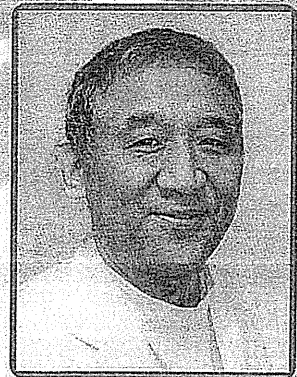


# 地域ケアで患者を支える



はっとりひでゆき  
服部英幸

独立行政法人国立長寿医療研究センター病院行動心理療法部長

**【略歴】** 1956年生まれ。81年：大阪大学医学部卒業、同精神神経科研修医、82年：大阪警察病院神経科医員、83年：ベルランド病院神経科医員、85年：近畿大学医学部第2病理学教室助手、97年：金沢医科大学老年病科講師、2003年：国立療養所中部病院精神科医長、04年：国立長寿医療センター行動心理療法科医長、10年：独立行政法人国立長寿医療研究センター精神科医長、11年より現職

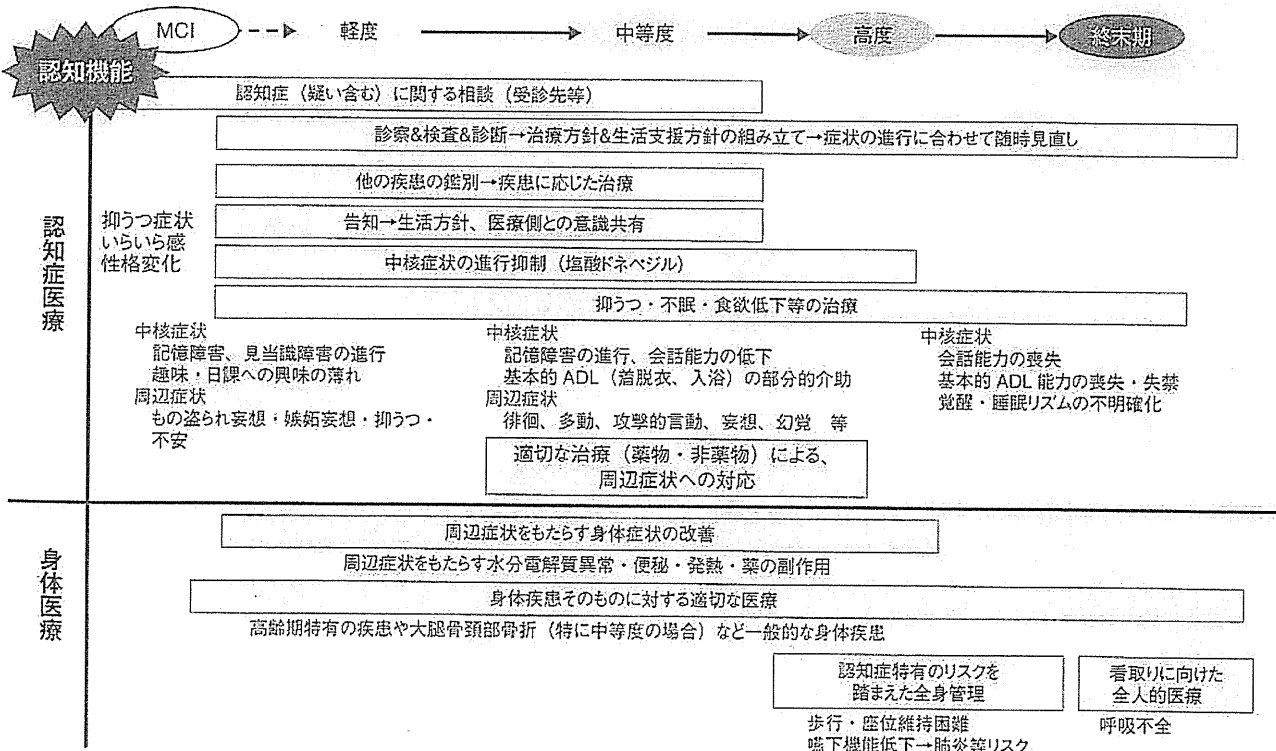
**【専門分野】** 老年精神医学。医学博士

## はじめに

認知症の地域連携、ケアを考えるうえで、まず認知症の特性について押さえておく必要がある。認知症は単一疾患ではなく、さまざまな原因疾患を背景にして生ずる脳機能損傷から出現する症候群であって、多彩な症状の発現がみられる。たとえ基礎疾患が同じであっても現れる

る病像は個人差が大きく、併存する身体疾患、取り巻く環境などの影響を強く受ける。さらに、多くの認知症例は長期の経過をとるが、認知機能障害が軽度の時期、重度の時期では状態像が大きく異なり、必要とされる介護の質が変化するという特性もある。

アルツハイマー型認知症を例にとると、初期の段階では、診断を適切に下すことともに、診断に基づいた生活



(東京都福祉保健局編資料を一部改変)

図1 認知症の経過と必要な医療  
(アルツハイマー型認知症等変性疾患の場合)

援助を本人の能力に応じて支援する体制づくり、疾患の知識、介護サービスの利用法などを家族へ伝えることが重要であり、抗アルツハイマー病薬の使用も積極的に勧められるであろう。認知機能低下が進むと一般的に徘徊などの行動障害や着脱衣、入浴などの生活機能障害が顕著になり、介護困難の度合いが増してくるためデイサービス、ショートステイ、ホームヘルプなどの介護サービスの積極的利用が求められる。認知症に伴う精神症状・行動異常（BPSD）に対して抗精神病薬の使用なども必要となろう。末期になると日常生活機能低下が著しくなり、栄養や水分補給、感染症予防といった身体管理の重要性が増してくる。身体治療のための入院や施設入所の必要性が増してくるし、在宅の場合は訪問看護、自宅の改造などが求められる（図1）<sup>11)</sup>。

以上をまとめると、認知症には、原因の多様性、症状の多様性（個体差、経時的変化）が考慮される必要があり、認知症患者・家族を取り巻く地域におけるさまざまな職種、施設の連携があって初めて、行き届いた診療、ケア、介護を進めることができる。

### 認知症医療の課題

上記のような特性を持つ認知症、とくに認知症に伴う

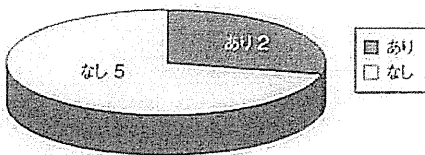


図2-A 認知症患者専用病棟の有無

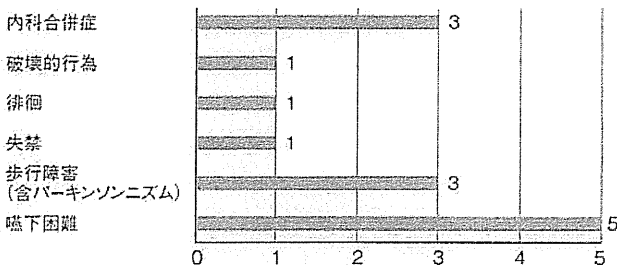


図2-B 治療困難な重度認知症の症状(複数回答)

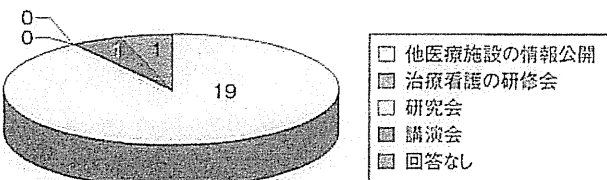


図2-C 診療ネットワークづくりにおいて期待するもの

精神症状・行動異常（BPSD）に対する医療、介護の現状はどうであろうか。

国立長寿医療研究センターが位置する知多半島において精神科医療機関に対して行ったアンケート調査結果の一部を紹介する。対象は知多半島地域及び近隣の単科精神科病院、総合病院精神科、精神科クリニックである。内訳は単科精神科病院7件、クリニック、総合病院14件である。その結果、認知症の専門治療はすべての精神科病院で行われているわけではなく、むしろ少数にとどまっていた（図2-A）。認知症患者の治療において難渋するのは純粋な精神症状というよりもむしろ内科疾患や、嚥下障害、歩行障害といった神経症状であった（図2-B）。認知症診療における地域連携の具体的実践として求められているのは、病院、クリニックともに地域の医療機関の情報公開であった（図2-C）。さらに他の調査結果を総合してみると、認知症診療における表1のような問題点が浮かび上がってきた。

### ●認知症地域連携において求められるもの（身体疾患治療、BPSD）

このような状況から考えると、認知症診療において地域連携が必要とされる局面は2つであるように思われる。一つは、地域における認知症患者の早期発見とそこから早期治療につないでいくこと。もう一つは、介護負担が大きく、医療介入が必要なBPSD患者及び身体疾患を併発した認知症患者の診療である。

早期発見・早期治療についてはすでに多くの地域でさまざまな取り組みがなされている。国立長寿医療研究センターのある大府市においても、地域の医師（大府市医師団）と連携でクリニックレベルでの早期発見と専門病院であるセンターへの円滑な紹介ができるシステムを構築してきた。一方で、BPSD患者の地域連携上の問題点として、BPSD自体が治療介護困難であること、症状把握の困難さ、合併身体症状の治療困難（手術など入院時の管理）があげられる。また、BPSDの何に焦点をあてた介護診療を行うかで担当すべき医療機関、施設が適切に選択できるかが重要になる。すなわち、症状自体の治

表1 認知症診療の現状(アンケート結果から)

1. 専門医療を提供する医師や医療機関の数が不十分
2. 認知症を専門としない医療関係者の認知症に関する理解が不十分
3. 認知症の行動・心理症状に対する治療が未確立
4. 身体合併症の治療が適切に行われていない

療、管理が目的か、合併身体症状の治療のための管理かといった問題である。目的に沿って総合病院、単科精神科病院、老人保健施設などがニーズに合った形で有機的に連携できることが望ましいが、そのための情報が決定的に不足している。どの病院が精神症状をみることができるのか、合併症状を治療するためのスタッフ、BPSD管理の専門家がいるのかなどの情報が本当に必要な場面で利用できない状況がみられる。

診療介護の困難なBPSD例に対して地域の中で連携をとりながら対応していくために重要な役割を果たすのが、認知症疾患医療センターと地域包括支援センターである。

### ●認知症疾患医療センター

認知症疾患医療センターは平成20年度より、地域における認知症医療の中核として厚生労働省が都道府県、政令市に呼びかけて設立している。基本的に総合病院であり、認知症の診断、治療、身体合併症の治療を行うことができ、地域の認知症診療の中核となることが期待されている。全国で150か所の設置を目標としているが、地域による偏在が激しく、熊本県、大阪府では多くの認定施設があるが、まったく存在しない地域もある。しかしながら、次々に認定機関が増加している。平成23年2月9日現在、29都道府県、7指定都市の98か所設置

されており、今後も設立の計画が進んでいる(図3)<sup>2)</sup>。

認知症疾患医療センターの主たる機能は専門医療の提供、地域連携の強化、認知症に関する情報センターとなることの3つである。とくに、認知症の早期発見、確定診断をつけること、認知症に伴うBPSD及び身体合併症治療において専門的貢献が求められる。

国立長寿医療研究センターも平成23年4月より地域型認知症疾患医療センターとして承認された。当院はベッド数300床の総合病院であり、骨粗鬆症、骨折、褥瘡、慢性呼吸不全等、高齢者に特有のさまざまな疾患に対応できる体制づくりをめざしている。認知症診療も重点的に行っており、平成22年よりもの忘れセンターを開設し、老年科、神経内科、脳神経外科、精神科といった認知症関連科が年間約1,000例の新患を診療している。すべての症例について血液、放射線(MRI、脳血流シンチなど)、神経心理学的検査を行っており、データ蓄積が進んでいる。

### ●地域包括支援センター

2005年の介護保険法改正で制定された、地域住民の保健・福祉・医療の向上、虐待防止、介護予防マネジメントなどを総合的に行う機関である。中学校区を一つの単位として全国で5,000か所程度整備することが予定さ

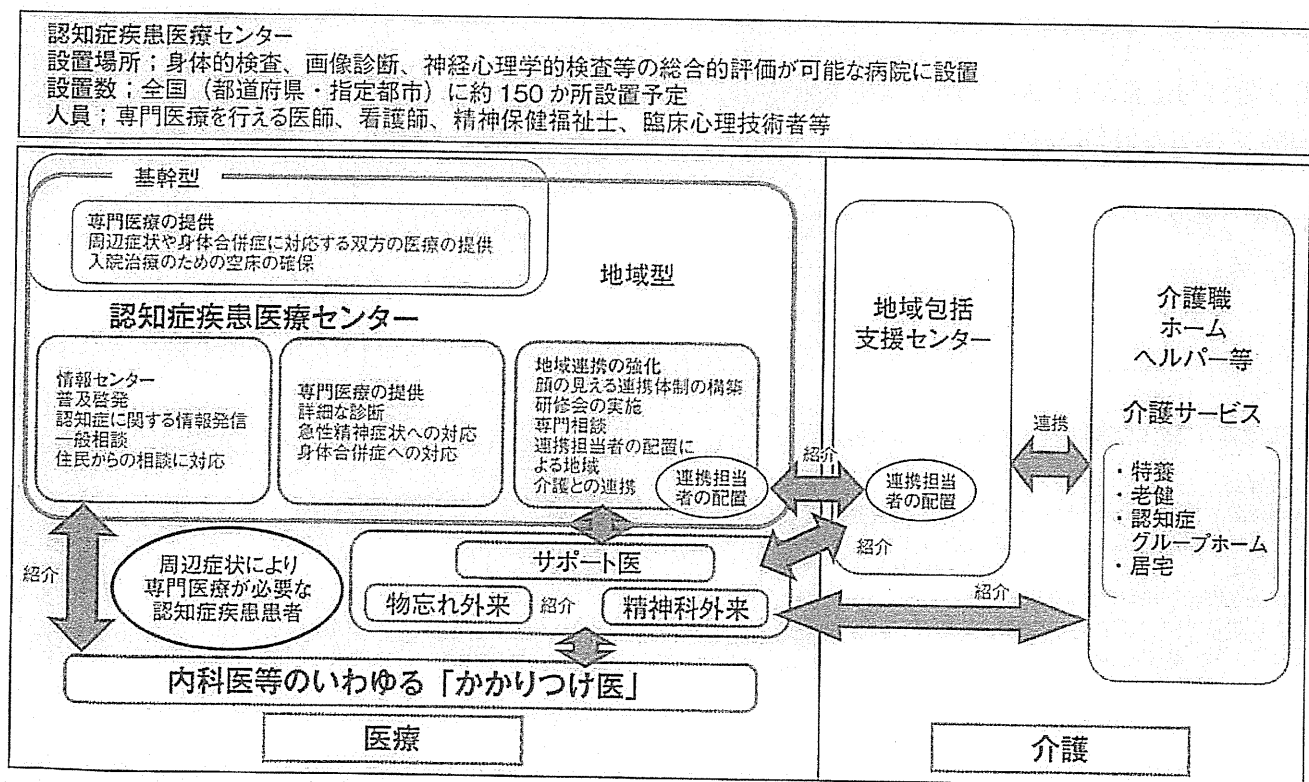


図3 認知症疾患医療センター運営事業

れている。センターには、保健師、主任ケアマネジャー、社会福祉士が置かれ、専門性を生かして相互連携しながら業務にあたる。法律上は市町村事業である地域支援事業を行う機関であるが、外部への委託も可能である。要支援認定を受けた者の介護予防マネジメントを行う介護予防支援事業所としても機能する。

その業務内容は、認知症疾患医療センターとの相談・連絡、認知症患者の権利擁護の専門家等との相談・連絡、他の地域包括支援センターへの専門的な認知症ケア相談、定期的な巡回相談、具体的な援助等となっている。認知症疾患医療センターの「連携担当者」と地域包括支援センターの「認知症連携担当者」が連携し、切れ目のない医療と介護のサービスを提供するとともに、地域ケアに対する専門的な支援を実施することが求められる。

## 今後の地域連携について

現在、各地で認知症医療・介護のための地域連携組織が立ち上げられている。それらは、地域連携バスの使用、研修会などによる相互交流などにより、患者の転院、紹介などを円滑に行うことをめざしており、直接「顔の見える」連携が模索されている。このことは大変重要なことであり、各地の関係者のみなさんの努力を多としたい。しかし、一方で医療機関や介護施設での受け入れ能力が十分でないことが連携を滞らせる大きな要因にもなっている。たとえば、身体合併症治療が必要な認知症患者が地域の中で発生した場合でも、一般病院では管理面から認知症、なかでもBPSD患者の入院治療受け入れが困難であることが多くなっているのが実情だ。したがって、認知症疾患医療センターのような専門医療機関内の認知症BPSD及び身体合併症診療能力を上げることで、患者

受け入れ能力を向上させることも、間接的に地域連携を促進する重要な要素であると考えられる(表2)。認知症患者の受け入れ能力を改善するためには、院内に認知症入院治療支援体制を構築することが必要である<sup>3)</sup>。

国立長寿医療研究センターでは、入院に関しては精神科病床を持たないため、重度のBPSD例に関しては近隣の協力病院にお願いすることになっているが、身体合併症を有する認知症例の治療のために、軽度から中等度レベルのBPSDにも対応できる病棟を開設した。ここでは、肺炎急性期、大腿骨頸部骨折術後などでADL改善、リハビリテーションを必要とするにもかかわらず、認知症のために急性期病棟では十分な治療、看護ができない患者(このような例はきわめて多い)の治療継続を身体、精神両面から行う。治療にあたっては現疾患の主科医師とともに、老年科、神経内科、精神科といった認知症専門の医師が担当副科として加わることで主科医師の負担を軽減する。さらに、認知症認定看護師を配置してケアの充実も図る。

さらに、呼吸器疾患、整形外科疾患などの病棟において治療中の認知症患者の評価、対応をサポートするための院内回診チーム(Dementia Support Team: DST)を立ち上げた。これは、認知症専門医、認知症認定看護師、臨床心理士、精神保健福祉士がチームをつくり、院内を回診して、各病棟における認知症患者の問題についてアドバイスし、必要に応じて、認知症身体合併症治療病棟への転棟適応の判定を行う。このような試みは他施設でも始められている<sup>4)</sup>。認知症身体合併症治療病棟の開設およびDSTの立ち上げにより、認知症患者の一般病棟での受け入れが改善し、地域連携に貢献することが期待される。

表2 認知症専門医療機関による地域連携の2つの型

### 直接的連携

地域連携バスの使用、研修会などによる相互交流などにより、患者の転院、紹介などを円滑に行うことをめざす。

### 間接的連携

専門医療機関内の認知症BPSD及び身体合併症診療能力を上げることで、患者受け入れ能力を向上させる。院内に認知症入院治療支援体制を構築することが必要である。

### 【文献】

- 1) 独立行政法人国立長寿医療研究センター編：認知症サポート医研修テキスト平成22年版。p32, 2010。
- 2) 厚生労働省社会援護局資料。http://www.wam.go.jp/wamappl/bb15GS60.nsf/0/2c116f8976613f4a4925783f00016cba/\$FILE/20110222\_1shiryoku4\_1\_4.pdf
- 3) 栗田主一：認知症疾患医療センターをめぐる—老人認知症患者センターの立場から—。精神医学, 2008, 50, 738-41
- 4) 内海久美子：認知症の地域医療—各医療機関の特性(得手・不得手)と地域連携の現状・課題。3) 総合病院における認知症専門医の立場から、神経内科, 72 (Suppl. 6), 200-205, 2010

COMMISSION REPORT

# Guidelines for non-medical care providers to manage the first steps of emergency triage of elderly evacuees

Takashi Takahashi,<sup>1</sup> Katsuya Iijima,<sup>2</sup> Masafumi Kuzuya,<sup>3</sup> Hideyuki Hattori,<sup>4</sup> Koichi Yokono<sup>5</sup> and Shigeto Morimoto<sup>6</sup>

<sup>1</sup>Laboratory of Infectious Diseases, Graduate School of Infection Control Sciences, Kitasato University, <sup>2</sup>Department of Geriatric Medicine, University of Tokyo, Tokyo, <sup>3</sup>Department of Community Healthcare and Geriatrics, Nagoya University Graduate School of Medicine, Nagoya, <sup>4</sup>Department of Psychiatry, National Center for Geriatrics and Gerontology, Obu, <sup>5</sup>Department of Internal and Geriatric Medicine, Kobe University Graduate School of Medicine, Kobe, and <sup>6</sup>Department of Geriatric Medicine, Kanazawa Medical University, Ishikawa, Japan

On 11 March 2011, a strong earthquake occurred off of Japan's Pacific coast and hit northeastern Japan. The earthquake was followed by huge tsunamis, which destroyed many coastal cities. As a result, the Study Group on Guidelines for the First Steps and Emergency Triage to Manage Elderly Evacuees quickly established guidelines enabling non-medical care providers (e.g. volunteer, helpers, and family members taking care of elderly relatives), public health nurses, or certified social workers to rapidly detect illnesses in elderly evacuees, and 20 000 booklets were distributed to care providers in Iwate, Miyagi, and Fukushima prefectures. The aim of this publication is to reduce susceptibility to disaster-related illnesses (i.e. infectious diseases, exacerbation of underlying illnesses, and mental stress) and deaths in elderly evacuees. *Geriatr Gerontol Int* 2011; 11: 383–394.

**Keywords:** earthquake, elderly evacuee, emergency triage, guidelines, non-medical care provider.

## Background

Japanese people have already experienced a variety of natural disasters including earthquakes,<sup>1</sup> typhoons,<sup>2</sup> tsunamis,<sup>3</sup> and others. It is very important to manage

the medical care of elderly evacuees in the wake of disasters because: (i) elderly subjects (especially those needing to live in shelters) may suffer excessive mental and/or physical stress under the altered environment; and (ii) it is difficult to maintain medical management of chronic illnesses (e.g. hypertension, diabetes mellitus, cerebrovascular or cardiac disease) when care has already been started at local medical institutions. It was reported that acute risk factors possibly triggered cardiovascular events in hypertensive elderly patients after the Hanshin-Awaji earthquake.<sup>4</sup> Increased incidence of transient left ventricular apical ballooning (takotsubo cardiomyopathy) was also described after the Mid Niigata Prefecture Earthquake of 2004.<sup>5</sup>

In April 2010, the Study Group on "Guidelines for the First Steps and Emergency Triage to Manage Elderly

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Correspondence: Professor Shigeto Morimoto MD, Department of Geriatric Medicine, Kanazawa Medical University, 1-1 Daigaku, Uchinada-machi, Kahoku-gun, Ishikawa 920-0293, Japan. Email: shigeto@kanazawa-med.ac.jp

**Authors' contributions:** Shigeto Morimoto and Takashi Takahashi contributed to the study concept and design. Masafumi Kuzuya, Hideyuki Hattori, and Koichi Yokono performed acquisition of data. Katsuya Iijima and Shigeto Morimoto analyzed and interpreted the data. Takashi Takahashi and Shigeto Morimoto prepared the manuscript.



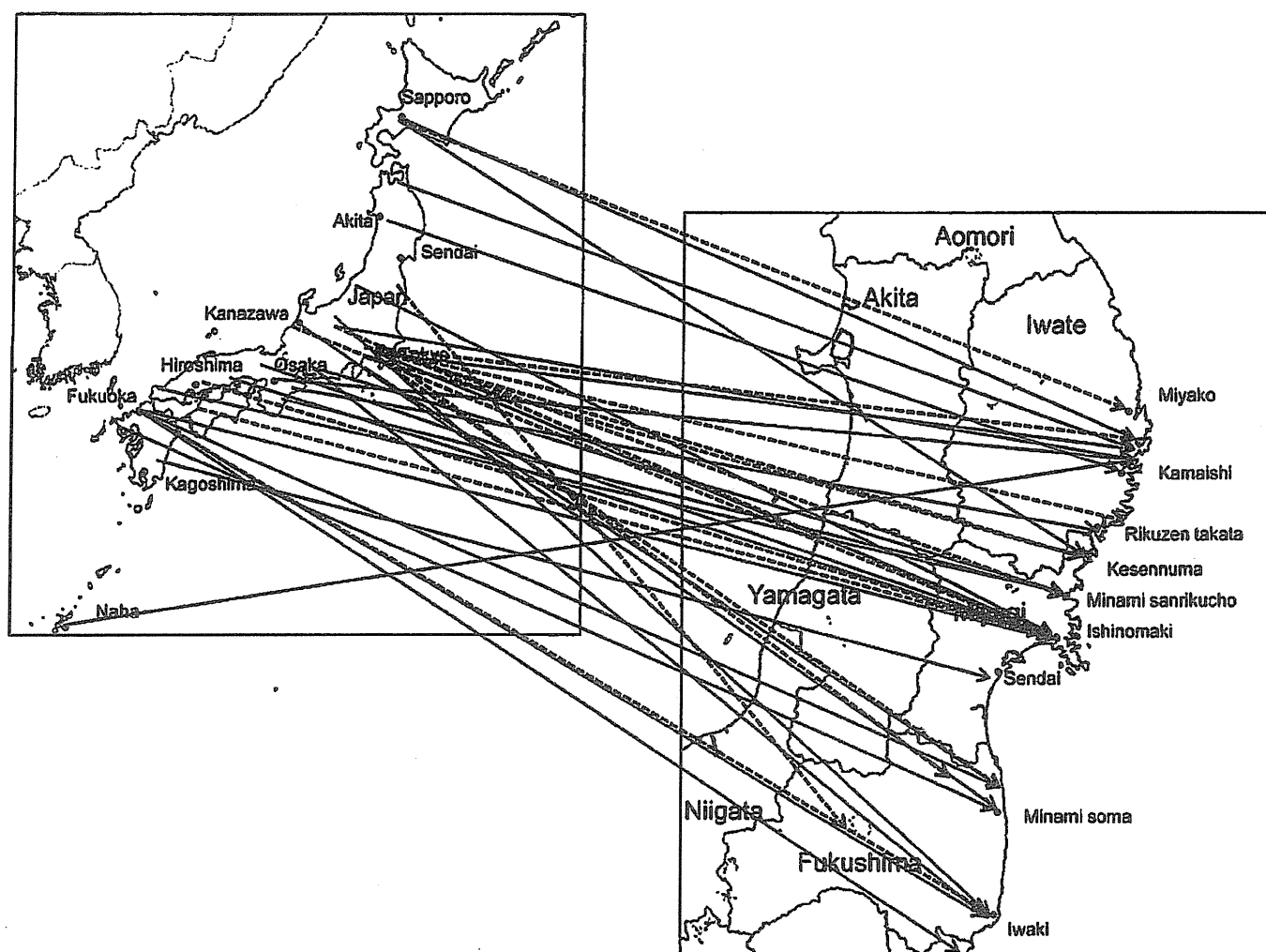


Figure 1 One week after the 2011 Tohoku earthquake, 20 000 booklets for non-medical care providers were distributed by members of the Japan Geriatrics Society (dotted lines) and Japan Medical Association Team (straight lines), to evacuation centers located in Iwate, Miyagi, and Fukushima prefectures.

Evacuees” was formed, with funding from Japan’s Ministry of Health, Labour and Welfare, to conduct comprehensive research on aging and health. The study group aimed to complete and revise the guidelines based on external reviews by expert medical doctors by March 2012.

By collaborating with the Japan Geriatrics Society after the 2011 earthquake off the Pacific coast of Tohoku, we have quickly published two tentative guidelines to manage elderly evacuees: one for medical care providers and another for non-medical care providers (NMCP), including volunteer, helpers, and family members who are taking care of the elderly, public health nurses (PHN), or certified social workers (CSW). A total of 20 000 guideline booklets have been distributed by members of the Japan Geriatrics Society and the Japan Medical Association Team to NMCP, PHN, or CSW working in Iwate, Miyagi, and

Fukushima prefectures (Fig. 1). The Japan Medical Association Team’s mission is to provide medical assistance at hospitals or clinics in disaster-affected areas and to provide ongoing medical treatment that was started before the disaster.<sup>6</sup>

### Preface

The guidelines for NMCP, PHN, and CSW have three chapters: (i) Features and prevention of critical diseases in elderly in evacuation areas; (ii) Signs of acute diseases in elderly; and (iii) Symptoms of anxiety in elderly in shelters. Ideally, NMCP, PHN, or CSW will use the booklets to rapidly detect illnesses in the elderly in shelters or homes. NMCP, PHN, or CSW should immediately inform attending medical staff when those with the signs or symptoms are detected.

## Guidelines

### I. Features and prevention of critical diseases in elderly in evacuation areas

1-1). *Heart attack*. This condition includes angina pectoris, myocardial infarction, and other illnesses due to myocardial ischemia, a lack of blood flow in arteries.

#### Signs and symptoms of a heart attack

Location of symptoms	Central chest to left side of chest Apart from chest discomfort, anginal pain in the upper central abdomen, back, neck, jaw, or shoulders
Detailed symptoms	Worsening ("crescendo") chest pain, specifically crushing, burning, or choking sensation Onset of severe oppression or worsening oppression
Duration of symptoms	Infrequent or lasting less than 10 min Lasting more than 15 min, suggesting unstable condition

Note: Caution is needed because silent or mild symptoms frequently occur in the elderly, especially in those with diabetes. In addition, elderly people sometimes present with atypical symptoms, including breathlessness, nausea, discomfort in the upper central abdomen, or burping.

#### Measures to prevent heart attack in shelters

- NMCP, PHN, or CSW should be aware of elderly who normally take medication for cardiac disease and/or hypertension.
- NMCP, PHN, or CSW should check on the elderly.
- NMCP, PHN, or CSW should ensure that the elderly drink plenty of fluid, including water, to prevent dehydration. They should also advise that the elderly consume a low-salt diet and not smoke.
- If the elderly have any of the above symptoms, medical staff should be alerted.

#### Tips to treat cardiopulmonary arrest in shelters

- NMCP, PHN, or CSW should perform CPR, pushing the central chest strongly and quickly (100 times per minute) and alert medical staff immediately.

1-2). *Hypertension*. Awareness of blood pressure (BP) and its variability in the elderly is necessary because they may have excessive mental and/or physical stress, especially if in an emergency evacuation area or first-aid station, relative to their day-to-day lives before the disaster.

#### Measures to deal with elderly receiving antihypertensive drugs

- First, elderly people who are usually prescribed antihypertensive drugs should be reported to medical staff. NMCP, PHN, or CSW should check on the elderly.

- Elderly people who have been diagnosed as hypertensive should also be checked by medical staff, NMCP, PHN, or CSW.
- BP should be measured frequently. If possible, it is better to measure it daily using an automatic BP machine. In high-risk patients, it is recommended that BP be measured in both the morning and evening.
- If the elderly person's medication is not known because the prescription record is lost, a doctor or medical staff should be consulted.
- If an elderly person has a headache, palpitations, chest symptoms, and/or flushing, BP should be measured immediately and medical staff consulted.
- No smoking and a low-salt diet are also recommended. Endeavors must be made to ensure the elderly maintain physical activity (e.g. any exercise for at least 30 minutes a day).

### 2. Stroke/cerebrovascular disease (CVD)

Cerebrovascular accidents occur suddenly due to a disturbance in the blood supply to the brain and lead to a loss of cerebral function.

#### Signs and symptoms of stroke/CVD

If elderly people have any of the following symptoms, it is possible that they may have suffered a stroke/CVD. Consult medical staff immediately, because these situations may become medical emergencies.

- Symptoms starting suddenly and lasting from a few seconds to minutes
- Headache (mild to severe)
- Vertigo and/or dizziness (with nausea/vomiting on occasion)
- Disturbance of consciousness (snoring-like breathing, semiconscious state/coma)
- Motor disturbance including hemiparesis/hemiplegia/numbness, exhaustion, muscle weakness of the face (central facial palsy), drooling from one corner of the mouth, eyelid drooping (ptosis)
- Aphasia (difficulty with verbal expression, auditory comprehension)
- Sensory or vibratory disturbance (on one side)
- Visual field defect/hemianopia, double vision/polyopia
- Loss of balance when sitting, standing, or walking; loss of coordination.

#### Measures to prevent stroke/CVD in shelters

- First, medical staff and people around should be aware of elderly people who usually take medication for atherosclerotic diseases and/or lifestyle-related diseases (e.g. hypertension, diabetes, dyslipidemia, and cardiac diseases including atrial fibrillation).
- Also, people around should check on the elderly.

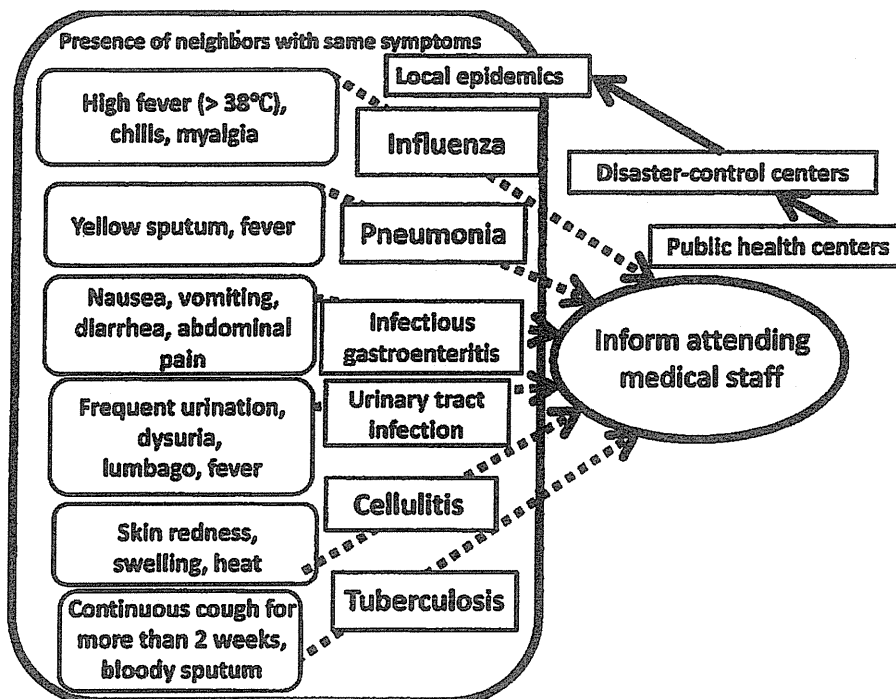


Figure 2 Measures to rapidly detect infectious diseases.

- Continue usual drugs including anticoagulation drugs if possible.
- In cases of unidentified medical conditions because of loss of an elderly person's prescription record, medical staff should be consulted.
- Anticoagulation drugs are generally essential. However, it is better to consult medical staff because it is necessary to check for external wounds or bleeding from the gastrointestinal tract, including stress-induced ulcer.
- CVD is strongly associated with hypertension. Measure BP regularly.
- No smoking is strongly recommended.
- Drink any fluid, including a lot of water, to prevent dehydration.
- A low-salt diet is strongly recommended. Endeavor to take dietary fiber in vegetables including seaweed and mushrooms.
- Endeavor to do any type of exercise or walk for at least 30 minutes a day regularly.
- Prevent constipation.
- Be careful about changes in temperature, especially in winter.

### 3. Infectious diseases

#### Signs and symptoms of infectious diseases

It is useful to have information on epidemics of infectious diseases in stricken areas before and after disasters, in order to quickly detect illness. In particular, this measure is beneficial for diseases, such as influenza, food poisoning and viral gastroenteritis, with a short

incubation time from infection to the onset of symptoms (i.e. several hours up to 3 days). Pay special attention to elderly persons with these symptoms and immediately inform medical staff if there is suspicion that an elderly person has such an illness. In relation to this point, it is important to collect epidemiological information from district public health centers through disaster-control centers (Fig. 2).

In fact, many evacuees in shelters developed vomiting and diarrhea after the 2007 Noto Peninsula Earthquake. It was possible to immediately predict an outbreak of norovirus gastroenteritis among evacuees since a local epidemic of this infectious disease had already been observed in the Noto area before the quake.

However, local epidemics are not always useful for detecting infectious diseases, particularly those with a long incubation period (i.e. several months up to 2 years) such as pulmonary tuberculosis.

#### Measures to prevent transmission of infectious agents in shelters

- The environment in shelters induces an increased risk for outbreaks of infectious diseases because many evacuees are living together in a very limited space.
- It is very important to wash hands and gargle as standard precautions. Please apply hand disinfectant when it is not possible to use water. It is essential to wash hands or use hand disinfectant after using the toilet.
- NMCP, PHN, or CSW should not directly touch human bodily fluids (e.g. blood, urine, feces, nasal discharge, and sputum) with their hands because the fluids may include infectious microorganisms.



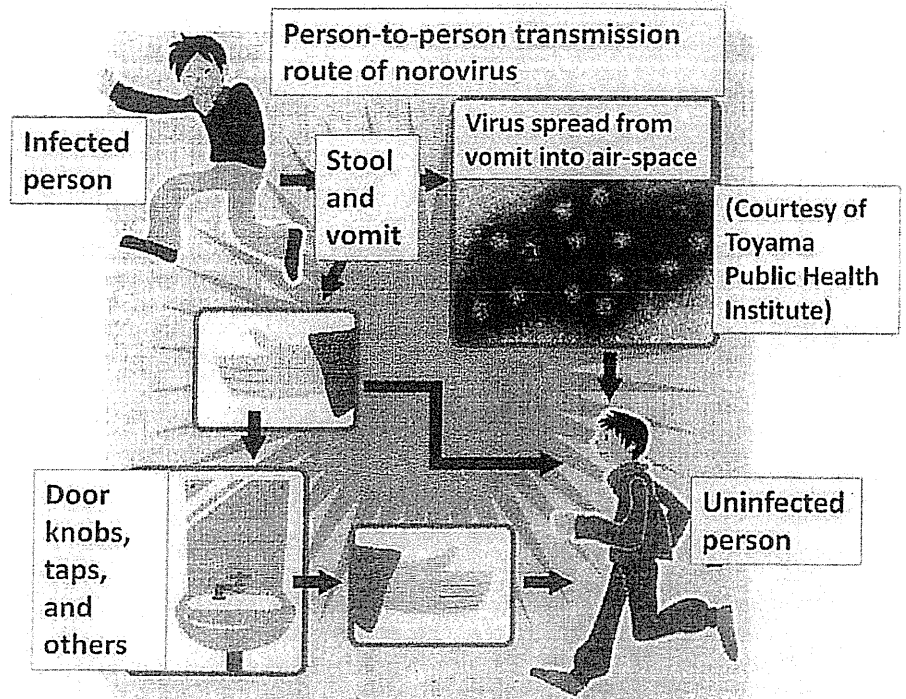


Figure 3 Person-to-person transmission route of norovirus.

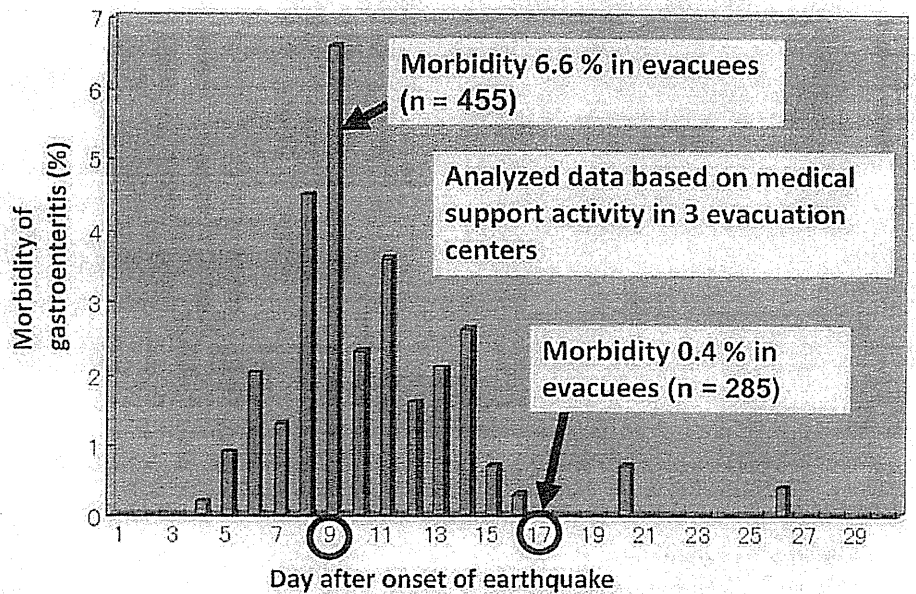


Figure 4 Morbidity of gastroenteritis in evacuees in shelters after the 2007 Noto Peninsula Earthquake.

If NMCP, PHN, or CSW are aware that the environment (floors in shelters, portable toilets, and temporary water-suppliers) has been contaminated with vomitus or diarrheal matter, contact medical staff. Do not clean the contaminated environment yourself. The staff can deal with this using 0.1% sodium hypochlorite disinfectant.

- Norovirus can spread via person-to-person transmission and lead to gastroenteritis outbreaks (Fig. 3).<sup>7</sup> However, it is unnecessary to isolate subjects with gastroenteritis from the stricken areas. The outbreak

in shelters after the Noto quake was quelled after one week of interventions including personal hand hygiene, gargling, and the use of disinfectant on environmental surfaces (Fig. 4).<sup>8</sup>

In addition, respiratory hygiene (cough etiquette) is recommended to prevent respiratory infections.<sup>9</sup> With respect to coughing, rhinorrhea, sneezing, and sputum, please instruct evacuees to behave as follows: (i) use a tissue to cover your mouth and nose when you cough or sneeze (Fig. 5); (ii) drop used tissue in a special waste basket; and (iii) wash your hands with soap and warm

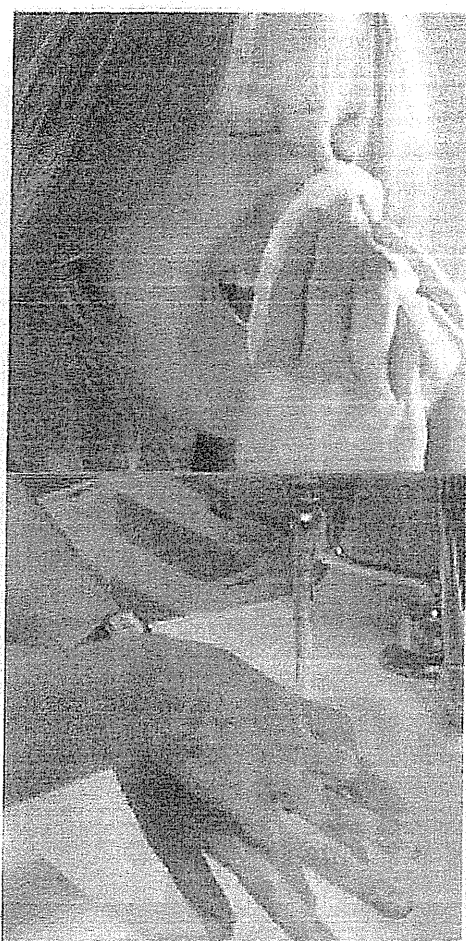


Figure 5 Respiratory hygiene (cough etiquette).

water or clean with alcohol gel or wipes since your hands may be contaminated with secretions (Fig. 5). Elderly people who frequently cough or sneeze should be asked to wear a surgical mask provided by medical staff. Please keep a distance of more than 1 m between symptomatic subjects and others.

#### 4. Dehydration

##### Signs and symptoms of dehydration

If an elderly person has some of the more severe symptoms of dehydration listed below, call medical staff immediately.

- Muscle weakness
- Physical fatigue
- Increased body temperature
- Decreased urine production
- Dry skin, even under the armpits.

##### Measures to prevent dehydration in shelters

- When elderly people feel thirsty, they are already dehydrated, so do not restrict water intake.
- To prevent dehydration, an elderly person without particular illness such as heart failure or kidney failure

Table 1 Risks for dehydration in the elderly

Inability to feed oneself
Appetite loss (decrease in food intake)
Swallowing problems
Diarrhea or vomiting
Thirsty or dry mouth
Taking a diuretic
Increased body temperature
Decreased urination
No air conditioning/not using air conditioning
Limitation of water intake to avoid frequent urination

simply needs to replenish fluids with at least one liter of water per day.

- When elderly people have any of the risks for dehydration listed in Table 1, they should be carefully assessed by a doctor for dehydration.

#### 5. Malnutrition

##### Signs and symptoms of malnutrition

When an elderly person has any of the risks for malnutrition listed below, the person should be carefully assessed by medical staff.

- Consumed less than half the usual dietary intake for at least 1 week
- Diarrhea or vomiting for more than 2 or 3 days
- Decrease in body weight of more than 5% for 2 weeks
- Insufficient intake or dysphagia due to inadequate food
- Receiving enteral or parenteral nutrition.

##### Measures to prevent malnutrition in shelters

The following general precautions to prevent malnutrition should be considered:

- Adequate food supply
- Adequate types of food consumed
- Adequate feeding assistance
- Dental issues such as gum disease, cavities, and poorly fitting dentures
- Regular assessment of nutritional status and weight loss.

#### 6. Gastrointestinal disorders

##### Signs and symptoms of gastrointestinal disorders

When elderly evacuees have any of the signs and symptoms of gastrointestinal disorders listed below, they should be carefully assessed by medical staff.

- Upper central abdominal pain after meals (on suspicion of stomach ulcer)
- Upper central abdominal pain when hungry (on suspicion of duodenal ulcer)
- Gastric discomfort

- Appetite loss
- Heartburn
- Tarry (black) stool or blood in the stool.

#### Measures to prevent gastrointestinal disorders in shelters

The following general precautions to prevent gastrointestinal disorders should be considered:

- Avoid psychological stress.
- Eat substantial meals at regular mealtimes.
- Wash hands, gargle, and disinfect cooking utensils to prevent infectious enteritis.
- Flush or discard any vomit, and change diapers with rubber gloves while wearing a flu mask. Thoroughly clean and disinfect contaminated surfaces with a bleach-based household cleaner immediately after an episode of illness.
- Drink sufficient liquid and take a lot of exercise to avoid constipation.
- Do not ignore the urge to defecate and maintain a regular bowel habit.

### 7. Diabetes mellitus (DM)

#### 7-1). Hyperglycemia

##### Signs and symptoms of exacerbation of DM

If elderly people have any of the symptoms described below, their DM might be worsening. Please contact medical staff if any of the following symptoms are detected:

- Frequent urination
- Increasing incontinence
- Thirst
- Fatigue
- Not looking well.

##### Measures to prevent exacerbation of DM in shelters

- Eat meals regularly and take medication with meals.
- Patients with DM type 1 should not skip basal insulin injections.
- Drink enough water to prevent dehydration.
- If someone has a fever or little appetite, monitor blood glucose more frequently than usual or consult a doctor promptly.

7-2). *Hypoglycemia*. In addition, if elderly evacuees are taking hypoglycemic medication, be alert for symptoms of hypoglycemia.

##### Signs and symptoms of hypoglycemia

The symptoms described below might be caused by hypoglycemia. Please contact medical staff if any of the following symptoms are detected:

- Strong feeling of hunger
- Cold sweats
- Palpitations
- Weakness

- Sleepiness
- Slurred speech
- Blurred vision
- Convulsion.

##### Measures to prevent hypoglycemia in shelters

- Elderly people should avoid exercise or working when hungry.
- Eat meals regularly.
- Eat carbohydrates (e.g. rice, bread, noodles, or potatoes).
- If people cannot eat a meal, they should reduce or skip their hypoglycemic medication.
- Set a higher goal of glucose control (150–200 mg/dL) than usual.

##### Tips to treat hypoglycemia in shelters

- NMCP, PHN, or CSW should ask those with the above symptoms to take a glucose tablet.

### 8. Bronchial asthma

#### Signs and symptoms of exacerbation of bronchial asthma

If elderly people have any of the following symptoms, bronchial asthma might be worsening. Please contact medical staff if the following symptoms are detected:

- Paroxysmal wheezing or coughing, or reoccurrence of these symptoms
- Breathlessness during the night
- Breathlessness when moving, speaking, or lying down
- Cyanosis or edema
- Drowsiness.

##### Measures to prevent exacerbation of bronchial asthma in shelters

- Let NMCP, PHN, CSW, or medical staff know that if an elderly person is taking medication.
- Continue taking medicine.
- Wash your hands and gargle regularly, wear a mask if available, and be careful about infectious diseases such as colds.
- Keep warm.

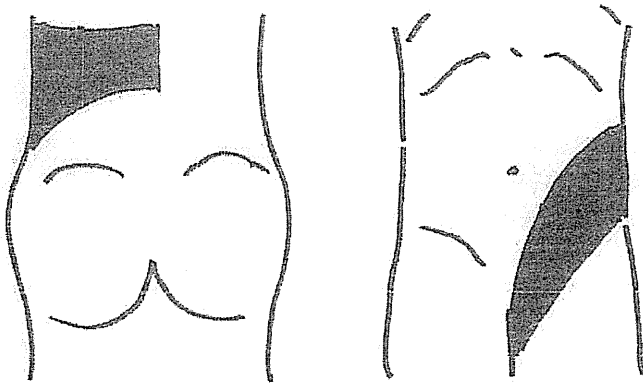
### 9. Chronic obstructive pulmonary disease (COPD)

#### Signs and symptoms of exacerbation of COPD

If an elderly person has any of the following symptoms, COPD might be worsening. Please contact medical staff if the following symptoms are detected:

- Increased respiratory rate and shortness of breath
- Worsening of dyspnea on exertion or at rest
- Increased frequency or severity of cough and excessive sputum production
- Mucopurulent sputum (change in sputum character)
- Cyanosis or edema
- Drowsiness.

##### Measures to prevent exacerbation of COPD in shelters



**Figure 6** Areas where pain occurs due to urinary tract diseases.

- Let NMCP, PHN, CSW, or medical staff know if an elderly person is taking medication.
- Continue taking medication and inhaling bronchodilators.
- Avoid exposure to smoke and dust.
- Try to wash your hands and gargle regularly.
- Keep warm and do not stay in the cold.

#### 10. Chronic kidney disease (CKD)

##### Signs and symptoms of CKD

If elderly evacuees have any of the following symptoms, CKD might be worsening. Please contact medical staff if the following symptoms are detected:

- Inactivity, fatigue, or weakness
- Edema
- Appetite loss
- Nausea and/or vomiting
- Pruritus.

##### Measures to prevent CKD in shelters

- Let NMCP, PHN, CSW, or medical staff know if an elderly person is taking medication.
- Continue taking medicine.
- Have regular blood pressure checks.
- Restrict salt intake.
- Drink enough water to prevent dehydration.
- Keep warm.
- Be careful about infectious diseases such as colds.

#### 11. Urinary diseases

##### Signs and symptoms of urinary diseases

If an elderly person experiences some of the more severe symptoms of urinary diseases listed below, call medical staff immediately.

- Pain on urination
- Lower abdominal pain (Fig. 6)
- Back pain, lumbago (Fig. 6)
- No urination for half a day or longer

- Distention of lower abdomen
- Bloody urine
- Cloudy smelly urine
- Frequent urination
- Incontinence
- High fever (in cases of pyelonephritis, 38°C or higher)
- Limiting water intake in order to avoid frequent urination or incontinence.

##### Measures to prevent urinary diseases in shelters

- Replenish fluids with at least one liter of water per day in persons without particular illness such as heart failure or kidney failure.
- Do not avoid going to the toilet.

#### 12. Post-traumatic stress disorder (PTSD)

##### Signs and symptoms of PTSD

Please contact medical staff if an elderly person has any of the following symptoms. Please contact medical staff if the following signs are detected:

- Sudden change in personality
- Absent-mindedness and the inability to respond quickly
- Restlessness
- Frequent hyperventilation
- Frequent palpitations
- Panic attacks.

##### Measures to prevent PTSD in shelters

- If elderly people feel distressed or pain, they should confide in someone (a medical staff member, NMCP, PHN, or CSW).
- It may be necessary for the elderly to take medication if they cannot sleep or feel distressed and there is no alternative.

#### 13. Depression

##### Signs and symptoms of depression

It is not unusual for an elderly person to experience grief after suffering from severe stress. Please contact a medical staff member if the following symptoms of depression are detected:

- Cannot help thinking of bad things
- Not knowing what to do despite actually having many things to do
- Feeling too sluggish to move, although the results of a medical checkup and blood tests are normal
- Unable to sleep at night
- Always thinking of dying.

##### Measures to prevent depression in shelters

- It is important to maintain a routine, including waking up and going to sleep at the same time daily.
- If elderly people feel distressed or pain, they should confide in someone (a medical staff member, NMCP, PHN, or CSW).

- It may be necessary for the elderly to take medication if they cannot sleep or feel distressed and there is no alternative.
- If an elderly person has been attending a clinic for the treatment of depression, please tell a medical staff member. It is important that the person continues to receive treatment.

#### 14. Behavioral and psychological symptoms of dementia (BPSD)

##### Signs and symptoms of BPSD

Please contact a medical staff member if the following symptoms of dementia are detected:

- Restlessness and speaking in a disjointed manner
- Paranoid or having delusions (e.g. a false idea of being robbed)
- Becoming angry or starting to cry suddenly.

##### Measures to prevent BPSD in shelters

- Create an environment in which dementia patients can spend time with familiar people.
- Prepare a quiet environment so that dementia patients can get adequate sleep at night.
- Preparations should be made so that a dementia patient can be transferred to a professional medical institute when psychological symptoms or behavioral abnormality is observed.

#### 15. Delirium

##### Signs and symptoms of delirium

Please contact medical staff if any of the following physical symptoms are detected in elderly persons who had previously been well and not experienced any decrease in cognitive function:

- Speaking or behaving in an erratic manner
- Absent-mindedness or being distracted
- Emotional instability (e.g. becoming angry, starting to cry, or getting excited suddenly).

##### Measures to prevent delirium in shelters

- Particular attention should be paid to dehydration, infections, and other underlying physical disorders, which can cause delirium in the elderly. Please be aware that elderly people with physical disorders are potential delirium patients.
- Keeping the elderly company and talking to them to provide stimulation are effective for preventing lethargy during the daytime. At night, create a quiet environment to help them achieve a regular sleeping pattern.

#### 16. Dental diseases

##### Signs and symptoms of dental diseases

If an elderly person is showing some of the more severe symptoms of dental disease listed below, call medical staff immediately.

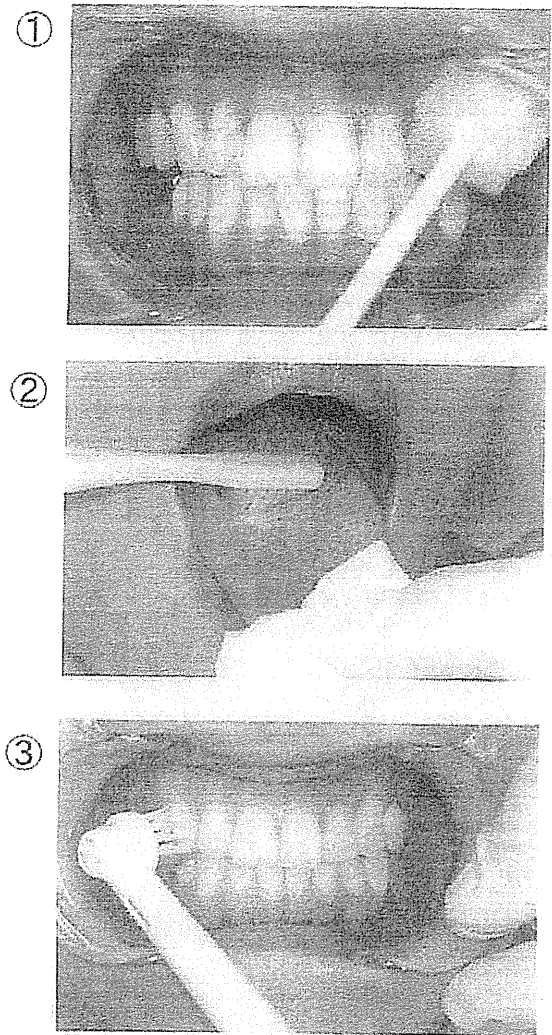


Figure 7 Systematic oral care program.

- Pain from dental caries
- Swelling and bleeding of the gingival
- Severe halitosis
- Fur on the tongue.

##### Measures to prevent dental diseases in shelters

- Keep cleaning the mouth.
- Brush the teeth every day.
- Those who are unable to do the above independently need to receive a systematic oral care program (Fig. 7)<sup>10</sup>
  - 1 Remove oral-mucosal and gingival saburra by using an oral care sponge for one minute.
  - 2 Remove fur from the tongue with a tongue brush for half a minute.
  - 3 Remove bacterial flora from the tooth surface with an electric toothbrush for 2.5 minutes, if an electric power supply is available.
  - 4 Rinse the mouth for 1 minute.



### 17. Functional inactivity

#### Signs and symptoms of functional inactivity

Elderly people often may not complain of their subjective symptoms accurately, or they may not be aware of a decline in their health. Thus, it is important for NMCP, PHN, or CSW to be aware of elderly persons' health conditions as well as the whereabouts of subjects who require support and/or nursing care.

If an elderly person shows some of the more severe symptoms of functional inactivity listed below, call medical staff and/or shelter staff.

- Being isolated, with no attempt to communicate
- Narrow range of activities and staying indoors
- Lying down all day long

#### Measures to prevent functional inactivity in shelters

- Encourage subjects to greet each other and make small talk in the shelter.
- Exercise regularly.
- Bend and stretch your arms and legs often, even in the narrow living space in the shelter.
- NMCP, PHN, or CSW should evaluate the reserve capability of elderly subjects with functional inactivity promptly.

### 18. Decubitus

#### Signs and symptoms of decubitus

NMCP, PHN, or CSW should actively survey the onset of decubitus ulcer, particularly on the hip, the backbone, the heel, and the back of the head, in bedridden subjects. Since this illness needs long-term management, contact medical staff and arrange transport to the hospital.

#### Measures to prevent decubitus in shelters

- Change bedridden subjects' position every 2 hours a day.
- Keep the skin clean.

### 19. Heat stroke

#### Signs and symptoms of heat stroke

In summer, pay special attention to heat stroke in elderly people in shelters. The main features are hot skin (body temperature  $\geq 40^{\circ}\text{C}$ ) without sweat and drowsiness. Call medical staff immediately as this condition will cause fatality.

#### Measures to prevent heat stroke in shelters

- Keep cooling the neck or under the arms.
- Do not restrict water intake.

## II. Signs of acute diseases in elderly

If any of the following symptoms is encountered in the elderly, they may be severely ill due to acute disease.

These signs of acute diseases are sensitive enough to rapidly detect a severe state in elderly evacuees. NMCP, PHN, or CSW should consult attending medical staff immediately. Asterisks denote signs indicating the need for emergency transport.

### 1. Disturbance of Consciousness (Japan Coma Scale [JCS] Scoring)

- Rousable by being spoken to but reverts to previous state if stimulus stops (JCS II-10)
- Rousable with loud voice but reverts to previous state if stimulus stops (JCS II-20)
- Rousable only by repeated mechanical stimuli (JCS II-30)
- \* Unrousable using any forceful stimuli but responds to avoid the stimuli (JCS III-100 to III-300).

### 2. Shock

- \* Anemia (e.g. pallor of lips and/or nails)
- \* Bleeding due to external injuries
- \* Disturbance of consciousness (JCS III-100 to III-300)
- Abnormal skin turgor, a physical sign of dehydration
- Dry tongue
- \* A decline in BP: systolic BP  $< 90$  mmHg
- \* An increase or decrease in pulse rate (i.e. resting pulse rate of more than 120 beats/minute or less than 50 beats /minute).

### 3. Dyspnea

- Shallow and rapid respiration, puffing (shallow breathing)
- Shoulder breathing (accessory muscle use)
- Flaring of wings of the nose and dilated nostrils (nasal alar breathing)
- Violet color to lips and nails (cyanosis)
- Wheezing or whistling while breathing (wheeze/stridor)
- Sleeping with the upper body raised in order to breathe (orthopnea)
- Weak breathing, suspended on occasion (apnea)
- Pursing the lips when exhaling (pursed lips breathing)
- \* Collapse of supraclavicular or intercostal spaces when inhaling (inspiratory retraction)
- \* Distension of the abdomen/shrinking of the chest when inhaling, and shrinking of the abdomen/ distension of the chest when exhaling (seesaw breathing)
- \* Obvious asymmetric movement of the chest during respiration
- \* Respiratory rate less than 10/minute or more than 30/minute.

### 4. Acute abdomen

- \* Uncontrollable abdominal pain



- \* Hematemesis, vomiting blood
- \* Tarry (black) stool, visibly bloody stools not due to hemorrhoids
- \* Frequent vomiting
- \* Abdominal swelling, abdominal distension
- \* Severe anemia (pallor of face or lips).

#### 5. *Neurological abnormalities.*

- \* Motor disturbance including hemiparesis/hemiplegia/numbness, muscle weakness of the face (central facial palsy), eyelid drooping (ptosis)
- \* Aphasia (difficulty with verbal expression, auditory comprehension)
- \* Sensory or vibratory disturbance (unilateral)
- \* Visual field defect/hemianopia, double vision/polyopia
- \* Loss of balance when sitting, standing, or walking; loss of coordination
- \* Pupils not isocoric
- \* Convulsions or cramps.

#### 6. *Chest pain*

- \* Chest pain, oppression, burning, or choking sensation in anterior chest
- \* Increasing frequency and worsening angina attacks compared with 2 weeks earlier
- \* Chest symptoms even at rest or at night
- \* Continuation (without improvement) of these symptoms in spite of aspirin or nitroglycerine use
- \* Duration of chest symptoms: more than 20 minutes.

#### 7. *Hypertensive emergency*

- \* Hypertension (systolic BP  $\geq$  200 mmHg).

#### 8. *High fever*

- Shivering (shaking chills) coinciding with high fever and potential severe infectious diseases (i.e. bacteremia)
- Burning forehead and poor response to being called.

#### 9. *Hematuria*

- Red and/or tea-colored urine.

### *III. Symptoms of anxiety in elderly in shelters*

If an elderly person is showing some of the symptoms listed below, immediately ask medical staff to assess the presence of serious diseases.

#### 1. *Dysphagia, difficulty in swallowing*

- Coughing or breathing in food while swallowing

- Aspiration (i.e. escape of food or liquid into the lungs) or labored breathing while swallowing
- Recurrent pneumonia, respiratory infections, or choking experiences
- Wet vocal quality ("gurgly" voice) after swallowing
- Irritability during feeding or failure to thrive
- Prolonged feeding times (more than one hour)
- Unexplained weight loss.

#### 2. *Diarrhea*

- Subject has diarrhea and a fever.
- Similar symptoms (diarrhea) are observed in surrounding evacuees.
- If diarrhea persists for two days or more, ask medical staff to assess, in order to avoid dehydration.

#### 3. *Constipation*

- Change in bowel habit
- Constipation with abdominal pain
- Constipation for 2 or more days.

## Discussion

On 11 March 2011, an earthquake with a 9.0 magnitude occurred off of Japan's Pacific coast and hit northeast Japan. The earthquake was followed by huge tsunamis, which destroyed many coastal cities.<sup>11,12</sup> A total of 14 841 people died in these events, and 10 063 persons are still missing as of 6 May 2011.<sup>13</sup> In addition, 109 086 homes were completely or partially destroyed, and 3970 roads were damaged.<sup>13</sup> There are still 119 967 displaced people (down from approximately 470 000 on March 14) living in shelters because of disrupted community utility services and/or health risks related to the nuclear power plant accidents in Fukushima.<sup>13-15</sup> Specifically, 37 482, 35 923, and 25 501 persons took refuge into the 357, 403, and 157 evacuation centers located in Iwate, Miyagi, and Fukushima prefectures, respectively.<sup>13</sup>

There were several reports concerning medical needs following the 2011 earthquake off the Pacific coast of Tohoku. For instance, reports have highlighted the importance of managing the exacerbation of chronic illnesses (e.g. hypertension, cardiac disease, DM, and chronic pulmonary disease) as well as dehydration in elderly evacuees, especially as it was difficult to source enough medication for their chronic illnesses.<sup>16,17</sup> Health workers should pay attention to the possible spread of acute diseases such as gastroenteritis, diarrhea, and other illnesses associated with dirty water.<sup>16</sup> In addition to physical health problems, it is important to rapidly detect long-term mental problems in the elderly (e.g. PTSD, depression, BPSD, and delirium) triggered by the disaster.<sup>16,17</sup> Medical specialists have indicated

that thousands of victims will be in need of long-term counseling to cope with the loss of their relatives, friends, and homes.<sup>16</sup>

There were some cases that previous guidelines failed to cover because of the unexpected phenomena following the Tohoku earthquake. Therefore, it is essential that we are mindful of the difficulties in establishing general guidelines that can cover a wide (and unexpected) range of disasters. Feedback regarding the booklets will need to be collected from NMCP, PHN, or CSW to assess the guidelines' usability. We further need to investigate the morbidity and mortality from disaster-related illnesses among the elderly in order to clarify efficacy of these guidelines.

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### References

- 1 Tanida N. What happened to elderly people in the great Hanshin earthquake. *BMJ* 1996; 313: 1133-1135.
- 2 Liu C, Linde AT, Sacks IS. Slow earthquakes triggered by typhoons. *Nature* 2009; 459: 833-836.
- 3 Shuto N, Fujima K. A short history of tsunami research and countermeasures in Japan. *Proc Jpn Acad Ser B Phys Biol Sci* 2009; 85: 267-275.
- 4 Kario K, Matsuo T, Kobayashi H et al. Earthquake-induced potentiation of acute risk factors in hypertensive elderly patients: possible triggering of cardiovascular events after a major earthquake. *J Am Coll Cardiol* 1997; 29: 926-933.
- 5 Sato M, Fujita S, Saito A et al. Increased incidence of transient left ventricular apical ballooning (so-called "Takotsubo" cardiomyopathy) after the mid-Niigata Prefecture earthquake. *Circ J* 2006; 70: 947-953.
- 6 Starkey J, Maeda S. Earthquake in Japan. *Lancet* 2011; 377: 1653.
- 7 Takahashi T. Prevention of norovirus infection. *Gekkan Hokkoku Actus* 2007; 211: 36-39. (in Japanese).
- 8 Nomura K, Murai H, Nakahashi T et al. Outbreak of norovirus gastroenteritis in elderly evacuees after the 2007 Noto Peninsula earthquake in Japan. *J Am Geriatr Soc* 2008; 56: 361-363.
- 9 Siegel JD, Rhinehart E, Jackson M et al. The Healthcare Infection Control Practices Advisory Committee. Guideline for isolation precautions: preventing transmission of infectious agents in healthcare settings 2007. [Cited 06 May 2011.] Available from URL: <http://www.cdc.gov/ncidod/dhqp/pdf/guidelines/Isolation2007.pdf>.
- 10 Sumi Y. A systematic oral care program for frail elderly persons that should be performed by dental hygienists. *J Dent Hyg* 2009; 29: 1322-1326. (in Japanese).
- 11 Normile D. Japan disaster. Waves of destruction. *Science* 2011; 331: 1376.
- 12 Shibahara S. The 2011 Tohoku earthquake and devastating tsunami. *Tohoku J Exp Med* 2011; 223: 305-307.
- 13 Emergency Disaster Countermeasure Headquarters, National Police Agency of Japan. *Damage Situation and Police Countermeasures Associated with 2011 Tohoku District-off the Pacific Ocean Earthquake*. Tokyo: National Police Agency of Japan, Emergency Disaster Countermeasure Headquarters, 2011. [Cited 06 May 2011.] Available from URL: <http://www.npa.go.jp/archive/keibi/biki/higaijokyo.pdf>.
- 14 Matsumoto M, Inoue K. Earthquake, tsunami, radiation leak, and crisis in rural health in Japan. *Rural Remote Health* 2011; 11: 1759.
- 15 Christodouleas JP, Forrest RD, Ainsley CG et al. Short-term and long-term health risks of nuclear-power-plant accidents. *N Engl J Med* 2011; 364: 2334-2341.
- 16 McCurry J. Japan: the aftermath. *Lancet* 2011; 377: 1061-1062.
- 17 Furukawa K, Arai H. Earthquake in Japan. *Lancet* 2011; 377: 1652.

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# Controlled study on the cognitive and psychological effect of coloring and drawing in mild Alzheimer's disease patients

Hideyuki Hattori, Chikako Hattori, Chieko Hokao, Kumiko Mizushima and Toru Mase

*Department of Psychiatry, National Center for Geriatrics and Gerontology (NCGG), Obu, Aichi, Japan*

**Aim:** Art therapy has been reported to have effects on mental symptoms in patients with dementia, and its usefulness is expected. We performed a controlled trial to evaluate the usefulness of art therapy compared with calculation training in patients with mild Alzheimer's disease.

**Methods:** Thirty-nine patients with Alzheimer's disease showing slightly decreased cognitive function allowing treatment on an outpatient basis were randomly allocated to art therapy and control (learning therapy using calculation) groups, and intervention was performed once weekly for 12 weeks.

**Results:** Comparison of the results of evaluation between before and after therapy in each group showed significant improvement in the Apathy Scale in the art therapy group ( $P = 0.014$ ) and in the Mini-Mental State Examination score ( $P = 0.015$ ) in the calculation drill group, but no significant differences in the other items between the two groups. Patients showing a 10% or greater improvement were compared between the two groups. Significant improvement in the quality of life (QOL) was observed in the art therapy compared with the calculation training group ( $P = 0.038$ , odds ratio, 5.54). ANOVA concerning improvement after each method revealed no significant difference in any item.

**Conclusion:** These results suggested improvement in at least the vitality and the QOL of patients with mild Alzheimer's disease after art therapy compared with calculation, but no marked comprehensive differences between the two methods. In non-pharmacological therapy for dementia, studies attaching importance to the motivation and satisfaction of patients and their family members rather than the superiority of methods may be necessary in the future. *Geriatr Gerontol Int 2011; 11: 431–437.*

**Keywords:** Alzheimer's, art, coloring, non-pharmacological.

## Introduction

Alzheimer's disease causes declines in not only cognitive function but also mood, vitality and activities of

daily living (ADL). Concerning drug therapy, new drugs other than donepezil are undergoing trials, but, despite expectations, it is difficult to control the disease with these drugs alone. The well-balanced administration of drug and non-pharmacological therapies is a matter of basic importance in the therapeutic strategy for Alzheimer's disease. Particularly, non-pharmacological therapy is expected to be effective for improving the ADL and quality of life (QOL).<sup>1</sup> Although various methods have been proposed as non-pharmacological

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Correspondence: Dr Hideyuki Hattori MD PhD, Department of psychiatry, National Center for Geriatrics and Gerontology (NCGG), 35 Gengo, Morioka, Obu, Aichi 474-8511, Japan.  
Email: [hideyuki@negg.go.jp](mailto:hideyuki@negg.go.jp)

therapy for dementia, evidence of their effectiveness remains insufficient. Art therapy has been reported to be effective for alleviating psychiatric symptoms of dementia<sup>2</sup> and is expected to be useful, but there have been few comparative studies using a control group.<sup>3</sup> In this study, we administered art therapy to patients with Alzheimer's disease, and evaluated its effectiveness for the treatment of dementia in a controlled study using calculation training.

## Methods

### *Registration criteria*

Of the men and women aged 65–85 years who consulted the outpatient clinic of the Department of Psychiatry or Memory Clinic, National Center for Geriatrics and Gerontology, who were accompanied by their families and could visit the hospital once a week, only those showing mild impairment of cognitive function with a Mini-Mental State Examination (MMSE) score of 20 or higher, which is a National Institute of Neurological and Communicative Diseases and Stroke/Alzheimer's Disease and Related Disorders Association (NINCDS-ADRDA) diagnostic criterion for Alzheimer's disease, and exhibiting characteristic findings such as diffuse brain atrophy on magnetic resonance imaging (MRI) and a decrease in the blood flow in the parietal lobe and posterior cingulate gyrus on single photon emission computed tomography (SPECT) were registered. The subjects were also limited to those showing recent memory impairment and disorientation. For patients administered donepezil hydrochloride, those in whom 6 months or longer had passed were registered. Among those with MMSE of 25 or higher, only those exhibiting recent memory impairment (more specifically, score of recall as a sub-item of the MMSE = 0) and findings characteristic of Alzheimer's disease on SPECT were registered.

### *Exclusion criteria*

Patients who did not fulfill the diagnostic criteria of Alzheimer's disease, namely, those with MMSE of 25 or higher except those who fulfilled the above registration criteria and those with MMSE of 19 or lower, were excluded. Also, those in whom speech symptoms and the impairment of execution functions were primary symptoms and those who showed no findings characteristic of Alzheimer's disease on cerebral scintigraphy were not registered. The above judgments of whether the patients should be registered or excluded were made by a geriatric psychiatrist not involved in the intervention.

### *Grouping*

All patients gave consent before registration. Consent for the study was obtained from 47 patients who fulfilled the diagnostic criteria of Alzheimer's disease. Forty-three registrants, excluding four who did not fulfill the criteria on the evaluation immediately before the study, were stratified according to age ( $\leq 75$  and  $\geq 76$  years), sex and MMSE ( $\leq 24$  and  $\geq 25$ ), and randomized to two groups using the minimization method. After the beginning of intervention, two patients were lost from each group because they contracted physical diseases, and so evaluation at the end of intervention was possible in 39 (Fig. 1). Table 1 shows the baseline data in each group.

### *Study period*

Group therapy with approximately five participants in each session was performed in both the art therapy and calculation drill groups. Patients of both groups visited the hospital once a week and underwent a 45-min training session. They were also instructed to carry out tasks within their capability for approximately 15 min daily. Comparisons were made between before and after 12 sessions (1 course).

### *Intervention methods*

In the art therapy group, art therapy was performed by combining several techniques, but the primary task was to color abstract patterns with pastel crayons or water-based paint (Fig. 2). These patterns were originally devised by T. Mase, a co-author, and the shapes of birds and cats among others, which are unclear before coloring, are designed to appear after coloring. In addition, the patients were encouraged to color line drawings of familiar objects such as flowers, children and fish or draw pictures based on their memories or favorite seasons. Art therapy was performed by T. Mase, C. Hattori, C. Hokao and K. Mizushima. Mase has not experienced medical work but has a long career as an industrial designer and artist. C. Hattori, C. Hokao and K. Mizushima have rich experience as speech therapists in non-drug therapy for dementia and rehabilitation for patients with higher brain dysfunction.

In the calculation group, the task involved simple calculations, which were additions and multiplications of 1- or 2-figure numbers. No target was set, and the patients performed as many calculation tasks as possible during the session at their own pace. C. Hattori, C. Hokao and Mizushima were involved in the calculation drill.

Patients were accompanied by their family members in both art therapy and calculation training to reduce patients' tension and calm them.

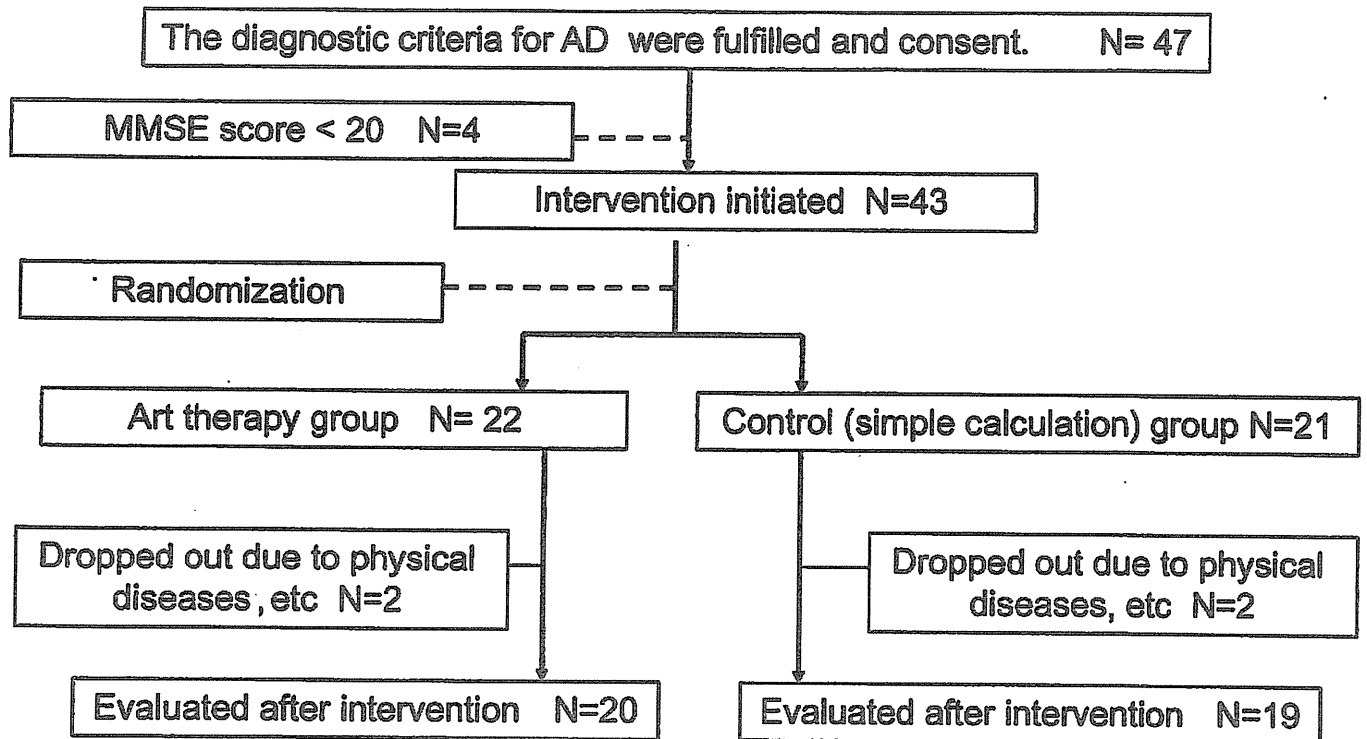


Figure 1 Flow chart of patient registration. There were patients who did not fulfill the criterion concerning the Mini-Mental State Examination (MMSE) score on re-examination after registration. AD, Alzheimer's disease.

Table 1 Baseline data

	Colorings and drawings 20	Control (calculation) 19
<i>n</i>	20	19
Age	75.3 ± 5.3	73.3 ± 6.3
Sex (M/F)	9/11	9/10
MMSE	24.6 ± 3.4	22.3 ± 2.7
HDS-R	23.2 ± 4.7	24.3 ± 5.0
logical memory	7.2 ± 5.5	6.1 ± 4.4
Barthel Index	97.4 ± 6.3	98.1 ± 5.3

HDS-R, Revised Hasegawa's Dementia Scale; MMSE, Mini-Mental State Examination.

### Evaluation methods

In this study, the patients' mental functions such as mood and vitality, behavioral impairment, QOL and ADL, and their caregivers' sense of burden were evaluated in addition to the patients' cognitive functions such as memory and orientation. Cognitive function and memory were evaluated by MMSE and logical memory, a subscale of the Wechsler Memory Scale revised (WMS-R). Mood and vitality were evaluated by the Geriatric Depression Scale (GDS)<sup>4</sup> and Apathy Scale (Japanese version).<sup>5</sup> The QOL was evaluated using Short Form (SF-8). With SF-8, the QOL can be evaluated from physical and mental viewpoints using the

Physical Component Summary (PCS-8) and Mental Component Summary (MCS-8).<sup>6</sup> The patients' behavioral abnormalities were evaluated using the Dementia Behavior Disturbance Scale (DBD).<sup>7</sup> Whether the sense of burden of the patients' families changed between before and after the intervention was evaluated by examining the Barthel Index and performing the Japanese version of the Zarit Caregiver Burden Interview<sup>8</sup> before and after the intervention.

### Statistical analyses

Comparisons of the results of evaluations before and after the intervention were made employing the signed

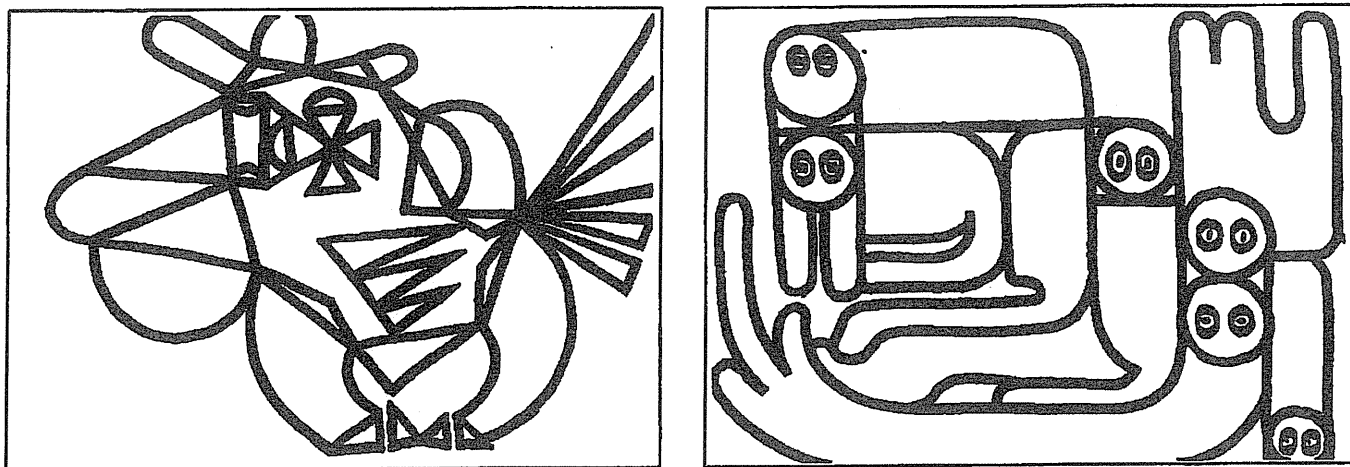


Figure 2 Line drawings used in this study. They were originally devised by T. Mase, a co-author. While the designs are unclear as line drawings, the shapes of birds and cats among others become apparent through coloring.

rank sum test (Wilcoxon). Because there were differences in baseline data between the art therapy and calculation drill groups, a simple comparison of the test scores did not yield clear differences on direct comparisons. Therefore, the percentage of patients who showed a 10% or greater improvement relative to the baseline score before the intervention was compared using the  $\chi^2$ -test.<sup>9</sup> To compare therapeutic effects between the two groups, two-way ANOVA was performed.  $P < 0.05$  was considered significant in all tests.

## Results

Comparison at the baseline showed no significant difference between the two groups. Comparison of the results of evaluation between before and after each therapy revealed significant improvement in the Apathy Scale in the art therapy group ( $P = 0.0014$ ) and in the MMSE score in the control group ( $P = 0.0015$ ) but no significant difference in the other items (Table 2). To compare the effects between art therapy and calculation training, the percentage of responders showing a 10% or greater improvement was compared between the two groups by the  $\chi^2$ -test. Significant improvement was observed in MCS-8 as a subscale of the SF-8 in the art therapy compared with the calculation training group ( $P = 0.038$ ; odds ratio, 5.54) (Fig. 3). Concerning cognitive function, changes in the MMSE score were analyzed by two-way ANOVA. The value before therapy was corrected, regarding the mean value in both groups as 24.6. No interaction with other items was observed. The MMSE score tended to improve in the calculation training group, but did not significantly differ between the two groups (Fig. 4). ANOVA for vitality, mood and the QOL also showed no significant difference. These results suggested improvement in vitality in the art

therapy group and in cognitive function in the calculation training group. Direct comparison revealed improvement in the mental QOL in the art therapy group but no difference in the other items, suggesting that the effects were similar between art therapy and calculation.

## Discussion

In this study, the effects of art therapy on Alzheimer's disease concerning multiple factors including the patients' cognitive function, vitality, behavior and burden on caregivers were evaluated. A wide variety of non-drug therapies for dementia, including cognitive-behavioral therapy,<sup>9</sup> cognitive rehabilitation,<sup>10,11</sup> reality orientation training,<sup>12</sup> reminiscence therapy,<sup>13</sup> music therapy,<sup>14</sup> aromatherapy,<sup>15</sup> animal therapy<sup>16</sup> and exercise therapy,<sup>17</sup> have been proposed, but the lack of precision and consistency in the diagnosis and evaluation of the patient's condition remains a problem.<sup>3</sup>

With this problem in mind, we emphasized the precision of the clinical diagnosis and conducted this study in patients carefully diagnosed on the basis of not only clinical symptoms but also MRI and SPECT findings. No therapeutic intervention in the control group is ethically unacceptable as a control group. In this study, therefore, we treated the control group by employing a method reported to have been effective. A calculation drill was adopted as a control task on the basis of a report that it was effective for the treatment of dementia.<sup>18</sup>

Also in this study, an intimate atmosphere was considered important for patients to receive art therapy or perform calculation, and staff members took care not to produce differences in conditions between the two groups. In both groups, patients and accompanying