【 ORIGINAL ARTICLE 】

Identifying and Characterizing People with Dementia Not Accessing the Japanese Community-Based Integrated Care System Using Health Insurance Claims Data

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Abstract:
Objective In the Japanese Community-Based Integrated Care System (CBICS), access to formal care services is based on voluntary consultations mainly from the families of people with dementia (PWD). The problem is that some people need services but do not consult their municipalities for various reasons. The purpose of this study is to examine the possibility of using health insurance claims data to identify and characterize these PWD.
Methods Using health insurance claims data, we selected PWD prescribed with anti-dementia drugs. Of them, excluding those with a usage history of long-term care insurance services or other formal services, facility residents and deaths, we identified PWD not accessing the CBICS. We conducted a visit survey on their status, home care environment and reasons for not accessing services, a proposal for using services and a one-year follow-up.
Result Based on the data of 1,809 late-stage elderly who resided in the Tamaki-cho, a town in Mie Prefecture, Japan, for a 2-month period, 16 PWD not accessing the CBICS were identified, and 15 PWD and their families participated in this study. Ten were men and 13 were physically and cognitively relatively independent. All lived with a family caregiver and refused services. Ten families needed but had not accessed the services due to refusal by PWD and other reasons. As a result, seven of these PWD started using long-term care insurance services or dementia prevention services.
Conclusion PWD not accessing the CBICS can be identified using health insurance claims data. The results proved that the municipality has a cost-effective way of providing their services to PWD and their families, even if they have never consulted voluntarily.

Key words: dementia, community formal care services, health services accessibility, home care, insurance claims analysis

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Introduction

In Japan, medical and nursing care demands are expected to increase with the increase in the aging population, especially in elderly people with dementia (PWD). To support elderly people to live on their own in familiar environments for the rest of their lives, even if they develop a need for long-term care, the Ministry of Health, Labour and Welfare has been promoting the establishment of a comprehensive care system called the "Community-Based Integrated Care System (CBICS)" to provide health care, nursing care, disability prevention, housing, and livelihood support for elderly people (Fig. 1) (1, 2).

Further, to promote the measures for PWD to help them live well in their communities, the Ministry of Health, La-
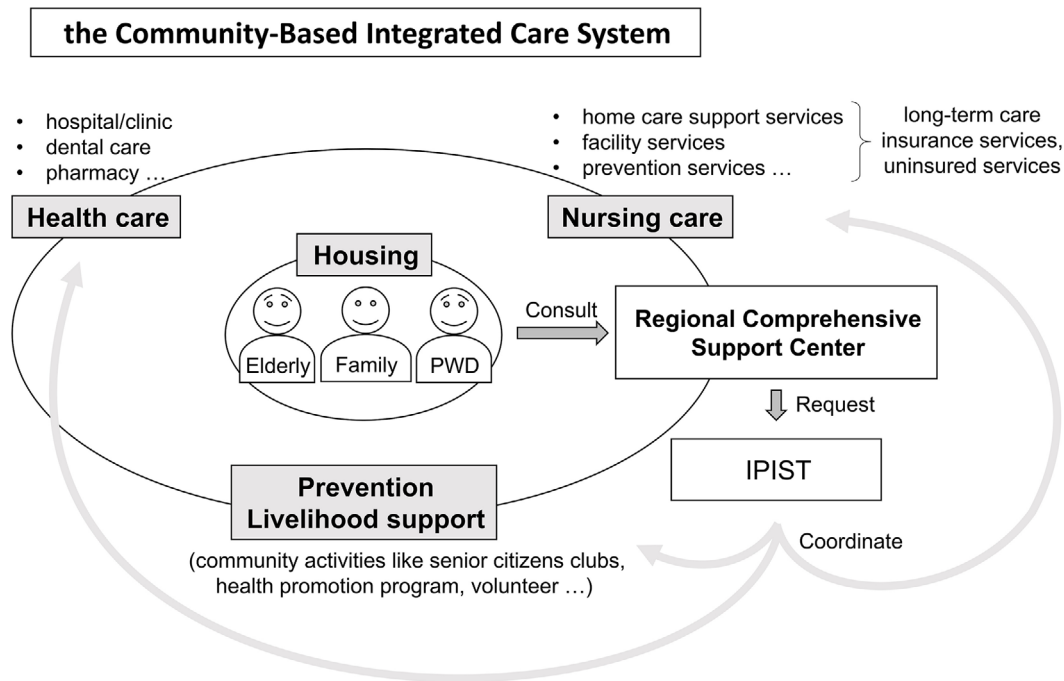
Figure 1. **Japanese Community-Based Integrated Care System (CBICS) and the role of Initial-Phase Intensive Support Teams of Dementia (IPISTs). The Community-Based Integrated Care System in Japan is a comprehensive care system to provide health care, nursing care, disability prevention, housing, and livelihood support for the elderly. This system has been established to support elderly people to live in their own ways in familiar environments for the rest of their lives, even if they develop substantial need of long-term care. The Initial-Phase Intensive Support Teams of Dementia, in the initial phase of intervention for people with dementia (PWD), act as coordinators of agencies in the CBICS and provide PWD with tailored services. PWD: people with dementia, IPIST: Initial-Phase Intensive Support Team of Dementia**

bour and Welfare announced a "Five-Year Plan for Promotion of Measures Against Dementia (Orange plan)" (3) in 2012 and the "Comprehensive Strategy to Accelerate Dementia Measures (New Orange Plan)" (4) in 2015 (2, 5, 6).

It is generally accepted that while delayed care can accelerate the progression of dementia, increase the behavioral and psychological symptoms of dementia (BPSD), and make it difficult to continue living at home, early and timely care makes it possible to maintain the quality of life for PWD, reduces the burden on caregivers, and also reduces healthcare costs (7, 8). As one of the main measures of the Orange plan, the Initial-Phase Intensive Support Teams of Dementia (IPISTs) system has been established for each municipality to increase the effectiveness of early and timely detection of and care for dementia. The mission of the IPISTs is to provide PWD with tailored care services more quickly (2, 6, 7). The IPISTs system was modeled after the Croydon Memory Service in England. However, unlike the Memory Service's long-term provision of diagnosis, treatment, and nursing care, IPISTs in Japan - where the health- and social-care systems had multiple access points in the dementia care pathway - act as coordinators of agencies for PWD in the initial phase of accessing the CBICS (Fig. 1) (9).

The structure of IPISTs varies for each municipality, but

it basically consists of a "dementia support doctor" (certified doctors who support medical/care systems as liaisons with PWD in the community) (10) and medical/care specialists, and the general flow of their activities is common (11). The teams provide tailored services for those suspected of having dementia and those who are diagnosed with dementia, but are not yet receiving appropriate medical/nursing care services, have had an interruption in their services, or are in need of a readjustment of their treatment due to worsening symptoms within 6 months after consultations (Fig. 2-a).: (1) Family or neighbors of PWD consult with the Regional Comprehensive Support Center directly, or via attending doctors, medical social workers, local welfare commissioners, or dementia supporters; (2) IPISTs visit PWD and their families for a comprehensive assessment, including evaluations of the dementia symptoms and the living environment; (3) IPISTs meet with multi-occupational staff members regarding nursing care to formulate a tailored plan to introduce necessary social resources and services; and (4) the adopted content is continued mainly by long-term care insurance services and prevention services in the CBICS (2, 6, 7). Namely, when people around PWD voluntarily consult the municipality, IPISTs activities are triggered, and PWD can access the formal community care services provided in the CBICS smoothly and quickly.
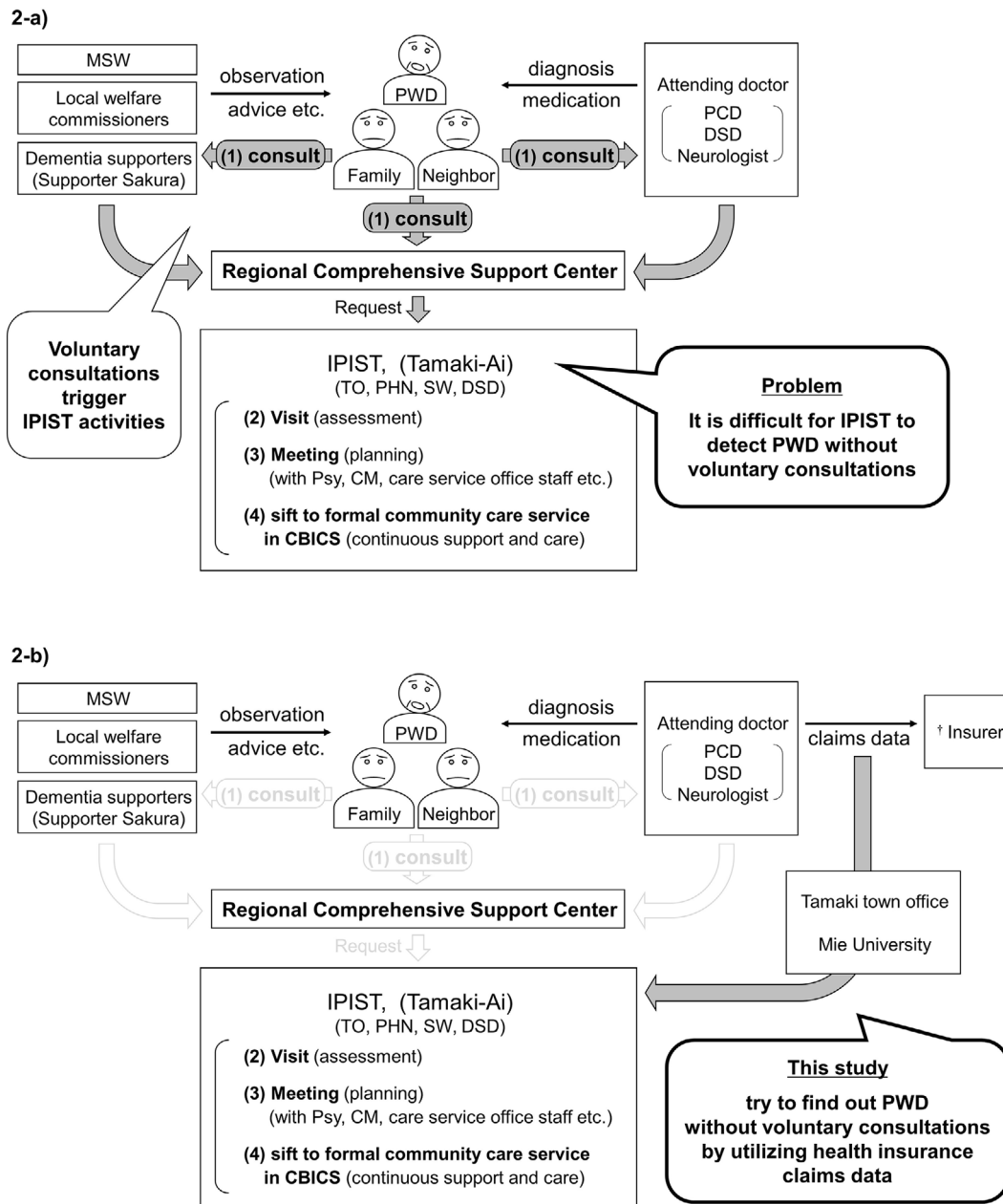
2-a)

2-b)

Figure 2. The general flow of the current IPIST activity and the trial in this study. a) The general flow of the current IPIST activity. Voluntary consultation requests from families and/or neighbors trigger activities by the IPIST, providing PWD and their families smooth access to the CBICS. People who have used community formal care services in the CBICS are classified as "listed with CBICS" and the municipality can follow up on them. On the other hand, PWD who had never accessed the CBICS ("PWD unlisted with CBICS"), even if they need support, are difficult to be detected actively without voluntary consultation. Essentially, the current system does not allow the municipality to actively identify them. b) The trial in this study. In this study, we tried to identify and intervene with PWD unlisted with the CBICS, by utilizing health insurance claims data. †In this study, we used the insurance claims data of the Latter-stage Elderly Healthcare System, and the insurer is the Association of Medical Care Services for Older Senior Citizens. PWD: people with dementia, IPIST: Initial-Phase Intensive Support Team of Dementia, CBICS: Community-Based Integrated Care System, CM: care manager, DSD: dementia support doctor, MSW: medical social worker, PCD: primary care doctor, PHN: public health nurse, Psy: psychiatrist, SW: social worker, TO: town official

In the current article, this state of a person with dementia, in which they have access to the CBICS and have been identified as PWD by the municipality, is described as "listed with CBICS." The municipality can detect people in need of re-intervention by visiting those "listed as PWD" who have stopped using the services. However, there are

two main problems for "unlisted PWD." First, even if they are in need of support, intervention by IPISTs does not begin unless the PWD and their family consult voluntarily. Certainly, the medical staff who notice their condition could also consult with the IPISTs via the Regional Comprehensive Support Center and trigger IPISTs' activities; however, those from the medical institutions account for only 7% of all consultations to the IPISTs (11). Second, there is no way for the municipality to detect "unlisted PWD."

In this study, we verified the possibility of using health insurance claims data to identify PWD unlisted with the CBICS; further, we conducted a survey to clarify the background that identified PWD who have not used the services (Fig. 2-b). Japan has a universal healthcare insurance system in which every citizen must be enrolled in some type of official medical insurance. Therefore, the claims data submitted by medical institutions can be an excellent source of medical information.

Materials and Methods

Regional characteristics

Tamaki-cho, a town in Mie Prefecture, Japan, had a population of 15,741 and a late elderly population of 2,009 in 2016. Its late aging rate (population ratio over 75 years old) is closely equal to that of Japan (12.8% and 12.9%, respectively).

The IPISTs initiative in Tamaki-cho was launched in April 2015, following the Orange plan (3), and it has been providing medical/nursing care and dementia prevention services of the CBICS to PWD and their families who have voluntarily consulted. In addition, Tamaki-cho has an official volunteer group "Supporter Sakura" of "dementia supporters" who have acquired correct knowledge about dementia in various training programs (12), as well as a welfare company called "Tamaki-Ai," which is a Tamaki Town-affiliated organization entrusted with jobs that complement the IPISTs (Fig. 2). In addition to assisting the IPISTs, Tamaki-Ai is involved in various businesses related to PWD, such as receiving consultation requests from PWD and nursing facilities/offices, regularly visiting PWD listed with the CBICS not using the services, promoting dementia awareness, and supporting the Supporter Sakura group.

Tamaki-cho is a community which is active in disability prevention and various townspeople-led prevention efforts have taken place outside of the CBICS (senior citizens' clubs, gymnastic clubs, gathering places involving the elderly/PWD etc.). In addition, there are town-operated prevention programs included in the "General Care Preventive Projects" of the CBICS (dementia prevention class, health promotion class etc.). Tamaki-Ai and Supporter Sakura are involved in both of these prevention services.

On the other hand, with respect to health care for dementia, there are two dementia support doctors (10), but no neurologists, neurosurgeons, or psychiatrists in Tamaki-cho.

Study design (Fig. 3)

We conducted this survey between 2017-2018 under a three-party research contract among the Tamaki Town office, Tamaki-Ai, and the Department of Neurology at Mie University. To identify PWD efficiently, we used the insurance claims data of the "Latter-Stage Elderly Healthcare System," which includes all late elderly people above 75 years of age and authorized persons aged 65-74 years with certain qualifying disabilities. Mie University processed the anonymized data for personal information protection.

First, the Tamaki Town office provided completely anonymized health insurance claims data (converted to an Excel file format) for May and June 2016 from the "Latter-Stage Elderly Healthcare System." Mie University identified people prescribed with anti-dementia drugs by searching for four anti-dementia drug codes in the data: donepezil, galantamine, rivastigmine, and memantine ("medication" in Fig. 2)

Next, the Tamaki Town office excluded people with a history of long-term care insurance usage and other formal service usage (they had already been followed up by the municipality) and identified those unlisted with the CBICS as of June 2018. Those who lived in facilities or had died were also excluded.

The staff of Tamaki-Ai, who are well-trained and experienced nurses, visited identified people and their families. After obtaining their consent to participate, the nurses conducted an interview about the condition of the person with dementia, the care situation, concerns, and other related matters. To assess PWD, we used the "Bedridden level" and "Rating of Dementia" (Table 1) (13), which are referenced in long-term care insurance certification; the Barthel Index (14) to measure the basic activities of daily living (ADL); the Lawton scale (15) to measure instrumental ADL; and the Mini-Mental State Examination (MMSE) (16) to measure cognitive functioning. In addition, household composition and PWD/their families' opinions on using care services of the CBICS were also checked. During a one-year follow-up, the staff of Tamaki-Ai proposed the usage of services and provided the services in the CBICS as needed. Mie university received and analyzed the results of the visit survey after re-anonymization.

Statistical analysis

Fisher's exact test was used to evaluate the gender ratio. Welch's t-test was used to compare variables such as age and MMSE score between male and female participants. A p value <0.05 was considered to be significant. All statistical analyses were performed using the Bell Curve software program for Excel ver.3.20.

Ethics

This study was carried out in accordance with the Declaration of Helsinki and the Ethical Guidelines for Medical and Health Research Involving Human Subjects. The proto-
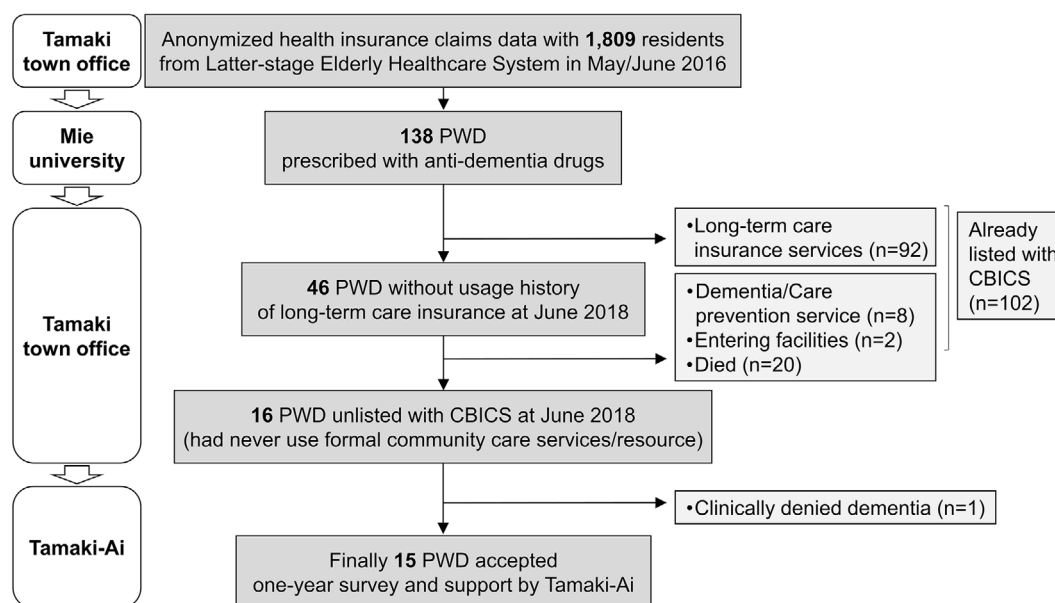
Figure 3. Flow diagram of the selection process (n=number of people). The Tamaki Town office provided completely anonymized health insurance claims data from the "Latter-Stage Elderly Healthcare System" in May and June 2016 (n=1,809). Mie University analyzed the data and selected people prescribed with anti-dementia drugs (n=138). The Tamaki Town office excluded those with a usage history of long-term care insurance services (n=92) and other community formal care services, facility residents, and deaths in June 2018, and identified people unregistered in the CBICS (n=16). The staff of Tamaki-Ai visited them, and excluding one person whose dementia had been clinically ruled out, 15 PWD and their families participated in this study. PWD: people with dementia, CBICS: Community-Based Integrated Care System

col was approved by the internal review board of Mie University (Registration number: 1766).

Results

Health insurance claims data analysis (Fig. 4)

A total of 1,809 people visited hospitals or clinics in May and June 2016: they were aged 65 to 106 years; 703 were men (38.9%, mean age 81.5±5.2 years) and 1,106 were women (61.1%, mean age 83.0±5.9 years).

A total of 138 people (7.6%) were prescribed with anti-dementia drugs, consisting of 50 men (36.2%, mean age 83.6±5.0 years) and 88 women (63.8%, mean age 84.7±4.7 years). The percentage of people prescribed a single drug and a combination of drugs were 89.1% (donepezil: 56.5%, galantamine: 17.4%, rivastigmine: 4.3%, memantine: 10.9%) and 10.9%, respectively. Regarding the attending doctors, there were nine neurologists outside the town (including neurosurgeons and psychiatrists), two dementia support doctors, and 20 primary care doctors; 25.4%, 25.4%, and 49.3% of the people prescribed anti-dementia drugs had been seen by these doctors, respectively.

Characteristics of the people with dementia unlisted with the CBICS (Table 2, Fig. 3, 4)

Sixteen PWD were unlisted with the CBICS as of June 2018. Upon visiting them, we found that one person's prescription of an anti-dementia drug had been stopped because dementia had been clinically ruled out. Finally, 15 PWD (10.9% of those prescribed with anti-dementia drugs) participated in the visit survey.

The 15 participants consisted of 10 men (66.7%) and 5 women (33.3%); Fisher's exact test revealed the relationship between the CBICS-listed/unlisted and gender (p=0.020); men were more likely to remain unlisted with the CBICS than women. Furthermore, women were older than the men (mean age men 82.4±2.8 versus women 88.2±6.0; Welch's t-test, one-sided, t(4.89)=2.05; p=0.049). The disease name for all participants in the insurance data was Alzheimer's disease, and 53.3% of them had been seen by a neurologist, neurosurgeon, or psychiatrist (Table 2). Fourteen (93.3%) were prescribed a single medication (donepezil: 53.3%, galantamine: 26.7%, memantine: 13.3%), while one (6.7%) was prescribed a combination (rivastigmine and memantine).

Thirteen (86.7%) were almost completely independent physically (75-90 on the Barthel index and Grade J1-2 on the "Bedridden level"). One participant scored 90 on the Barthel index but Grade A1 on the "Bedridden level," meaning he was independent physically but could not go outside without care due to cognitive decline (case 9). Cognitively, seven (46.7%) were almost completely independent (more than half on the Lawton scale and Grade I in the "Rating of Dementia"), and six (40.0%) had some problems but could

Table 1.   Bedridden Level and Rating of Dementia Based on Interviews, Defined by the Japanese Ministry of Health, Labour and Welfare.

Bedridden level [†]	
Grade J (Independent)	Have some sort of disability, but is almost independent in daily life and can get out of home alone.
1	Go out using transport facilities.
2	Go out to neighbors.
Grade A (Quasi-bedridden)	Almost independent for indoor daily life, but cannot go outside without care.
1	Go out with care, and stay away from bed for most of the daytime.
2	Do not go out so much, and get in and out of bed in daytime.
Grade B (Bedridden)	Require some sort of care for indoor daily life, and stay in bed for most of the time but can maintain a sitting position.
Grade C (Bedridden)	Stay all the time in bed, and require care for toileting, eating and changing clothes.
Rating of Dementia[‡]	
Grade I	Has some sort of dementia, but is almost independent in daily life of domestic and social activities.
Grade II	Symptoms, behavior, or difficulty in communication that interfere with the person's daily life are observed in some degree, but can live independent if someone will look after the person.
Grade III	Symptoms, behavior, or difficulty in communication that interfere with the person's daily life are observed once a while, and requires care.
Grade IV	Symptoms, behavior or difficulty in communication that interfere with the person's daily life are observed frequently, and requires constant care.
Grade M	Significant psychotic manifestations, problem behavior, or severe physical diseases are observed, and requires specialized medical care.

[†]According to the "Criteria for determination of the daily life independence level of the elderly with disability." [‡]According to the "Criteria for determination of the daily life independence level of the elderly with dementia." (13)
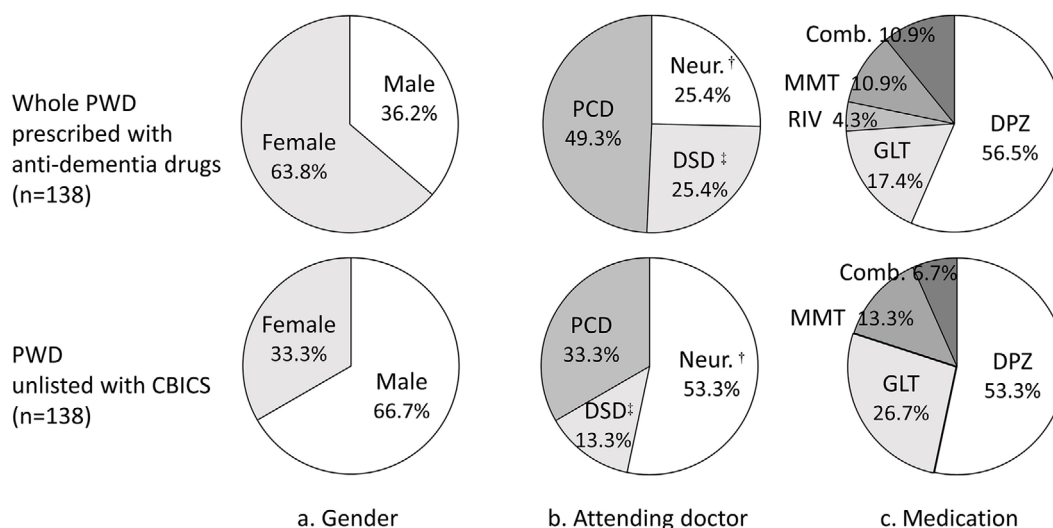

Figure 4.   Health insurance claims data analysis. The pie chart shows the gender, attending doctor, and medication of people with dementia prescribed with anti-dementia drugs and those unlisted with the CBICS. [†]Including neurologists, neurosurgeons, and psychiatrists. [‡]Dementia support doctors who support the medical and care system as liaisons for older adults with dementia in the community. Comb.: in combination, DPZ: donepezil, DSD: dementia support doctor, GLT: galantamine, MMT: memantine, Neur.: neurologist, PCD: primary care doctor, RIV: rivastigmine

live independently with some assistance (Grade II). Only two were quasi-bedridden (Grade A1-2) and required care for BPSD (Grade III). No one was bedridden (Grade B or C) or had severe BPSD (Grade IV or M). Their MMSE scores ranged between 12 and 29, with no difference by gender (mean score men 20.6±4.3 versus women 20.8±6.0,

Table 2.   Characteristics of People with Dementia who were Unlisted with CBICS.

Case No.	Age	Sex	Barthel Index	Lawton scale†	Bedridden level/ Rating of Dementia	MMSE	Attending doctor	Main family caregiver	Family's need for the services	Reason for not using the services‡	The services used after the survey
1	80	M	100	5/5	J1/I	28	PCD	Wife	yes	A C	Prevention service§
2	80	M	100	4/5	J1/I	17	DSD	Wife	yes	A B	Long-term care service
3	84	M	100	3/5	J2/I	22	Neur.	Daughter	yes	A C	
4	87	M	100	5/5	J2/I	12	PCD	Wife daughter	yes	A	
5	80	M	100	3/5	J2/II	22	PCD	Wife	yes	A B	
6	85	M	100	3/5	J2/II	22	Neur.	Wife	yes	A	Long-term care service
7	80	M	100	3/5	J2/II	-	Neur.	Wife	yes	A B C	
8	98	F	75	1/8	J2/II	19	Neur.	Daughter	yes	A B	
9	81	M	90	2/5	A1/III	21	Neur.	Daughter	yes	A C	
10	88	F	50	0/8	A2/III	16	PCD	Husband	yes	A B	Long-term care service
11	81	M	100	4/5	J1/I	20	PCD	Wife	no	A D E	
12	85	F	100	8/8	J1/I	25	DSD	Daughter	no	A B D E	Prevention service§
13	82	F	100	6/8	J2/I	29	Neur.	Daughter in law (care worker)	no	A D F	Prevention service§
14	86	M	90	2/5	J2/II	21	Neur.	Daughter in law granddaughter	no	A F	
15	88	F	80	0/8	J2/II	15	Neur.	Daughter in law (care worker)	no	A F	Long-term care service

†The Lawton scale assesses all eight domains of functioning for women, but only five domains for men (food preparation, housekeeping, and laundry are excluded). ‡The reason for not using the services is (A) Refusal of the person with dementia, (B) Insufficient information about the service contents/effects, (C) Family's postponement of consultation, (D) Not knowing his/her diagnosis and medication of dementia, (E) Recognition that he/she is independent enough, (F) Sufficient family care capacity.

§Prevention services in Tamaki-cho include both town-operated prevention programs ("Care Prevention & Daily Life Support Project" inside of long-term care insurance) and townspeople-led prevention program. Tamaki-Ai is involved in both prevention services.

DSD: dementia support doctor, MMSE: Mini-Mental State Examination, Neur.: neurologist, PCD: primary care doctor

Welch's t test, $t(6.34)=0.080$, $p=0.9386$), and were not correlated with the "Rating of Dementia" grades. Regarding household composition, all participants lived with family caregivers, and most caregivers were women such as wives, daughters, and daughters-in-law, and only one was a man.

All participants had refused the services, and the reasons for refusal were denial or lack of awareness of dementia (n= 10), anxiety about becoming known as a dementia patient to neighbors (n=9), and social withdrawal (n=6).

In 10 cases, families felt that the services were necessary, and listed the following reasons: for a prevention of social withdrawal (cases 1-4), activities to delay the progression of cognitive decline (cases 2-10), life support for PWD (cases 9, 10), and time away from PWD (cases 8, 10). However, they had not consulted with the IPISTs, either because of refusal by PWD (n=10), insufficient information about the service contents/effects (n=5), or the family's postponement of consultation (n=4). In five cases, the families thought that the services were unnecessary.

All participants and their families were provided with tailored and sufficient information about dementia and the services, for encouraging service use. Seven participants started using the services (the long-term care service 4, the prevent service 3) during a one-year follow-up. Two among the four cases where the families felt that the services were necessary were almost completely independent with Grade J 1/I (cases 1, 2), but the families wanted prevention services due to decreased PWD's socialization or communication ability.

On the other hand, two of the three cases where families thought that the services were unnecessary did not know about the diagnosis and medication of PWD (cases 12, 13). However, informing them of the diagnosis and providing sufficient information encouraged them to use the dementia prevention services. Further, in the remaining case (case 15), the family caregiver's hospitalization triggered the use of the long-term care services. In the other eight cases, they did not use the services but did request follow-up by Tamaki-Ai and/or Supporter Sakura, such as regular visits and information provision. As a result, all 15 participants were finally listed with the CBICS.

Discussion

Utilizing Japanese health insurance claims data, we successfully identified 15 PWD unlisted with the CBICS that

were difficult to detect through current activities by the IPISTs without voluntary consultations. In a 2018 nationwide survey, most IPISTs conducted less than 20 interventions during 6 months (1-5 cases, 45%; 6-10 cases, 13%; 10-19 cases, 10%) (11). The IPISTs in Tamaki-cho intervened in 16 cases during the year 2018. These numbers are comparative to the 15 cases in this single screening study.

According to previous reports, activities by the IPISTs were triggered by voluntary consultations; people who received interventions were mostly women (64-67%) and physically independent (Grade J1-2, about 80%), but cognitively dependent (Grade I, 13-16%; Grade II, 59-65%; Grade III-M, 15-20%). They lived either alone or in small family units (lived alone, 30-46%; lived with a couple, 24-42%). This result indicates that when PWD who are physically independent and who live with few/no family exhibit cognitive decline, people around them often consult with the IPISTs (11, 17, 18). Unlike those who consulted with the IPISTs voluntarily in the previous reports, our participants were mostly men, physically and comparably cognitively independent, and lived with their family caregivers. The fact that they were mostly men correlates with several reports about care from across the world, which observe that women tend to use nursing care services earlier than men, while men tend to receive care by family female caregivers, especially spouses, for as long as possible (19, 20). A correlation between the Barthel index for basic ADL evaluation and "care need level in long-term care insurance system," and the Lawton scale for instrumental ADL evaluation and MMSE score, has been reported in previous studies. Similarly, the Barthel index and the Lawton scale in this study were consistent with the grade of the "Bedridden level" and the "Rating of Dementia," respectively (21, 22).

In this study, 10 of the 15 families had felt the need for the services because of care burden and/or prevention of dementia progression, but had never used the services mostly due to refusal by PWD. In early dementia stages, PWD frequently exhibit behavior that glosses over or denies symptoms relating to memory or cognition loss (23). Therefore, they often refuse care or rehabilitation, and often impose caregiving burdens on family (24). This clinical feature of early dementia stages may explain why the most common reasons for participants' refusal of service usage were "denial or lack of awareness of their own dementia" and/or "anxiety for becoming known as a dementia patient to neighbors." Another reason, "social withdrawal," is consistent with the view that it is often difficult for PWD to use the services due to impaired cognitive function which hinders their adaptation to new environments (25).

A consultation with a dementia specialist generally leads to early diagnosis and early service use (26), but unexpectedly, almost half of our participants went to neurologists outside the town. This may be due to the medical support environment of Tamaki-cho, where there are no neurologists in the town. That is, this may imply that those unwilling to be known as dementia patients to neighbors often visit neu-

rologists outside the town and do not use the services. This may also imply that the medical personnel working in medical institutions outside the town do not regard themselves as primary doctors. Further study is required to ascertain whether this is a local issue limited to Tamaki-cho, whether measures such as reinforcing the collaboration can solve the issue, or whether other unknown causes exist.

The results of this study indicate that if the person with dementia is male, physically and cognitively relatively independent, and living with a family caregiver, the family in need for the service may be reluctant to consult the IPISTs. Meanwhile, this study also proved that the municipality has a way of identifying and actively intervening with PWD and their families using health insurance data. We will examine the possibility of regular screening surveys and interventions by the municipality.

On the other hand, this study indicates the difficulty in encouraging PWD to use the available services, especially in cases of PWD actively refusing to use them. About half of our participants had not started using the service during the 1-year follow-up period, even though their family felt it was necessary. For achieving the early and timely use of services, "encouraging strategies" tailored for individual PWD are required (25). Providing appropriate and sufficient information according to the situation of PWD and their families could be the first step toward good "encouraging strategies." In this study, we found that in cases where PWD were almost completely independent at the early dementia stages, the families often wanted prevention services against the issue of decreased social connections; therefore, informing them about the diagnosis of dementia and providing sufficient information encouraged their service use. In this manner, keeping track of our participants and finding out what strategy, information, or life-event triggered their acceptance of the services may prove to be useful for improving care specialists' "encouraging strategies" for reluctant PWD and their families.

Our study is associated with several limitations. First, this study did not include PWD under 65 years, who had not been prescribed anti-dementia drugs (donepezil, galantamine, rivastigmine, and memantine), or who did not visit the hospital. Further study is required utilizing insurance covering younger generations or selecting the disease name of "dementia" in the insurance data. Second, this study focused on elderly PWD residing in a rural area, whose characters may differ from those in urban areas. Third, participants' cultural and generational background, educational history, and use of drugs other than anti-dementia drugs (such as anti-psychotic drugs), as well as whether they had been informed about the CBICS services or IPISTs by doctors, had not been checked. These may have affected the acceptance of the services or their access to the CBICS, which need to be investigated in future research. Fourth, there was a time lag between the acquisition of claims data, and the visit survey due to a new unaccustomed procedure. Using real-time data, we could identify more PWD in need of sup-

port and services immediately after diagnosis.

In conclusion, using health insurance claims data is a practical and efficient way to identify PWD unlisted with the CBICS by simply searching for the insurance codes. Regular surveys by the municipality may achieve early and timely service use by PWD and their families who are reluctant to consult the municipality. Additionally, this study will be useful in improving "encouraging strategies" for such PWD and their families. Further study is required in the targeting of health insurance, the use of real-time data, and adapting to other municipalities.

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