

Effectiveness of a Care Delivery Model for High-Need Older Adults in Communities

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Abstract

Purpose: This study aimed to test the effectiveness of High-Need Community-Dwelling Older Adults Care Delivery Model (HCOACDM) in Taiwan. **Methods:** A cluster randomized controlled trial with repeated measures design was conducted in eight community care centers, involving 145 high-need older adults who were assigned to the intervention group or comparison group. The HCOACDM was provided over 6 months. Functional ability, quality of life, depressive symptoms, and health care and social service utilizations were measured at baseline, at 3 months, and 6 months into the intervention. The participants' satisfaction was measured at the end of 6-month intervention. **Results:** Positive effects were shown on all variables in the intervention group at both the 3-month and 6-month intervals (all $p < .05$). The intervention group had a higher satisfaction with care delivery than the comparison group ($p < .05$). **Discussion:** The promising findings supported a long-term implementation of the HCOACDM as applicable and beneficial.

Keywords

care coordination, care delivery model, community care center, older adult

Aging individuals have increasing and multidimensional physical, psychological, and social care needs (Gobbens et al., 2010; Verver et al., 2018). High-need older adults are those aged 65 and older and who are frail, marginal, and with different conditions; therefore, they often have complex health and social care needs and thus require multiple care services (Hsu et al., 2019). The health care and social services, however, are often provided individually by various providers without sufficient integration and communication, which results in fragmented, uncoordinated, and discontinuous care (Kristensson et al., 2010; Tinetti et al., 2012; Wallace et al., 2015). Older adults have reported that they experienced the health system as being complicated and inaccessible because they did not know what they were entitled to or how to access information (Ferry, 2017; Kristensson et al., 2010; Mirzaei et al., 2013). A response to the problems encountered in segmented care in order to enable high-need older adults to have their complex care needs met at an appropriate level is to develop a holistic model of care delivery.

Different systems of care delivery targeting older adults have been developed with the aim of reducing the risk of care fragmentation (Beland & Hollander, 2011). Care delivery models deploying care coordinators appear to be promising, with evidence suggesting that care coordinators have beneficial effects on helping older adults living in the community overcome barriers to needed medical, social, and psychological services and support (Hudon et al., 2017; Scharlach et al., 2015) and to improve health

and functional outcomes (Popejoy, 2015). In this regard, a High-Need Community-Dwelling Older Adults Care Delivery Model (HCOACDM) was developed (Hsu et al., 2019) in Taiwan based on a care coordination model suggested by the World Health Organization (WHO, 2016). The HCOACDM addressed the importance of care coordination. The care coordinator in the HCOACDM mainly had a coordinating function and was responsible for conducting comprehensive assessments of physical, psychological, and social functioning in high-need older adults, identifying their service needs, linking access to and coordinating needed services and support, and monitoring and reassessing the older adults as frequently as necessary. Such individualized and person-centered care was recognized as crucial to holistic care delivery (Morgan & Yoder, 2012). The HCOACDM aimed to

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coordinate health care and social services and was developed to improve the high-need community-dwelling older adults' quality of care and service use (Hsu et al., 2019); its effectiveness, however, has not yet been validated.

In the studies regarding care intervention effectiveness, assessing the physical, psychological, and social conditions of older adults was emphasized in order to achieve success outcomes (Gobbens et al., 2010; Gobbens & van Assen, 2014; Taube et al., 2018). Many of the prior evaluation studies focused primarily on three indicators, namely, disability, quality of life, and depression (Bleijenberg et al., 2016; Gobbens & van Assen, 2014; Sánchez-García et al., 2017). Multimorbidity is highly prevalent in older adults resulting in physical dependency that is exacerbated by physical or social environment leading to poor quality of life and increased risk of depressive symptoms (Garin et al., 2014; Mezuk et al., 2012; WHO, 2018). Those evaluation studies, however, showed inconsistent evidence of care coordination effectiveness. It is, therefore, unpredictable as to how disability, quality of life, and depression will affect such a special group of high-need older adults. Evaluation of the HCOACDM regarding the three indicators of functional ability, quality of life, and depressive symptoms would generate additional knowledge concerning the care and well-being of high-need older adults.

The aim of this study, therefore, was to evaluate the effectiveness of the HCOACDM with regard to high-need community-dwelling older adults. The main hypothesis was that older adults identified with high needs receiving an intervention of intensive care coordination and service monitoring would have greater improvements in their functional ability, quality of life, depressive symptoms, health care and social service utilizations, and satisfaction with care delivery than the comparison group. In addition, the numbers of older adults with high needs would be decreased after the intervention as the older adults had received their adequate care services and left out the situation as with high needs.

Method

Design

This study was conducted from July to December 2019 at community care centers in Kaohsiung, southern Taiwan. It was a cluster randomized controlled trial with repeated measurements (Clinical Trial Registration Number: NCT03864471). This study is reported according to the Consolidated Standards of Reporting Trials statement (Campbell et al., 2012).

Ethical Considerations

This study was approved by the human research ethics committee of a university hospital (KMUHIRB-F(I)-20170070). Signed informed consent was obtained from all study participants before data collection. The participants were also informed that confidentiality would be maintained when presenting the results.

Setting and Participants

There were 25 community care centers in Kaohsiung. The community care centers provide community-based services such as home visits, telephone checkups, meals on the wheel, health promotion activities, and resource referrals aiming to provide preventive care for older adults. Eight of the 25 community care centers stationed with social workers were invited to participate in this study, and they were randomly assigned to either the intervention group (four centers) or comparison group (four centers) by means of drawing lots performed by one of the researchers. The eight community care centers were geographically separated to reduce contamination bias between clusters.

Eligible participants were older adults who (1) lived in the community at least 3 months, (2) were over 65 years old, (3) fluently communicated in Mandarin or Taiwanese, and (4) were screened by the High-Need Community-Dwelling Older Adults Screening Scale (HCOASS; Chen et al., 2020) administered by care coordinators. The HCOASS has 18 questions with a "yes" or "no" response, and scores are summed and range from 0 to 18. A cutoff score of 5 or greater is used to identify those older adults with high needs. The HCOASS has shown high sensitivity and specificity (Chen et al., 2020). It was not feasible to blind the involved care coordinators and researchers, but the participated older adults were blinded for group allocation.

The sample size was calculated using G*Power Version 3.1 with the analysis of *F* test—multivariate analysis of variance: repeated measures within-between interaction. To be able to detect a difference between the intervention and comparison groups, the α was set at .05 with a power of .80. As this was an innovative intervention study, the effect size (ES) was set as the small ES of 0.4 (Higgins & Green, 2011). The number of groups was two, and the number of measurements was three; therefore, the estimated sample size was 64. Accounting for the cluster design effect, sample size was calculated as the Estimated Sample Size \times Design Effect. The design effect = $1 + (n-1) \times$ intraclass correlation coefficient (ICC), in which n was an average cluster size (Adams et al., 2004) and was $64/8 = 8$ in this study. The ICC used in estimating patient outcomes of primary care usually was set as less than 0.05 (Campbell et al., 2000); thus, the design effect was $1 + (8-1) \times 0.05 = 1.35$ in this study. The required sample size was $64 \times 1.35 = 87$. Accounting for possible loss to follow-up of 25%, the final sample size had to be 109 in total.

Intervention

In the intervention group, the HCOACDM was implemented for 6 months. The HCOACDM involved case screening, comprehensive assessment, and care coordination (Hsu et al., 2019). After a screening using the HCOASS, the high-need older adults received in-home assessments of functional and cognitive status, quality of life, and current resource utilization by a care coordinator. Based on the results of the assessments

and the types of the high-need older adults, the care coordinator used a specifically designed list of categorized care services to formulate an individualized care plan in order to make linkages of corresponding levels of care and support. The care coordinator used the list as a guide to assist and support the high-need older adults in their contact with different establishments in the health care and social service systems in the most efficient, effective, and acceptable way. The available care services and support to be arranged were primarily in three categories: care and nursing resources, social welfare resources, and resources for caregivers. Regular follow-up home visits were carried out every 3 months by the care coordinator. Situation changes of each high-need older adult were monitored and followed up at the home visits. Condition assessments were carried out regularly by the care coordinator and, when necessary, the care and support plan was updated and adapted.

Care coordinators in both the intervention group and comparison group were 36 years old on average with a social work background and had an average of 9 years of working experience with older adults. To prepare for this study, the care coordinators in the intervention group participated in a preintervention training program delivered over 3 days by the research team. They were briefed on the characteristics of high-need community-dwelling older adults, procedures and tasks in each stage of the HCOACDM, common problems of care management and strategies to handle problem situations, and instructions on the use of assessment instruments. After commencing the intervention implementation, the care coordinators communicated and collaborated regularly with the research team, including attending monthly steering group meetings. Solutions to particularly difficult cases were brought up for discussion in the steering group meetings. Because the directors of the community care centers and the care coordinators were obligate to have regular meetings, case situations were also discussed in those in-house meetings. Regular meetings were organized to exchange ideas and knowledge between the research team and directors of the community care centers as well.

As for the comparison group, routine care services were provided based on an older adult's needs. The routine care services provided by care coordinators in community care centers contain home visits, telephone checkups, meals on the wheel, health promotion activities, and service referrals. The HCOACDM was not introduced to the care coordinators in this group, and thus they did not receive the list of categorized care services and support. The care coordinators had to make service linkages, if necessary, based on their experience and knowledge.

Measures

At the baseline, the high-need older adults' sociodemographic characteristics, including age, gender, educational level, and presence of chronic disease, were collected to describe the participants. Outcomes of functional ability, quality of life, depressive symptoms, and health care and social service

utilizations were assessed at baseline, at 3 months, and at 6 months for the purpose of evaluating the effects of the intervention. By the end of the 6-month intervention, the participants' satisfaction with care delivery was measured in both groups.

Functional ability. Functional ability was assessed by the Barthel Index (BI), which comprised of 10 aspects describing daily living activities and mobility (Mahoney & Barthel, 1965). The BI generates a score from 0 to 100. A score of 0–20 suggests total dependence, 21–60 severe dependence, 61–90 moderate dependence, 91–99 slight dependence, and 100 complete independence (Shah et al., 1989). The scale has yielded an acceptable validity and reliability among older adults in Taiwan (Y.-F. Yao & Chen, 2017). The Cronbach's α coefficient was .93 at baseline in this study.

Quality of life. The quality of life was measured by the 28-item Taiwan version of WHO quality of life (WHOQOL-BREF) assessment instrument regarding an individual's physical health, psychological health, social relations, and environment (The WHOQOL-Taiwan Group, 2000). The responses use a 5-point Likert-type scale, with a higher score indicating better quality of life. Linguistic validity, internal consistency ($\alpha = .73-.81$), test-retest reliability ($r = .59-.94$), and construct validity of the WHOQOL-BREF Taiwan version have been shown adequate for community-dwelling older adults (Chang et al., 2015; Hwang et al., 2003; G. Yao et al., 2007). The Cronbach's α coefficient was .92 at baseline in this study.

Depressive symptoms. The depressive symptoms were measured using the 17-item Hamilton (1960) Depression Rating Scale (HDRS). The items are summed to give a score ranging from 0 to 52. Scores of 0–7 are considered as being normal, 8–16 suggest mild depression, 17–23 moderate depression, and scores over 24 are indicative of severe depression (Zimmerman et al., 2013). The Chinese version of HDRS has shown adequate validity in older adults (Zheng et al., 1998) and shows an acceptable internal consistency for this study ($\alpha = .79$).

Health care and social service utilizations. To describe situations of health care and social service utilizations, 21 resources covering care and nursing, social welfare, and caregiver resources were applied (Hsu et al., 2019). The services that have been used by the high-need older adults were marked.

Satisfaction with care delivery. Two dimensions in a service satisfaction questionnaire developed and validated by Chiou and Chiou (2011) were adopted to measure the high-need older adults' satisfaction with their care delivery at the end of the 6-month intervention. The satisfactory questionnaire used in this study consisted of five items regarding professional ability and five items regarding interpersonal communication and attitude. It was designed on a 5-point Likert-type scale, with a higher score indicating a higher degree of satisfaction. The

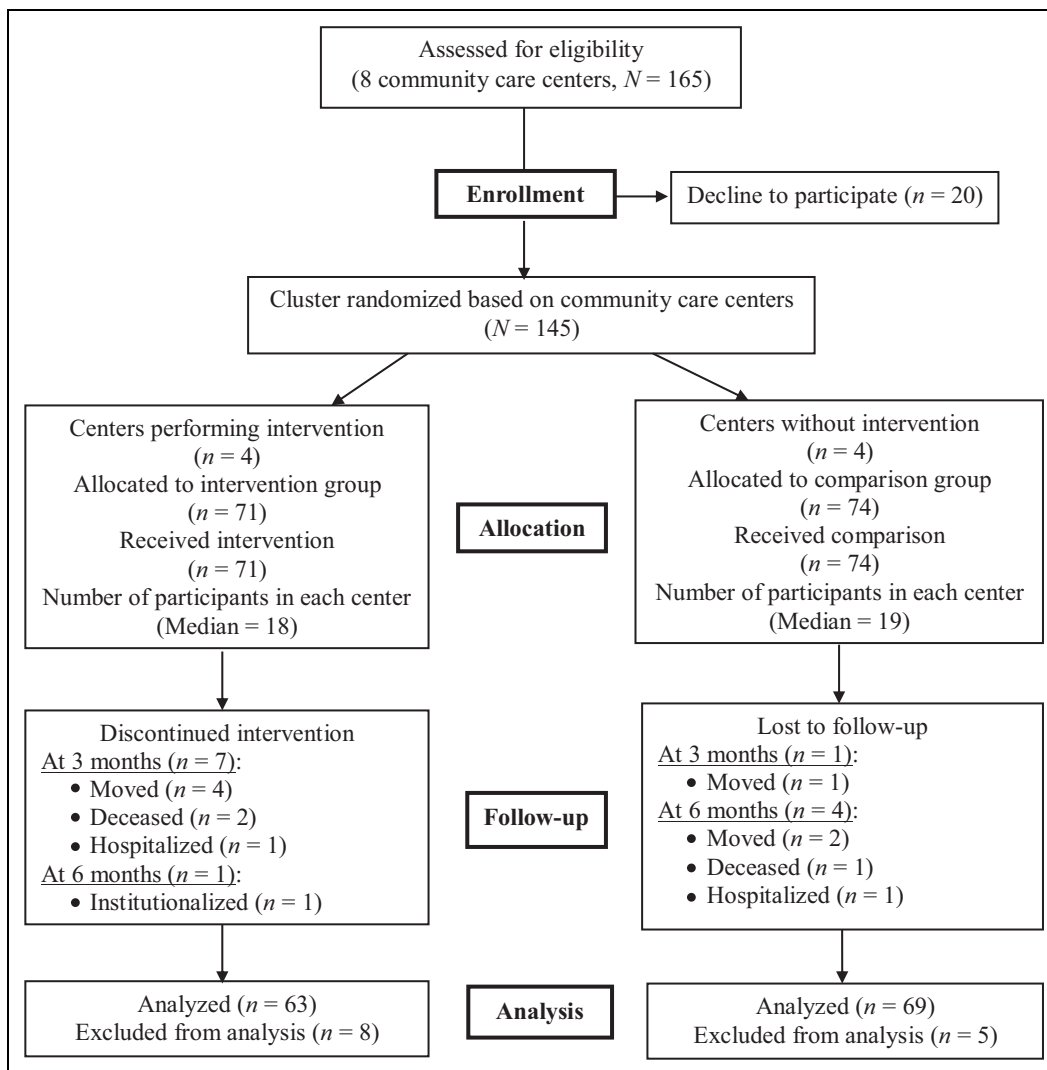


Figure 1. Flow of the participant enrollment and the study progression.

Cronbach's α coefficients of the two dimensions were .99 and .99, respectively, in this study.

Statistical Analysis

Descriptive statistics of percentage, mean, and standard deviation (*SD*) were used to describe the characteristics of the high-need older adults. For comparisons between the intervention and comparison groups, independent *t* tests for continuous variables and χ^2 tests for nominal variables were used. A generalized estimating equation model of linear regression analysis, permitting the inclusion of participants with missing data (Wang, 2014), was adopted to compare the changes from the baseline to the posttest over the 6 months between the two groups. Cohen's (1988) *d* was calculated to determine the ES at 6 months, where 0.20–0.49 represents a small, 0.50–0.79 a medium, and over 0.80 a large effect (Middel et al., 2001). The level of statistical significance was set at $p < .05$. The Statistical

Product and Service Solutions Version 22 was used for the statistical analyses.

Results

Participant Profile

A total of 165 older adults were identified with high needs from the eight community care centers. Of which, 20 older adults either personally or their family members declined participation. In total, 145 high-need community-dwelling older adults participated in the study. According to the community care center in which they regularly participated, the 145 high-need older adults were assigned to the intervention group (four centers, $n = 71$) or comparison group (four centers, $n = 74$; Figure 1).

The mean age of the 145 high-need older adults was 77.97 ($SD = 6.99$) years, 55.2% ($n = 80$) were female, and 76.5% ($n = 111$) had a 6-year elementary school education or less. The high-need older adults had an average of 2.04 ($SD = 1.39$)

Table 1. Characteristics of Participants and Baseline Comparisons.

Variables	Total (N = 145)				Intervention (n = 71)				Comparison (n = 74)				Statistics	p
	M	SD	n	%	M	SD	n	%	M	SD	n	%		
Age	77.97	6.99			77.38	6.95			78.53	7.03			t = -0.99	.325
Gender													$\chi^2 = 0.01$.913
Male			65	44.8			31	43.7			34	45.9		
Female			80	55.2			40	56.3			40	54.1		
Education													$\chi^2 = 13.05$.042*
Illiterate			47	32.4			21	29.6			26	35.1		
Elementary			64	44.1			37	52.1			27	36.5		
≥High school			34	23.5			13	18.3			21	28.4		
Chronic disease	2.04	1.39			1.92	1.35			2.16	1.43			t = -1.06	.290
Functional ability	80.10	25.55			82.61	22.60			77.70	28.04			t = 1.16	.249
Quality of life	67.82	17.20			68.77	14.14			66.90	19.74			t = 0.65	.519
Depressive symptoms	13.50	6.92			12.78	5.81			14.18	7.81			t = -1.21	.229
Health care and social service utilizations	1.26	1.34			0.97	1.37			1.53	1.26			t = -2.54	.012*

Note. M = mean; SD = standard deviation.

*p < .05.

chronic diseases. Apart from a lower educational level ($\chi^2 = 13.05, p = .042$) and less health care or social service utilizations ($t = -2.54, p = .012$) in the intervention group, there were no significant differences between the two groups at baseline (Table 1). By the end of 6-month study, a total of 132 (91%) participants remained in the study (intervention group $n = 63$; comparison group $n = 69$; Figure 1). Reasons for withdrawal were the following: moved out of the community ($n = 7$), deceased ($n = 3$), hospitalized ($n = 2$), and institutionalized ($n = 1$).

Changes Over Time on Functional Ability

At baseline, the high-need older adults had a moderate degree of functional dependency with a mean BI score of 80.10 ($SD = 25.55$). Considering group-time interaction effect, the intervention group had significantly greater improvements in functional ability than the comparison group ($p < .05$; Table 2). Although the intervention group showed a greater improvement in functional ability than the comparison group, the significant difference appeared only at 6 months ($\beta = 4.87, p = .012$) but not at 3 months ($\beta = 0.72, p = .333$; Table 2). The magnitude of the intervention across time was small on the outcome of functional ability ($ES d = 0.37$).

Changes Over Time on Quality of Life

At baseline, the high-need older adults had a moderate level of quality of life with a mean WHOQOL-BREF score of 67.82 ($SD = 17.20$). Considering group-time interaction effect, the intervention group had significantly greater improvements in the quality of life than the comparison group ($p < .05$; Table 2). The intervention group had a better quality of life at 3 months ($\beta = 6.83, p < .001$) and at 6 months ($\beta = 12.72, p < .001$) than the comparison group. The magnitude of the intervention across time was large on the outcome of quality of life ($ES d = 0.86$).

Table 2. Changes of the Participants From Baseline to 3 Months and From Baseline to 6 Months of the Study.

Variables	β	SE	95% CI	p
Functional ability				
Group (Int.) ^a	4.90	4.19	[-3.31, 13.12]	.242
Month 3 ^b	0.06	0.65	[-1.22, 1.34]	.930
Month 6 ^b	-1.76	1.36	[-4.42, 0.90]	.196
Group (Int.) × Month 3 ^c	0.72	0.74	[-0.74, 2.17]	.333
Group (Int.) × Month 6 ^c	4.87	1.93	[1.09, 8.65]	.012*
Quality of life				
Group (Int.) ^a	1.87	2.86	[-3.75, 7.48]	.515
Month 3 ^b	-0.49	0.28	[-1.04, 0.06]	.083
Month 6 ^b	-0.71	0.37	[-1.44, 0.03]	.058
Group (Int.) × Month 3 ^c	6.83	0.75	[5.36, 8.30]	<.001***
Group (Int.) × Month 6 ^c	12.72	1.05	[10.66, 14.78]	<.001***
Depressive symptoms				
Group (Int.) ^a	-1.40	1.15	[-3.65, 0.85]	.223
Month 3 ^b	0.47	0.28	[-0.08, 1.02]	.096
Month 6 ^b	0.68	0.33	[0.04, 1.32]	.038*
Group (Int.) × Month 3 ^c	-3.26	0.56	[-4.36, -2.16]	<.001***
Group (Int.) × Month 6 ^c	-5.18	0.61	[-6.39, -3.98]	<.001***
Health care and social service utilizations				
Group (Int.) ^a	-0.56	0.22	[-0.98, -0.13]	.011*
Month 3 ^b	-0.01	0.04	[-0.09, 0.06]	.690
Month 6 ^b	0.01	0.05	[-0.09, 0.11]	.784
Group (Int.) × Month 3 ^c	1.90	0.15	[1.61, 2.20]	<.001***
Group (Int.) × Month 6 ^c	2.25	0.18	[1.90, 2.60]	<.001***

Note. N = 145. Int. = intervention group; β = regression coefficient; 95% CI = 95% confidence interval.

^aReference group: comparison group. ^bReference group: baseline. ^cReference group: comparison group at baseline.

*p < .05. ***p < .001.

Changes Over Time on Depressive Symptoms

The high-need older adults experienced mild depression with a mean HDRS score of 13.50 ($SD = 6.92$) at baseline. Considering group-time interaction effect, the intervention group had

significantly greater improvements in the depressive symptoms than the comparison group ($p < .05$; Table 2). The intervention group had fewer depressive symptoms at 3 months ($\beta = -3.26$, $p < .001$) and at 6 months ($\beta = -5.18$, $p < .001$) than the comparison group. The magnitude of the intervention across time was large on the outcome of depressive symptoms (ES $d = 1.08$).

Changes Over Time on Health Care and Social Service Utilizations

On average, the high-need older adults had utilized 1.26 ($SD = 1.34$) health care or social services at baseline. Considering group-time interaction effect, the intervention group had significantly greater improvements in health care and social service utilizations than the comparison group ($p < .05$; Table 2). The intervention group utilized more health care or social services at 3 months ($\beta = 1.90$, $p < .001$) and at 6 months ($\beta = 2.25$, $p < .001$) than the comparison group. The magnitude of the intervention across time was large on the outcome of health care and social service utilizations (ES $d = 1.15$).

Satisfaction With Care Delivery

While evaluating their satisfaction with the care delivery, the intervention group ($M = 33.75$, $SD = 5.06$) was more satisfied with the care delivery than the comparison group ($M = 10.35$, $SD = 5.26$; $t = 26.04$, $p < .001$) at the end of the 6-month study.

Changes on Numbers of High-Need Older Adults

As for the overall situation of the high-need older adults, the numbers of the high-need older adults in the intervention group were considerably reduced from 71 (100%) at baseline to 48 (75%) at 3 months and 38 (60.3%) at 6 months. On the other hand, the numbers of the high-need older adults in the comparison group were slightly reduced from 74 (100%) at baseline to 61 (83.6%) at 3 months and 57 (82.6%) at 6 months. There was significantly more decrease in the number of high-need older adults in the intervention group at 3 months ($\beta = -0.52$, $p < .001$) and at 6 months ($\beta = -1.49$, $p < .001$) than the comparison group.

Discussion and Applications to Practice

The HCOACDM had contributed to improved functional ability and quality of life, reduced depressive symptoms, greater access to adequate health care and social services, and more satisfaction with care delivery and service linkage among high-need community-dwelling older adults. The effects of the HCOACDM were predominantly positive at 3 months and 6 months of the intervention, indicating a promising sustainability of the HCOACDM. By the end of the study, there was a significant decrease in the number of high-need older adults in the intervention group than the comparison group.

The high-need older adults in the intervention group utilized more health care and social services than those in the comparison group both at 3 months and 6 months, suggesting that a specifically designed list of categorized care services used to formulate an individualized care plan in the model was effective in assisting different types of high-need older adults to receive corresponding levels of care and support. It has been reported that outreach care interventions may find people with a need for health care and social services that were unknown to the health organization, and geriatric assessment could result in an increase in care usage (Hoogendijk et al., 2016). A differentiated model of care coordination, whereby the comprehensiveness of the assessment and the intensity of care service delivery are calibrated to individual needs, has been suggested as an important mechanism for more efficiently utilizing resources (Scharlach et al., 2015). The HCOACDM was innovative in identifying and classifying older adults, thereby enabling care coordinators to provide person-centered care and support. The intervention may have worked from an individual point of view and been successful because previously unnoticed conditions were identified and unmet needs were satisfied.

The positive effect of the HCOACDM on functional ability may result from comprehensive assessments and precise corresponding service linkages. The improvement in functional ability is important both for the high-need older adults and for the society. For older adults, being physical independent during daily living results in more self-confidence and feelings of pride (Eklund et al., 2013) and has been found to be correlated with a better quality of life (Bilotta et al., 2010) and better life satisfaction (Berglund et al., 2014). As for the society, the improvement in functional ability or the delay of dependence could lead to less use of home care services and a reduction in financial burden (Eklund et al., 2013). Although notable effects on functional ability cannot be realized in the short term (3 months), this might not be surprising. Frailty is a gradual, progressive process of deterioration (Gobbens et al., 2010); more time might be required to perceive changes in functional ability as shown at 6 months of the intervention in this study. To summarize, the findings of functional ability improvement showed that the HCOACDM could contribute positively to high-need community-dwelling older adults and the society at large.

Corresponding to the results found in a prior study on older adults (Lin et al., 2017), the HCOACDM also has influenced the quality of life, in that the intervention group showed positive results. Affecting the quality of life is important because it is a personal evaluation of both the physical and psychological aspects of life made by the individuals themselves (Lin et al., 2017). Prior research has shown that a proactive attitude has positive results on quality of life (Gobbens & van Assen, 2014) and that timely identification of frailty prevents further deterioration (Bilotta et al., 2010; Looman et al., 2016). The improved level of the quality of life, as shown at the 3-month interval in this study, may decrease or delay the development of poorer health outcomes.

Another important finding was that the high-need older adults in both groups were likely to be depressed, which corresponds with prior studies that there is an association between depression and frailty; the need for providing appropriate support has been emphasized (Mezuk et al., 2012; Taube et al., 2018). The possible explanation that the HCOACDM yielded a favorable significant effect on depressive symptoms at 3 months might be the involvement of the care coordinator and effective care coordination resulting in the high-need older adults' satisfaction. When the high-need older adults felt satisfied with care provision and knew whom to contact in different situations, it probably made them feel secure and in turn influenced their psychological health positively. In addition, early recognition of depressive symptoms has shown to be effective in preventing recurrent episodes of depression and improving the quality of life (Chang et al., 2015). The care coordinator in the community care center could play an important role in detecting those at risk, providing basic preventive strategies, and, when needed, making adequate care service linkages.

The intervention group perceived a high satisfaction with care linkages. This may be due to the training and coaching that the care coordinators received before and during the intervention period. Prior studies have suggested that older adults mostly perceived greater satisfaction with care interventions when care planning involved a care coordinator and frequent home visits (Berglund et al., 2013; Sandberg et al., 2015). It is reasonable to believe that the home visits and support of the care coordinator in the HCOACDM played an important role in terms of noticing potential problems and determining ways to deal with different problems. The results may suggest that the care coordinator in this intervention had the possibility of working closely with high-need older adults in order to coordinate care and solve some of their problems and to be able to evaluate them via continuous follow-ups.

It is plausible that a few limitations may have influenced the results obtained. The generalizability of the findings in this study was limited by the geographic location (Kaohsiung in Taiwan) and potential selection bias (cluster randomized with community care centers as opposed to individual subjects), so the results need to be interpreted with caution. In addition, the participants had several diseases so that attrition caused by declining health or death may be a threat to both internal and external validity. A minimal loss to follow-up (9%) over 6 months and a similarity between the intervention and comparison groups (no significant differences at baseline) indicated that the data collection methods were feasible, and this limitation on validity was minimized to some extent (Polit & Beck, 2012). Furthermore, we only investigated physical, psychological, and social indicators of functional ability, quality of life, depressive symptoms, and service utilization in relation to the care delivery. Other unknown and unmeasured factors may exist and may confound the study results. Having said that, the large number of outcome measures was lengthy to complete, and their burden on the high-need older adults needs to be considered in future studies.

The HCOACDM is the first care delivery model with the aim of providing a comprehensive list of categorized health care and social services for care coordinators to make sufficient care linkages for high-need community-dwelling older adults in Taiwan. The findings from this study may indicate that community-dwelling older adults with high needs could be managed with the help of a care coordinator rather than needing admission to a long-term residential care facility. These results may have implications for policy, practice, and research. First, the findings could support further development and funding of health care and social service linkages for all high-need community-dwelling older adults. Given the pivotal role of care coordinators and the categorized list of care services, the HCOACDM will be of particular value in strengthening sufficient care coordination. Second, the effects of the HCOACDM were generally more pronounced at 3 months and 6 months, supporting the idea that long-term care coordination programs may lead to greater effectiveness as care coordinators establish a good rapport with their high-need older adults and further recommendations are implemented. In the further adaptation of the HCOACDM, it will be important to provide long-term support to enable improvement to be sustained and optimized. Future studies on the findings in this study are needed to be confirmed in other settings to verify their generalizability. Finally, an economic evaluation of the HCOACDM has to be conducted to optimize services for the high-need community-dwelling older adults.

Authors' Note

All authors meet the criteria for authorship, have approved the final article, and all those entitled to authorship are listed as authors.

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