

The effectiveness of advanced case management in community-based long-term care services

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Research Article

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Abstract

Aim: This study examined the long-term care in Taiwan to determine the effectiveness of advanced case management with Community Integrated Care Service.

Methods: This was a retrospective observational study targeting individuals who had developed disabilities and received services for at least 6 months between January 2018 and June 2021. Participants who received only long-term care services were assigned to the control group, and those who received advanced case management with long-term care were assigned to the experimental group. Analyzed disability prevention, depression improvement, and consumption of medical resources.

Results: The data of 1,947 participants. The ratios of complicated care needs and severe disabilities were significantly higher in the experimental group. The two groups had similar levels of disabilities. The experimental group had significantly of depression improvement scores than the control group did. No significant difference was observed in medical resources expended before and after intervention between groups. Complex cases had more medical expenses, and interventions prevent the medical expenses from increasing rapidly.

Conclusion: The advanced case management group achieved superior results in alleviating depression and lowering the costs incurred on the taxpayers and patients' families. From a holistic health-care perspective, advanced case management is essential.

Introduction

In Taiwan, the prevalence of chronic diseases, the complexity of care services and the length of care, and the changes in social and family structures have made the demand for long-term care a critical concern that health-care policies must address; this concern has been exacerbated by a recent substantial increase in the older-adult population [1–3]. Care for older adults must not be confined to passively responding to diseases; instead, it should encompass the management of chronic diseases and physical and mental disabilities [4–7].

The Long-term Care Plan 2.0, which has been in effect since 2016, provides diverse and uninterrupted care services [8]. The care managers dispatched by the Centre of Long-term Care Management of the Department of Health of the Taipei City Government and the case managers serving under various community integrated service centres play key roles in policy implementation; they visit households that require care services to evaluate the patients' needs, develop appropriate care plans, and assist patients in applying for care services, providing coordination when necessary [9]. In September 2016, the Department of Social Welfare of the Taipei City Government became the first agency in Taiwan to launch an integrated care service, for long-term care receivers with complicated needs. The advanced case management this service provides is aimed at addressing the lack of information sharing between various long-term care services, a problem that has persisted for years, by forming cross-disciplinary teams to actively seek out individuals with complicated needs and to establish human-centred indicators

to closely monitor these individuals' conditions. In addition to managing complicated cases, case managers provide resident services in community service stations. These services mainly involve counselling and organising disability-delaying activities and homecare provider support groups. In total, Taipei City has 12 such stations, 4 of which are staffed by teams recruited from the hospital at which the author is employed. These community service stations gain the trust of community residents and encourage community resource sharing. Furthermore, the stations facilitate the integration of long-term care through the cross-disciplinary expertise of a professional team, enabling community residents to enjoy care services in the neighbourhood they are most familiar with, which supports the goal of ageing in place and good death [10–13].

Studies on the establishment and evolution of community-based long-term care stations in Taiwan have rarely discussed the effectiveness of care services from the perspective of individuals receiving the intervention. Therefore, this study investigated the implementation of advanced case management for community integrated care services to assess the adequacy, strengths, and weakness of such management. Suggestions for future long-term care plans were provided based on the results.

Materials And Methods

Data Source

A regional hospital in northern Taiwan served as the source of data for this study. That is, the case management information system, and patient medical records of the hospital supplied the data for analysis. The data were anonymised before use. This study was approved by the Institutional Review Board of Taipei City Hospital (TCHIRB-11005002-E-F).

Research Design

This was a retrospective observational study of data collected between January 2018 and June 2021. The improvements in disability prevention, depression improvement, and consumption of medical resources..

Research Participants

This study targeted patients of all age groups with disabilities who were registered in a regional hospital in northern Taiwan for long-term care services. Those who received only long-term care services were assigned to the control group, whereas those who received advanced case management, which provided long-term care services based on their complicated needs, were assigned to the experimental group. Only individuals who had received long-term care services for at least half a year by the start of the data collection period and whose records indicated that they had been evaluated twice were included.

Variables

The dependent variables were as follows: disability postponement (indicated by the long-term care as determined by the Long-Term Care Case-Mix System) [14], activities of daily living (ADL) [15], Instrumental Activities of Daily Living, IADLs [16], depression (indicated by a score on the Center for Epidemiologic Studies Depression scale [CESD- Iowa form]) [17], and reduced load for caregivers (indicated by a score for caregiver load and changes in quality of life) [18–19].

Statistical Analysis

The personal attributes of the experimental and control groups were presented as numbers and percentages to demonstrate their distribution. For univariate analysis, the chi-squared test was compared between two groups. Logistic regression was performed to compare the risk of deterioration in the CMS ratings, ADL scores, and CESD scores of the two groups with all other variables (age, sex, marital status, social welfare status, possession of a disability card, number of visits, CMS rating, ADL score, and CESD score) being controlled for. A paired *t* test, one-way analysis of variance, and independent samples *t* test were performed to compare the medical resources expended in the two groups before and after the intervention. The software program SAS 9.4 (SAS Institute, Cary, NC, USA) was used, with the level of significance set at $p < 0.05$.

Results

A total of 1,947 individuals were included, of whom 1,710 (87.8%) were assigned to the control group and 237 (12.2%) were assigned to the experimental group. Regarding the demographic information of these individuals, the percentages of individuals who were eligible for social welfare, had disabilities, and had severe disabilities were significantly greater in the experimental group than those in the control group. This indicates that individuals in the experimental group had greater complexity in their long-term care needs (Table 1).

Table 1
Demographic information (N = 1947)

	Experimental group	Control group	<i>p</i> -Value
Item	(<i>n</i> = 237)	(<i>n</i> = 1710)	
Age, years, M (SD)	77.0 (14.7)	77.8 (14.1)	0.419
Gender N (%)			
Female	128 (54)	1010 (59.1)	0.136
Male	109 (46)	699 (40.9)	
Marital status N (%)			
Divorced or single	129 (54.4)	994 (58.2)	0.276
Married	108 (45.6)	715 (41.8)	
Social welfare status N (%)			
Eligible*	59 (24.9)	236 (13.8)	< 0.001*
Not eligible	178 (75.1)	1473 (86.2)	
Disability card			
Possessed	159 (67.1)	994 (58.2)	0.009*
No	78 (32.9)	715 (41.8)	
Living alone N (%)			
No	202 (85.2)	1432 (83.8)	0.571
Yes	35 (14.8)	277 (16.2)	
CMS rating**			
Mild	26	372	< 0.001*
Moderate	98	756	
Severe	113	582	
* mid or low-income household, disability living allowance for non-listed			
** Long-Term Care Case-Mix System			

Regarding the changes in disability postponement and depression improvement (Table 2), the percentages in the experimental group were greater than those in the control group for CMS improvement

($p = 0.004$), ADL score maintenance or improvement ($p = 0.013$), and CESD score maintenance or improvement ($p = 0.012$).

Table 2
Disability postponement, depression, and caregiver load after intervention

	Experimental group	Control group	<i>p</i> -Value
Item	(<i>n</i> = 237)	(<i>n</i> = 1710)	
CMS N (%)			
Improved	55 (23.2)	283 (16.6)	0.004*
Unchanged	108 (45.6)	965 (56.4)	
Deteriorated	74 (31.2)	462 (27.0)	
ADL N (%)			
Improved	43 (18.5)	367 (22.1)	0.013*
Unchanged	136 (58.6)	804 (48.4)	
Deteriorated	53 (22.8)	491 (29.5)	
missing = 53			
CESD N (%)			
Improved	8 (11.4)	48 (18.5)	0.012*
Unchanged	59 (84.3)	173 (66.8)	
Deteriorated	3 (4.3)	38 (14.7)	
missing = 1618			

After controlling for other variable, the risks of deterioration in the CMS ratings, ADL scores, and CESD scores of the two groups were compared by the logistic regression in Table 3. For CMS rating deterioration, the odds ratio of the experimental group was 2.09 times that of the control group (95% CI = 1.03–4.24). Regarding the collinearity between the CMS rating and ADL score, when the ADL score was excluded from the control variables, no significant difference was observed in the deterioration risks of the two groups. For ADL scores, the two groups did not exhibit a significant difference (OR = 0.97, 95% CI = 0.50–1.88). For CESD scores, the odds ratio of the experimental group was 0.20 (95% CI = 0.05–0.73) compared with that of the control group, suggesting that the experimental group faced a significantly lower risk of CESD score deterioration than did the control group.

Table 3
CMS rating, ADL score, and CESD score after intervention

Item	Group	OR	95% C.I.	P
Risk of deterioration, CMS rating	Control group	1		
	Experimental group	2.09	1.03–4.24	0.041*
Risk of deterioration, ADL score	Control group	1		
	Experimental group	0.97	0.50–1.88	0.929
Risk of deterioration, CESD score	Control group	1		
	Experimental group	0.20	0.05–0.73	0.015*

Regarding the expended medical resources (according to the medical records kept by the hospital) before and after the intervention, for the first 6 months, the control group demonstrated a reduction in hospitalisation expenses (by 35.3%), hospitalisations ($p = 0.004$), and days of hospitalisation ($p = 0.001$), which indicates an effective reduction in the days of hospitalisation. Emergency care expenses (reduced by 35.6%, $p = 0.003$) and instances of emergency care ($p < 0.001$) were lower, indicating an effective reduction of emergency care expenses in the experimental group (Table 4). A comparison of the two groups reveals that they exhibited no significant difference in either emergency care expenses or instances of emergency care (Table 5).

Table 4 Expended medical resources before and after intervention in the experimental group in the first 6 months (N= 1947)

Item	Before	After	Difference (95% CI)	<i>p</i> -Value
Hospitalisation				
Expenses	33496.48	21667.91	-11828.57 (3832.08, 19825.06)	0.004*
Times	0.33	0.23	-0.10 (0.03, 0.17)	0.004*
Days	5.24	3.30	-1.94 (0.75, 3.13)	0.001*
Outpatient visits				
Expenses	15282.15	17811.14	2528.98 (-4851.78, -206.19)	0.033*
Times	4.93	4.97	0.04 (-0.56, 0.48)	0.874
Emergency				
Expenses	5126.05	3299.62	-1826.43 (633.61, 3019.26)	0.003*
Times	0.51	0.33	-0.18 (0.09, 0.27)	<0.001*

Table 5
Changes in expended medical resources after intervention

	Experimental group	Control group	p-Value
Item	(n = 237)	(n = 1710)	
Outpatient visits M (SD)			
Times	0.42 (7.94)	0.41 (9.17)	0.648
Expenses (NTD)	1318.15 (16670.90)	1369.88 (25683.48)	0.978
Hospitalisation M (SD)			
Times	0.01 (0.32)	-0.01 (0.31)	0.111
Expenses (NTD)	-5429.88 (84713.21)	-70666.84 (79246.60)	0.624

The costs of the experimental group receiving long-term care with advanced case management were analysed to assess the adequacy of the management based on actual costs. The total annual cost for four stations would be NT\$5.84 million. The four stations served a total of 517 individuals annually. Regarding the reduction in the expended medical resources, in the experimental group, National Health Insurance expenses valued at NT\$480,003 were saved annually, calculated based on the reduction in instances of emergency care before and after intervention in the first 6 months and in the emergency care expenses of NT\$2,579 per person per use. Additional National Health Insurance expenses valued at NT\$10,513,236 were saved annually, calculated based on the reduction in days of hospitalisation and the hospitalisation expense of NT\$5,241 per person per day. In summary, community-based advanced case management, with which it served 517 individuals per year and saved NT\$10,993,239 by reducing emergency care and hospitalisation expenses; what it achieved far outweighed the required investment. For intangible benefits, the proactive and rapid provision of human-centred, family-oriented, community-based medical and care services that were customised to the care receiver enabled the integration of long-term care with the National Health Insurance system, thereby reducing the waste of health insurance resources and lowering the costs incurred on the taxpayers and patients' families.

Discussion

Unlike the common care service model, which only concerns the provision of long-term care, advanced case management under the Community Integrated Care Service involves proactively paying frequent visits to care receivers that have complicated needs. This practice is in line with the case management model proposed by Yu, Feng, and Ko, which involves a case manager being fully in control of organising the provision of care services; this model encourages care receivers to accept the care services recommended to them, ensures the provision of consistent services, and enables care receivers to resolve the problems they encounter in home care and medical treatment [20]. The results of this study were improvement in body functions to that of individuals receiving long-term care only. For depression, however, advanced case management achieved significantly greater improvement than did regular long-

term care. These results are similar to those of Itoh et al., who reported that individuals with high complicated care-need levels had a greater need for advanced case management and exhibited significantly greater health improvements upon receiving it [21].

Evidence suggests that the hospitalisation rate of this group is two times higher than that of older adults without disability [22–24]. That 54% of medical insurance expenditures and 72% of medical subsidy expenditures are associated with disabilities in the United States [25]. In this regard, the findings of the present study are consistent with those of the aforementioned studies.

With respect to individuals receiving long-term care, this study accessed only the data of a regional hospital in northern Taiwan. Moreover, for expended medical resources, only the data of the regional hospital were used. Because these individuals could have also received emergency care or have been hospitalised in other medical institutions, the data for which were unavailable to the research team, the results obtained in this study could not be generalised to all of Taipei City. Additionally, because case managers were the original source of these data, human error or missing may exist in the evaluation, execution, and record keeping. Although the information systems have built-in alert functions, data accuracy may still affect interpretation of these results.

Conclusion

This study discovered that placing individuals with complicated care needs under advanced case management, a feature of the Community Integrated Care Service, improved the physical and mental conditions of these individuals, thereby reducing the need for medical care. From a perspective of holistic health care, this form of case management is superior to the practice of providing only long-term care. Researchers are advised to develop service frameworks for different categories of care receivers [26]. Because advanced case management provides custom-made care services for individuals with complicated care needs, it requires close cooperation with medical teams, long-term care providers, and communities to harness the full potential of integrated medical and health care.

Declarations

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Authors' contributions

Ruey-Shiuan Ueng: Conceptualization, Methodology, Formal analysis, Writing - Original draft. Visualization. Hsiao-Yun Hu: Conceptualization, Methodology, Formal analysis, Writing - Original draft. Chao-Ming Huang : Conceptualization, Methodology, Formal analysis. Yu-Ping Chang : Formal

analysis, Writing - Original draft. Chia-Chen Hsu: Conceptualization, Methodology, Writing - Original draft, Visualization, Supervision, Funding acquisition.

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Availability of data and materials

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Ethics approval and consent to participate

The present study has been approved by the the Institutional Review Board of Taipei City Hospital (TCHIRB-11005002-E-F). A regional hospital in northern Taiwan served as the source of data for this study. That is, the case management information system, and patient medical records of the hospital supplied the data for analysis. all participants (or their legal proxies for those who were unable to sign their names) have provided written informed consent. The data were anonymised before use. All the methods in this study were in line with relevant guidelines and regulations.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing financial interests.

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