

# ผลของการสนับสนุนการจัดการตนเองผ่านแอปพลิเคชันไลน์ออฟฟิเชียล ต่อความรู้ ทักษะ และพฤติกรรมในผู้ป่วยโรคไตเรื้อรัง Effects of Self-Management Support via Line Official Application on Knowledge, Attitude and Practice in Chronic Kidney Disease Patients

นิพนธ์ต้นฉบับ

Original Article

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วารสารไทยเภสัชศาสตร์และวิทยาการสุขภาพ 2566;18(4):379-388.

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Thai Pharmaceutical and Health Science Journal 2023;18(4):379-388.

## บทคัดย่อ

**วัตถุประสงค์:** เพื่อพัฒนาแอปพลิเคชันไลน์ออฟฟิเชียลที่ใช้ดูแลผู้ป่วยโรคไตและเปรียบเทียบผลของการใช้แอปพลิเคชันต่อความรู้เรื่องโรคไต ทักษะต่อการรับประทานอาหารเค็ม พฤติกรรมการปฏิบัติตัวเพื่อชะลอไตเสื่อม และความพึงพอใจของผู้ป่วย วิธีการศึกษา: การวิจัยนี้มี 2 โครงการย่อย คือ 1. การวิจัยเพื่อพัฒนาไลน์ออฟฟิเชียล “หมอยารักษ์ไต” 2. การวิจัยกึ่งทดลองเพื่อศึกษาผลของไลน์ออฟฟิเชียล กลุ่มตัวอย่าง คือ ผู้ป่วยโรคไตเรื้อรังระยะที่ 2 และ 3 จำนวน 34 ราย การแทรกแซงคือไลน์ออฟฟิเชียลหมอยารักษ์ไตและการสนับสนุนการจัดการตนเองโดยเภสัชกร ไลน์ออฟฟิเชียลมี 4 เมนู คือ ความรู้โรคไต การดูแลตนเอง การรักษาโรคไต และคำถามที่พบบ่อย ในช่วง 10 สัปดาห์ที่ให้การแทรกแซงมีการส่งข้อมูลบรอดแคสต์ 10 เรื่อง การวิเคราะห์ความรู้ ทักษะต่อการรับประทานอาหารเค็ม และพฤติกรรมการปฏิบัติตัวเพื่อชะลอไตเสื่อมเปรียบเทียบก่อนและหลังการแทรกแซง ใช้สถิติ paired t-test **ผลการศึกษา:** เมื่อสิ้นสุดการศึกษากลุ่มตัวอย่างมีคะแนนความรู้เรื่องโรคไตเพิ่มขึ้น ทักษะต่อการรับประทานอาหารเค็มลดลง และพฤติกรรมการปฏิบัติตัวเพื่อชะลอไตเสื่อมเพิ่มขึ้นอย่างมีนัยสำคัญทางสถิติ (P-value < 0.001, 0.024 และ < 0.001 ตามลำดับ) ความพึงพอใจส่วนใหญ่อยู่ในระดับพึงพอใจมากที่สุด **สรุป:** หลังการใช้ไลน์ออฟฟิเชียลหมอยารักษ์ไต ความรู้และคะแนนพฤติกรรมการปฏิบัติตัวเพื่อชะลอไตเสื่อมของผู้ป่วยเพิ่มขึ้น ทักษะต่อการรับประทานอาหารเค็มลดลง ผู้ป่วยส่วนใหญ่พึงพอใจระดับมากที่สุด ควรขยายการใช้ไลน์ออฟฟิเชียลกับผู้ป่วยโรคไตในโรงพยาบาลต่อไป

**คำสำคัญ:** โรคไตเรื้อรัง, แอปพลิเคชันไลน์ออฟฟิเชียล, ความรู้, ทักษะ, พฤติกรรมการปฏิบัติตัวเพื่อชะลอไตเสื่อม

Editorial note

Manuscript received in original form: March 27, 2023;

Revision notified: April 21, 2023;

Revision completed: April 28, 2023;

Accepted in final form: May 27, 2023;

Published online: December 31, 2023.

## Abstract

**Objective:** To develop an intervention using Line Official application with pharmacist's self-management support for chronic kidney disease (CKD) patients and to compare scores of knowledge about kidney disease, attitude towards eating salty food, practice to delay CKD progression, and satisfaction. **Methods:** The first part was to develop the intervention and the second part was quasi-experimental research on the intervention. Thirty-four stage 2 – 3 CKD patients were recruited. The application had 4 menus including knowledge about CKD, self-care, treatment of CKD, and frequently asked questions. During the 10-week intervention, 10 broadcasts were done. Scores of knowledge, attitude and practice before and after the intervention were compared using paired t test. **Results:** After the intervention, scores of knowledge and practice increased significantly (P-value < 0.001 for both) and scores of attitude toward salty foods decreased significantly (P-value = 0.024). Most satisfaction aspects were at the highest level. **Conclusion:** The intervention of pharmacist supporting self-management with Line Official application improved knowledge, attitude and practice to delay CKD progression. It should be extended to CKD patients at the regular CKD clinic.

**Keywords:** chronic kidney disease, Line Official application, knowledge, attitude, behavior

Journal website: <http://ejournals.swu.ac.th/index.php/pharm/index>

## Introduction

Chronic kidney disease (CKD) is a major public health problem worldwide including Thailand. The worldwide prevalence of CKD is 13.4%.<sup>1</sup> CKD contributes to 1.4 million deaths. In 2019, CKD-related deaths increased by 20% which was 1 in 10 of deaths.<sup>2</sup> In Thailand, epidemiologic data revealed a prevalence of CKD of 17.6% or 8.4 million cases.<sup>3</sup> In 2019, CKD-related death in Thai people increased by 16.49 per 1000,000 population or 10,000 cases per year.<sup>4</sup> CKD affects quality of life when entering stage 2 and 3. Quality of life deteriorates immensely when reaching the last CKD stage

which needs renal replacement therapy. CKD is also a family burden and negatively affects the mental health of the patient and family members. Ministry of Public Health is responsible for 10,000 million baht annually for renal replacement therapy.<sup>5</sup>

Patients with early stage CKD could decelerate the disease progression if they could control their co-morbidity such as blood pressure control, glycemic control, life-style modification, and dietary habits.<sup>6</sup> However, only 1.9% of Thai population realize that they have CKD<sup>3</sup> since no signs or

symptoms of the early stage disease are obvious.<sup>7</sup> Patients with no clear signs or symptoms of early stage CKD put no attention for lifestyle modification and disease control. Hence, the disease progresses continuously to the end-stage of CKD.<sup>8-10</sup>

Lifestyle modification is a cooperation between the patient and healthcare providers. These providers play a crucial role in promoting the patient's self-management for life-style modification in patients with chronic diseases. The providers are expected to offer optimal measures to help the patient obtain knowledge and understanding about the disease, strengthen the patient's confidence, offer solutions optimal for specific patients in life-style modification.<sup>11</sup> Self-management is the person's plan and set goals to achieve a better disease control by changing their view on their own behavior, monitoring their own health, making decision to choose to perform the behavior, and evaluating their outcomes against their goals shared with healthcare providers.<sup>12</sup>

A study of Ong and colleagues used Line application to monitor CKD patients' blood pressure, medication management, signs and symptoms evaluation, and clinical outcomes. They found that CKD patients had systolic blood pressure/diastolic blood pressure decreased by 3.4/2.1 mmHg.<sup>13</sup> A study in Thailand showed that self-management with Line application improved health behavior and delayed CKD progression.<sup>11</sup> This present study aimed to apply self-management to improve health behavior in CKD patients.

Previous research used Line application in various chronic diseases such as Line application to improve knowledge and skill of inhaler use for asthma patients resulting in a significantly better asthmatic control compared with control group.<sup>14</sup> Another study in Thailand used Line application in home visit to monitor and evaluate outcomes of primary pharmaceutical care for bed-ridden patients and cancer patients.<sup>15</sup> Line application allowed a more convenient medication use monitoring, and an easy to access for the patient.<sup>15</sup> Line application has diverse, unique features with Line Official that offers online communication simultaneous for multiple users with various media including text, pictures, videos, and stickers. Fonts in Line Official could be enlarged for convenient use. Line Official offers private messaging for text-based communication unseen by other users which allows pharmacists to provide answers for specific patients. Line application has been widely used and most elderly are familiar with. No additional download is needed. A survey on

the use of applications among Thais showed that the elderly used Line application the most.<sup>16</sup> This was because it is easy to use.<sup>17</sup> Line Official has been widely used in online business and recently more in healthcare service such as Line Official More Prompt for vaccination information.

Khaochaison Community Hospital offers an out-patient CKD clinic with care provided by multidisciplinary team consisting of physician, pharmacist, nurses, and nutritionist. In 2023, a total of 1,228 early-stage CKD patients receiving care at the clinic. Of these 1,228 patients, there were 730 and 498 patients were at stage 2 and 3, respectively. The guidelines recommend early-stage CKD patients modify their lifestyles to prevent and delay the progression of CKD. However, a preliminary survey at Khaochaison Hospital in 30 early-stage CKD patients revealed that as high as 96% did not know that they had CKD. This means that most patients lack knowledge about CKD and its self-care since no signs or symptoms of CKD are presented. As a result, the patients are not concerned about taking good care of themselves and the disease progresses rapidly. The number of CKD patients has been increased continuously from 563 to 1,104 and 1,504 cases from 2018 to 2020, respectively. The study of Payuha and colleagues showed that knowledge affects behavioral change and CKD progress control.<sup>18</sup> These studies indicate that the patients need more knowledge for a self-care to achieve a better control of CKD. There is a need for self-management and lifestyle modification in CKD patients to avoid or reduce risk of disease progression.<sup>19</sup>

More attention should be paid to CKD patients. However, with a scarce human resource of healthcare providers, time for consultation for each of all patients is limited. In addition, the Covid-19 pandemic made it even harder for patients to access healthcare at the hospital and hence out-patient appointment visits were missed. Pharmacists for the CKD patient thus has sought a better way to provide knowledge and advice to CKD patients. Based on the previous studies, Line Official application was used in the care of diabetes patients.<sup>20</sup>

Line application was used in CKD patients<sup>11</sup>, but Line Official application has not been tested in this group of patients. Line Official application is more beneficial than Line application with more advantageous features such as broadcasting to many patients simultaneously and allowing re-reading the old messages without expiration. The researcher thus applied Line Official application as an online

communication to provide self-management support to the patient. Line Official application could help providers with limited time in promoting self-care, knowledge, behavioral modification in CKD patients. Specifically, this study aimed to develop an intervention of pharmacist's self-management support for CKD patients via Line Official application and to compare scores of knowledge about CKD, attitude toward salt and salty food consumption and practice of health behavior to delay CKD progression before and after the intervention.

## Methods

This study was approved by the Ethics Committee for Human Study of Phuthalung Provincial Health Administration Office (approval number: 1471/2565; approval date: May 19, 2022).

This study consisted of two parts. The first part was research and development of applying activities for self-care of CKD patients into Line Official application. The second part was an experiment of Line Official application in CKD patients.

### The first part

In the first part, self-management knowledge and consultation for CKD patients was incorporated into Line Official application. With the research and development design, informants of problems and needs were CKD patients and healthcare providers.

The researcher determine content suitable for the application based on the need of CKD patients including medication use, behavioral changes, the lack of CKD knowledge, and self-management. The visual design of Line Official application was based on the need of CKD patients and healthcare providers at CKD clinical including infographics and video clips. The application was designed as guided by the Dialogflow design tool.<sup>21</sup>

For CKD patients, a total of 10 patients were recruited with purposive sampling. They were those who were willing to give opinions and had been using Line application or Line Officials application. Questions for the interview included whether the patients knew that they had CKD, how they took care of themselves, and what kind of information they needed from the CKD clinic. For healthcare providers, informants included an internal medicine specialist, a pharmacist experienced in kidney disease, a nurse experienced in kidney disease, and a nutritionist in kidney disease.

The content of CKD care in Line Official application was evaluated for appropriateness by 15 questions of 7 aspects. The response was a 5-point rating scale ranging from 1-need improvement, to 2-fair, 3-moderate, 4-good, and 5-best. This scale was evaluated for content validity by three experts (i.e., hospital pharmacists with at least 3 years of experiences). The scale was found to have good content validity with an Index of Item-Objective Congruence (IOC) of 1 for every question. The design of Line Official application for CKD care was evaluated by three experts specifically one pharmacy faculty member specialized in CKD care, and two hospital pharmacists specialized in CKD care. Revision was made based on the expert recommendations.

Efficiency of Line Official application for CKD care was evaluated using the questions of Srisupak and colleagues.<sup>21</sup> The response was a 5-point rating scale of 1-poor, to 2-fair, 3-moderate, 4-good and 5-best. The 14 questions covered 3 aspects of efficiency namely basic system need, the proper system function, and proper use. The scale had a high internal consistency reliability with Cronbach's alpha coefficient of 0.85.<sup>22</sup> The Line Official application for CKD care was evaluated by three experts including a computer specialist, a hospital information system administrator, and a practicing pharmacist with experienced in application development. After evaluating, revision was made accordingly. The revised Line Official application for CKD care was tested in 3 CKD patients. It was found that the application was understood and navigated.

Data obtained from the first part on content that the patients needed or content that were crucial for the patients were analyzed using thematic analysis. Data on efficiency of Line Official application were summarized as frequency with percentage and mean with standard deviation.

### The second part

The second part was a quasi-experimental research with a one-group pre-test post-test design. The experiment was the CKD progress delaying intervention with the use of Line Official application. The outcomes were scores of knowledge about kidney disease (K), attitude toward salt and salty food consumption (A) and practice of self-management to delay CKD progression (P). It was hypothesized that scores knowledge and practice after the intervention were higher than those before the intervention, and score of attitude after the intervention was lower than that before the intervention.

The study sample was 34 patients diagnosed with stage 2 – 3 CKD receiving care at the out-patient CKD clinic of Khaochaison Hospital recruited by a purposive sampling. To be eligible, they had to be diagnosed with stage 2 and 3 CKD with ICD10 of N182 and N183, respectively, be 20 years old or older, have and be able to use Line application, be able to read, write and communicate in Thai language, be willing to participate in the study. However, those who moved or were transferred to other healthcare setting, were dead while hospitalized, or needed dialysis were excluded.

The sample size was estimated based on the quasi-experimental study.<sup>23</sup> It was guided by the change of self-care knowledge scores before and after a program promoting self-care for early-stage CKD patients ( $15.82 \pm 3.73$  and  $22.00 \pm 1.76$  points, respectively).<sup>24</sup> The sample size of 22 participants was needed. With the Covid-19 pandemic, missed study appointments or withdrawal were expected. To compensate for a 55% loss, a total of 34 participants were needed.

### The interventions

The regular CKD clinic service was as follows. Stage 2 – 3 CKD patients were scheduled to see physicians on Thursday of week 1 and 3 of the month. The patients were asked by the nurse for signs and symptoms to find any problems. The patients were sent to see the multidisciplinary team of nurse, pharmacist, and nutritionist if there were any problems before seeing the physician. The multidisciplinary team investigated problems and obtained the information for the physician. Once the physician visit was done, the patients were scheduled for the next visit and were given prescribed medications.

The 10-week interventions experimented in this study were Line Official application and the promotion on self-management by pharmacists. For the Line Official application for CKD self-care, it was installed in the participant's phone by the pharmacist. The application consisted of knowledge and self-care for CKD patients in the forms of infographics, videos, and video links. The content consisted of four components namely 1) main content of knowledge, 2) knowledge delivered through broadcast Line Official, and 3) knowledge provided through Q&A channel of Line Official.

For **component 1**, the main content of knowledge, the participants could access this segment at any time. This segment consisted of 4 menus of a) kidney disease (i.e., general knowledge of kidney disease, causes and risks of

kidney disease, screening for kidney disease, and my kidney health), b) self-care for kidney disease (i.e., dietary control, exercise, stress management and meditation, and management of adverse effects of kidney disease), c) treatment of kidney disease (i.e., medications, and kidney dialysis), and d) frequently asked questions, e.g., does diabetes cause kidney disease.

For **component 2**, the knowledge delivered through broadcast Line Official, the pharmacists sent knowledge covering all aspects of CKD and its care to all participants simultaneously. The pharmacist also sent messages to remind participants to login Line Official application. Scheduled for 2 times a week for 5 weeks, the broadcast aimed to provide knowledge necessary for self-management for CKD patients. A total of 10 topics of content were scheduled including basic knowledge about CKD, care and control of CKD, self-monitoring signs and symptoms of CKD progress, exercise, food and water consumption for CKD, medication use, benefits of medications, herbs and health products to avoid, health behavior modification strategies, managing obstacles in lifestyle modification, acute and chronic complications of CKD, basic knowledge of blood sugar, blood pressure, control of phosphate and potassium, clinical guideline for CKD care, other health problems in CKD patients, and role model of CKD patients with good disease control.

In this component, the researcher acting as the administrator of Line Official were able to monitor the use of all participants to assure that they all were intervened. For any participants with no use of Line Official application, the researcher sent a direct message and/or telephone to the participant to learn the causes of no use, solve the obstacles to the use, and remind them to use the application.

For **component 3**, knowledge provided through Q&A channel of Line Official, the researcher provided Q&A sessions each day from 4.30 to 8.00 PM. From 8.00 PM to 4.30 PM of the next day, automatic answering was available. For unresolved questions or online communication problems, the researcher telephoned the participants for clarification. The Line Official application was used for 10 weeks before the outcome evaluation after the intervention.

### The self-management promoting program delivered by the pharmacist

The self-management promoting program was designed by the researcher based on the self-management theory of

Creer. Six steps of self-management include setting goals, collecting data, processing and evaluating the data, decision making, practicing, and reflecting.<sup>12</sup> After installing Line Official application in the participant's phone, the researcher inspected the patient diary book for treatment outcomes, talked with the participant to encourage self-care, identified problems and what the participants did well, and helping the participants to set goals and behavioral changes such as controlling blood glucose, blood pressure, and alcohol intake, and increasing exercise. The participants were encouraged by the researcher to choose their own goals. At home, the participants used Line Official application to learn about CKD and behavioral changes to reach their goals. The participants could also online communicate with and ask the researcher question through Line Official application at any time. The participants could record their behavioral changes in the diary book or report the changes to the researcher in Line Official application. The researcher could advise if anything wrong happened. For example, for participants with stress or exhaustion from weight loss or fluid control, the researcher advised timely before the regular scheduled appointment.

On the scheduled appointment date after the 10-week intervention, the researcher asked how the participants used the knowledge from Line Official application to change their behavior, and how successful they were in doing so compared with their own goals. With this self-reflection, the researcher complimented the participants for their success and encouraged them for continuous attempt. The researcher worked with the participants to identify the causes of their failure to reach the goals, and planned for more effective behavioral change strategies.

### **Research instruments**

Knowledge about CKD, attitude toward salt consumption, and practice of health behaviors to delay CKD progress were evaluated using a questionnaire. For knowledge about CKD, the questions asked about general knowledge about kidney disease, and treatment and self-care of the disease. The questions were from the work of Kaewchana and Anusornsangiam which has an acceptable internal consistency reliability (Cronbach's alpha coefficient of 0.77).<sup>25</sup> The 14 questions had a response of yes, no, not sure, and not know. A score of one point was rewarded for a correct answer, and zero points otherwise resulting in a possible total

score of 0 to 14 points. Higher scores indicate more knowledge.<sup>25</sup>

The attitude toward salt intake or salty food consumption could lead to less salt or salty food consumption.<sup>26</sup> Ten questions were modified from the work of Konkaew<sup>27</sup> which has an acceptable internal consistency reliability (Cronbach's alpha coefficient of 0.76). The response was a 4-point rating scale ranging from 1-disagree, to 2-less agree, 3-moderately agree, and 4-highly agree. With a possible total score of 10 – 40 points, higher scores indicate more positive toward salty food or more difficult to limit salty food.<sup>27</sup>

For the practice of behavior to delay CKD progress, the questions asked about the behavior of food intake, medication taking, and exercise of CKD patient. The 15 questions were from the work of Kaewchana and Anusornsangiam which has an acceptable internal consistency reliability (Cronbach's alpha coefficient of 0.74).<sup>25</sup> The response was a 4-point rating scale ranging from 1-never practice to 2-practice sometime, 3-practice often, and 4-practice regularly for positive statements or with the opposite direction for negative statements. With a possible total score of 15 – 60 points, higher scores indicate more practice of positive behavior or less practice of negative ones. The comparisons of each of knowledge, attitude and practice before and after the intervention were based on their mean scores.<sup>25</sup>

In addition to the knowledge, attitude and practice of CKD patients, satisfaction of the participants on the use of Line Official application was also evaluated. The 11 questions has a 5-point rating scale ranging from 1-the least, to 2-less, 3-moderate, 4-more, and 5-the most. With a possible total score of 11 – 55 points, higher scores indicate higher satisfaction toward the use of Line Official application. The questions have a high internal consistency reliability (Cronbach's alpha coefficient of 0.82).<sup>28</sup>

### **Data collection procedure**

Once permitted by the Khaochai Hospital director, patients at the CKD clinic who were eligible were invited to participate in the study. The researcher provided prospective participants with objectives, procedure and voluntary nature of the study. Once written informed consent was obtained, the participants were evaluated with the knowledge, attitude and practice questionnaire. Data of demographic and clinical characteristics were also collected. All evaluation was done by a research assistant to avoid social desirability bias since

the researcher was the practicing pharmacist at the CKD clinic.

The researcher installed Line Official application and instructed the participants how to use it. The researcher helped the participants set their own goals. All features of CKD care communication through Line Official application were demonstrated by the researcher. Once the 10-week intervention was over, the participants were evaluated on knowledge, attitude and practice on CKD care and satisfaction on the use of Line Official application.

### Data analysis

Descriptive statistics including mean with standard deviation and frequency with percentage were used to summarize demographic and clinical characteristics and study variables of knowledge, attitude, and practice. Mean scores of knowledge, attitude, and practice before and after the intervention were compared using paired t test. Satisfaction on the use of Line Official application after the 10-week intervention was summarized using descriptive statistics. Statistical significance was set at a type I error of 5% (i.e., P-value < 0.05).

## Results

The Line Official application applied for CKD care was found to have a good content (mean = 4.33 ± 0.37 out of 5 points) and good system (mean = 4.86 ± 0.34 out of 5 points).

Of the 34 participants, the majority were women (55.9%), married (66.7%), agriculturists (38.2%), with primary school or lower (50.0%), with no caregivers (91.2%), with stage 3 CKD (55.9%), with diabetes and hypertension (55.9%). Their average age was 61.0 years (Table 1).

Mean scores of knowledge and practice significantly increased by 2.91 and 4.50 points, respectively from before to after the intervention (P-value < 0.001). For attitude toward salt or salty food consumption, mean scores significantly decreased by 3.24 points (P-value = 0.024) which indicates a better attitude to limit salt intake (Table 2).

For satisfaction on the use of Line Official application, most aspects of satisfaction were rated with the highest satisfaction, except the ease to use menu which was rated as high. Mean score of overall satisfaction was 4.43 out of 5 points. The three items with the highest scores were the overall features, visual design, and appropriateness of the

content. On the other hand, font size was rated with the least score (Table 3).

**Table 1** Demographic and clinical characteristics of the participants (N = 34).

Characteristics	N	%
<b>Sex</b>		
Women	19	55.9
Men	15	44.1
<b>Age (years) (mean = 61.09, SD = 7.37)</b>		
<b>Marital status</b>		
Married	23	67.6
Single	6	17.6
Widowed	5	14.7
<b>Occupation</b>		
Agriculturist	13	38.2
Housewife	5	14.7
General labor	5	14.7
Others	5	14.7
Small business	4	11.8
Civil servant	2	5.9
<b>Education</b>		
Primary school or lower	17	50.0
High school	12	35.3
Associate degree	3	8.8
Bachelor's degree	1	2.9
Other	1	2.9
<b>Caregivers</b>		
No	31	91.2
Yes	3	8.8
<b>Stage of CKD</b>		
Stage 2	15	44.1
Stage 3	19	55.9
<b>Co-morbidities</b>		
Diabetes and hypertension	19	55.9
Diabetes	11	32.4
Hypertension	3	8.8
Dyslipidemia	1	2.9

**Table 2** Scores of knowledge, attitude and practice before and after intervention (N = 34).

Outcomes	Before intervention			After intervention			P-value <sup>1</sup>
	min	max	mean ± SD	min	max	mean ± SD	
Knowledge about CKD	3	12	8.15 ± 2.59	9	13	11.06 ± 1.32	< 0.001
Attitude toward salt consumption*	12	36	23.59 ± 6.26	12	35	20.35 ± 6.94	0.024
Practice of behavior to delay CKD progression	29	49	39.56 ± 4.36	32	52	44.06 ± 4.59	< 0.001

<sup>1</sup> Paired t test.

\* Higher attitude scores mean more positive attitude toward salt and salty food consumption.

**Table 3** Satisfaction on Line Official application for CKD care (N = 34).

Satisfaction aspects	Number of participants in each satisfaction levels					Mean	SD
	Highest	High	Moderate	Low	Lowest		
1. Appropriate design and color	18	10	6	0	0	4.53	0.56
2. Appropriate content	20	12	2	0	0	4.53	0.62
3. Ease of use and reading	16	16	2	0	0	4.44	0.66
4. Visual esthetic, and up-to-date and attractive content	16	16	2	0	0	4.41	0.61
5. Distinct content sections	18	13	3	0	0	4.41	0.61
6. Easy to use menu	14	18	2	0	0	4.35	0.66
7. Fast access	19	14	1	0	0	4.35	0.77
8. Proper font size	15	14	5	0	0	4.29	0.72
9. Overall - quality	20	9	5	0	0	4.44	0.75
10. Overall - design	18	12	4	0	0	4.41	0.70
11. Overall	22	10	2	0	0	4.59	0.61
<b>Overall</b>	<b>196</b>	<b>144</b>	<b>34</b>	<b>0</b>	<b>0</b>	<b>4.43</b>	<b>0.66</b>

## Discussions and Conclusion

Pharmacy service has evolved using creativity and innovation to improve the efficiency.<sup>29</sup> Line Official application with CKD care is an innovation using technology for a more comprehensive hospital pharmacy service. Line Official application allows pharmacists to have broader access to CKD patients with unlimited time for consultation.<sup>10</sup> Online communication allows for home access and consultation. Onsite appointment visits are sometimes limited and not suitable for proactive, comprehensive, and holistic care.<sup>31</sup> This application allows pharmacists to an easy access to the patients. The application use could be extended to other CKD patients.

The features of Line Official application for CKD care allows the patients to access knowledge at any time and consultation with pharmacists at their convenience without the need to see pharmacists at the scheduled appointment visits. For patients not logging in to use Line Official application, broadcasting message helped remind the patients to use the application except one that needed telephone reminding. It is obvious that the broadcasting could be used to remind many patients effectively. The use of Line Official application could also be extended to all members of the multidisciplinary team other than the pharmacists, and to healthcare providers at Sub-district Health-Promoting Hospitals which are located closer to the patients.

The drawback of Line Official application for CKD patients was that some elderly patients had difficulty typing but they were able to read. Therefore, interaction with pharmacist in Line Official application was somewhat limited for these elderly patients.

In terms of content, experts recommended adding food appropriate for CKD patients especially foods from the south. Another drawback was that the navigation was somewhat complicated. Steps to access content should be reduced and content of more medications in CKD patients should be added.

Scores of knowledge about CKD increased after the intervention. This could be because Line Official application offered knowledge through infographics and video clips which could be more effective for learning than plain text. Broadcasting also stimulated the participants to log in and learn quite often. The knowledge obtained could lead to better practice in self-care in CKD patients. Improved scores of knowledge and practice of CKD patients are consistent with

the study of Kaewchana and Anusornsangiam where scores of knowledge and practice also improved with the same questions.<sup>25</sup> In diabetes elderly patients, the study of Poonprapai and colleagues also showed that Line application improved knowledge in the patients and caregivers and practice in the patients.<sup>20</sup> At present, no studies use Line Official application in CKD patients. There are only studies of Line application to improve knowledge in patients with type 2 diabetes and patients with hypertensive patients with stage 3 CKD.<sup>30</sup> They found that knowledge about health among CKD patients improved.<sup>30</sup> In the future, questions about knowledge should be more specific about medication use and the prevention of CKD progression.

The scores of practices to delay CKD progression improved after the intervention. With Line Official application and the pharmacist, the patient could set their own goals of self-care. Knowledge available for practice was available for convenient review including avoiding sweet beverages. With no exercise, patients were more comfortable to exercise as guided by video clips. This could be because of the fear of dialysis soon. Patients temporarily receiving care from places other than Khaochaison Hospital could also send laboratory results to the pharmacist through Line Official application at any time. The care continuity could be preserved.

Line Official application also provided food menu for CKD patients the patients could modify for daily living. This is consistent with Thungtong and colleagues where practice scores significantly improved after the self-management program to delay CKD progression among diabetes patients when compared with the control group.<sup>31</sup> However, scores of certain individuals questions before and after the intervention were not different such as consumption of foods with coconut milk, fresh fruits such as banana, orange, and jackfruit, and seafoods. This consumption was related to community agriculture of Khaochaison district where fruit plantation is abundant and available year-round. In addition, locating close to the sea, people in Khaochaison have an easy access to seafoods.<sup>32</sup>

The scores of attitude toward consumption of salt and salty food decreased (improved) after the intervention significantly. The Line Official application offered various food menu suitable for CKD patients to cook. The patients did not need to avoid most foods so they were not too stressed. Food selection in moderation allowed the patients to enjoy their lives. Food options were highly needed by these patients. With

knowledge and sufficient menus provided, the patients' attitude could be improved. For example, avoiding salt and salty food was usually viewed as difficult. Options of food menus allowed patients and caregivers to choose and adjust themselves accordingly with ease. However, certain questions on attitude toward consumption of salt or salty foods had improved scores with no statistical significance. For example, I eat salty food because it was prepared by my family members, community lifestyle made me eat salty food.<sup>32</sup> However, no significant score change could be because the attitude before the intervention was already appropriate (i.e., low score). This finding is consistent with the work of Peñalvo and colleagues showing that knowledge and attitude affected behavioral change in salty food consumption.<sup>26</sup>

The use of Line Official application for self-management promotion aimed to coach patients individually. It helped the patients set their own goals in disease control and promoted self-management for disease control and health behavior to achieve the target. For example, patients with high blood glucose and with no exercise could set their goal to control blood glucose by dietary control and exercise. Knowledge from Line Official application could help the patients practice more appropriately in glucose control which ultimately result in blood glucose reaching the target. Such success was evident to the patients which could reinforce them to further improve their health behavior.

Knowledge provided by Line Official application might not always be a sole factor of health behavior change. Reinforcement from healthcare providers is critical for promoting self-care behavior.<sup>33</sup> Pharmacist at the CKD clinic in this study acted as a reinforcement factor for each individual patient in behavioral change. The pharmacist allowed participants to share their problems or obstacles in changing behavior. With a friendly approach and no blaming for unsuccessful or no attempt, healthcare providers could encourage and help the patient set goal in behavioral change. In this study, the researcher helped participants to be more confident in changing their behavior. Within the 10-week period, the participants were encouraged to ask the researcher. After the intervention, the participants stated they were proud for being able to achieve their goal and wanted to continue to receive such help in CKD clinic even after the study.

Findings from our study are consistent with the study of Sonjai and colleagues where self-management promoting

program could improve health behavior in diet, exercise, and medication use, and make stage 2 CKD patients proud in their success and want more of help.<sup>34</sup> They are also consistent with the work of Juntachat and colleagues in diabetic patients with stage 3 CKD patients where self-management promoting program improved knowledge and practice of self-management significantly.<sup>35</sup> Self-management promoting program were also found to improve self-management behavior to delay CKD progression in another study.<sup>36</sup>

Satisfaction on the use of Line Official application was found the highest level for most aspects. However, font size could be bigger for ease of use among the elderly. The most satisfying aspect was the overall use, followed by appropriate content, and visual design. The finding is consistent with a previous study where Line application for kidney disease care had the highest satisfaction and font size should be bigger.<sup>30</sup>

Strengths of this present study were that a large number of participants could communicate online with the researcher at any time with no need to wait for the actual clinic visit. The evaluation was conducted by a research assistant which could prevent social desirability bias since the practicing pharmacist was also the researcher. However, the study has certain limitations. Some patients were not fluent in using Line Official application. Caregivers should be instructed to help the patient. The program should also be extended to Line application for those who are familiar with the application. Chat mode with automatic response was not functioning at the early time of intervention. The administrator could not see the messages from the participants. Later in the course, the system was fixed, and communication was improved. This quasi-experiment design with no control group could potentially allow for certain bias. Future studies should use control group for comparisons. The intervention was only 10 weeks which could only capture a short-term benefit. Future studies should extend the duration to represent an intermediate or even long-term benefit of the intervention. In practice, with proven benefit and feasibility, the intervention should be implemented in the regular CKD clinic. More content and media should be developed to improve efficiency of the Line Official application for CKD care. In this study, no clinical outcomes were evaluated. Future studies should emphasize clinical outcomes such as blood pressure, kidney functions, and CKD progression and stage. In addition, (Participatory Action Research; PAR) could be done to detail behavioral changes. In practice, since a study showed that high sodium



in foods in Phatthalung province was not only from household but also from commercial products.<sup>37</sup> Educational content should also emphasize literally sodium content for patients and caregivers before purchase and consumption.<sup>30</sup> Such content of sodium content in food products should also added in Line Official application on health products, labeling, and nutritional labeling.

### Acknowledgement

The study was financially supported by Faculty of Pharmaceutical Sciences, Prince of Songkhla University (grant number: PHA6504128S). The authors would like to thank the Head of Pharmacy Department and Director of Khaochaison Hospital for assistance, the experts for their advice, and participants for their invaluable participation.

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