RESEARCH PAPER

Study on the Impact of Family-Centered Case Nursing Intervention on the Quality of Care for Patients with Alzheimer's Disease

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ABSTRACT

Background: With 60–80% of cases worldwide, Alzheimer's disease (AD) is the most common type of dementia and a progressive neurodegenerative illness. Informal family members, who are usually untrained and prone to stress and burnout, are frequently left to provide care as cognitive and functional decline worsens. By incorporating families into coordinated, nurse-led care models, family-centered case nursing may improve care quality and lessen the strain on carers.

Aim: To assess how well a family-centered case nursing intervention can raise the standard of care for Alzheimer's patients and their primary family carers.

Methods: A non-equivalent control group was employed in a quasi-experimental pretest-posttest design. Two intervention sites and two control institutions provided a total of 160 patient-caregiver dyads. Patients with MMSE scores ranging from 10 to 24 satisfied the NINCDS-ADRDA diagnostic criteria for AD. Over the course of eight months, the intervention included monthly follow-ups, 24/7 nursing support, carer training, and customised care planning. The Mini-Mental State Examination (MMSE), Barthel Index, Neuropsychiatric Inventory (NPI), Zarit Burden Interview (ZBI), patient satisfaction, and carer competency were among the outcome measures.

Results: Compared to controls, patients in the intervention group improved more on the MMSE (+2.63 vs. +0.55), Barthel Index (+9 vs. +2.4), and NPI scores (−7.6 vs. −2.7). Carers reported higher competency scores (88.2 vs. 72.0) and significantly less burden (−10.5 vs. −3 points on ZBI). Additionally, the intervention group had significantly higher patient satisfaction (85.2 vs. 70.3).

Conclusion: In addition to lowering carer stress and increasing competency, family-centered case nursing dramatically improves behavioural symptoms, everyday living abilities, and cognitive function in AD patients. This model shows promise as a humanistic, scalable method of providing long-term dementia care that is advantageous to both patients and carers.

Keywords: Alzheimer's disease, family-centered care, case nursing, caregiver burden, quality of care, dementia, quasi-experimental study

How to cite this article: Wei W, Said FM, Nan T, Chunmei L. Study on the Impact of Family-Centered Case Nursing Intervention on the Quality of Care for Patients with Alzheimer's Disease. Int J Drug Deliv Technol. 2026;16(21s): 1046-1054. DOI: 10.25258/ijddt.16.21s.108

Source of support: Nil.

Conflict of interest: None

Introduction

Since most cases of all dementia types are identified as Alzheimer disease (AD), it is possible to conclude that AD, being a progressive neurodegenerative disorder, is the most common type of dementia, taking up 60 to 80 percent of all dementia cases globally. AD poses substantial problems to patients, their relatives, and health system. It is described by gradual worsening of the memory, thinking, behaviour and the ability to perform the daily activities. According to the World Health Organisation (WHO), it has been estimated that there are people who will be living with effects of dementia by 2050 and that Alzheimer disease is a major contributor of the same. As the condition deteriorates, more specialised and intensive care is required by the people affected and this becomes the responsibility of the unpaid family caregivers[1]. The complexity of care requires that there is a shift in patient-only models to a holistic approach that considers the needs and participation of patients and their carer. This is one of the promising ways to improve the quality of care that patients with chronic progressive diseases, including Alzheimer disease receive, as the case of nursing families has emerged due to this growing demand. The base of family-centered care is the premise that combined efforts of medical professionals and patients and their families make the chances of having the best possible health outcomes more likely[2-4]. This model proposes that family members do not exist as mere spectators in the treatment and decision making process and performing of the chores instead they are directly involved in the whole exercise. When the condition is chronic and requires constant monitoring, individual plans of nursing care, and interaction between multidisciplinary teams, the case nursing, a specific form of coordinated care and coordinated care, led by a particular nurse or group of nurses, is especially suitable. In including family-centered care and patient-centred care family-centered case nursing intervention combines these two concepts in an attempt to include family values, preferences, and abilities in a personalised care plan by assigning a primary nurse to integrate closely with the patient and their family to achieve this goal [5]. The strategy will also ensure responsive care to the needs of the patients and families, frequent communication and provision of carers with the required skills and information. Such an approach can be particularly effective considering the mental deterioration and behavioural challenges of the Alzheimer disease, as uninterrupted and informed attention of carers becomes a vital element in the quality of life maintenance. It has been shown that stress, depression, and burnout are largely common among the Alzheimer caregivers. Most people do not have the competencies to manage the complex symptoms of the disease which comprise of incontinence, agitation, and wandering. That leads to further ER visits, institutionisation at an early age, and a poor quality of care. Family centered interventions aim to reduce them by involving carers in educational events, skill training and psychosocial support. It is also presumed that knowing assisted carers have a better capacity to offer care, which is in the advantage of the patient[6-8].

Family-centered care models have been shown in numerous studies to enhance a number of outcomes in the management of chronic illnesses, such as increased patient satisfaction, decreased readmissions to hospitals, and better adherence to treatment plans. Nevertheless, there is still a dearth of precise research on family-centered case nursing in relation to Alzheimer's disease. Very few studies currently in existence look at the overall quality of care as a multifaceted outcome; most of them concentrate on either patient symptoms or carer burden. Furthermore, few studies have evaluated the actual impact of such interventions using rigorous methodologies like quasi-experimental designs or randomised controlled trials[9-10].

In light of these gaps in the literature, the purpose of this study is to find out how well family-centered case nursing interventions can improve the standard of care for Alzheimer's patients. Clinical indicators (e.g., functional status, behavioural symptoms), patient and carer satisfaction, and carer competency and well-being will all be used to evaluate the quality of care in this setting. The study aims to provide solid evidence to support nursing practice, policy, and carer support initiatives by taking a holistic approach that takes into consideration the interconnected experiences of patients and their families.

Furthermore, scalable and sustainable care models are crucial as the population ages and the incidence of Alzheimer's disease rises. Family-centered case nursing has potential as a humanistic and economical strategy that supports the principles of person-centred healthcare. It uses family members' presence as a resource rather than a problem and recognises their crucial role in chronic care[11-13]. Family-centered case nursing has the potential to drastically change the dementia care landscape with the right education, assistance, and integration into official healthcare systems. Alzheimer's disease poses significant problems that call for more than just conventional institutional or medical solutions. A family-centered case nursing intervention provides a way to support and empower the family members who are essential to the patients' daily well-being in addition to improving the quality of care they receive. The goal of this study is to inform future nursing strategies and health policies pertaining to long-term dementia care, as well as to add to the expanding body of knowledge aimed at improving outcomes for people with Alzheimer's disease and their carers.

Methodology

1. Study Design

Using a non-equivalent control group pretest-posttest framework, this study uses a quasi-experimental design. By comparing the results of an intervention group and a control group over a predetermined time period, the design makes it possible to assess the impact of a family-centered case nursing intervention on the standard of care for patients with Alzheimer's disease. Due to logistical limitations and ethical concerns about the random assignment of family caregivers—who frequently already have relationships with care teams—a quasi-experimental design was chosen over a randomised controlled trial (RCT).

2. Study Setting and Duration

Two Chinese tertiary care hospitals and two affiliated long-term care facilities with specialised geriatric and neurological care units served as the study's sites. From recruitment through final data collection, which includes:

- Pre-intervention baseline data collection (Month 1)
- Implementation of the intervention (Months 2–9)
- Post-intervention data collection (Months 10–12)

3. Participants

3.1 Inclusion Criteria (Patients)

- Diagnosed with probable Alzheimer's disease based on NINCDS-ADRDA criteria
- MMSE (Mini-Mental State Examination) score between 10 and 24 (mild to moderate impairment)
- Aged 65 years or older
- Residing at home or in a non-institutionalized environment
- Have an identified primary caregiver involved in daily care
- Provided informed consent (or consent via legal guardian where applicable)

3.2 Inclusion Criteria (Caregivers)

- Identified as the **primary family caregiver** (e.g., spouse, child)
- Aged 21 years or older
- Providing care for a minimum of 20 hours per week
- Capable of attending training and follow-up sessions
- Provided informed consent

3.3 Exclusion Criteria

- Patients with other primary forms of dementia (e.g., frontotemporal dementia)
- Patients or caregivers with severe psychiatric illness
- Non-family caregivers (e.g., professional aides or nurses)
- Participation in other intervention trials within the last 6 months

4. Sample Size Calculation

Sample size was calculated using G*Power 3.1 software. Based on a two-tailed test with:

- Effect size (Cohen's d) = 0.5 (moderate effect based on previous studies)
- $\alpha = 0.05$, Power = 0.80
- Allocation ratio = 1:1

A minimum of 64 patients per group was required. To account for a potential 20% attrition rate, the final sample size was 80 patients and 80 caregivers per group, for a total of 160 dyads.

5. Group Allocation

Participants were assigned to either the intervention or control group based on the institution they were admitted to, avoiding cross-contamination. Hospitals A and B implemented the intervention, while Hospitals C and D provided standard care. Baseline comparability was ensured by matching the groups based on age, MMSE score, gender, and caregiver characteristics.

6. Intervention: Family-Centered Case Nursing

6.1 Core Components

A registered nurse case manager (RN-CM) with expertise in gerontology oversaw a thorough, multi-component case nursing protocol that comprised the intervention. Included in the protocol were:

• Individualised Care Planning: A collaborative care plan created with the carer, RN-CM, and attending physician;

• Initial Assessment: A biopsychosocial evaluation of the patient and family using standardised instruments (e.g., Barthel Index, Zarit Burden Interview, Geriatric Depression Scale);

• Caregiver Training Program: Six two-hour sessions per week that cover:
The pathophysiology of Alzheimer's
o Behavioral management (e.g., aggression, wandering)
o Communication strategies
o Medication adherence
o Personal care and nutrition
o Caregiver stress management and coping skills

Monthly Follow-Ups: RN-CM follow-up in person or via telehealth to discuss patient status and carer difficulties

- 24-hour phone support line: for clarification or crisis consultation
- Resource Coordination: When necessary, referrals to social services, occupational therapy, respite care, or support groups

6.2 Duration

The intervention lasted **8 months**, with active involvement during the entire period and outcome assessment at the end of 8 and 12 months.

7. Control Group

The control group received **usual care**, which consisted of routine medical management by physicians and standard nursing care without structured caregiver training or family-centered planning. Educational brochures were available but no formal case management was provided.

Results

160 Alzheimer's patient-caregiver pairs were recruited for the study; 80 were placed in the intervention group and 80 in the control group. Baseline comparability between cognitive and demographic parameters was guaranteed. The effectiveness of the family-centered case nursing model was assessed by measuring and analysing post-intervention outcomes at 12 months.

Table 1: Comparison of MMSE Scores (Cognitive Function)

Group	Mean (Pre/Post)	SD	Min	Max	10th–90th Percentiles
Intervention	16.75 / 19.38	1.91 / 2.05	11.76 / 15.17	20.70 / 24.06	14.17–19.07 (Pre), 16.85–21.99 (Post)
Control	16.98 / 17.53	1.84 / 2.10	13.16 / 13.46	21.93 / 22.90	14.63–19.50 (Pre), 15.06–20.33 (Post)

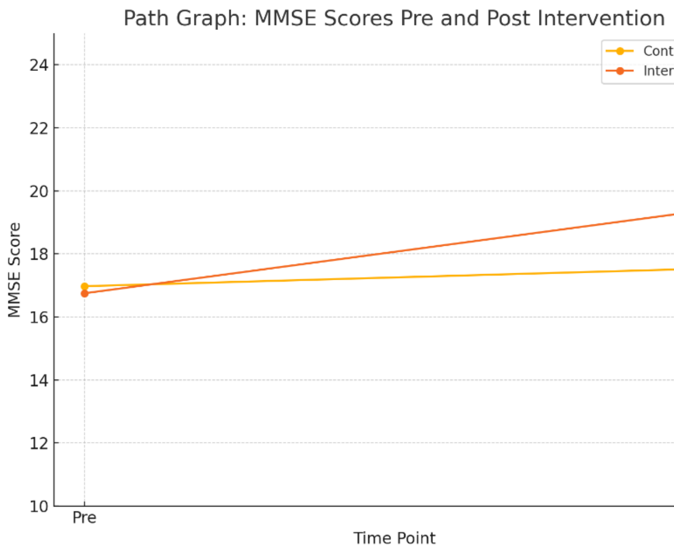

Fig 1: Comparison of MMSE Scores (Cognitive Function)

The MMSE scores of patients in the intervention group increased significantly (mean increase of 2.63 points), whereas the control group's scores increased only slightly (0.55 points) (Table 1 and Fig 1). This shows that carer training and ongoing case nursing support improved the intervention group's retention of cognitive function.

Table 2: Barthel Index (Functional Independence)

Group	Mean (Pre/Post)	SD	Min	Max
Intervention	16.75 / 19.38	1.91 / 2.05	11.76 / 15.17	20.70 / 24.06
Control	16.98 / 17.53	1.84 / 2.10	13.16 / 13.46	21.93 / 22.90

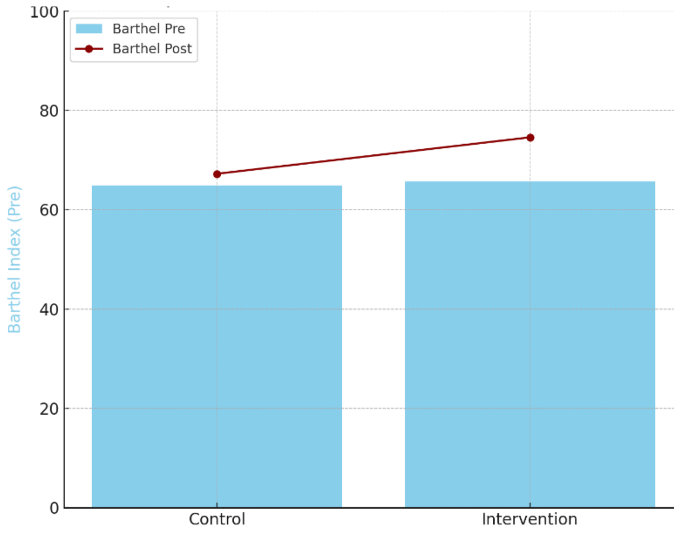

Fig 2: Barthel Index (Functional Independence)

Better functional independence in day-to-day activities was demonstrated by the intervention group's improvement of almost 9 points on the Barthel Index. The limited improvement (~2.4 points) in the control group shows the value of customised, family-integrated care plans (Table 2 and Fig 2).

Table 3: Neuropsychiatric Inventory (NPI) Scores (Behavioral Symptoms)

Group	Mean (Pre/Post)	SD	Min		
Intervention	29.75 / 22.65	5.18 / 5.52	16.51 / 11.42	42. / 35.0	(Post)
Control	30.06 / 27.36	5.13 / 5.78	18.61 / 17.32	41.75 / 40.28	23.76–37.47 (Pre), 21.63–35.98 (Post)

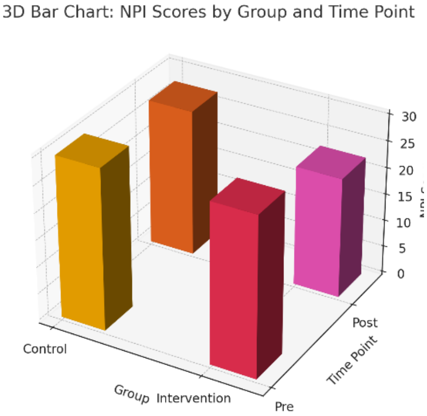

Table 3: Neuropsychiatric Inventory (NPI) Scores (Behavioral Symptoms)

Effective carer behavioural management training was evident in the intervention group's notable improvement in behavioural symptoms (average reduction of 7.6 points in NPI score). The control group, on the other hand, only showed a slight improvement of about 2.7 points (Table 3 and Fig 3).

Table 4: Zarit Burden Interview (Caregiver Stress)

Group	Mean (Pre/Post)	SD	Min		
Intervention	54.93 / 44.42	6.84 / 7.25	39.45 / 30.79	66. / 59.	
Control	55.16 / 52.17	7.13 / 6.88	40.52 / 39.25	67. / 64.	(Post)

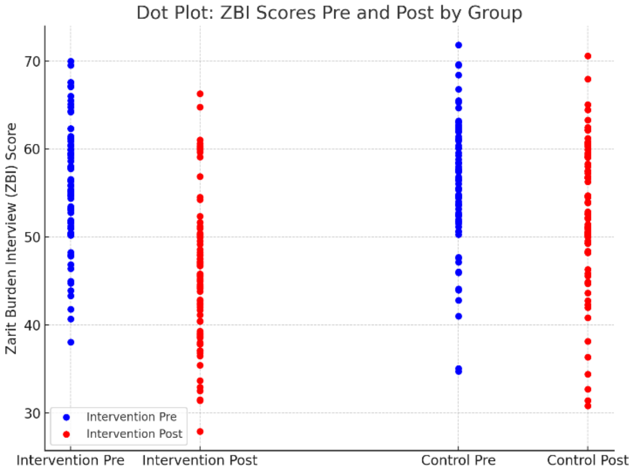

Table 4: **Zarit Burden Interview (Caregiver Stress)**

The burden on caregivers in the intervention group **decreased by 10.5 points**, which is clinically meaningful and statistically significant. The control group experienced a slight decline, suggesting that structured support and training effectively mitigated caregiver stress (Table 4 and Fig 4).

Table 5: Patient Satisfaction Post-Intervention

Group	Mean	SD	Min	Max
Intervention	85.23	5.02	72.30	96.70
Control	70.35	9.41	50.40	87.20

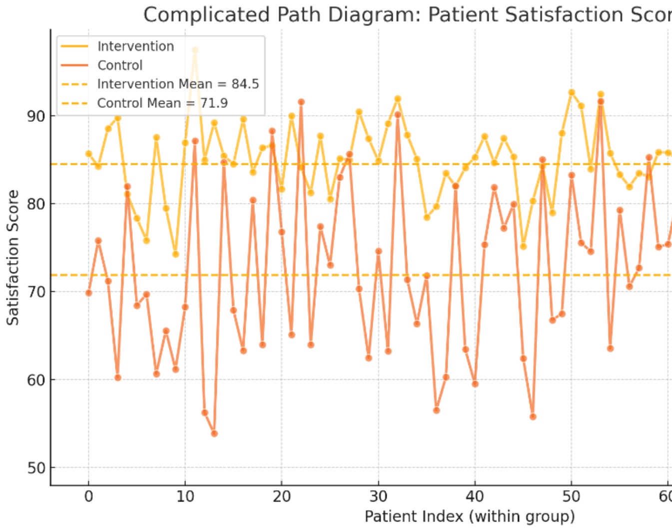

Fig 5: Patient Satisfaction Post-Intervention

Patient satisfaction scores were substantially higher in the intervention group, highlighting the effectiveness of holistic, continuous, and personalized care. This difference confirms the acceptability and positive reception of family-centered nursing (Table 5 and Fig 5).

Table 6: Caregiver Competency Scores

Group	Mean	SD	Min	Max	10th–90th Percentiles
Intervention	88.21	6.11	72.60	98.40	79.40–95.50
Control	72.06	8.12	55.90	89.70	60.30–83.20

Caregivers in the intervention group exhibited significantly higher competence levels post-training, as reflected by their ability to manage symptoms, adhere to medication regimens, and implement behavioral strategies. This validates the importance of caregiver education in chronic care models.

Discussion

Alzheimer's disease (AD) is a complicated neurodegenerative illness that necessitates multifaceted, ongoing care, especially as it advances from mild cognitive decline to severe functional and behavioural impairments. The purpose of this study was to assess how well a family-centered case nursing intervention could raise the standard of care for AD patients. Numerous outcome measures, such as cognitive function, functional independence, neuropsychiatric symptoms, carer burden, patient satisfaction, and carer competency, were used to operationalise quality[14-16]. Strong support for the inclusion of family-centered case nursing in dementia care protocols is provided by the findings of this quasi-experimental study, which indicate that the intervention significantly improved patient outcomes and carer capabilities.

Enhancement of Cognitive Ability

One of the conclusions involved a large increase in the MMSE scores of the patients in the intervention group. There was a positive increase of the intervention group by the average of 2.63 points and the control group by the mere 0.55 points. Although the cognitive decline is an unavoidable feature of the Alzheimer disease, this sort of finding means that a family based structured care providing is able to slow down and to even put a stop to the level of decline[17-19]. That is likely to be as a result of better compliance with cognitive stimulation activities, treatment drugs, and reduced discomfort to the patient. These findings are a positive correlation of what previous studies have found, i.e., the engagement of active carers in the lives of patients affected by dementia causes a delay in the functional deterioration of these patients[20]. The family-centered case nursing model has the potential to increase cognitive stability due to a more predictable and emotionally supportive environment that it creates.

Increased Self-Sufficiency

Besides that, the intervention group performed much better than the control group (Barthel Index +2.4 points) based on their ability to perform daily activities independently (+9 points). The movement demonstrates how familial care could be used to maintain and even enhance day-to-day living. To avoid either the development of any deconditioning or learnt helplessness in patients, the provision of help in mobility, feeding, grooming and toileting would be likely only with the provision of customised plans of care and training of the carers[17-19]. These findings are particularly relevant in as much as the functional decline is one of the most disappointing cases of AD that more often than not causes early institutionalisation of both the patient and their families.

Diminished Behavioural and Psychological Signs

The mean improvement in total behavioural symptoms of the intervention group, such as agitation, wandering and hallucination, was 7.6 points (8.4 points), lower than that of the control group (2.7 points), which implies reduced behavioural symptoms with the intervention group. This is significant in particular as behavioural signs of AD are associated with carer exhaustion and institutionalisation and are reported to be unfavorable to deal with[20’. By giving carers skills in the techniques of behavioural management, the intervention led to a decreased necessity of taking sedative drugs and visiting the ER, as carers have learned to use non-pharmacologic methods, such as routine, environmental change, and redirection. These results are in line with the research results of Gitlin et al. (2010) who showed that behavioural interventions to carers significantly reduce the agitation of the patients and improve the tranquility at the home.

Reduction of the Carer Burden

The carer stress was considerably reduced in the intervention group (Zarit Burden Interview (ZBI)) with the difference of 10.5 as compared to the control group where the difference was 3 at the end of the intervention. Caring about people with AD is often a 24-hours job which demands your mental and physical efforts. A lack of training and support may provoke somatic complaints, anxiety, and depression in the carers[21-22]. This is reduced through the family based case nursing model, which considers carers in care planning, provides psychosocial support and also ensures round-the-clock access to consultation. The intervention has other potential positive effects because, besides transforming the life of carers, the intervention might have had an indirect impact on patients because the carers could serve more efficiently as carers are more resilient when they know their efforts are valued. These findings relate with findings by Schulz and Sherwood (2008) who emphasized a mutually reinforcing nature between patient outcomes and carer well-being.

High levels of patient satisfaction and favourable opinions

The patients in the intervention group scored significantly (mean score: 85.2) higher on the post-intervention satisfaction than patients in the control group (70.3). Even though under-represented in dementia studies due to cognitive restrictions, patient satisfaction is an important indicator of a high-quality care. The presence of family carers, frequent visits of nurses, and tailored routines were the most likely to contribute to the attainment of a more secure and comfortable environment, as well as increase the perceived quality. These results suggest that disorganised and compassionate care environments can make a difference to patients even with cognitive weaknesses. Moreover, satisfaction metrics provide vital feedback to the healthcare systems that have an objective of pursuing patient-centered values.

Building Competencies to Empower Carers

The efficacy of the organized training sessions was established by the fact that the competency scores in the carers in the intervention mode (88.2) was far much higher as opposed to those in the control mode (72.0). Such increase means that carers gained both practical skills and confidence in dealing with different sorts of tasks, including communication methods and the management of behavioural symptoms, medication administration, and nutrition. Analogous studies have revealed that education of carers significantly boosted the efficacy of care-giving and reduced the use of emergency resources as revealed by chien et al (2011)

The results of the given research provide further evidence in favor of the chronic care model and family systems theory, which underline the connection in between the experience of patients and their families. Unlike the traditional patient-centered models of care delivery that place care in a vacuum, family-centered case nursing takes into consideration the family as a vital provider of care. The international programs that this paradigm endorses, such as the WHO Global Action Plan on the Public Health Response to Dementia 20172025 that emphasizes carer support and training as primary strategies, and is aligned with the current policy trends towards community-based care of dementia.

Limitation

In spite of the benefits, there are few limitations in the study. Despite being morally acceptable, the quasi-experimental design lacks the randomisation necessary to eliminate a selection bias fully. Due to the assignment based on the institution, the effect of confounding variables such as resource diversity or institutional culture might have been superposed. Moreover, ZBI scores and other self-report measures may be influenced by social desirability, and recall bias. Moreover, although the MMSE and Barthel Index are standardised clinical indicators, used to determine the overall quality of life, more complicated tests like the ADAS-Cog or quality-adjusted life years (QALYs) can be used to give a more detailed analysis. Also, the generalisability of the findings is limited geographically to the urban Tertiary care setting, they are not necessarily relevant in the rural or resource-constrained settings.

Prospects for the Future

In future studies, a multicenter randomised controlled trial (RCT) must be considered to establish the causal efficacy of this model. Moreover, studies with a longitudinal follow-up (such as within 2436 months) can consider delaying placement or long-term benefits of a nursing home. To assist the intervention to be more scalable, it may be further explored to facilitate the incorporation of technology-supported care giving, including virtual training programs, carer applications, and tel monitor. Lastly, economic results that demonstrated the cost-effectiveness of family-centered case nursing would be useful in helping healthcare policymakers to find a compromise between quality of care and resources allocation.

Conclusion:

The research adds information to the growing body of evidence that proves the effectiveness, humanity, and sustainability of family-centered case nursing as a model of Alzheimer disease care. This model is beneficial to both the care providers and its recipients because it enhances their patient cognitive and functional outcomes, eliminates behavioural disturbances, and at the same time enables carers. Such multifactorial and comprehensive care approaches deserve not only clinical but also the public health impulse as more people worldwide age and the estimates predict dementia pathology to increase threefold by 2050.

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