Development and Preliminary Validation of Self-management Scale for Breast Cancer Patients in a tertiary hospital in southeastern Nigeria

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ABSTRACT

Background: Self-management process of diseases aims to equip patients with specific information that will improve adherence with prescribed medication and develop strategies that will help to maintain good quality of life. This study developed and validated a self-management scale for breast cancer patients in two tertiary hospitals in southeastern, Nigeria.

Methods: A set of 35-potential self-management model was developed for the breast cancer patients in 2 domains from extensive literature search. The Instrument was validated using Delphi technique, item-total correlation analysis, factor analysis, construct validity and reliability analysis. Consensus was reached on the content validation of the self-management scale with mean score > 3.5, median > 3.5, absolute value between the median and mode < 1.00.

Results: Forty-three items emerged after content validation in 2 domains: demographic characteristics of patients, and self-management content. Construct validity for selected items of the instrument showed values above 0.5. Item-total correlation analysis resulted in 31-items of the instrument. Factor analysis revealed a multi-dimensional instrument. The internal consistency of the instrument was determined with values between 0.5 - 0.8. The Cronbach's alpha for the reliability of the items of the instrument were : Items 1 to 11: 0.60; Items 12 to 17: 0.60; Items 18 and 19: 0.80; Items 20 to 30: 0.50; and Items 31 to 33: 0.60.

Conclusion: Preliminary validation of the instrument showed the instrument is valid but the internal consistency needs to be evaluated further with larger population size. The self-management scale revealed level of self-management among the breast cancer patients. This instrument should form a reliable tool for evaluating self-management in breast cancer patients in Nigeria.

INTRODUCTION:

There has been an increase in the global burden of cancer especially in the low and middle income countries hence implementing effective strategies of primary prevention is of utmost concern [1]. Cancer is now being classified as a chronic disease, whose diagnosis have been associated with beginning of end of life to majority of people with emergence of new challenges in its survival such as long term care and management of symptoms [2].The number of individuals diagnosed with cancer has been on the increase and it's estimated to reach 27 million by 2050 [2]. Breast cancer is the most common type of malignant cancer in women and has accounted for about 30% of all new cancer cases in women in 2021 [3]. Breast cancer has been described as a heterogeneous disease, characterized by its complexity in histology, in metastatic behavior, alteration of gene and the responses to treatment. [4,5]. There were more than 2 million recorded cases of breast cancer in women worldwide in 2020 [6]. Reports have shown that the incidence rate of breast cancer is higher in developed countries than developing countries worldwide, though this varies with ethnicity and race [7]. The incidence of breast cancer is however growing in developing countries but the outcomes are low due to late presentation [8]. In Nigeria, there has been a drastic increase in the incidence of breast cancer as a result of lifestyle and urbanization [4]. The 5-year survival rate for breast cancer has been estimated to about 87.2% following adequate treatment [9]. Cancer patients usually experience physical symptoms, emotional problems and social problems during treatment and different interventions have been developed for breast cancer patients from period of diagnosis to survivorship after treatment [10]. Cancer survivorship is the period starting from the diagnosis of cancer through the patients' balance of life. Breast cancer survivorship demands regular oncology visits, understanding and managing the signs and symptoms of the disease as well as the effects of cancer and its treatments; dealing with the psychological, emotional and social problems of patients.

Self-management aims to actively involve patients in the self-care process and make them to be more responsible in managing the symptoms and complications of their diseases [11]. It is the ability of an individual to manage the symptoms, treatments, changes in lifestyle, psychological, spiritual, social, emotional consequences of chronic diseases in collaboration with their caregivers, families, community and healthcare professionals [12]. Most chronic diseases are being linked to lifestyle hence self-management is an opportunity to ensure that interventions are provided to individuals at their level that will impact positively on their health [13]. Self-management is different from self-care in that self-care deal with activities that are performed by individuals and communities to sustain and promote health [14]. Several studies have been conducted on the self-management of chronic disease showing that self-management interventions can improve outcomes of patients with cancer in terms of their quality of life and psychosocial wellbeing [15]. Studies have shown that there is a gap in literature in the outcome of self-management in breast cancer as a chronic disease [16,17]. Barkitas and colleagues stressed the need to refine the existing models and address the need of incorporating management of symptoms in cancer patients. [2]. To improve survivorship in patients with breast cancer, self-management models should be developed and implemented in managing breast cancer as a chronic disease. This will improve survivorship in the three phase of cancer care continuum. This study therefore aimed to develop and validate self-management scale for breast cancer patients in two tertiary hospitals in southeastern, Nigeria.

Materials:

Development of the questionnaire

Extensive literature search was conducted to search for self-management scale developed for breast cancer patients by searching Medline through Pubmed

and Google scholar. The following keywords were searched: "self-management", "development", "validation", "breast cancer". Studies selected were those that reported development and validation of self-management scale, studies on self-efficacy model, those that reported symptom management, management of drug adherence, social support, and emotional management. A set of thirty-five potential self-management scale was developed in 2 domains from literature search [18,19,9,20,15,21-24]. The 35 potential self-management scale was reviewed by 10 panel of experts for content validity.

Sample size/sampling technique

Purposive sampling technique was employed to select panel of experts for Delphi technique. The inclusion criteria were medical oncology specialist and pharmacy oncology specialist practicing in facilities with functional oncology clinics. Ten panel of experts were selected from the inclusion criteria: 6 medical oncology specialist and 4 pharmacy oncology specialists. For a satisfactory result from Delphi panel, ten to fifteen panel of experts are needed [25]. A systematic review of the content validation of self-management interventions showed that it is based mainly on expert opinions [26].

Instrument validity and reliability

Content validity

The instrument was subjected to content validation using Delphi technique conducted in three rounds by consulting 10 expert panels. The experts reviewed the developed instrument based on the following criteria: appropriateness of the contents; its relevance to the theme content; need for addition or deletion of an item from the scale; simplicity of language; repetitions; comprehensibility of the scale.

Round 1 Delphi technique

In the first round, a questionnaire-based self-management scale was distributed to the panel of experts with clear and specific instruction on how to fill the questionnaire. Each of the experts were to tick agree (A) or disagree (D) beside each of the items. Those who disagreed with the items were asked to state their reasons. The experts were also encouraged to provide additional comments and suggestions that will help in developing the instrument. To ensure that the items of the instrument reach consensus, 8 out of the 10 experts must agree on each item of the instrument (80% agreement from the panel of experts) for the item to be accepted on each of the rounds [25]. After a period of 2 weeks, the questionnaire was collected back. Questions that did not meet the 80% consensus were restructured based on the feedback and comments received from the experts. The instrument was summarized for the second round.

Round 2 Delphi technique

For round two Delphi technique, the summarized instrument from the first round was distributed to the panel of experts. The experts used the same voting they used in first round but this time they had the knowledge of the previous rounds comments and scores and are free to change their mind as they reflect on the decision from the round and still preserve the anonymity of their responses. Questions that needed to be rephrased were rephrased and those that did not reach consensus were deleted from the list. At the end of this round, the instrument was summarized for the third round.

Round 3 Delphi technique

In the third and final round of the Delphi panel, Likert scale instrument was distributed to the panel of experts. The experts were asked to state the degree to which they agreed or disagreed with the items of the instrument using a 5 point scale where 1 meant highly irrelevant and 5 meant highly relevant. The aim of the third round was to clarify those questions that reached consensus and also to generate additional information needed to develop the instrument. The second and third rounds of the Delphi technique were aimed to achieve consensus in response. Once consensus was reached, Delphi panel was deemed complete. At the end of the third round, forty- three itemed self-management scale was developed in 2 domains: demographic characteristics, which consisted of twelve statements and self-management content, which consisted of thirty-one statements. The period of data collection was from November 2021 to January 2022.

The self-management scale

The first domain of the self-management scale consisted of the demographic characteristics of the respondent. This included twelve items with mixed options. The second domain consisted of the following:

1. A statement on the concern(s) of the respondent. This was an open-ended interview question to determine the needs of the respondent in relation to the management of their illness.

2. Statements on daily life management. This included eight items with 5-point Likert scale options where 1= strongly disagree and 5= strongly agree and two items with Yes and No option

3. Statements on management of medication and symptoms of disease. This section included 11 items with 5-point Likert scale options and three items with Yes and No option.

4. Statements on emotional, cognitive management and social support. This also included nine items using 5-point Likert scale options.

Method of data collection

Data was obtained from breast cancer patients receiving treatment in two tertiary hospitals in southeastern Nigeria. The sampling strategy was based on recently diagnosed breast cancer patients and breast cancer patients currently receiving treatment in the two tertiary hospitals. Thirty- five breast cancer patients were included in the study but only thirty fully participated in the study. A sample size of 30 is suitable for measuring the internal consistency of items using Cronbach's alpha if the items have good correlation [27]. The period of data collection was from January to April, 2022.

Item-total correlation

Item-total correlation was calculated for each item on the instrument. For an item to be retained, it should have an item-total correlation value greater than 0.2 [28,29].

Factor analysis

Factor analysis was performed using principal component analysis by employing Varimax rotation to establish the factors or components in the instrument. The factors were composed of extraction communalities. Missing values were handled using list wise deletion. Criterion

Eigen value greater than 1 was used to the number of factors to be retained. For an item to be retained, it must have a factor loading greater than 0.4 [29].

Construct validity

The construct validity of the instrument was determined by computing the convergent validity of its items. Two pairs of items from the two domains were chosen to assess construct validity.

Reliability analysis

The internal consistency of the instrument was calculated to obtain reliability statistics using Cronbach's alpha.

Method of data analysis

Data collected was analyzed using Statistical Package for Social Students (SPSS) version 27. The information obtained from collective judgment of the participants was analyzed using mean, median and mode. Studies have shown that measures of central tendency (mean median and mode) are the major statistics used in analyzing studies in Delphi technique [25]. The statements considered effective or relevant were those who met the following criteria:

1. 80% of the participants vote must rate 3 or higher on a 5 point scale
2. The mean score on the Likert scale should be > 3.5
3. The median should be > 3.5
4. The absolute value of the difference between the median and mode should be < 1.00 [25].

Results:

After round 1 voting, 34 statements reached consensus from the initial 35 statements of the self-management scale reached consensus in 2 domains (≥ 8 of the expert panel members ticked "agree" on the statements). The experts reached consensus to remove two statements: "I store my medications according to my providers' instruction; and I learn that negative emotions can affect the body." One statement "I also contact my pharmacist when I experience an adverse effect" was added to the instrument after round 1 voting increasing the number of statements of the instrument to 33 items.

After round 2 voting, the panel of experts reached consensus on 43 statements. The expert panel reached con-

sensus to add 10 statements to the final instrument after the round 2 voting These statements are: "When did you start your menstrual period; how many children do you have; did you breastfeed your children; do you have history of breast cancer in your family; menopause status (for the demographic characteristics of the respondents); I do monthly self-breast examination of the opposite breast; l can manage simple side effects of my medication such as nausea and vomiting with simple OTC drugs; I have access to my medications whenever I need them; I have financial constraints in accessing my medications and I cry as a result of my breast cancer."

The final instrument consisted of 43 statements in 2 domains. 12 statements related to demographic characteristics, 1 statement related to the needs and (or) concerns, 8 statements related to daily life management; 14 statements related to management of symptoms of medication and side effect of treatment while 9 statements related to emotional, cognitive management and social support. At the end of the third round, consensus was established. Ratings at the end of round 3 Delphi technique is shown in Table 1.

Computing the corrected item-total correlation for each item revealed that ten items of the instrument had correlation values < 0.2. The computed total-item correlation of the items of the instrument is shown in Table 2.

Table 1. Result of the rating from the round 3 Delphi Technique

omponents of Self-management scale	Consensus			
	Mean	Median	(Me-Mo)	Status
DOMAIN I: Demographic characteristics **1. Age** **18-29 30-39 40- 49 ≥ 50**	5.0	5.0	0.0	valid
2. Marital status **Married Single Divorced Widowed Separated**	4.4	4.0	0.0	valid
3. Employment status **Unemployed Self employed Civil servant Retired Others**	4.1	4.0	0.0	valid
4. Level of education **Uneducated Primary school Secondary school Tertiary level**	4.3	4.0	0.0	valid
5. Part of breast affected **Rt Breast Lt Breast Both Breast**	4.6	5.0	0.0	valid
6. Duration of disease (Yrs)	4.6	5.0	0.0	valid
7. When did you start your menstrual period? **< 10 years 10-15 years > 15 years n**	4.7	5.0	0.0	valid
8. How many children do you have? **None One Two Three Four > Four**	4.7	5.0	0.0	valid
9. Did you Breastfeed your children? **Yes No**	4.8	5.0	0.0	valid
10. Do you have any history of breast cancer in your family? **Yes No**	4.6	5.0	0.0	valid
11. Menopausal status **Pre-menopausal Menopause Post-menopausal**	4.3	4.0	0.0	valid
DOMAIN II: SELF MANAGEMENT CONTENT **Daily life management** **12. I am particular about what my diet. I eat mainly fruits, vegetables and food rich in protein**	4.0	4.0	0.0	valid
13. I drink plenty of water (> 5L) daily	4.0	4.0	0.0	valid
14. I check my body weight every week	4.0	4.0	0.0	valid

15. I make sure I have 6 to 8 hours of sleep daily	4.0	4.0	0.0	valid
16. I exercise at least 3 times a week based	4.5	4.5	0.0	valid
17. I do not smoke (or stopped smoking)	4.4	4.0	0.0	valid
18. I do not drink alcohol (or stopped drinking)	4.8	5.0	0.0	valid
19. I do monthly self breast examination of the opposite normal breast	4.3	4.0	0.0	valid
20. I contact my doctor only when I experience an adverse drug reaction	4.1	4.0	0.0	valid
21. I also contact my pharmacist when I experience an adverse drug reaction	4.5	4.5	0.0	valid
22. I usually follow my doctor's advice and return for review	4.2	4.0	0.0	valid
23. I self- manage the physical symptoms of my diseases	4.3	4.0	0.0	valid
24. I can manage simple side effects of my medication such as nausea and vomiting with simple OTC drugs.	4.5	4.5	0.0	valid
Management of medication and side effect of treatment 25. I have good knowledge and understanding of my medications	4.5	4.5	0.0	valid
26. I have access to my medications whenever I need them	4.8	5.0	0.0	valid
27. I have financial constraints in accessing my medications	4.0	4.0	0.0	valid
28. I accept my doctor's medication plan	4.4	4.0	0.0	valid
29. I take my medications on time according to doctor's advice	4.0	4.0	0.0	valid
30. I sometimes forget to take my medication.	4.2	4.0	0.0	valid
31. Do you sometimes forget to bring your medication when you travel?	4.0	4.0	0.0	valid
32. Do you sometimes stop taking you medication especially when you feel your health condition is under control?	4.0	4.0	0.0	valid
33. Do you often have difficulty remembering to take all your medication?	4.0	4.0	0.0	valid
Emotional, cognitive management and social support 34. I am cared for and supported by friends and friends.	4.0	4.0	0.0	valid
35. I participate actively is social activities within my capacity.	4.0	4.0	0.0	valid
36. I discuss any information concerning my medication with family and caregiver	4.0	4.0	0.0	valid
37. I feel that my family and colleagues treat me differently	4.0	4.0	0.0	valid
38. I vent my emotions on family and friends unconsciously during my treatment	4.0	4.0	0.0	valid
39. I am able to recognize my emotional changes	4.2	4.0	0.0	valid
40. I do not want to talk to anyone when I am feeling depressed	4.3	4.0	0.0	valid
41. I cry as a result of my breast cancer	4.0	4.0	0.0	valid
42. How do you relieve stress? by talking, watching TV, taking a deep breath or surfing the Internet. Choose the one which applies	4.3	4.0	0.0	valid

Factor analysis was performed on the items of the instrument using principal component method and varimax rotation and four factors emerged. The first factor had information on the demographic characteristics of the respondent. Seven out of the eleven items in this factor had factor loading >0.5. Items 12 to 19 were loaded on the second factor and made up daily life management. Out of the nine items, only one item had had factor < 0.5. The third factor (items 20 to 33) made up management of medication and symptoms of diseases. Twelve out of the fourteen items had factor loading > 0.5. The fourth factor labeled Emotional, cognitive management and social support had nine items (items 34 to 41) with factor loadings > 0.5. Details of the factor analysis are shown in Table 3.

Construct validity was conducted on selected items of the instrument. Two pairs of items: items 9 and 10 from domain I and items 12 and 15 from domain II were used to determine the construct validity of the instrument. The items are related and are expected to be dependent

Table 2. Corrected Item-total Correlation

Items	Corrected item-total correlation
DOMIAN I: Demographic characteristics **1. Age** 18-29 30-39 40- 49 ≥ 50	**0.797**
2. Marital status **Married Single Divorced Widowed Separated**	**0.479**
3. Level of education **Uneducated Primary school Secondary school Tertiary level**	**0.032**
4. Employment status **Unemployed Self employed Civil servant Retired Others**	**0.094**
5. Part of breast affected **Rt Breast Lt Breast Both Breast**	**0.220**
6. Duration of disease (Yrs)	**0.727**
7. When did you start your menstrual period? **< 10 years 10-5 years > 15 years n**	**0.110**
8. How many children do you have? **None One Two Three Four > Four**	**0.785**
9. Did you breastfeed your children	
10. Menopausal status **Pre-menopausal Menopause**	**0.804**
11. Do you have any history of breast cancer in your family? **Yes No**	**-0.112**
DOMAIN II: SELF MANAGEMENT CONTENT **Daily life management**	
12. I am particular about what my diet. I eat mainly fruits, vegetables and food rich in protein.	**0.669**
13. I make sure I have 6 to 8 hours of sleep daily	**0.693**
14. I drink plenty of water (> 5L) daily	**0.596**
15. I exercise at least 3 times a week based	**0.550**
16. I check my body weight every week	**0.510**
17. I do monthly self breast examination of the opposite normal breast	**0.490**
18. Do you smoke (or stopped smoking)	**-0.138**
19. Do drink alcohol (or stopped drinking)	**-0.031**
Management of medication and side effect of treatment **20. I usually follow my doctor's advice and return for review**	**0.237**
21. I accept my doctor's medication plan	**0.292**
22. I contact my doctor when I experience an adverse drug reaction	**0.458**
23. I also contact my pharmacist when I experience an adverse drug reaction	**0.485**
24. I have financial constraints in accessing my medications	**0.422**
25. I can manage simple side effects of my medication such as nausea and vomiting with simple OTC drugs.	**0.402**
26. I self- manage the physical symptoms of my diseases	**0.503**
27. I have good knowledge and understanding of my medications	**0.569**

28. I have access to my medications whenever I need them	0.686
29. I take my medications on time according to doctor's advice	0.145
30. I sometimes forget to take my medication.	0.094
31. Do you sometimes forget to bring your medication when you travel?	0.143
32. Do you sometimes stop taking you medication especially when you feel your health condition is under control?	0.126
33. Do you often have difficulty remembering to take all your medication?	-0.139
Emotional, cognitive management and social support 35. I discuss any information concerning my medication with family and caregiver	0.213
36. I feel that my family and colleagues treat me differently	0.265
37. I am able to recognize my emotional changes	0.381
38. I vent my emotions on family and friends unconsciously during my treatment	0.419
39. I do not want to talk to anyone when I am feeling depressed	0.427
40. I cry as a result of my breast cancer	0.749
41. I participate actively is social activities within my capacity.	0.432

Table 3. Factor Analysis

Items	1	Domains 2	3	4
DOMIAN I: Demographic characteristics 1. Age 18-29 30-39 40- 49 ≥ 50	0.783			
2. Marital status Married Single Divorced Widowed Sepaed	0.511			
3. Level of education Uneducated Primary school Secondary school Tertiary level	0.859			
4. Employment status Unemployed Self employed Civil servant Retired Others	0.388			
5. Part of breast affected Rt Breast Lt Breast Both Breast	0.411			
6. Duration of disease (Yrs)	0.727			
7. When did you start your menstrual period? < 10 years 10-5 years > 15 years n	0.401			
8. How many children do you have? None One Two Three Four > Four	0.837			
9. Did you Breastfeed your children? Yes No	0.787			
10. Menopausal status Pre-menopausal Menopause	0.807			
11. Do you have any history of breast cancer in your family? Yes No	0.115			
DOMAIN II: SELF MANAGEMENT CONTENT Daily life management				
12. I am particular about what my diet. I eat mainly fruits, vegetables and food rich in protein.	0.378			

Item				
13. I drink plenty of water (> 5L) daily	0.453			
14. I check my body weight every week	0.592			
15. I make sure I have 6 to 8 hours of sleep daily	0.526			
16. I exercise at least 3 times a week based	0.786			
17. I do monthly self breast examination of the opposite normal breast	0.570			
18. Do you smoke (or stopped smoking)	0.907			
19. Do you drink alcohol (or stopped drinking)	0.739			
Management of medication and side effect of treatment				
20. I contact my doctor only when I experience an adverse drug reaction		0.580		
21. I also contact my pharmacist when I experience an adverse drug reaction		0.568		
22. I usually follow my doctor's advice and return for review		0.490		
23. I self- manage the physical symptoms of my diseases		0.895		
24. I can manage simple side effects of my medication such as nausea and vomiting with simple OTC drugs		0.813		
25. I have good knowledge and understanding of my medications		0.676		
26. I have access to my medications whenever I need them		0.464		
27. I have financial constraints in accessing my medications		0.228		
28. I accept my doctor's medication plan		0.937		
29. I take my medications on time according to doctor's advice		0.783		
30. I sometimes forget to take my medication.		0.319		
31. Do you sometimes forget to bring your medication when you travel?		0.596		
32. Do you sometimes stop taking you medication especially when you feel your health condition is under control?		0.584		
33. Do you often have difficulty remembering to take all your medication?		0.419		
Emotional, cognitive management and social support				
34. I am cared for and supported by friends and friends.			0.904	
35. I discuss any information concerning my medication with family and caregiver			0.734	
36. I feel that my family and colleagues treat me differently			0.883	
37 . I am able to recognize my emotional changes			0.871	
38. I do not want to talk to anyone when I am feeling depressed			0.737	
39. I vent my emotions on family and friends unconsciously during my treatment			0.754	
40. I cry as a result of my breast cancer			0.833	
41. I participate actively is social activities within my capacity.			0.577	

on each other to have convergence. Correlation values of 0.5 to 1.0 would indicate convergence. Items 9 versus 10 had correlation value of 0.733 while item 12 versus 15 had correlation value of 0.589. Detailed analysis is shown in Table 4. For the reliability analysis, the Cronbach's alpha for the items of the instrument are as follows: Items 1 to 11: 0.60; Items 12 to 17: 0.60; Items 18 and 19: 0.80; Items 20 to 30: 0.50; and Items 31 to 33: 0.60.

Discussion:

This study aimed to develop and validate self-management scale for breast cancer patients in two tertiary hospitals in southeastern Nigeria. This self-management scale is the first to be used in Nigerian hospital setting to the best of our knowledge. It was developed through intensive literature search. The content validity of the self-management scale was done using Delphi tech-

Table 4. Construct validity

Items	Item 9	Item 10	Item 12	Item 15
Item 9 **How many children do you have?**	1.00	0.733	0.268	0.237
Item 10 **Did you Breastfeed your children?**	0.733	1.00	0.153	0.103
Item 12 **I am particular about what my diet. I eat mainly fruits, vegetables and food rich in protein.**	0.263	0.153	1.00	0.589
Item 15 **I make sure I have 6 to 8 hours of sleep daily.**	0.237	0.103	0.589	1.00

Values above 0.5 show convergent correlations.

nique conducted in three rounds using expert opinion. A study [30] stated that expert opinion is the most commonly used method and a convincing approach for measuring content validity. Delphi technique has been used in validating self-management scale [31-36, 30, 15, 21,37,38]. The number of items that resulted in our self-management scale was greater than that developed in high income countries like China, Taiwan, Korea, United States of America (USA). The study in China [16] developed 36-itemed oral chemotherapy self-management scale for breast cancer. This included the following: daily life management (8 items); symptom management (6 items); medication management (11 items); emotional cognitive management (7 items); social support (4 items). Another study in China [39] developed 32 itemed breast cancer scale across 4 categories. A study in Taiwan [21] developed 34 itemed symptom management self-efficacy scale for breast cancer in relation to chemotherapy. This included the following: Communicating about chemotherapy (3 items); measurement of chemotherapy-related symptoms (14 items); managing emotional and inter-personal disturbances (7 items); acquiring relevant resources (9 items). Studies in Korea [37] and USA [40] developed 21 and 14 itemed self-efficacy scale respectively for breast cancer patients. The difference in the number of items of the self-management scale in the high- income countries when compared to ours could be explained partly due to lack of understanding of self-manage-

ment of the disease on the part of the patients or due to the lower standards of care obtainable in developing countries [25]. The developed self-management scale would however improve self-management among breast cancer patients in Nigeria.

The validity of our self-management scale was supported by factor analysis, item-total correlation and construct validity.

Results obtained from the construct validity showed the self-management scale adequately assessed the items for which they were intended to assess. The result of factor analysis in this study showed that the self-management scale is multi-dimensional and this may have resulted in the low Cronbach's alpha values obtained. The Cronbach's alpha of the scale with respect to the reliability was between the ranges of 0.50 to 0.80. According to George and Mallery, Cronbach's alpha value above 0.90 indicated excellent internal consistency while value below 0.50 is unacceptable [41]. A high Cronbach's alpha value show good consistency of the scale and the items of the scale but does not indicate that the scale is unidimensional. Cronbach's alpha is grounded on the Tau-equivalent model which assumes that a scale is unidimensional. According to this model, if an instrument has multiple factors revealed by factor analysis, then the assumption is violated, and reliability of the instrument is under estimated by Cronbach's alpha. Studies have also shown that larger minimum size is needed to detect Cronbach's alpha at 0.70, but a sample size of 30 can

be used to measure internal consistency of items of an instrument using Cronbach's alpha if the items of the instrument have good correlation [27].

The developed self-management scale can be used as a tool to promote self-management in breast cancer patients in Nigeria. This instrument can also be used to determine the barriers to self-management in breast cancer patients in Nigeria.

This study had some possible limitations. One of the limitations could be due to the possible side effects of Delphi technique. This was minimized by ensuring strict confidentiality and avoiding contacts among the expert panels. Respondents fatigue was minimized by limiting the Delphi rounds to 3. The small sample size used in this study could have affected the result of the Cronbach's alpha obtained.

Conclusion:

This study developed a self-management scale, first of its kind, to be used in breast cancer patients in Nigeria. The validation process indicated that the instrument is valid and reliable and will be a valuable instrument in assessing self-management in breast cancer patients in Nigeria. Further studies in needed to evaluate the internal consistency of the items of this instrument.

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Conflict of Interest:

The authors declared that they have no conflict of interest to disclose

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Ethical statement:

Ethical approval was obtained from the ethics committee of Chukwuemeka Odumegwu Ojukwu University Teaching Hospital: COOUTH/CMAC/ETH.C/VOL.1/FN:04/141. All subjects provided written informed consent for inclusion before they participated in the study.

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