Diagnosis and treatment of dementia in neurology outpatient departments of general hospitals in China

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Abstract

Introduction: The status of dementia diagnosis and treatment of neurology outpatients in general hospitals in China remains unclear.

Methods: From neurology outpatients at 36 randomly selected hospitals, we first collected baseline data concerning the number of dementia doctors, memory clinics, and patients diagnosed with dementia. In stage 2, we intervened based on drawbacks discovered in stage 1, implementing a dementia initiative program. In stage 3, we reinvestigated the outpatients to determine the effects of intervention.

Results: After intervention, all 36 hospitals had established memory clinics (205 dementia doctors) compared with only 6 (47 dementia doctors) before intervention. The percentage of patients diagnosed with dementia significantly increased from 0.10% (536 dementia patients of 553,986 outpatients) in stage 1 to 0.41% (2482 dementia patients of 599,214 outpatients) in stage 3.

Discussion: Proper diagnosis and treatment are unavailable to many dementia patients because of a lack of dementia doctors and memory clinics in China.

Keywords: Dementia; Diagnosis and treatment; Hospital; Intervention; Memory clinic

1. Introduction

Presently, China has an elderly population, aged 65 years or older, of 130 million, accounting for 9.4% of the total 1.35 billion Chinese population [1,2]. With a prevalence of dementia of 5.14% [3], we estimate that China has more than 8 million dementia patients, who place a great burden on their families and society.

However, it remains unclear how this tremendous dementia population is managed in a hospital setting. In China, the neurology departments at general hospitals would be the main choice for potential dementia patients. The shortage of dementia doctors and memory clinics in these hospitals has resulted in the speculation that many patients with dementia may have no access to prompt diagnosis and treatment. Accordingly, our team evaluated dementia diagnoses and treatments in the neurology outpatient departments of...
36 randomly selected tier 3 hospitals throughout China, and interventions were initiated to remedy the problems identified.

2. Methods

2.1. Hospital selection

The inclusion criteria for hospitals were (1) tier 3 general hospitals with neurology departments and relevant diagnostic equipment (e.g., magnetic resonance imaging [MRI] facilities), (2) average daily outpatient visits of 150 or more, and (3) consent to participate.

This investigation covered seven major economic zones, including 995 tier 3 general hospitals, across China. The local population determined the number of hospitals selected (one hospital for every 30 million people); 36 hospitals in different economic zones were randomly selected by an independent statistician.

2.2. Investigation and intervention

In total, 26 dementia specialists (each responsible for one or two hospitals) were organized by the leading hospital to form survey teams. All of them had ≥5 years of experience in the standard practices of dementia diagnosis and treatment and were selected based on scores from a consistency examination after 1 week of training. Regional and national quality control committees were also established for the survey. The ethics committee at each participating hospital approved this study protocol. Written informed consent was obtained from each patient with dementia, either directly or from his/her guardian, before data collection. This study was conducted from June 2009 to January 2010 (7 months) and included three stages (Fig. 1).

2.2.1. Stage 1 (3 months): Baseline investigation

2.2.1.1. Original status of the outpatients

We determined the number and specialties of the doctors (dementia and nondementia) and the number of memory clinics from the neurology department directors. We considered doctors, who had a period of training in a dementia training center in an academic teaching hospital and whose specialty was cognitive disorders, as dementia doctors. We assessed the total number of outpatient visits in the 3 months, how patients were allocated by the registration office, and the number of patients diagnosed with dementia, by reviewing all the neurology outpatient records in the registration office and the daily reports of patients who were diagnosed with dementia in a neurology outpatient department.

2.2.1.2. Diagnostic pattern for dementia

The dementia diagnosis made according to internationally accepted criteria, based not only on a clinical examination but also on a neuropsychological assessment, neuroimaging, and laboratory tests, was regarded as “by standard procedures.” Otherwise, diagnosis was recorded as “by personal experience.” Patient numbers were determined by reviewing all medical documents of the patients who had been diagnosed with dementia as a first diagnosis.

2.2.2. Stage 2 (1 month): Intervention

2.2.2.1. Training program

A 1-month intensive dementia training program (8 h/d) was initiated in the national centers by 11 dementia experts with advanced experience, including neurologists and neuropsychologists from leading hospital and other dementia training centers. The training included theory and practice and comprised a study process, assessment of scales and internationally accepted diagnostic criteria for dementia and its subtypes, neuroimaging (computed tomography [CT] and MRI), standard diagnostic procedures, and corresponding dementia guidelines. Didactic and hands-on training was conducted through lectures and discussions,

![Flowchart of dementia survey in 36 hospitals across China. Abbreviations: IQCODE, Informant Questionnaire on Cognitive Decline in the Elderly; MMSE, Mini-Mental State Examination.](image-url)
watching videos, and examining the skills of patients with cognitive disorders. The purpose was to address the following issues: (1) Doctors selected as candidate dementia doctors in memory clinics must have an advanced ability to diagnose dementia accurately; (2) Neuropsychological doctors must learn how to evaluate patients using the various scales necessary for diagnosis; (3) Doctors with other specialties must learn how to recognize patients with cognitive impairment and recommend that they attend a memory clinic; and (4) Junior doctors, postgraduates, and nurses organized as a team (10–15 persons depending on the number of neurology department outpatients) must learn how to screen for dementia.

2.2.2.2. Establishing a memory clinic after reaching the training goal

After training, the interrater reliability for the cognitive tests and diagnostic procedures, which relied on videotaped interviews, was required to exceed 0.90. All trainees had to pass consistency examinations before being allowed to participate in stage 3 of the study. Finally, memory clinics were organized in departments with no existing memory clinic and comprised three to six doctors, depending on the number of outpatient visits, for a total number of 36.

2.2.3. Stage 3 (3 months): Changes after intervention

In this stage, we reinvestigated the baseline data, use of dementia medications, and care. Outpatient screening (see the following section) was adopted to detect dementia because the registration offices at most hospitals did not conduct triage for patients with a memory disorder, and patients were assigned randomly to outpatient doctors, regardless of specialty.

2.2.3.1. Outpatient screening and dementia diagnosis

Patients targeted for screening were identified based on a 3-day pretest performed at five randomly selected hospitals. We sought consecutive visitors who were >55 or <55 years but complained of cognitive impairment. This procedure was expected to include >95% of patients ultimately diagnosed with dementia (data not shown). Patients who were unable to finish the examination or refused to participate were excluded. For those who were too demented to finish the examination, we diagnosed them directly as severe dementia according to the disease history, clinical symptoms, neuroimaging, and diagnostic criteria.

All eligible patients were assessed using the Informant Questionnaire on Cognitive Decline in the Elderly (IQCODE) in the outpatient waiting room. If a score was ≥3.3 [4,5], the patient was asked to take the Mini-Mental State Examination (MMSE) in a neuropsychological room [6,7]. If the MMSE score was less than the cutoff value (illiterate, ≤19 cutoff; ≤6 years of education, ≤22 cutoff; and ≥7 years of education, ≤26 cutoff), the patient was advised to visit a memory clinic. Dementia doctors at the memory clinics collected demographic and general information and clinical data, including patient complaints and disease history (time and mode of onset, possible triggers, affected domains, course of condition, impact on daily activities, and changes in mood or behavior). Standardized general and neurological physical examinations were performed. These patients were also assessed in the neuropsychological room with a battery of neuropsychological assessments, including the Montreal cognitive assessment [8], the World Health Organization University of California-Los Angeles auditory verball learning test [9], the clock-drawing test [10], the activities of daily living scale [11], the neuropsychiatric inventory [12,13], the Hamilton rating scale [14], the Hachinski ischemia scale [15], and the clinical dementia rating (CDR) scale [16,17]. Brain CT or MRI and laboratory tests (blood biochemical tests, vitamin B12, folic acid, and the presence of the syphilis antibody) were conducted before a diagnosis was made. Finally, all of this information was recorded on the case report form (CRF). Once the dementia diagnosis was confirmed, patient medication and care were recorded on the CRF.

Participants were divided into the following categories according to cognitive level: cognitively normal, mild cognitive impairment (MCI), or dementia. Cognitively normal was assigned when subjects achieved a normal score on all the cognitive domains and scored 0 on the CDR scale. MCI was diagnosed using the broaden Petersen criteria [18]; dementia was assigned according to the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Revised criteria [19]; probable Alzheimer’s disease (AD) was assigned according to the National Institute of Neurological and Communicative Disorders and Stroke and the Alzheimer’s Disease and Related Disorders Association criteria [20]; and probable vascular dementia (VaD) was assigned using the National Institute of Neurological Disorders and Stroke and the Association Internationale Pour la Recherch et l’Enseignement en Neurosciences criteria [21]. Patients meeting the criteria for both AD and VaD were diagnosed with mixed dementia (MD). Other dementia (OD), which included frontotemporal dementia [22], dementia with Lewy bodies [23], and Parkinson’s dementia [24], was diagnosed when a patient met neither the AD nor the VaD criteria but met the criteria for dementia. Neuroimaging was necessary for diagnosing dementia and its subtypes. At the end of each workday, all the data were reviewed, and final cognitive diagnoses were made by at least two dementia doctors. Diagnoses were also reviewed by experts from the leading hospital. When a consensus could not be reached, the regional or national quality control committees were asked for opinions. Once diagnosed, each new patient with dementia was regarded as one case for the calculations, regardless of how many times they had revisited the hospital.

2.2.3.2. Dementia medications

Medication usage for dementia patients was divided into antidementia drugs (e.g., cholinesterase inhibitors,
2.3. Statistical analysis

The CRFs were sent to the bioinformation center at Xuan Wu Hospital. An electronic database was established by computer software engineers based on the CRF data. Data were double entered to ensure accuracy. All data were checked, cleaned, and analyzed by independent statisticians.

Categorical variables were analyzed by frequencies and percentages. The primary statistical analysis was based on contingency tables. The percentages of dementia doctors and memory clinics before and after the intervention were compared using Pearson χ² or Fisher exact test, based on the data distribution characteristics and homogeneity. Differences in the percentage of patients diagnosed with dementia and their medications before and after the intervention were assessed using the same statistical methods. Prevalence rates and corresponding 95% confidence intervals for dementia and each subtype were calculated for patients ≥55 and those ≥65 years of age. All statistical analyses were performed using SPSS, version 17.0, software (SPSS, Inc., Chicago, IL, USA). All statistical tests were two tailed, and a P < .05 was considered significant.

3. Results

3.1. Number of dementia doctors and memory clinics

The total number of “neuro” doctors at the 36 hospitals was 1361, of whom 47 were dementia doctors in stage 1 and 205 after the intervention (4.36-fold increase, P < .001). Memory clinics increased from 6 to 36 in the 36 hospitals in stage 3. In stages 1 and 3, patients who arrived at the neurology department with no preregistration accounted for 95%, were allocated randomly by the registration office to outpatient doctors with no specialty selection.

3.2. Percentage of patients diagnosed with dementia in all outpatients

In stage 1 before the intervention, of 553,986 outpatients at the 36 hospitals, only 536 were diagnosed with dementia, and its percentage of patients diagnosed with dementia in all outpatients was thus 0.10%. After the intervention in stage 3, a total of 599,214 outpatients who visited neurology outpatient departments were screened (response rate: 93.74%), and target population of 122,742 outpatients (110,684 aged ≥55 years and 12,058 aged <55 years but complained of cognitive impairment) was selected and examined further using the IQCODE. Next, 18,531 outpatients with scores ≥3.3 were examined using the MMSE (response rate: 93.98%), and 5008 patients who obtained abnormal MMSE scores or who did not complete the test underwent a standardized diagnostic workup for the diagnosis using the CRF (response rate: 90.20%). In 36 hospitals, 2482 patients were diagnosed with dementia, resulting in 0.41% of patients diagnosed with dementia of all 599,214 outpatients, which was as 4.1-fold increase relative to the 0.10% in stage 1 (536 dementia patients of 553,986 outpatients, P < .001). Among the 2482 dementia patients, 1662 were diagnosed at the 30 new memory clinics established in stage 3, and the percentage of dementia was 0.38% among the 437,520 outpatients, representing an increase of 13.2-fold compared with the 0.03% at stage 1 before the intervention (117 dementia patients of 405,490 outpatients, P < .001, Fig. 2). In addition, the percentage of patients diagnosed by standard procedures increased from 23.1% during stage 1 (124 of 536) to 97.5% during stage 3 (2420 of 2482) after the intervention (P < .001).

3.3. Dementia and its subtypes

In total, 2092 patients were diagnosed with MCI, accounting for 1.7% of the target population, of whom 38% and 62% were the amnestic subtype of MCI and “other MCI,” respectively. Among the 2482 patients with dementia, the subtypes included AD (1105, 44.5%), VaD (729, 29.4%), MD (222, 8.9%), and OD (426, 17.2%). The prevalence of dementia in outpatients aged ≥55 years was 1.99% and that for AD was 0.95%, VaD 0.58%, MD 0.20%, and OD...
0.26%. We also found that the prevalence of dementia increased with age and was 3.08% for those aged ≥65 years: 1.55% for those with AD, 0.84% VaD, 0.35% MD, and 0.33% OD (Fig. 3).

3.4. Medications for dementia and its subtypes

Before the intervention, only 23.6% patients with dementia (30.1% AD, 20.7% VaD, 22.1% MD, and 12.4% OD) were receiving antidementia medication. However, those numbers increased significantly to 67.5%, 85.1%, 49.4%, 63.3%, and 56.0%, respectively (all \( P < .001 \)), during stage 3 after the intervention. Use of cholinesterase inhibitors for AD increased from 19.7% to 66.6% and use of memantine increased from 4.1% to 21.5% (all \( P < .001 \)) before and after the intervention, respectively.

No significant change was observed in the treatment of dementia and its subtypes with adjuvant medications or traditional Chinese medicines before and after the intervention (Table 1).

3.5. Dementia care

Among the 2482 patients with dementia, 1355 agreed to an investigation of their dementia care. Among the 1127 patients with dementia who did not participate in the dementia care survey, 1009 were not accompanied by their direct caregiver; thus, they could not provide the required detailed information, and the others rejected participation in the survey. Of the 1355 patients who agreed to participate, only 27 (2.0%) with dementia lived in a nursing home or hospital were cared for by professionals. The remaining 1328 patients were cared for by nonprofessionals at home; 1150 (84.9%) were cared for by family members; 112 (8.3%) lived alone; and 66 (4.9%) were cared for by hired nannies.

4. Discussion

The aim of this study was to determine how dementia patients were diagnosed and treated by doctors at neurology outpatient departments in general hospitals in China. If proper diagnosis and timely treatment were not available for dementia patients, we sought to determine the cause of the situation and to solve the problem.

Stage 1 was the initial stage, with no intervention, reflecting the original status of dementia diagnosis and treatment in China. In the 36 hospitals, there were only six memory clinics with 47 dementia doctors. Because of the lack of dementia doctors and memory clinics, among the 553,986 outpatients at the 36 hospitals, only

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Abbreviations: CHEIs, cholinesterase inhibitors; TCM, traditional Chinese medicine; AD, Alzheimer’s disease; VaD, vascular dementia; MD, mixed dementia; OD, other dementia.

\* \( P < .001 \), compared before versus after intervention.
536 patients were diagnosed with dementia; thus, the percentage of patients diagnosed with dementia was 0.10%. In response to the problems identified in stage 1, including a shortage of dementia doctors and memory clinics and a particular lack of knowledge about dementia in outpatient doctors, we initiated an intense training program for the diagnosis of dementia in stage 2. Emphasis was placed on enhancing the professional abilities of dementia doctors regarding the diagnosis of dementia and establishing memory clinics with appropriate numbers of dementia doctors at each hospital. In stage 3, we reinvestigated the baseline data and dementia treatment to determine how the situation had changed after the intervention. The numbers of dementia doctors were increased significantly, from 47 to 205, as were memory clinics, from 6 to 36. The percentage of patients diagnosed by “standard procedures” for dementia, that is, according to internationally accepted criteria, increased from 23.1% to 97.5%. The numbers of dementia patients diagnosed rose from 536 to 2482 (percentage of patients diagnosed with dementia increased from 0.10% to 0.41%), strongly suggesting that a large number of dementia patients had been overlooked because of the lack of dementia doctors and memory clinics in these hospitals previously. However, our program only included 36 hospitals in the context of 995 tier 3 general hospitals or 23,170 total hospitals across China [25]. We believe that those unexplored hospitals are probably in a similar situation to that revealed here, indicating that a tremendous number of dementia patients are being overlooked. Our results support the notion that an intensive dementia training program is a good way to enhance the capacity of neurology department to manage patients with dementia. Similar training was implemented in Malaysia, according to the Malaysian clinical practice guidelines, and the results showed significant improvements in knowledge about dementia and its management among trainees [26]. In addition, our results also suggest that a memory clinic is a very important setting for diagnosing and treating cognitive disorders. Similarly in Europe and the United States, several studies and guidelines have confirmed that memory clinics are useful for screening dementia, even at its predementia stage [27–29]. Indeed, urgent dementia management is needed to set up memory clinics with the appropriate number of trained dementia doctors in every tier 3 hospital in the country and ultimately to gradually extend the policy to all hospitals below tier 3. This action requires urgent attention from the government and health care administration.

It should also be stressed that most Chinese patients with dementia have not received prompt treatment. Indeed, only 23.6% of the 2482 patients with dementia in our study had used any antidementia drug. Merely 19.7% and 4.1% patients with AD had been treated with a cholinesterase inhibitor or memantine, respectively, suggesting that about 80% of known Chinese patients with dementia remain untreated by any drug. One reason for the low treatment rate before the intervention was that doctors with no training in dementia were unclear about the basic medications available for dementia. The increased number of prescriptions for treating AD (66.6% for cholinesterase inhibitors) after the intervention further supports this observation. Providing rapid and appropriate medication for patients with dementia is vital for a higher level of dementia management.

Whether patients with dementia receive some appropriate professional care determines their quality of life and prognosis. Among the 1335 patients with dementia who participated in the dementia care investigation, only 27 (2.0%) lived in a nursing organization or hospital and were cared for by professionals and the remaining 98.0% lived with their families. The proportion of patients with dementia cared for by families in Western countries is much lower than that in China [30,31]. This mode of care causes a great mental and physical burden to families, particularly for single people and young workers. Thus, establishing a feasible dementia care system should be a government imperative.

The study had several limitations. The accuracy of the dementia diagnosis may have been compromised by the lack of diagnostic experience and the short duration of the dementia doctor training. However, all diagnoses were reviewed by dementia specialists with advanced experience and were supervised by quality control committees. Furthermore, discussions were initiated immediately to minimize any diagnostic errors after a discrepancy arose.

In conclusion, appropriate diagnosis and treatment are not available to many patients with potential dementia because of the lack of established memory clinics and trained dementia doctors in China. This situation is desperately in need of intervention and improvement. The method by which we set up memory clinics at general hospitals in this study could be useful as a model for dementia practice in China.

Acknowledgments

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Supplementary data

Supplementary data related to this article can be found at http://dx.doi.org/10.1016/j.jalz.2015.06.1892.
RESEARCH IN CONTEXT

1. Systematic review: We searched the MEDLINE and China National Knowledge Infrastructure databases for information regarding the diagnosis and treatment of dementia in general hospitals in China over the past 10 years. To date, there have been no nationwide or regional studies on the prevalence of dementia in neurology outpatients or on the relationship between percentage of patients with diagnosis and dementia management systems (dementia doctors and memory clinics) in neurology outpatient departments in China.

2. Interpretation: This study was conducted in 36 randomly selected tier 3 general hospitals across China in 3 stages. In stage 1, we investigated baseline data concerning the diagnosis and treatment of dementia. In stage 2, we intervened, implementing changes to the system based on drawbacks that we discovered in stage 1. In stage 3, we reinvestigated the status. We found that, after our intervention, there were significant differences in terms of the number of memory clinics (6 in stage 1 compared with 36 in stage 3) and dementia doctors (47 compared with 205), percent of diagnoses by “standard procedures” (23.1% compared with 97.5%), the percentage of patients diagnosed with dementia in all neurology outpatients (0.10% vs. 0.41%), the number of patients diagnosed with dementia (536 dementia patients of 553,986 outpatients compared with 2482 dementia patients of 599,214 outpatients), and the use of anti-dementia medication (23.6% of patients compared with 67.5%). This strongly suggests that a large number of dementia patients had been overlooked because of the previous lack of dementia doctors and memory clinics in these hospitals.

3. Future directions: Our study included only 36 of 995 tier 3 general hospitals or of 23,170 hospitals in total across China. There is an urgent need for health care administration to establish memory clinics with appropriate numbers of dementia doctors in every tier 3 hospital in the country.

References


