



Effects of A Nurse - Led Integrated Care Model for Older Adults with Uncontrolled Chronic Diseases in Bangkok Metropolitan

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Abstract

Background: Uncontrolled non-communicable disease is a significant challenge for older adults, who have multimorbidity. In Bangkok, older adults with multimorbidity have difficulties in self-management due to fragment health services and continuing care, leading to poor control.

Objective: This two-group pretest-posttest quasi-experimental research was conducted to evaluate the effects of a Nurse-led integrated care model for older adults with uncontrolled chronic disease, living in Bangkok.

Methods: A total of 60 older participants with uncontrolled chronic disease were recruited from two public health centers and allocated by sites to an intervention group (n=30) or a comparison group (n=30). The intervention group received the 12-week Nurse-led ICM program, consisting of 1) a comprehensive geriatric assessment; 2) health education and skill training; 3) monthly home visits by multidisciplinary team; 4) bi-weekly self-management support by a nurse case manager using self-monitoring application; and 5) two group sharing sessions. While, those in a comparison group received usual care. **Results:** According to Paired t-test and Independent sample t-test results, the mean score of self-management, functional status, blood sugar, and blood pressure within the intervention group were significantly improved and better than the comparison group ($p < 0.001$) at week 12th. **Conclusion:** Findings suggest that this integrated care model is feasible and effective for older adults with uncontrolled chronic diseases in primary care context. Thus, it could

be applied to those older adults with chronic diseases, living in other community in Bangkok. In addition, self-management support competency of public health nursing should be strengthened to promote quality of care and patient outcome.

Keywords: Nurse-led integrated care, Older adults, Uncontrolled chronic diseases, Self-management

What was Known

- The integrated care is evidence-based recommended for older people with chronic conditions to prevent, slow or reverse declines in the physical and mental capacities of older people.
- Self-management is recognized as crucial for older adults with multiple chronic conditions, but most of them struggle to maintain their self-management to prevent risk and complication, leading to poor control of their chronic conditions.

What's New and Next

- Strengthening integrated healthcare services by nurses, multidisciplinary team, family support, and community involvement can improve self-management, functional status, and clinical outcomes among community-dwelling older adults with uncontrolled NCDs.
- The provision of integrated care is key role for nurses to support and promote self-management practice and quality of life among community-dwelling older adults with multimorbidity.

Introduction

Similar to the rest of the world, the proportion of Thai older adults has been increasing over the past decades. It is anticipated to increase from 15.2 percent in the year 2020 to 26.9 percent by 2030 and about 14,027,411 older adults (20%) lived in Thailand in 2024⁽¹⁾. In addition, about 1,456,740 older adults lived in Bangkok, accounting for 16.0%⁽¹⁾.

Older adults with uncontrolled chronic disease often have complex and interacting needs and require a wide range of professional care and services. They have higher risk for dependency because of several factors⁽²⁾. First, they tend to face physiological degeneration leading to less functional status and increasing complication. Second, they tend to have more psychological problem, such as having depression and cognitive function decline. Third, concerning the urbanization and socio-cultural aspects, they may not receive adequate care because of their low income, low health

literacy, less family and community support. Fourth, their developmental stage may lead to being isolated, less active and less participation lastly, the interaction between their role and their social and physical environment can lead to poor self-management and health outcome⁽³⁾. Challenges aging population requires more effective mechanisms between families and community care for health and other social services. Particularly for those living in an urban community, where health systems are characterized by hospital-oriented care, private clinics and hospitals, and lack of effective primary health care systems.

To address the complex and fragmented care needs of older adults with multimorbidity, integrated care models (ICM) have been increasingly recommended as an evidence-based approach to improving continuity and coordination of services. Integrated care model was defined by WHO⁽⁴⁾ as “the management and delivery of health services such that people receive a continuum of health protection, health promotion, disease prevention, diagnosis, treatment, long-term care, rehabilitation and palliative care services through the different levels and sites of care within the health system”. It can improve the seamless transition between primary care settings to hospitals, and networks. The ICM recognized by WHO can benefit on the care for patient with complex needs⁽⁴⁾. From the current systematic review, 6 elements of ICM were identified as: 1) integrated pathways/plans; 2) multi-disciplinary teams; 3) financial or governance aspects of integration; 4) case coordinator/manager; 5) patient education; and 6) shared access to records/information technology⁽⁵⁾. Although Integrated Care for Older People (ICOPE) implementation guideline addressed an integrated care plan and self-management support; evidence on the elements and the effects of ICM for older adults with uncontrolled chronic diseases in urban communities were not yet reported in Thai context⁽⁶⁾. In addition, the role of nurses in self-management support for older adults with multimorbidity and uncontrolled chronic disease in primary care system has not been clearly recognized⁽⁷⁾. Moreover, outcomes of the model were identified as improvement of self-management, health outcome, and service quality⁽⁸⁾. Thus, this study aimed to examine the effects of a Nurse - Led Integrated Care Model on self-management, clinical outcomes, and function status among older adults with uncontrolled chronic disease living in Bangkok Metropolitan.

Materials and Methods

Study Design

A two-group pretest-posttest quasi-experimental research was conducted to evaluate the effects of a Nurse-led ICM for older adults with uncontrolled chronic disease living in Bangkok Metropolitan. A 12-weeks Nurse-led ICM was implemented at the selected public health center in Prasicharone District, Bangkok; whereas older adults with uncontrolled chronic disease at the comparison public health center received a usual care. After the intervention, the effects of Nurse-led ICM were evaluated among older adults with uncontrolled chronic diseases in terms of self-management, functional status, and clinical outcome. The data from the experiment and comparison groups were collected before and after intervention.

Settings and Sample

Among the 50 Districts of Bangkok, Prasicharoen District was purposively selected as the study setting. Then, two public health centers under Prasicharoen District were randomly assigned as an experiment and a comparison group. In accordance with a previous study, a sample size of 52 was calculated using G*Power program with effect size of 0.9⁽⁹⁾. The inclusion criteria were: being aged 60 years old and older; got diagnosis of Diabetes Mellitus or Hypertension with HbA1c >7 or DTX > 130 mg/dl or Systolic BP $\geq$ 140 mmHg / Diastolic BP $\geq$ 90 mmHg within the last 3 months; ADL > 11; cognitive intact MMSE – Thai 2002; score > 23, and willing to participate in the study. Finally, the older adults with uncontrolled chronic disease were assigned to an intervention group (n=30) and a control group (n=30) according to their registration at the selected public health centers.

Research Instrument

Research instrument included the 12 weeks Nurse - Led ICM program for older adults with uncontrolled chronic disease, the application for self-management monitoring, and instruments for data collection.

The 12 weeks Nurse - Led ICM

According to WHO guideline and literature review, the 12-weeks Nurse-Led Integrated Care Model was developed by the researcher for older adults with uncontrolled chronic disease^(5,6). Initially, the 12 weeks Nurse - Led ICM program consisted of 7 key components, including: 1) a

comprehensive geriatric assessment; 2) health education and skill training; 3) home visits by multidisciplinary team; 4) integrated pathway care plan; 5) self-management support by a nurse case manager; 6) sharing sessions, and 7) outcome monitoring and evaluation. Effective management of a chronic illness requires patients to be supported with respect to three key tasks (self-regulator, self-monitoring, and self-evaluating), and six skills (problem-solving, decision-making, resource use, partnering with providers, action planning, and self-tailoring)^(7,8,9,10). With the findings from in-depth interviews with key stakeholders and health care providers, the 12 weeks Nurse - Led ICM program consisted of 5 features, including 1) a comprehensive geriatric assessment and goal settings; 2) health education and skill training; 3) monthly home visits by multidisciplinary team; 4) bi-weekly self-management support by a nurse case manager using self-monitoring application; and 5) two group sharing sessions.

In addition, the application for self-management monitoring was developed by the researcher based on the self-management framework and user-centered design for older adults with NCD. It included self-evaluation and goal setting; health information related to NCDs; self-management support for exercise, eating behavior, medication, sleeping, taking a rest; and complication management; and weekly outcome monitoring and feedback. Each participant was encouraged to have a daily lifestyle record and submit to the nurse case manager 3 days per week. Then, the nurse case manager gave feedback weekly. The content of this program was validated by four experts, including a medical doctor, a nurse case manager, a gerontological nurse, and a nurse instructor. The acceptable CVI of 0.8 was reported.

Instrument for data collection: A 4-parts self-report Questionnaire

Effects of model were measured in terms of self-management, functional status, and clinical outcome (blood sugar and blood pressure) in older adults with uncontrolled chronic diseases before and after intervention. Thus a 4-parts self-report questionnaire was developed and modified by the researcher, including: 1) personal characteristic; 2) self – management questionnaire; 3) functional status; and 4) clinical outcome. Personal characteristics included age, sex, marital status, ethnic background, education, place of residence, and health status. Self – Management questionnaire (DSMQ) was developed by Schmitt et al., 2013^(10,11) and was modified by the researcher. In this study, self-management were measured in terms of 6 aspects: 1) eating ,2) exercise ,3) relieving stress, 4) medical adherence, 5) controlling and preventing risk, 6) regular checkups.

Functional status was measured in terms of performance test and Time up and Go test. Performance test was measured as both lower and upper extremity function ⁽¹²⁾, consisting of seven items, each score from 0 to 4, for a total range of 0 to 28 such as writing a sentence, simulated eating, simulated dressing, picking up a penny, placing a heavy object on a shelf, turning 360 degree, and walk 50 feet. The sum score was used to reflect functional performance of older adults with uncontrolled chronic disease, the higher the better. In addition, Time up and Go developed by Mathias, Nayak, and Issacs since 1986 ⁽¹³⁾. Each subject was timed after he stood from the chair, walked with normal speed for 3 meters, turned around and then walked back to sit on the chair. The time to complete TUG test (seconds) were used for data analysis, the higher time reflected the worse function. The content validity was high, and internal consistency (Cronbach's $\alpha = 0.89\text{--}0.92$) and test-retest stability ($r = 0.86$) were acceptable.

Data collection and data analyses

After signing the informed consent forms, the participants were interviewed by the researcher using a 4-part questionnaire as baseline data. Then those from a comparison group received usual care, which was a 6-week follow-up. The intervention group received the 12-week Nurse-led ICM program. First week, a pre-test and a comprehensive geriatric assessment for older adults with uncontrolled chronic diseases were conducted by the nurse researcher. Self-evaluation and goals setting were performed. Skill training for chronic disease management included diet, exercise, medication, and stress management were done by a nurse researcher. Week 2, 3 and 5, participants were encouraged to conduct self-evaluation and received feed-back from a nurse researcher through e-platform and Tele-follow up. Week 4,7,11, bi-weekly home visits was done by a multi-disciplinary team to promote self-management. Week 6, 12, participants joined face-to-face group sharing session at Health Care Center run by a nurse researcher to share their experience about supportive factors and barriers for self-management. Data were collected by the researcher using a 4-part questionnaire after 12 weeks. In order to examine the effects of the model, means of self-management, functional status, and clinical outcome (blood pressure and blood sugar) were compared using a Paired t-test and Independent Sample T-test at significant level of 0.05. Statistical analysis was performed using SPSS 26.0.

Results

General characteristics of older adults with uncontrolled chronic disease

After the intervention, a total of 54 participants remained in the study. Six participants dropped out because two of them moved out of the community and the other four cannot continue the program because of their health. As shown in Table 1, there were no differences in general characteristics between an experimental and a comparison group in terms of age, gender, education, religious, and chronic disease. Most of them were Buddhism (96.3%), lived with spouse and children (88.5%), earned less than 3,000 Thai Baht per month (68.52%), and completed primary school (66.67%). More than a half of them were aged 60-69 years old (53.70%), female (57.41%), having no job (55.6%), married (26.63%), The common chronic diseases were hypertension and diabetes (46.30%), hypertension (25.93%), diabetes (22.22%), and stroke (5.56%).

Table 1 Characteristics of the participants in the experimental and comparison groups

Characteristics	Experimental group (n=26)		Comparison group (n=28)		Total (n=54)	
	n	%	n	%	n	%
Sex						
Female	16	61.5	15	53.6	31	57.41
Male	10	38.5	13	46.4	23	42.59
Religion						
Buddhism	25	96.2	27	96.4	52	96.30
Christ	1	3.8	1	3.6	2	3.70
Marital						
Widows/Separated	14	53.8	17	60.7	31	57.41
Married	9	34.6	7	25.0	16	29.63
Single	3	11.5	4	14.3	7	12.96
Age (Years)						
60-69	12	46.20	17	60.7	29	53.70
70-79	12	46.0	8	28.6	20	37.04
80 and over	2	7.6	3	10.7	5	9.26

Characteristics	Experimental group (n=26)		Comparison group (n=28)		Total (n=54)	
	n	%	n	%	n	%
Education						
Primary school	17	65.4	19	67.9	36	66.67
Secondary school	4	15.4	2	7.1	6	11.11
High school	3	11.5	5	17.9	8	14.82
Diploma and higher	2	7.6	2	7.2	4	7.40
Occupation						
None	17	65.4	20	57.2	37	68.52
Merchant	5	19.2	6	21.4	11	20.37
Labor	4	15.4	2	7.1	6	11.11

Table 1 Characteristics of the participants in the experimental and comparison groups (Cont.)

Characteristics	Experimental group (n=26)		Comparison group (n=28)		Total (n=54)	
	n	%	n	%	n	%
Income (baths)						
600 – 3000	16	61.54	21	75.0	37	68.52
3001- 6000	6	23.08	1	3.6	7	12.96
6001- 9000	1	3.85	3	10.7	4	7.41
9001-12000	3	11.54	3	10.7	6	11.11
Chronic disease						
Hypertension and Diabetes	15	57.69	10	35.71	25	46.30
Hypertension	5	19.23	9	32.14	14	25.93
Diabetes	5	19.23	7	25.00	12	22.22
Stroke	1	3.85	2	7.14	3	5.56
Living arrangement						
Spouse & Children	23	88.5	25	89.3	48	88.89
Relative	3	11.5	3	10.8	6	11.11

Before the intervention, there were no differences of mean scores for self-management, functional status, blood pressure and blood sugar between the experimental and comparison group, except for systolic blood pressure (Table 2). In contrast, it was found that the experimental group had significantly higher mean scores of self-managements than the comparison group (p -value <0.001). Similar results were observed for PPT (p -value < 0.001) and TUG (p -value < 0.001). The experimental group had significantly lower mean score of blood sugar, systolic and diastolic blood pressure than the comparison group (p -value = 0.002, p -value = 0.007, and p -value = 0.001), respectively.

Table 2 Comparison of self-management practice scores, functional status scores, blood sugar, and blood pressure between the experimental group and the comparison group before and after the intervention

Variables	Experimental group		Comparison group		Independent t - test	p-value
	(n=26)		(n=28)			
	$\bar{X}$	SD	$\bar{X}$	SD		
Before experiment						
Self-management Functional Status	99.00	10.16	112.21	12.02	4.35	0.282
-PPT	17.12	3.59	13.82	3.94	0.031	0.976
-TUG	14.68	5.48	12.89	4.95	1.15	0.257
Blood sugar level	155.39	37.76	146.64	33.29	0.904	0.370
Blood pressure						
- Systolic	146.31	21.81	135.04	12.85	2.33	0.023
- Diastolic	85.00	11.05	83.39	9.82	0.57	0.574
After experiment						
Self-management Functional Status	120.69	8.29	103.61	14.95	5.24	<0.001
-PPT	20.00	3.64	18.09	4.80	4.58	<0.001
-TUG	11.15	3.34	19.69	6.19	3.42	<0.001
Blood sugar	130.73	23.03	142.57	53.41	1.07	0.002
Blood pressure						
- Systolic	133.65	14.07	145.64	17.10	2.80	0.007
- Diastolic	78.08	7.49	86.79	10.90	3.39	0.001

After the intervention, the experimental group had better mean scores of self-management practice scores, functional status scores, blood sugar, and blood pressure than before the intervention ($p=0.002$) (Table 3). The comparison group had no differences of the mean scores of self-management practice, functional status, and blood sugar before and after the intervention. However, the comparison group had higher systolic blood pressure and diastolic blood pressure than before the intervention ($p=0.047$).

Table 3 Comparison of self-management practice scores, functional status scores, blood sugar, and blood pressure within the experimental and the comparison groups before and after the intervention

Effects	Before Intervention		After Intervention		Paired t -test	p-value
	$\bar{x}$	SD	$\bar{x}$	SD		
Experimental group (n=26)						
Self-management	99.31	10.16	120.69	8.29	-13.14	<0.001
Functional Status						
-PPT	17.12	3.59	20.00	3.64	-5.66	<0.001
-TUG	14.68	5.48	11.15	3.34	-2.85	0.009
Blood sugar level	155.39	37.76	130.73	23.03	3.52	0.002
Blood pressure						
-Systolic	146.31	21.81	133.65	14.07	4.07	<0.001
-Diastolic	85.00	11.05	78.08	7.49	5.20	<0.001
Comparison group (n=28)						
Self-management	107.54	8.98	107.79	8.90	-0.11	0.92
Functional Status						
-TUG	13.61	5.17	13.50	6.86	0.08	0.94
-PPT	17.14	2.89	20.08	2.81	-4.44	<0.001
Blood sugar level	146.64	32.29	142.57	53.41	0.70	0.67
Blood pressure						
-Systolic	135.04	12.85	145.64	17.10	-1.89	0.007
-Diastolic	83.39	9.82	86.79	10.90	-2.08	0.05

Discussion

The effects of the ICM were supported by the findings of changes in self-management, functional status, and clinical outcomes after the intervention. Similar to the previous study, those from the experimental group had better self-management practice leading to better changes in blood sugar level, blood pressure, and functional status. Self-management support from a nurse care manager who provided feedback and continuous monitor their behaviors, particularly eating behavior led to significantly better health outcomes⁽³⁾.

This current study showed that improvement of self-management practice for older adults with uncontrolled NCDs was influenced by goal settings, skill training, self-regulation, self-monitoring, and self-evaluating. First, self-regulation was applied for each subject, who got training about self-management strategies for their appropriate behavior focusing on reinforcement and feedback. As self-monitoring, each subject was encouraged to record their daily self-management behavior. Then, each subject received feedback from the nurse case manager by using self-evaluating record of their daily lives. Similar to the previous studies^(9,14), educational intervention, behavioral change intervention, and emotional/psychological support intervention were key components to support self-management for NCDs.

This study, a nurse case manager provided home visit and support each subject according to his self-evaluation report. Each subject reported their behavior using NSMIM application to monitor self-management for individual subjects, at <https://www.12wsnuledicm.shop> on their mobile phone once a day for three months. This tool was used to monitor self-management behavior for older adults with uncontrolled chronic disease. If the data were abnormal, the system was alerted and care manager nurses were notified and positive support was provided for each subject and their family by multidisciplinary team. Furthermore, the continuity of monitoring was a key mechanism for sustainable self-behavioral modification⁽¹⁵⁾. The 12-week dietary self-management program⁽¹⁶⁾ showed the positive effect of older adults in nutritional status from teaching and practicing skills ($p=0.012$).

Improvement of functional status was observed after receiving training, home visit, and multidisciplinary care for a period of 3 months. Each subject received feedback and support from a nurse case manager. Exercise and nutrition activities were monitored weekly. Therefore, PPT was higher than the comparison group and after implementation with statistical significance at the 0.01 level. Likewise, the study found that 96% of patients thought that the care planning discussion would improve their own functional status⁽¹⁷⁾. It was found that average time to complete Time up and Go test was significantly decreased after three months⁽¹⁸⁾. Similar to the previous study, participants who received a 6–9-month chronic illness self-management program reported modest better Time up and Go test than comparison group⁽¹⁹⁾. The key process is the cooperation between multidisciplinary team and community care network. In addition, communication with the practitioner can make positive changes for those with diabetes, such as perceived ability to adhere to diet and exercise⁽²⁰⁾. Similar to the previous study, home visit and group line and care plan could improve in the HbA1c and perceived ability to control blood glucose ($p<0.001$)^(21,22).

Lessons from the current study confirmed the key roles of nurses in the integrated care model for uncontrolled chronic diseases as a case manager, self-management support, coaching, coordinator, and advocator. The findings supported preparation for strengthening nurse capability in providing self-management support via a nurse-led supportive educative program. Similar to the previous study^(14,23,24,25,26), educational intervention, behavioral change intervention, and emotional/psychological support intervention were appropriate to improve self-management among older adults with uncontrolled chronic diseases.

Conclusion

The results of this study supported that the current model could improve self-management and clinical outcomes of the older adults with NCDs. In addition, nurse is recognized as a pivotal position across the continuum of care, using both person-centered care and the making every contact count approach, to support and enhance the skills of older adults in managing their own health conditions. Thus, role of nurse case manager and self-management support should be strengthened. Future research, a randomized controlled trial with a larger sample size should be suggested for testing the 12-weeks Nurse - Led ICM for older adults with uncontrolled chronic disease living in other urban communities to confirm the long-term effect of the integrated care model in other settings.

Ethical Approval Statement

The study was approved by Mahidol University IRB committees, Thailand (COA. No. MUPH 2022-509 Date 22 April 2022.)

Author Contributions

PN conducted the initiation and conceptualization of the hypothesis, research operations, data collection, data analysis, and results discussion, as well as prepared the manuscript. KA, PK and SL provided consultation on research question, conceptualization, research design, data collection, data analysis, results, discussion, as well as the manuscript; All contributed and provided critical revisions to the manuscript for important intellectual content.

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Conflicts of Interest

All authors declare that they have no conflicts of interest.

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