320). This was lower than the 12% utilization rate of home visit nursing found in another study.<sup>14</sup> The home visit nursing utilization rate for the people with medical treatment care was 9.1% in group 1 and 16.4% in group 2, compared to the 68% of people with medical treatment care reported by Masaaki *et al.*,<sup>16</sup> which appeared to be extremely low.

The total daycare utilization rate in this research was 21.6% (3313 people out of 15,320) which was lower compared to the 40% utilization rate found by Murakami *et al.*,<sup>14</sup> and almost the same ratio as Goto's utilization rate of 20%.<sup>15</sup>

People included in group 1 eat food through tubes and output urine through tubes. They might be identified with complex health and social needs. However, 11.5% of the respondents used home visit nursing, which is equivalent to 7 respondents out of 61. The home visit nursing utilization rate in group 1 was far lower than in group 2: in group 1, it dropped to almost half that of group 2. On the other hand, the utilization of home help was 27.9% in group 1, which is slightly lower than in group 2. The service utilization rate of home help, home visit nursing, and daycare services was calculated, and the results of the Chi-square test showed that there was a significant difference at the 1% level for home help and home visit nursing. However, there was no significant difference in daycare. Figure 2 showed that the discussion omitted daycare, which did not differ significantly, and focused on home help and home visit nursing.



**Figure 2.** Home care service utilization by groups.

### How can we improve in-home care for people with medical treatment needs through person-centered integrated care?

Family care is still prominent in Japan. Families, regardless of whether they live together or separately, take care of the elderly. Only 13% of people reported that home helpers were the main caregivers. The most common caregivers are wives or husbands. Children who live together with their parents come second. Daughters-in-law are ranked third among all caregivers.<sup>17</sup> A survey revealed that family caregivers who use home-based services are willing to continue caring for their family members at home.<sup>18</sup> However, the results of this study pointed toward limited home care service utilization in Japan. What is the background? Income may affect the amount of home care services used, which is less than half of the service fee covered by LTIC by care level.<sup>19</sup> Impact factors contributing to underutilization showed annual income was less than 1.2 million yen, and the elderly or family members prefer family care over social care.<sup>19</sup>

The World Health Organization announced a global strategy for people-centered and integrated health services.<sup>20,21</sup> In Denmark, in 2015, 12% of all residents over 65 years of age received home care services.<sup>22</sup> The time spent providing long-term care assistance in the home, however, was relatively low: as of 2007, around 50% of those over 65 years of age in Denmark received assistance of only 2 hours per week or less, and only about 13% had received more than 20 hours or more of home care assistance per week.<sup>22</sup> In a recent study, Rostgaard *et al.* noted that “there is not a uniform ‘welfare state’ in the Nordic countries, but rather a large number of ‘welfare municipalities’ that differ substantially from each other, not least in service levels. Recent decades have seen a continuous tendency towards prioritization of care for the frailest, contributing to unmet need, informalization of care and privatization in the use of topping up with market-based services.”<sup>23</sup>

Suanet *et al.* conducted a study about informal and formal home care use in 11 countries in Europe.<sup>24</sup> The results showed three different patterns. In two countries, the Czech Republic and Greece, older adults received informal care, and very low proportions received formal care. In five countries, including Sweden, Germany, Austria, Spain, and Italy, the proportion of people using informal care exceeds the proportion of people using formal care or a combination of formal and informal care. In four countries (Denmark, the Netherlands, France, and Belgium), the proportion of people using informal care is smaller compared to the proportion of people using formal care or a combination of formal and informal care. What social factors influence home care utilization? Mah *et al.* reported a wide range of social factors that influence home care utilization: age, ethnicity/race, self-assessed health, insurance, housing ownership, housing problems, marital status, household income, children, informal caregiving, social networks, and urban/rural areas.<sup>25</sup> Tsai suggested that higher social security benefits would encourage the use of formal home care.<sup>26</sup>

Coordination with health and social care should be essential to support people with urinary catheters and tube feeding because they may get urinary infections and may need to be hospitalized urgently.<sup>27</sup> Miller *et al.* provide an overview and critical commentary paper on integrated care policy in England from 2010-2020.<sup>28</sup> It was reported that integrated care is being promoted while the legal system is in place. The intensity of integration can be considered at the first level as “linkage,” the second level as “coordination,” and the third level as “full integration.” However, the process does not proceed in a straight line from linkage through coordination to full integration.<sup>29</sup>

In Japan, we cannot expect full integration. Because home-

based long-term care services are delivered by a private provider to which each care manager belongs. LTCI is managed publicly, but all home help and home nursing services are delivered through private providers operating on a profit-based business model. All long-term care service providers use their systems to manage information so that personal information does not leak to other providers. We should promote better person-centered integrated care by following these recommendations, which are essential to promoting integrated health and social care in Japan: i) identify high-risk people who require medical treatment care in the community; ii) home help and nurse visits, which are both professional services, should be more strongly coordinated; iii) assess care needs and coordinate them with multidisciplinary management of services; iv) make tailor-made services suitable for each individual and easy to access; v) support families who provide care.

## Conclusions

Through the population-based analysis, we identified the number of people living at home and the respective medical treatment items they used. We focus on those who have medical care needs with two tubes in their bodies: urinary catheters and tube feeding. They were divided into three groups: group 1 (both tubes: they used two tubes for eating and toileting), group 2 (either tube: they used one tube for either eating or toileting), and group 3 (no tube). Then, we analyzed home care service utilization. The results showed that the utilization rate of home visit nursing was 11.5% in group 1, dropping to almost half the rate in group 2. On the other hand, the utilization of home help was 27.9% in group 1, which is slightly lower than in group 2. Surprisingly, there is an extremely low utilization rate of home visit nursing, even among those with urinary catheters and tube feedings. Coordination with health and social care is essential to support aging in place.

## Implications for applicability and limitations

The present study analyzed long-term care insurance payments without including medical insurance payments. In Japan, physician visits and clinic nurse visits are based on medical insurance. It would be possible to obtain a more realistic picture of the home care situation for the elderly with medical care needs if the long-term care insurance payment data were combined with the medical insurance payment data and matched with ID. In this survey, we did not get data on the details of home visit nursing or home help. The details of medical treatment and care at home are unknown. Hence, further research is required.

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