

# Zone Tool: Improving Self-Care and Self-Efficacy among Patients with Chronic Kidney Disease

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**Abstract** Chronic Kidney Disease (CKD) mortality has increased in Egypt; consequently, comprehensive health education is necessitated. This study aimed to: develop and employ, then, evaluate the developed zone tool as a health education strategy on CKD patients' self-care management and self-efficacy levels. A methodological design was implemented. Two hundred patients with CKD were randomly assigned as an assessment group, then, by systematic random sampling; 30% of them, were recruited as an experimental group. Three tools were used for data collection: Tool one: Patient's sociodemographic and clinical characteristics questionnaire, Tool two: CKD Self-Management Instrument, and Tool three: Self-Efficacy for Managing Chronic Disease Six-Item Scale. Results for the assessment group showed an obvious low level in self-care management and self-efficacy perceptions. After using the developed zone tool among the experimental group; the findings revealed little improvement in clinical characteristic's values, and considerable improvement in self-care management and self-efficacy perception levels within 1st, 2nd, to 3rd assessments. Conclusion: the developed zone tool is a crucial educational approach to improve CKD patient's self-care management, and self-efficacy perception levels. Recommendations and further studies: interdisciplinary involvement should be integrated into developing comprehensive and valid CKD health education materials. Evaluation of health education' compliance among CKD patients is a required study.

**Keywords:** *Chronic Kidney disease (CKD), Health education tools, Patient's self-care management and Self-efficacy*

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## 1. Introduction

Health education with patients and families in managing chronic diseases is a significant nursing duty with any age and at any setting. Health care systems, nationally and internationally, should give closed attention to such concern. Many adult and older adult clients with chronic illness can effectively manage their conditions through health information literacy. Health education equips them to be involved actively in self-care and disease management decisions. Thus, health teaching for patients with chronic diseases is an ultimate crucial nursing intervention that supports the patients to be independent when the nurses or the doctors are not present. [1,2,3,4]

The noteworthy process that should be learned by the adult and elderly patients with a chronic illness is self-care management. It is a process of preserving the stability of one's health status through proper monitoring and compliance with disease management regimens. It includes activities such as assessment of signs and

symptoms of the chronic disease, managing any health deterioration features, following up the prescribed treatment and diet therapy, and taking fit decisions to contact with health staff, and, early monitoring besides, detecting of chronic disease complications. Self-care, certainly, has a constructive impact on the progress of the disease outcomes and improvement of patient's self-confidence, self-esteem, and self-empowerment. [5,6] Patients' self-care management reveals positive consequence on their health outcomes by encouraging the client's responsibility towards healthy behaviors and accountability towards controlling risky ones.

Self-care management is represented by all individual behaviors to maintain and improve own health. As patients stay long periods with chronic illness, they have an intense need to be independent on their self-care. Therefore, self-care awareness is a crucial intervention for patients with chronic disease management. Self-care with constant illness involves monitoring of physical, social, mental and emotional health steadiness, in addition to decreasing the risks and health alterations. Thus, it has obvious healthcare benefits such as reducing morbidity and mortality rates, decreasing hospital admission and

premature patient's deaths, plus minimizing the healthcare cost. Further, it leads to patient's gratification, empowering, self-control and improving the whole patient's quality of life. [4,6,7]

To improve self-care management among adult and geriatric patients with chronic illness; self-efficacy should be investigated in order to be developed. Self-efficacy is described as the belief of the individual in his/her potentials to accomplish own goals and reach the desired targets. In the earlier decade, Albert Bandera in 1986-1999 labeled self-efficacy as persons' trust and faith on own abilities to achieve the desired performance that positively affects health experiences and preserve life's strength. Additionally, self-efficacy pointed to the person's attitudes and intellectual beliefs that shape people's behaviors. Consequently, it can be observed that self-efficacy is a basic aptitude with patient's self-care management. It is the main and considerable power for assessing and managing chronic health conditions. Further, it is the key to psychological and physiological development which leads to coping with environments and performing healthy behaviors [7,8,9]. Patients with high self-efficacy have an elevated trust in their potentials to do complicated tasks and cope with any disease challenges. Thus, patients will have habitual consciousness in solving disease problems, before escaping them. But if the patients have low self-efficacy, they will distrust their capabilities and avoid dealing with any difficulties in the disease process. They have little hopes and lessen loyalty to achieve their targets.

In Egypt, [10] in 2017, reported that self-efficacy is an indicator of success and constructive effective performance. Accordingly, self-efficacy is a vital element of patients' self-care management with chronic illness. [8,9,10] All health education attempts should be handled and shaped to improve patients' self-efficacy in confronting the chronic diseases challenges.

Chronic illnesses are mainly considerable alarms in the health care system. They constitute huge percentages among adult and older adult all over the world, particularly in developing countries. Patients may have more than one of the chronic diseases; being a direct cause of frequent hospitalization, morbidity, mortality, and premature deaths. The most observed chronic disease in Egypt and other developing countries is chronic kidney disease (CKD). It constituted 13-15 % worldwide. In Egypt, CKD prevalence and incidence rates increase progressively. It considered a prevalent unrelenting state in Egypt, which has a huge expenditure and disability load on patients. Furthermore, it is a serious health condition facing several ages including youth, adults and elderly. It is also, considered a challenge to healthcare staff and healthcare educators. CKD is an epidemic wellbeing problem and its frequency and distribution have elevated day by day due to several circumstances of poverty, low socio-economic troubles, aging, and dietary problems. It is a hazardous clinical disorder that leads to several emotional and physical disabilities. It is the main community health problem in Egypt. But, the extent of it is differing according to geographical distribution from place to place as a result of hereditary and ecological factors. Diabetes, hypertension, bleeding, and obesity are major causes of CKD that can be united with it and lead to disability for adults and death for elders. [9,10,11,12]

CKD is defined as constant urine alterations, structural ones related to damage of excretory renal role that leads to a failure of nephrons utility. So, patients are susceptible to heart disease, hypertension, and even death. Patients, who have disease progression and have end-stage kidney disease (ESKD), particularly in developing countries with adults and seniors, may not access the renal transplantation therapy. Contributing factors for CKD are limited nephron count at birth or nephron loss as a result of the aging process, and kidney injuries and toxicity. Its main manifestations are weight loss, poor appetite, changing of urine habit (oliguria), swollen ankles, feet or hands, water and salt retention (edema), and shortness of breath. The treatment of CKD is depending on early finding and managing the disease underlying causes. If the nephron is lost, blood pressure management and dialysis are needed. Then, many complications arise like anemia, metabolic acidosis, pulmonary edema, hyperparathyroidism that have a great negative impact on cardiovascular well-being and whole patients' quality of life. CKD is categorized into five phases, according to the estimated efficiency of Glomerular Filtration Rate (eGFR) which is called a renal function marker. In phase 1, there is some confirmation of kidney alteration however, glomerular function is normal and eGFR is  $> 90$  ml/min; in phase 2, there is slight kidney damage and eGFR is 60–90 ml/min. While in phase 3 there is moderate kidney damage and eGFR is 30–59 ml/min; in phase 4 there is severe kidney damage and eGFR is 15–29 ml/min. Finally, in phase 5 the kidney has massive damage and enters ESRD with eGFR  $< 15$  ml/min, in such phase, the patient needs replacement therapy. This classification helps the health staff and patients to be alert for disease progression and deterioration and assists them to start early care plans to early save kidney function as possible. Clinically, patients can do a 24-h urine collection and thus creatinine clearance is estimated, then, the disease progress may be identified. Other studies such as ultrasound are required. [11,12,13]

There are huge burdens on adults and elders with CKD, particularly, if they have associated illness. They face several social, occupational and family problems. Further, elderly have deteriorated physiology of kidney function and several aging associated complains. Those factors expose those age groups to have more sufferings and affect negatively community health outcomes. Nevertheless, CKD has no cure. Mainly, with adults and elderly, managing the clinical manifestation is the core of CKD treatment such as controlling high blood pressure, managing anemia, swelling relieving measures, bone protection, low salt, and low protein diet regimen. When complications appear in the CKD end stage, the patient is recommended to be under haemo or peritoneal dialysis, or if there is some possibility for transplantation which has limited access for many patients. [11,12,13] Coping, diet regimens, periodical assessment, patient self-care management with high self-efficacy, are the major activities for CKD management. If CKD patients have clear awareness and consciousness of the disease process and its clinical picture and its management, they will have a steady disease condition and attain a healthy life. Hence, self-care management and self-efficacy are basic weapons that can be obtained by the patient through effective health education. [9,13,14,15]

Patient's health education has a positive impact on health and healthcare in a form of maintaining patient's conditions without further complications, decreasing morbidity and mortality rates, reducing risk factors and risk behaviors and increasing patients' satisfaction. World Health Organization (WHO) illustrated that health education instructional materials have several uses and are not only used for the distribution of health-related knowledge. These materials tend to enhance self-confidence, self-efficacy and self-care skills that are significant for healthcare management. Therefore, patient education is considered an important part of the total plan of care, principally, with adults and seniors who can understand it. Patient teaching is a successful mean of guiding healthcare decision making in the disease management plan. [10,14] Accordingly, there are several strategies and instructional materials that support the nurse as a health educator in monitoring, observing, teaching, persuading and motivating the patients with CKD for coping and shaping his/her health behaviors. Zone tool is one of self-care management strategies that are the necessary instructional instruments in health education for chronic diseases, dominantly with low literate adults and older adults. [4,13,15,16] It is a diagrammatic representation of disease management steps in a form of colored zones that involve the signs and symptoms of each stage of the patients' chronic disease and its solution. The tool helps the patient to handle specific health instructions for managing own condition, which aims to maintain illness stability and seek medical assistance if needed. Besides, the zone instructional tool represents each stage of the disease in a certain color as a traffic sign. The patient is guided by the colors in each stage (zone) which involves some significant instructions to be followed by the patient. Consequently, the patient assesses his/her condition according to the colored zone and does the instructions carefully to apply self-care management independently. [4,17,18,19]

### 1.1. Significance of the Study

Adults and elders with CKD, particularly, if they have associated illness are facing crucial health, social, occupational and family problems. They have more sufferings that negatively affect the community health and healthcare outcomes. Nurses as health educators ought to create and implement instructional tools that can help her/him in reinforcing, teaching, and communicating constructive health messages for patients. By those instructional instruments, the nurse can empower and encourage patient self-care management and self-efficacy in chronic illness. With adequate support from the family and the outpatient clinic follow up, patient self-care management with CKD will be achieved and enhanced. The zone tool as a self-care management strategy guides the patients as a self-learning reference handout. It involves diagrams, photos, and directing arrows with colors for attracting the attention of patients to learn independently. [4,10,15,19] The main intention of this methodological study is to develop and employ, then evaluate the developed zone tool effectiveness as a health education strategy and its effects on self-care management

and perceived self-efficacy levels among CKD patients. As a nursing intervention in health education activities and to improve CKD patients' health literacy and self-care practices, using zone tool can be a helpful teaching strategy for those patients.

### 1.2. Theoretical Framework

According to health education and health promotion theories and models, which illustrate the multidimensional nature of the individuals who interact within their environment and follow health instructions, the zone tool was developed. The activated health education model is one of health instructional models that represents three phases of active engagement of persons in health assessment (experiential phase); health-related behavior awareness (awareness phase); and awareness of own roles in values interpretation, resources utilization and planning for behavioral change (responsibility phase). The model describes the factors which are into the environment that can be used by the individual to manage his/her health status and provide interventional strategies. The individual has an active role in the healthcare process plus his/her understanding of the factors affecting health behaviors, then, follow the responsibility for healthcare management. Based on the model clarifications, a meaningful health education aids can be developed. Those health instructional aids are the essential environmental factors that have great positive effects on self-efficacy and self-care management among patients. [20,21,22]

### 1.3. Research Aim

To develop and employ, then evaluate the developed zone tool effectiveness as a health education strategy on self-care management and perceived self-efficacy levels among CKD patients.

### 1.4. Research Hypotheses

To execute the study aims, the following hypotheses were developed.

- a) Patients with CKD exhibit higher scores in the self-management scale after using the developed zone tool.
- b) Patients with CKD exhibit higher scores in the self-efficacy scale after using the developed zone tool.

## 2. Subjects and Methods

### 2.1. Research Design

Descriptive exploratory and quasi-experimental pretest-posttest designs. (Methodological study)

### 2.2. Setting and Subjects

The study was carried out at the outpatient renal clinics of Alexandria Main University Hospital in Alexandria,

Egypt. 200 patients with CKD were selected randomly and assigned as the assessment group; 30% (60 patients) of them were randomly assigned to be the experimental group. The minimal sample size for the assessment group was 177 and 54 for the experimental group according to the Fishers' formula  $z^2pq/d^2$ . The matching technique was

applied. The subject's recruitment flowchart was developed and presented in Figure 1. Participants' inclusion criteria were: males & females, 20 to 70 years old, alert, able to read, write and communicate, have CKD at least for one year, and their investigations approved that they are within stage 1 to 4 of CKD as shown in Figure 2. [23,24]

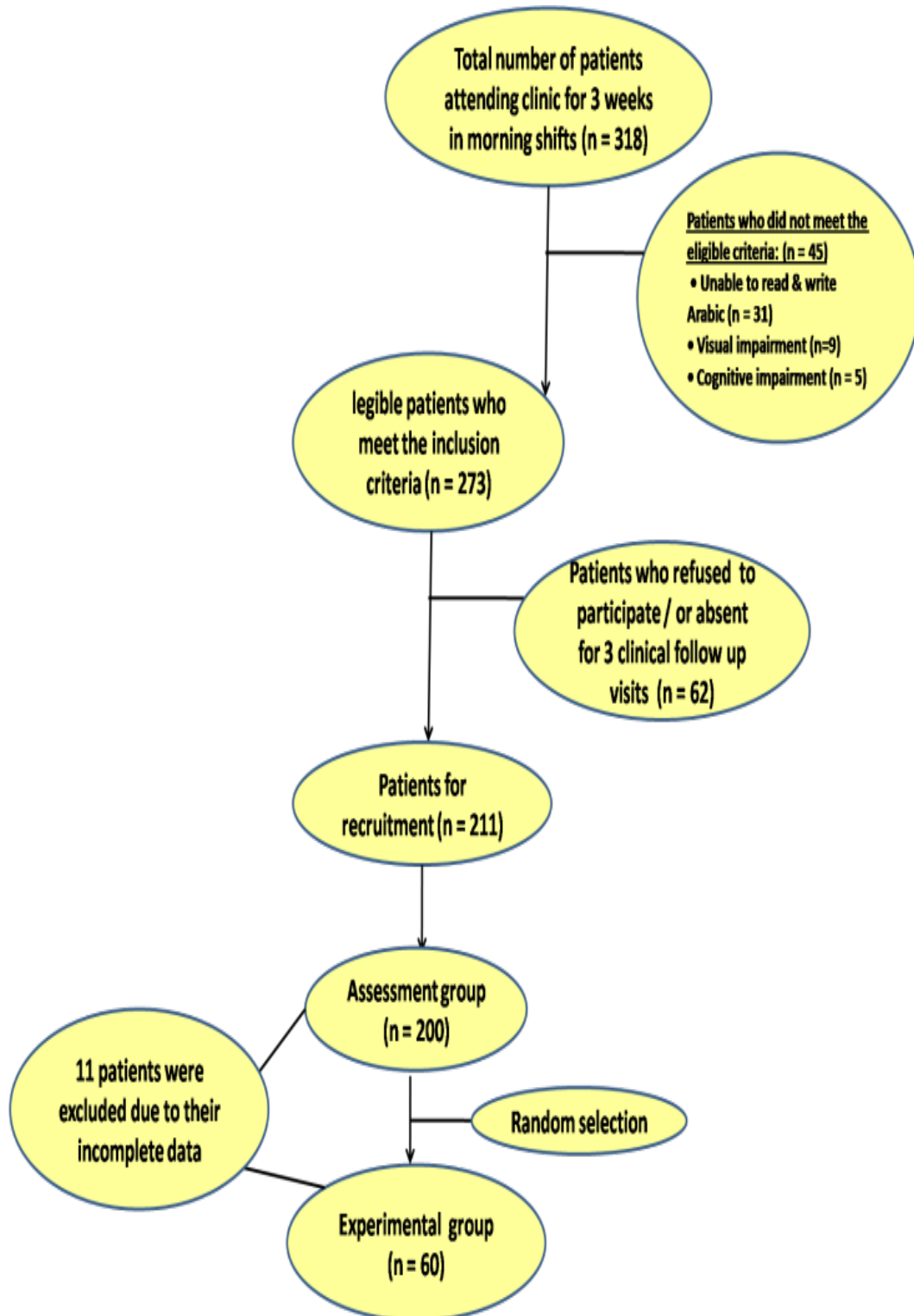


Figure 1. Subjects recruitment flow-chart

Stages of CKD of all types		
Stage	Qualitative Description	GFR (mL/min/1.73 m <sup>2</sup> )
1	Kidney damage – normal GFR	> 90*
2	Kidney damage – mild ↓ GFR	60-89*
3a	Moderate ↓ GFR	45-59
3b	Moderate ↓ GFR	30-44
4	Severe ↓ GFR	15-29
5	End-stage renal disease	<15

\*A GFR >60 mL/min/1.73 m<sup>2</sup> in isolation is not CKD, unless other evidence of kidney damage is present  
CKD, chronic kidney disease; GFR, glomerular filtration rate

**Figure : 2 (23, 24)**

Figure 2.

### 2.3. Tools

In order to achieve the study aim, *three tools* were utilized for data collection.

**Tool I:** A questionnaire was constructed by the researchers to assess patients' sociodemographic and clinical characteristics which included two parts:

Part one: Patient's socio-demographic data.

Part two: Clinical characteristics instrument (such as vital signs, serum calcium....) which was filled from patients' records.

**Tool II:** CKD Self-Management Instrument (CKD-SM) which was developed by [1] to assess the self-management behaviors of patients with CKD. It includes six dimensions: learning skills and knowledge about the disease, interaction with health professionals, and significant others, problem-solving, self-care, self-integration, and emotional management. Those dimensions represented through 32 statements against a four-point Likert scale (1 = never, 2 = sometimes, 3 = often, and 4 = always). The scoring system is 32 to 64 denoted low perceptions, 65 to 96 represented moderate perception and 97 to 128 indicated a high perception of CKD self-care management.

**Tool III:** Self-Efficacy for Managing Chronic Disease Six-Item Scale (SEMCD) was developed by [2]. It involved six items around managing and adapting to chronic illness. Each item is scored on a 10-point Likert scale ranging from "not at all confident" = (1) to "totally confident" = (10). Scoring for self-efficacy represents: 1 to 30 denote low, and 31 to 60 indicate a high level of perceived self-efficacy.

Tool II and III were translated into Arabic by 3 English and medical terminology specialists. The reliability of the study tools was checked and revealed acceptable values.

They were checked by 5 experts in the related fields to ensure its content and face validity that were accepted.

### 2.4. Data Collection

A pilot (pilot 1) study was implemented using the study tools on twenty CKD patients who were excluded from the study sample and modifications were done. Data collection lasted six months; from October 2018 to March 2019. The study executed the following phases ||

#### 2.4.1. Assessment Phase

Each patient in the assessment group was interviewed on an individualized base and the researchers filled the study tools. Then, statistical analysis was established and patients' needs were determined.

#### 2.4.2. Development Phase

Based on assessment phase results and a comprehensive literature review, the zone tool was developed. It's content, and objectives were settled and designed into 4 zones: White zone (for daily routine care with CKD), Green zone (for stable features of CKD and measures to maintain such stability), Yellow zone (for warning signs and how to deal with them), Red zone (for dangerous phase features and how to contact for help). Zoon tool is a descriptive simple diagram as a traffic light sign with four CKD phases as zones. Pictures, symbols, arrows, colors, and captions were used. Furthermore, an Arabic CKD booklet was prepared. This booklet includes health instructions about CKD in general and, in particular, about the use of zone tool as a self- reference at home. Zone tool and the educational booklet were organized in Arabic and revised for content and face validity by a jury of five experts in the related fields. The jury of the experts investigated the relation between the content of teaching with the developed booklet and zone tool and the theoretical framework in health education and medical pathology of the CKD. They ensured that the developed booklet and zone tool provided beneficial and valuable health instructions in each phase of the CKD. And also, they ascertained that each phase of the developed tool can direct the CKD patients to take appropriate healthy behaviors and decisions regarding the problems of the chronic disease. Following that the developed booklet and zone tool were tested for its feasibility on nine CKD patients (pilot 2) who were separated from the study sample. Consequently, adjustments were carried out.

#### 2.4.3. Implementation Phase

The researchers taught "the experimental group" only how to use the zone tool in each phase of CKD disease management, on an individualized base using the developed booklet. Each patient was interviewed for two hours teaching session and received a copy of the zone tool and CKD booklet. They received complete and simple data about the CKD including signs & symptoms, causes, diagnosis, treatment, and self-care management in each phase of the disease as presented in the developed booklet and zone tool. The patients were taught how to maintain their health status as stable as possible and seek help if they were exposed or felt certain dangerous signs.

They instructed to follow the instructions which are clarified in each phase in the booklet and colored developed zone tool. In each phase of the CKD, there are some instructions and precautions that encourage the patient to seek a doctor's or a nurse's help.

Each patient repeated twice how he/she can use the developed zone tool independently at home. The researchers answered all patients' questions about the developed tool. The researchers followed up each patient restrictively by phone every two days and met each patient at the outpatient clinics of Al Amery Hospital in the time of following up (every two weeks) or at any time when the patient told the researchers that he/she should visit the outpatient clinic.

#### 2.4.4. Evaluation Phase

After implementation phase by two weeks, each patient in the experimental group was re-interviewed for refilling the study tools (part 2 in tool I, tool II and tool III) again. Then, after another two weeks, experimental group was re-interviewed again and refilling the above mentioned study tools for the third time. Each patient in the experimental group was interviewed for assessment and evaluation **three times**; before the implementation of the instructional session, after the instructional session by two weeks, and then, after the instructional session by four weeks. Accordingly, 1- the experimental group's sheets of the assessment phase before using the zone tool were separated and investigated as a first assessment. Next, 2- after the instructional sessions by two weeks, the experimental group's sheets were investigated as a second assessment. Following that and 3- after the instructional sessions by four weeks; the experimental group's sheets were investigated as a third assessment. The experimental group's results for the study tools in the three assessments were compared. Afterward, the discrepancy between the three results was estimated to determine zone tool effectiveness.

#### 2.4.5. Ethical considerations

Written permission for data collection was obtained from the ethical committee in the faculty of nursing, and the setting authorities. Also, written informed consents were taken from the study subjects. They were assured to participate in the study with their voluntary decision and confidentiality treatment for their data. Anonymity was established.

### 2.6. Data Analysis

Collected data was computerized, coded, analyzed and tabulated. Statistical Packages for the Social Sciences (SPSS) version 19.0 for Windows and Microsoft Excel Spread Sheet Package (Office 2010) were used for the results of the study. Tests for significance were used: mean and standard deviation as well as percentage, frequency, chi-square, ANOVA test and P values.

## 3. Results

Results are represented in three parts:

- a) Socio-demographic characteristics and clinical features of the study subjects.
- b) Results of the assessment phase.
- c) Results of the evaluation phase.

a) Socio-demographic characteristics and clinical features of the study subjects:

**Table 1** clarifies that; more than one third among assessment and experimental groups (37.5% and 33.5%) were in adult-youth age. While about two thirds (61% and 65%) of both were males. Also, considerable parts of the study subjects (39.5% and 35%) were married. Minimal percentages (17.5% and 18.3%) were widowed. Approximately, less than one half (40.5%, 43.3%) of both groups was workers. As well, nearly the same proportions had a lower educational level (primary school). Furthermore, less than half of the assessment and experimental groups (39.5 % and 43.3%) had gastrointestinal problems with their CKD. While about two thirds (62% and 56.7%) of both were non-smokers. Lastly, the majority (72% and 76.7%) of both groups had no chance to have health education materials in self-care management with their chronic illness. Generally, there is no statistically significant difference between the two groups concerning their Socio-demographic characteristics.

**Table 2** describes the clinical features of the study groups, about one half (53% and 46.7%) of the assessment and experimental groups weighed between 80 to 90 kg. While more than one third (37.5% and 36.7%) of both had heights between 150 to 160 cm. The majority of the groups (60.5% and 61.7%) were clinically obese, using BMI. Also, the majority of both had normal ranges in vital signs measurement. Approximately half of the assessment group (43%) and more than one-third of the experimental group (36.7%) had CKD stage 3B and considerable percentages of both (31.5% and 23.3%) had CKD stage 2. the majority of the two groups (72.5% and 76.7%) had the normal value of serum potassium. Moreover, more than two-thirds of both groups (66% and 61.7%) had the normal value of serum calcium. Also, in serum phosphate, the majority of both groups (71.5% and 66.7%) have a normal level. Additionally, Albumin level was within the normal average for most of both groups (71% and 75%). Regarding the number of current medication taken by the two groups, approximately one half of the assessment and experimental groups (48% and 43.3%) reported intake of 4 to 7 different types of medications. The major two types of drugs mentioned by most of the two groups were antihypertensive drugs and diuretics.

b) Results of the assessment phase:

**Table 3** and **Table 4** represent the results of the assessment phase of the current study that involves the perceived self-care management and self-efficacy levels with the CKD as a chronic disease among assessment and experimental groups.

Regarding **Table 3**, it illustrates the perceived self-care management among assessment and experimental groups. Generally, it was observed that almost all of the assessment and experimental groups reported responses of mean scores below 2; which indicate an inadequate level of self-care management.

Table 1. Socio-demographic Characteristics of the study subjects

The characteristics	Assessment Group (N=200)		Experimental Group (N=60)		Test of Significant ( $X^2$ )
	No.	%	No.	%	
Age					
30 ≤ 40	20	10	13	21.7	$X^2=7.6309$ p-value= 0.1061
40 ≤ 50	75	37.5	20	33.3	
50 ≤ 60	45	22.5	9	15	
60 ≤ 70	60	30	18	30	
Gender:					
Male	122	61	39	65	$X^2=42.825$ p-value=0.000*
Female	78	39	21	35	
Social status					
Single	29	14.5	12	20	$X^2 = 1.2017$ p-value=0.7526
Married	79	39.5	21	35	
Divorce	57	28.5	16	26.7	
Widowhood	35	17.5	11	18.3	
Work Nature					
Worker	81	40.5	26	43.3	$X^2 = 4.972$ p-value= 0.2902
Employee	24	12	10	16.7	
Farmer	50	25	8	13.3	
Retired	22	11	10	16.7	
Unemployed	23	11.5	6	10	
Education Level					
Higher education	39	19.5	16	26.7	$X^2 = 2.0872$ p-value= 0.554
Moderate education	49	24.5	11	18.3	
Lower education	84	42	26	43.3	
Read & write	28	14	7	11.7	
Health Complains with the chronic illness:					
GIT complains♦	79	39.5	26	43.3	$X^2 = 1.8513$ p-value= 0.7631
Difficult breathing	29	14.5	7	11.7	
Urinary complains	55	27.5	15	25	
Back pain	25	12.5	6	10	
Heart beats troubles	12	6	6	10	
Smoking					
Yes	76	38	26	43.3	$X^2 =0.5507$ p-value=0.458
No	124	62	34	56.7	
Using of health education materials					
Yes	56	28	14	23.3	$X^2 = 0.5109$ p-value=0.475
No	144	72	46	76.7	

♦GIT=Gastro-intestinal,  $X^2 = Chi square$  test, P: level of significance  $\leq 0.05$ , \* =  $p \leq 0.05$ , \*\* =  $p \leq 0.01$ , \*\*\* =  $p \leq 0.001$ .

Table 2. Clinical characteristics of the study subjects

Clinical characteristics	Assessment Group (N=200)		Experimental Group (N=60)	
	No.	%	No.	%
Wight				
60 ≤ 70	30	15	8	13.3
70 ≤ 80	20	10	8	13.3
80 ≤ 90	106	53	28	46.7
90 ≤ 100	24	12	8	13.3
> 100	20	10	8	13.3
Height:				
130 ≤ 140	70	35	17	28.3
140 ≤ 150	20	10	10	16.7
150 ≤ 160	75	37.5	22	36.7
160 ≤ 170	23	11.5	7	11.7
170 ≤ 180	12	6	4	6.6
BMI (kg/m2)♦				
18 ≤ 22	121	60.5	37	61.7
22 ≤ 26	45	22.5	11	18.3
26 ≤ 30	34	17	12	20

Clinical characteristics	Assessment Group (N=200)		Experimental Group (N=60)	
	No.	%	No.	%
<b>Vital Signs</b>				
<b>Blood pressure</b>				
110/70 ≤ 120/80	35	17.5	13	21.7
120/80 ≤ 130/90	33	16.5	11	18.
130/90 ≤ 140/90	88	44	28	46.7
140/90 ≤ 150/10	44	22	8	13.3
<b>Temperature</b>				
36.3C° ≤ 37C°	122	61	37	61.7
37 C° ≤ 37.7C°	29	14.5	11	18.3
37.7C° ≤ 38.4C°	49	24.5	12	20
<b>Pulse</b>				
60 ≤ 70	39	19.5	18	30
70 ≤ 80	49	24.5	11	18.3
80 ≤ 90	84	42	22	36.7
90 ≤ 100	28	14	9	15
<b>Respiration</b>				
10 ≤ 15	66	33	18	30
15 ≤ 20	102	51	28	46.7
20 ≤ 25	32	16	14	23.3
<b>eGFR♦♦</b>				
CKD stage 1 (> 90)	18	9	8	13.3
CKD stage 2 (60 - 89)	63	31.5	14	23.3
CKD stage 3A (45 - 59)	11	5.5	6	10
CKD stage 3B (30 - 44)	86	43	22	36.7
CKD stage 4 (15 - 29)	22	11	10	16.7
<b>Serum Potassium (mmol/l)</b>				
3.5 ≤ 5.0	145	72.5	36	60
> 5.0	55	27.5	24	40
<b>Serum Calcium (mmol/l)</b>				
< 2.25	68	34	23	38.3
2.25 ≥ 2.85	132	66	37	61.7
<b>Serum Phosphate (mmol/l)</b>				
0.8 ≥ 1.5	143	71.5	40	66.7
> 1.5	57	28.5	20	33.3
<b>Serum Albumin (g/l)</b>				
≤ 35	58	29	15	25
35 ≥ 50	142	71	45	75
<b>No. of daily medication</b>				
≤ 3	56	28	16	26.7
4 ≥ 7	96	48	26	43.3
≥ 8	48	24	18	30

**Table 3. Self-care-Management with CKD as perceived by assessment and experimental groups and presented by mean and standard deviation.**

Perceived Self-care Management with CKD	Assessment group (N=200) Baseline data		Experimental group (N=60) Selected from assessment group	
	Mean	SD	Mean	SD
1. When I have questions about my disease, I discuss what I have to do with my family and friends.	1.6	0.78	1.8	0.96
2. I would ask about the possible reasons for my decline in my kidney function.	1.78	0.78	1.11	0.59
3. I inform my family and friends about my kidney treatment plan (such as medication changes, lifestyle changes).	1.92	0.58	1.56	1.11
4. I share my personal experience of kidney disease with other patients who have kidney disease.	2.7	0.49	2.92	0.78
5. I understand the meaning of my kidney function blood tests (such as creatinine, eGFR).	1.45	0.98	1.23	0.89
6. When my blood pressure is high (more than 140/90), I try to find out the possible reasons.	1.67	0.79	1.45	1.21
7. To prevent the increased workload on my kidneys, I am able to control what I eat.	1.78	0.68	1.23	0.79
8. I follow the kidney diet suggested by my doctor or nurse or dietician.	0.44	0.78	0.49	0.66
9. I solve problems related to my kidney disease by using various sources (such as calling my nurse or doctor, using the internet, Google, kidney support group).	1.74	1.3	1.22	0.98



Perceived Self-care Management with CKD	Assessment group (N=200) Baseline data		Experimental group (N=60) Selected from assessment group	
	Mean	SD	Mean	SD
10. When I am feeling upset or frustrated, I discuss my feelings with others.	1.55	0.47	1.85	1.11
11. I incorporate my kidney disease treatment into my life.	1.96	1.51	1.34	1.00
12. I avoid habits that worsen my kidney function (such as smoking, consuming alcoholic drinks, overly salty food).	1.67	0.78	1.56	1.21
13. I follow health professionals' advices about exercise.	1.62	0.59	1.78	0.67
14. I keep track of my symptoms and early warning signs (blood sugar levels, weight, shortness of breath, &feet swelling).	1.45	1.6	1.89	1.2
15. I follow health professionals' advices about eating a balance diet.	1.79	0.89	1.66	0.67
16. I ask doctors/nurses questions to clarify my treatment plan.	2.94	0.67	2.88	0.78
17. I follow health professionals' advices about stopping smoking.	1.64	0.56	1.22	1.3
18. I have changed my lifestyle to prevent my disease from getting worse.	1.74	1.81	1.35	1.44
19. I seek help from others when I am feeling upset or frustrated.	1.98	1.56	1.88	1.12
20. I keep my kidneys healthy by maintaining my overall health.	0.44	0.89	0.41	1.12
21. I stop bad habits which are harmful to my kidneys (such as smoking, consuming overly salty food and alcohol).	1.95	0.84	1.45	0.56
22. I take steps to understand the risk factors with my chronic disease (such as high blood pressure, diabetes, smoking, obesity).	1.59	1.5	1.91	1.11
23. I control my body weight as the advice from doctors or nurses.	1.66	0.56	1.78	0.45
24. I make good choices about the type and amount of food when I am not at home (such as at the shops, parties, eating out).	1.59	1.81	1.88	1.23
25. I can adjust my daily routine to follow my disease treatment plan when I am not at home (such as travelling, holidays).	1.73	0.68	1.67	0.76
26. When my body has new or worsening physical symptoms (such as foot swelling, severe headache, passing extra urine at night), I try to find out the cause.	1.64	0.78	1.79	1.23
27. I still take all my medications even when I am not at home.	1.46	1.3	1.68	0.89
28. I feel I am able to attend social events (such as weddings, parties, discussions) even though I have kidney disease.	0.45	0.59	0.42	0.67
29. I seek out information about chronic kidney disease from a range of sources (such as internet, flyers, brochures, books, kidney support group).	2.84	1.6	2.7	1.11
30. I take my medications as prescribed by my doctors or nurses or pharmacist.	1.83	0.89	1.76	1.34
31. I take action when my early warning signs and symptoms get worse.	1.48	0.81	1.67	0.78
32. When I have questions about my kidney disease, I discuss what to do with my doctors or nurses or pharmacist.	1.96	0.92	1.45	1.2
Total	1.7	0.96	1.6	0.96

While, there are three items from the thirty-two (4, 16 and 29) that have responses of mean scores above 2.6, that are denoting an adequate level of self-care management and are shaded by the yellow color in the table. Also; there are another three items (8, 20, and 28) that have responses' mean scores below 0.5, which signify that the participants in both groups perceive severe lack in their self-care management level and those items are shaded by gray color. The total mean scores for the perceived self-care management level among both study groups are 1.7 and 1.6 which are below 2 and clearly show the inadequacy of self-care management level among them.

Concerning self-efficacy among the assessment and

experimental groups, Table 4 clarifies that approximately both groups documented responses of mean scores below 5; which signifies a low level of self-efficacy. Only one item of the scale (no. 3) has 5.5 and 5.7 mean scores which indicate high self-efficacy among both groups regarding this item only and this item is shaded by yellow color. Also, there is another item (no.5) that has very minimal mean scores (1.48 and 1.66) which indicates a very low self-efficacy level among the patients in both study groups and these items are shaded by gray color. Total means are 3.6 and 3.8 for all self-efficacy scale items among the assessment and experimental groups, which correspond to a low level of self-efficacy, on the whole.

**Table 4. Self-efficacy with CKD as perceived by assessment group and presented by mean and standard deviation**

Perceived Self-efficacy with CKD	Assessment group (N=200) Baseline data		Experimental group (N=60) Selected from assessment group	
	Mean	SD	Mean	SD
1. How confident do you feel that you can keep the fatigue caused by your disease from interfering with the things you want to do?	3.8	2.35	3.6	2.1
2. How confident do you feel that you can keep the physical discomfort or pain of your disease from interfering with the things you want to do?	3.11	1.87	3.55	1.56
3. How confident do you feel that you can keep the emotional distress caused by your disease from interfering with the things you want to do?	5.56	2.89	5.7	2.56
4. How confident do you feel that you can keep any other symptoms or health problems you have from interfering with the things you want to do?	4.00	1.48	4.45	1.22
5. How confident do you feel that you can the different tasks and activities needed to manage your health condition so as to reduce your need to see a doctor?	1.48	2.98	1.66	2.78
6. How confident do you feel that you can do things other than just taking medication to reduce how much your illness affects your everyday life?	3.79	2.46	3.98	2.76
Total	3.6	2.3	3.8	2.2

**Table 5. Clinical characteristics among experimental group in the 1<sup>st</sup>, 2<sup>nd</sup>, to 3<sup>rd</sup> assessments, before and after using the developed tool as presented by number and percentage**

Clinical characteristics	Experimental Group (N=60)						Test of Significant (X <sup>2</sup> )
	1 <sup>st</sup> assessment		2 <sup>nd</sup> assessment		3 <sup>rd</sup> assessment		
	No.	%	No.	%	No.	%	
Wight							
60 ≤ 70	8	13.3	16	26.7	20	33.3	X <sup>2</sup> =20.8516 p-value= 0.008*
70 ≤ 80	8	13.3	17	28.3	20	33.3	
80 ≤ 90	28	46.7	17	28.3	14	23.3	
90 ≤ 100	8	13.3	6	10	3	5	
> 100	8	13.3	4	6.7	3	5	
Blood pressure							
110/70 ≤ 120/80	13	21.7	18	30	20	33.3	X <sup>2</sup> =10.2691 p-value=0.1138
120/80 ≤ 130/90	11	18.3	19	31.7	20	33.3	
130/90 ≤ 140/90	28	46.7	19	31.7	15	25	
140/90 ≤ 150/10	8	13.3	4	6.6	5	8.4	
eGFR♦♦							
CKD stage 1 (> 90)	8	13.3	10	16.7	11	18.3	X <sup>2</sup> = 6.0293 p-value=0.6439
CKD stage 2 (60 - 89)	14	23.3	16	26.7	16	26.6	
CKD stage 3A (45 - 59)	6	10	10	16.6	12	20	
CKD stage 3B (30 - 44)	22	36.7	15	25	16	26.7	
CKD stage 4 (15 - 29)	10	16.7	9	15	5	8.4	
Serum Potassium (mmol/l)							
3.5 ≥ 5.0	36	60	42	70	45	75	X <sup>2</sup> = 3.2349 p-value=0.1984
> 5.0	24	40	18	30	15	25	
Serum Calcium (mmol/l)							
≥ 2.25	23	38.3	20	33.3	16	26.7	
2.25 ≥ 2.85	37	61.7	40	66.7	44	73.3	
Serum Phosphate (mmol/l)							
0.8 ≥ 1.5	40	66.7	43	71.7	48	80	X <sup>2</sup> = 1.8658 p-value=0.3934
<1.5	20	33.3	17	28.3	12	20	
Serum Albumin (g/l)							
≤ 35	15	25	10	16.7	8	13.3	X <sup>2</sup> = 1.8658 p-value=0.3934
35 ≥ 50	45	75	50	83.3	52	86.7	

♦GIT=Gastro-intestinal, X<sup>2</sup> = *Chi square* test, P: level of significance ≤ 0.05 \* = p ≤ 0.05, \*\* = p ≤ 0.01, \*\*\* = p ≤ 0.001, Gray color represents the base line data for the experimental group which is detached from the assessment phase.

### c) Results of the evaluation phase:

Table 5, Table 6 and, Table 7 reveal the finding as regards the evaluation phase in the present study. Those tables included comparisons in between the experimental group in 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup>, assessments concerning the values of clinical features, patients' perceptions about self-care management and their self-efficacy levels with CKD. This means before using the developed tool (1<sup>st</sup> assessment) and after using it (in 2<sup>nd</sup> and 3<sup>rd</sup> assessments).

Table 5 clarifies the values of the clinical features among the experimental group in 1st, 2nd, 3rd assessments before and after using the developed tool. It is observed that all the seventh clinical characteristics in the table are slightly improved from 1<sup>st</sup>, 2<sup>nd</sup>, to 3<sup>rd</sup> assessments. Concerning the patient's weight, in the first assessment, about one half (46.7%) of the patients in the experimental group weigh 80 to 90 kg, but in 2<sup>nd</sup> and 3<sup>rd</sup> assessments, this percentage becomes 28.3% and 23.3%, while the percent of the patients with weight in between 60 to 70 kg is increased from 13.3% to 26.7% and then 33.3% from 1<sup>st</sup>, 2<sup>nd</sup>, to 3<sup>rd</sup> assessments. As well as, the same slight improvement happens with the blood pressure parameter. For the estimated Glomerular Filtration Rate (eGFR) the percentages of the patients in the CKD first and second stages are increased from 1<sup>st</sup>, 2<sup>nd</sup>, to 3<sup>rd</sup> assessments. Similarly, the normal values percentages of serums Potassium, Calcium, Phosphate and Albumin among the experimental group are slightly elevated from 1st, 2nd, to

3rd assessments. In general, the values of all clinical features among the experimental group illustrate somewhat improvement in the 2nd and 3rd assessments which denotes a constructive little progress of their disease conditions after using the developed zone tool. This slight improvement, respectively, does not approve statistically significant difference between the 1<sup>st</sup>, 2<sup>nd</sup>, to 3<sup>rd</sup> assessments by X<sup>2</sup> comparing test.

Table 6 explains the perceived self-care management level with CKD by the experimental group before and after using the developed zone tool in the 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup> assessments. It is noticed that approximately the entire experimental group perceives the thirty-two items of self-care management scale with mean scores less than 2.00 in the first assessment. But, in the second assessment and after utilization of the developed zone tool, exactly all of them have mean scores more than 2 for all scale items. Additionally, some items of the scale patients got mean scores above 3. In addition, in the third assessment, approximately all the experimental group responses get mean scores more than 3.00 for most of the self-management scale items. The comparisons in the patients' responses of the entire the experimental group regarding all scale items and from the 1<sup>st</sup>, 2<sup>nd</sup>, to 3<sup>rd</sup> assessments signify their positive progress in CKD self-care management dependency level. In general, the total mean scores of all scale items are increased from the 1st, 2nd, and 3rd assessments with respected values 1.6 to 2.7 and

then grow into 3.3 among the experimental group and after using the developed zone tool. It was observed that there was a STRONG statistically significant difference

and improvement in means scores between the 1st, 2nd, and 3rd assessments for all scale items as investigated by one way ANOVA F- test and P = 0.000.

**Table 6. Perceived self-care management with Chronic Kidney Disease in 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup> assessments, before and after using the developed zone tool among the experimental group as presented by mean and standard deviation**

Perceived Self-care management	Experimental Group (N=60)						F-Test	P-value
	1st assessment		2rd assessment		3rd assessment			
	Mean	SD	Mean	SD	Mean	SD		
1. When I have questions about my disease, I discuss what I have to do with my family and friends.	1.8	0.96	2.77	1.3	3.32	0.86	31.814	0.000
2. I would ask about the possible reasons for my decline in my kidney function.	1.11	0.59	2.82	1.1	3.54	1.23	91.313	0.000
3. I inform my family and friends about my kidney treatment plan (such as medication changes, lifestyle changes).	1.56	1.11	2.65	0.89	3.11	0.89	40.502	0.000
4. I share my personal experience of kidney disease with other patients who have kidney disease.	2.92	0.78	3.12	0.98	3.65	0.87	11.013	0.000
5. I understand the meaning of my kidney function blood tests (such as creatinine, eGFR).	1.23	0.89	2.82	1.1	3.31	0.99	71.369	0.000
6. When my blood pressure is high (more than 140/90), I try to find out the possible reasons.	1.45	1.21	2.94	1.4	3.47	1.11	42.404	0.000
7. To prevent the increased workload on my kidneys, I am able to control what I eat.	1.23	0.79	2.68	1.12	3.54	0.98	86.423	0.000
8. I follow the kidney diet suggested by my doctor or nurse or dietician.	0.49	0.66	2.87	1.00	3.33	0.73	212.72	0.000
9. I solve problems related to my kidney disease by using various sources (such as calling my nurse or doctor, using the internet, Google, kidney support group).	1.22	0.98	2.98	0.86	3.11	1.31	58.721	0.000
10. When I am feeling upset or frustrated, I discussed my feelings with others.	1.85	1.11	2.75	1.31	3.21	0.95	22.369	0.000
11. I incorporate my kidney disease treatment into my life.	1.34	1.00	2.65	0.75	2.94	0.86	56.820	0.000
12. I avoid habits that worsen my kidney function (such as smoking, consuming alcoholic drinks, overly salty food).	1.56	1.21	2.76	1.21	3.46	0.88	44.887	0.000
13. I follow health professionals' advices about exercise.	1.78	0.67	2.72	0.96	3.11	1.21	29.682	0.000
14. I keep track of my symptoms and early warning signs (blood sugar levels, weight, shortness of breath, & swelling in feet).	1.89	1.2	2.98	1.13	3.75	0.96	43.209	0.000
15. I follow health professionals' advices about eating a balance diet.	1.66	0.67	2.85	0.79	3.56	1.23	64.158	0.000
16. I ask doctors/nurses questions to clarify my treatment plan.	2.88	0.78	2.93	0.97	3.63	0.89	12.711	0.000
17. I follow health professionals' advices about stopping smoking.	1.22	1.3	2.76	0.89	3.85	0.87	97.035	0.000
18. I have changed my lifestyle to prevent my disease getting worse.	1.35	1.44	2.91	1.00	3.25	0.94	46.694	0.000
19. I seek help from others when I am feeling upset or frustrated.	1.88	1.12	2.84	0.88	2.93	1.21	17.454	0.000
20. I keep my kidneys healthy by maintaining my overall health.	0.41	1.12	2.74	0.93	2.88	0.98	112.50	0.000
21. I stop bad habits which are harmful to my kidneys (such as smoking, consuming overly salty food and alcohol).	1.45	0.56	2.79	1.11	3.24	0.83	69.841	0.000
22. I take steps to understand the risk factors with my chronic disease (such as high blood pressure, diabetes, smoking, obesity).	1.91	1.11	2.92	0.95	3.94	1.21	51.530	0.000
23. I control my body weight as the advice from doctors or nurses.	1.78	0.45	2.56	0.86	2.96	0.95	35.143	0.000
24. I make good choices about the type and amount of food when I am not at home (such as at the shops, parties, eating out).	1.88	1.23	2.77	0.98	3.76	0.86	49.549	0.000
25. I can adjust my daily routine to follow my disease treatment plan when I am not at home (such as travelling, holidays).	1.67	0.76	2.69	1.11	3.24	0.88	44.206	0.000
26. When my body has new or worsening physical symptoms (such as foot swelling, severe headache, passing extra urine at night), I try to find out the cause.	1.79	1.23	2.63	1.00	3.56	1.11	37.677	0.000
27. I still take all my medications even when I am not at home.	1.68	0.89	2.78	0.87	3.11	0.86	44.094	0.000
28. I feel I am able to attend social events (such as weddings, parties, discussions) even though I have kidney disease.	0.42	0.67	2.67	1.24	2.93	1.23	97.989	0.000
29. I seek out information about chronic kidney disease from a range of sources (such as internet, flyers, brochures, books, kidney support group).	2.7	1.11	2.94	0.97	3.66	0.96	14.518	0.000
30. I take my medications as prescribed by my doctors or nurses or pharmacist.	1.76	1.34	2.78	0.88	3.21	1.23	24.452	0.000
31. I take action when my early warning signs and symptoms get worse.	1.67	0.78	2.55	1.11	2.87	0.89	26.401	0.000
32. When I have questions about my kidney disease, I discuss what to do with my doctors or nurses or pharmacist.	1.45	1.2	2.88	0.87	3.13	0.96	47.425	0.000
Total	1.6	0.96	2.77	1.01	3.33	0.99	48.005	0.000

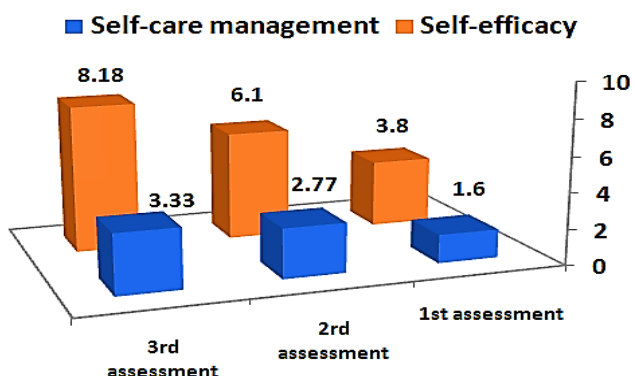
Gray color represents the base line data for the experimental group which is detached from the assessment phase, \* = p ≤ 0.05, \*\* = p ≤ 0.01, \*\*\* = p ≤ 0.001.

**Table 7. Perceived Self-Efficacy with Chronic Kidney Disease in 1<sup>st</sup>, 2<sup>nd</sup>, to 3<sup>rd</sup> assessments, before and after using the developed zone tool among the experimental group as presented by mean and standard deviation**

Perceived Self-Efficacy	Experimental Group (N=60)						F-Test	P-value
	1st assessment		2rd assessment		3 <sup>rd</sup> assessment			
	Mean	SD	Mean	SD	Mean	SD		
How confident do you feel that you can keep the fatigue caused by your disease from interfering with the things you want to do?	3.6	2.1	6.3	1.3	8.52	0.86	159.767	0.000
How confident do you feel that you can keep the physical discomfort or pain of your disease from interfering with the things you want to do?	3.55	1.56	6.82	0.89	7.72	1.23	182.913	0.000
How confident do you feel that you can keep the emotional distress caused by your disease from interfering with the things you want to do?	5.7	2.56	6.65	0.96	8.91	0.89	59.200	0.000
How confident do you feel that you can keep any other symptoms or health problems you have from interfering with the things you want to do?	4.45	1.22	6.15	1.65	8.74	0.87	169.102	0.000
How confident do you feel that you can do the different tasks and activities needed to manage your health condition so as to reduce your need to see a doctor?	1.66	2.78	4.11	1.32	6.88	0.99	117.475	0.000
How confident do you feel that you can do things other than just taking medication to reduce how much your illness affects your everyday life?	3.98	2.76	6.94	0.93	8.32	1.11	91.105	0.000
Total	3.8	2.2	6.1	1.17	8.18	99	120.187	0.000

Gray color represents the base line data for the experimental group which is detached from the assessment phase, \* =  $p \leq 0.05$ , \*\* =  $p \leq 0.01$ , \*\*\* =  $p \leq 0.001$ .

Concerning the perceived Self-Efficacy level with CKD among the experimental group in 1<sup>st</sup>, 2<sup>nd</sup>, to 3<sup>rd</sup> assessments, Table 7 shows an observed improvement in patient's responses. In the first assessment and before using the developed zone tool, almost all patients' perceptions of their self-efficacy with CKD get mean scores less than 5 which denote inadequate perceived self-efficacy level to manage their chronic illness. But, in the second assessment and after using the developed zone tool, about almost the entire patient's responses in the experimental group get mean scores above 6 which signifies their improvement in their perceived self-efficacy level with CKD. Then, and respectively, the improvement is continued in the third assessment, the majority of patient's responses obtain mean scores above 8, except in items 2 and 5 of the self-efficacy scale. Generally, the total mean scores of all scale items of self-efficacy among the experimental group responses are increased from the 1st, 2nd, to 3rd assessments with respected values 3.8 to 6.1 and then become 8.18 after using the developed zone tool. A STRONG statistically significant difference was observed between the 1st, 2nd, and 3rd assessments for all scale items as investigated by one way ANOVA F- test and  $P = 0.000$ .



**Figure 3.** Perceived Self-care management and Self-Efficacy with CKD in 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup> assessments, before and after using the developed zone tool among the experimental group as presented by total mean scores

Figure 3 represents overview of the positive progress of the experimental group responses in 1<sup>st</sup>, 2<sup>nd</sup>, to 3<sup>rd</sup>

assessments, before and after using the developed zone tool concerning their self-care management and self-efficacy levels with CKD.

## 4. Discussion

Self-care management in chronic illness has established a crucial role in healthcare practices, and it becomes an important target among health professionals. It is the main and effective conduct to change the patient's lifestyle and improve adaptability with chronic illness, mainly in CKD. Till now there are minimal trials or researches that focus on this issue and tend to improve patient's self-care management and in-dependability with chronic illness [6,13,25]. CKD is a gradually developed illness in the kidney and reaches to a serious fatal condition called End-Stage Renal Disease (ESRD) that needs maintenance dialysis or kidney transplantation. It is considered the main cause for disability and prolonged complains with adults and elders. About 440,000 clients start dialysis annually, globally in the world. Furthermore, the cost of kidney dialysis and transplantation is too expensive (about 100,000 \$ per year) which is an exhausting funding issue on healthcare finance and patient's income. As well, CKD is considered a major widespread reason for death nationally and internationally. [11,26,27,28].

CKD is as a lifelong, dangerous and persistent illness with adults and seniors needs a concentrated and condensed healthcare management with interdisciplinary healthcare fields. Accordingly, CKD self-care management and independency in solving disease symptoms and problems among those types of patients is a necessary and fundamental aspect of the nursing care plan and professional management as a whole [23,28,29] Hence, health education using self-care management materials and self-referenced tools for age groups of adults and elders, became an urgent strategy to help them in their chronic and terminal illness. Nurses have an essential role to develop special educational approaches that can assist the CKD patients through scientific updated knowledge, teaching activities and valuable health education self-referencing instruments. The process of health education

is a fundamental responsibility of nursing duties. The health instructional tools are developed based on accurate assessment, careful planning, efficient development, competent implementation, and standardized evaluation and testing. By such methodologies, instructional aides, diagrams, images, pamphlets, booklets and brochures, patients during chronic conditions who are mature in adult and older adult ages, will find health guidance and self-care management directions. Adults and older adults can comprehend the health messages with some sort of consideration and attention. They have to adhere and compile the instructions because they are full-grown and decide their favors. Further, those groups have serious life alterations from their chronic suffering and they are self-directed. Many of both age groups may have hearing and vision alteration that necessitate them to have self-reference health instructions. Such tools may represent the disease process, signs and symptoms, diagnosis and investigation, disease care and complication management. All needed information about the disease, lifestyle adaptation, physical, social, psychological health disturbances, and proper management approaches. Egyptian patients and many patients in developing countries with chronic diseases need simple, accurate and easy accessed means to be used as self-instructional resources, predominantly, the patients with chronic illness and low literate. The majority of those patients have no internet access, no mobiles and no suitable income to be regular visitors for health consultation [13,21,30]. Consequently, health education materials have a tangible value in such countries and they should receive considerable attention in the healthcare system, mainly with CKD adult and senior patients. Many investigations and shreds of evidence are needed for such an issue.

In the current research and in **the assessment phase**, there is an apparent inadequacy in the assessment and experimental groups' perceptions about their perceived self-care management with CKD (total means scores are below 2). This finding shows that patients with CKD have a serious lack of the knowledge and practices of self-care management during their chronic illness. The majority of patients with CKD in Egypt neglects and provides minimal attention to learn about their persistent disease and consequently, they have an inadequacy in self-care management. Similarly, to this result, [28,31] found in their reviews about such issue, that the self-care management awareness and interventions in between CKD patients are inadequate; there is a significant insufficient self-care management among researches participants with CKD in aging ranges between 40 to 70 years. This reduction in the patient's attentiveness reflects patients' passive views about self-care and increases their dependability on health professionals. Disorientation and neglect of self-care management lead to serious deterioration of CKD conditions, lacking immunity, malnutrition, early kidney damage and early End-Stage Renal Disease (ESRD) and death, particularly with vital ages in the community; as adults and elders. Contrasting to these findings, [32,33] discussed that patient's positive perceptions about their self-care management are the origin of chronic illness treatment and risk management. Self-responsibility about disease management directs constructive behavioral change and the development of

several management skills to deal with chronic illness problems and complications. Thus, closed consciousness about self-care management activities such as signs and symptom assessment, recognition, and proper dealing and managing the causes of complaints, particularly with adults and elderly age groups, definitely, direct the CKD patients to maintain disease stability as possible. Additionally, the CKD patient with positive perception about self-care management can easily follow healthy behaviors for example; treatment plan obedience, drug adherence, frequent lab investigations and radiological studies, exercises and eating proper diet regimen.

Relating to, the second finding of the assessment phase, the assessment and experimental groups have a low perception level of self-efficacy in managing their chronic disease. This finding indicates that there is an inadequate self-efficacy level as perceived by both study groups of Egyptian CKD patients. It reflects that they have limited abilities and potentials to manage their illness. Also, they have minimal capacity for illness decision-making. Without any doubt, self-efficacy is the cornerstone of self-care management among adult and senior patients with chronic disease. But, our patients have poor self-efficacy levels to manage CKD complaints. This point is supported by [34] who illustrated that low self-efficacy level among CKD patients is congruent with low self-care management, accelerates disease process, reduces patient's tolerance and increase their dependability. As well, [33] stressed that low self-efficacy levels among adult and senior patients with chronic status usually lead them to feel helplessness, hopelessness and physical and emotional alterations. Further and matching to the current result, [35] reported that if the patient with chronic illness has a low self-efficacy level, adult and older adult patient will lose the awareness of the therapeutic plan, understanding of the disease problems and its resolution techniques and miss positive attitudes toward disease improvement. Low self-efficacy is contributing to low motivation toward self-care management. Opposite of these views, [36,37] documented that the high recognition of illness-related self-efficacy is contributing to successful self-management of the chronic cases. High perception of self-efficacy empowers CKD patients to follow: blood pressure control, restricted salt and protein diet and easily taking multi-drugs, weight reduction and quitting smoking, mostly, with mature patients in adult and elderly ages. [36,37] Accordingly, high recognition of self-efficacy among CKD patients in significant life ages such adulthood and older adult is required for enhancing long term self-care management and maintaining confidence in their own abilities to overcome any disease problems and then, improving the chronic illness outcomes at all.

Concerning the results of **the evaluation phase** with experimental group only, the present study verifies that; using of the developed zone tool as self-instructional, educational tool and self-care management supporter, produces observable and valuable effects on CKD patients' clinical features, perceptions of self-care management and self-efficacy levels, which supports the first, second and third hypotheses.

Congruent to the results of the present study, the values of all clinical features among the experimental group illustrate a slight improvement from 1st assessment to 2nd

and 3rd assessments before and after using the developed zone tool. This study demonstrates that there is a positive association between CKD management knowledge and awareness and the improvement of patients' clinical features within adult and elderly age groups. Patient education is a target for many patients with chronic diseases which can be the magic cane for their disease stability in serious ages production such as our patient's age groups. Supporting to the current result, [28] found that the health education program as a self-care management intervention affects positively all clinical parameters among CKD patients, such as: controlling of blood pressure and weight, lesser 24 h urinary protein excretion, the stability of eGFR stage, decrease the risk for ESRD, the constancy of blood sugar level and albumin level. These advantages are helping greatly the adults and seniors who have many life responsibilities and cannot follow regular healthcare visits. As well and similarly to the present finding, [38] found that the self-instructional intervention leads to further protection to the kidneys through the patient's awareness to maintain lowering of CRP (C-reactive protein; the marker of inflammation in the body) levels. Additionally, CKD patients with high health literacy are maintaining exercise capacity which improves the immunity condition. In the same line with these views, [39] clarified that patient education and self-learning references help CKD patients to decrease inflammatory markers such as anti-inflammatory cytokines through overcoming and controlling: infections, protein malnutrition, high weight, and high blood sugar. Adults and elders have intense needs for such education to effectively manage their life and disease disturbances. The experimental group shows a little improvement in clinical features values which denote an evident effect of the health teaching materials. Zone tool was organized in a sequential pattern of CKD phases and each phase includes precise and specific patient practices to allow CKD adult and elders' patients taking appropriate decisions with any CKD problems. So, it has an essential impact on disease stability and chronic illness positive outcomes. Maybe some extraneous variables affect the experimental group' investigation values, but also, there is a great restricted follow-up and supervision by phones and patient interviews from the side of the researcher.

Matching with the first hypothesis in the present study, the experimental group has noticed improvements in their perceptions about self-care management. The total mean scores of all scale items are increased from 1st assessment to 2nd and 3rd assessments after using the developed instructional zone tool. A STRONG statistically significant difference was observed between the 1st, 2nd and 3rd assessments. The CKD patients in adulthood and elderly ages have a vital necessitate for awareness, recognition and understanding about disease-related knowledge, health care activities, and routine follow-up behaviors that allow them to manage disease sufferings and risks. Egyptian patient's health literacy improved through simple instructional self-learning aides such as the developed tool. The patient's initiation, motivation, and active participation have an apparent role in such improvement. Patients with chronic diseases should be responsible for own management and be active recipients of education. Health teaching among those patients is considered a motor for

assisting them to develop skills, comprehension, and experiences to manage their chronic status. [28,33,35] changing adult and seniors patient's believes and attitudes is the most difficult mission facing the nurse educators, but with scientific updated and attractive health messages, the patient's points of view can be modified.

Fitting with this result, [35,40] clarified that self-care-management education and using of instructional teaching approaches strengthen CKD adult and elderly patient's abilities and skills for the attainment of problem-solving and clinical judgment aptitudes. As well, [41,42] discussed that CKD patients' participation in self-management education and health instructional programs, particularly if he/she has co-morbidity with CKD, have an essential significance in shaping their self-care management behaviors and skills. Adult and elderly patient's education is a base of the care plan and has an essential link with self-care maintenance in chronic diseases. CKD patients with constant self-education, consultations, using self-referenced tools, will have cleverer awareness of the suitable selection of lab and radiographic studies, monitoring sufferings and risks, and control any physical or psychological upset. Health literacy directs adult and older adult patients with chronic illness to be more self-care dependent with clear improvement in disease prognosis and outcomes. In contrast to the current result, [43,44] explained that; there is an understandable gap between patient's self-management education needs and acquired skills by them, particularly with the chronic illness. There is an evident wide discrepancy between the given health education and CKD patient's exact knowledge and skills needs. Therefore, CKD with low health literacy will have a low perception of self-care management with chronic illness. Therefore, it is the time for nurses to guide such patients to utilize health education tools as mementos and significant reminders instruments for self-care management information. Nurse educators have crucial roles to plan, teach, persuade and shape patients' healthy behaviors.

On the other hand, several studies found that; the preparation of health education content, strategy and materials needs proficient, talented and expert skills from health educators, which becomes a burden in time and efforts. At the same time, those materials should meet the patient's educational needs, be attractive, cheap, accessible, understood and scientifically based. Moreover, those aides require funding and using advanced technology which can be an exhausting issue among nurse educators in developed countries. Consequently, in Egypt as a developed country, the instructional materials for CKD patients, particularly or adult and older adult ages, need careful attention from the ministry of health and government for preparing, planning, developing and implementing such educational materials. [21,33,40,45] In Egypt, the health education field still has many limitations and drops, particularly, regarding sponsoring and funding. So, there is a huge gap between patients' educational needs and the implementation of the instructional tools provided by healthcare professionals. However, in the existing study, and by careful planning, developing, implementation and evaluation, the zone tool as a health educational reference approve an effective impact on the CKD Egyptian patient's self-care perceptions.

In correspondence to the second hypothesis in the recent study, there is an evident improvement in the experimental group self-efficacy perceptions before and after using of zone tool in 1st, 2nd, to 3rd assessment. This finding is anticipated, because, health education activities are the first way to empower adult and elderly patients' self-efficacy, particularly with chronic illness. Effective instructional materials allow perfect chances for the nurse educator to constructively change patient's attitudes and perceptions toward their performance of healthy behaviors. In the same line with the current result, [46] in Port Said in Egypt found that there are noticed statistical significant differences in participant's Mean Scores of four domains of CKD-Self-Efficacy scale before and after the accomplishment of the health education guidelines, in favor of the experimental group, in serious life period of maturity such as adulthood and older adult ages. Additionally, and also, in Egypt, [47] discussed that the mean score of self-efficacy was improved post health education intervention and the patients had better knowledge and positive coping with the chronic condition post the educational intervention. As well, in Massachusetts, USA, [48] discussed that the different types of self-efficacy should be higher to empower self-efficacy and care management behaviors among CKD patients. Health education, instructional aides and teaching program or guideline consider motives and energies to improve the self-efficacy level, mainly with chronic illness.

## 5. Conclusion

Health education, in a form of instructional aides such as; the developed zone tool during CKD phases approves that; it is a major step for developing and empowering the nursing profession entity. Also it embowers its role as a crucial educational approach to improve clinical characteristics, perceived self-care management and self-efficacy levels among adult and older adult patients with CKD. Zone tool as a health education strategy confirms the significant nurse role of guidance for health instruction to improve CKD condition and outcomes. Further, it supports the valuable contributions of nurse educators in managing and empowering chronic conditions such as CKD. Thus, patient's education using several instructional aides; is considered a fundamental vehicle for disease management and main professional nurse responsibility.

## 6. Recommendations and Further Studies

Chronic Kidney Disease namely CKD, is a serious, chronic, widespread, and disabling condition with poor prognosis affecting adults and older adults in their important time of productivity in life, affecting patients, families, and society as a whole. Therefore, interdisciplinary health care teamwork contributions should be integrated into developing comprehensive and valid, reliable and declarative health education materials. Consequently, health education, particularly in chronic illness should be integrated into nursing curricula as an obligatory course to equip nurse graduates with basics of preparation, developing, implementation and evaluation of health education

materials. Therefore, the current study highlights some ideas for further studies such as (1) assessment of health education needs among CKD patients. (2) Evaluation of CKD patient's compliance with health education. (3) Implementing electronic health education interventions for chronic conditions. (4) Replication of the current study in a longer period and with different health education strategies.

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