PALGO JOURNAL OF EDUCATION RESEARCH

ISSN 2476-8332
Volume 7 Issue 3,December 2021.Page 50-61
www.palgojournals.org/PJER/Index.htm
Corresponding Author's Email:sarahdalezeola@gmail.com

Nutrition Support Workshop in Ghana Improves Knowledge and Confidence of Nutrition Professionals: A Prospective, Single Cohort Study

Sarah Dale Zeola* ,Andrea Arikawa[2] ,Matilda Asante[3] ,Laurene Boateng[4] ,Leah Qubty[5] ,Su-Nui Escobar[6] ,Debra A. Silverman[7] , Lauri Wright[8]

University of Dayton, Dayton, Ohio, United States of America*
University of North Florida, Jacksonville, Florida, United States of America[2,5,6,7,8]
University of Ghana, Accra, Ghana[3,4]

Accepted November 30, 2021

Introduction: Ghana, a middle-income country in West Africa, has long experienced high rates of malnutrition and is increasingly struggling with nutritional challenges from non-communicable diseases. There is an inadequate number of trained nutrition professionals in Ghana. Professionals providing nutrition care have limited opportunities for continuing education. This research sought to determine if providing a nutrition support workshop to Ghanaian nutrition professionals would impact their confidence in nutrition support practice, satisfaction with their nutrition support knowledge, and ability to apply nutrition support knowledge.
Methods: This quasi-experimental, prospective, singlecohort, pre-test/post-test study evaluated the impact of a nutrition support workshop provided for nutrition professionals in Accra, Ghana. Self-administered demographic and nutrition support questionnaires were collected prior to and at the conclusion of the workshop. Participants (n=76) included Ghanaian dietitians, dietetic interns, dietetic students, and nutritionists. Data was analyzed using paired sample t-tests.
Results: Participants reported having great extent of responsibility for providing nutrition support care (n=60, 85.7%). Participants' confidence in their nutrition support skills (p=.000), satisfaction with their nutrition support knowledge (p=.000), nutrition support knowledge accuracy (p=.000), and ability to apply knowledge gains using the Nutrition Care Process (NCP, n=39, p=.000) improved significantly following the workshop.
Discussion: 1-day intensive workshops are effective in improving nutrition support knowledge, confidence, satisfaction with knowledge, and ability to apply nutrition support knowledge using the Nutrition Care Process. Workshops are successful in meeting the continuing education needs of Ghanaian nutrition professionals, providing a platform from which to scale up nutrition in West Africa.

Keywords: Nutrition support, Nutrition care, Dietitian, Nutritionist, Continuing education

INTRODUCTION

There is a paucity of research on nutrition support, continuing professional education, and standards of dietetics practice in Ghana, Sub-Saharan Africa, and low- and middle-income countries.In Ghanathere is a critical shortage of qualified dietitians throughout all regions making the continuing education of qualified professionals of vital public health concern. (Aryeetey *et al* 2014)(Sodjinou *et al* 2014) In a survey of dietitians and dietetic interns by Aryeetey and colleagues, the respondents reported many challenges to dietetic practice in Ghana including, "inadequate access to in-service training and job aids, poor remuneration and rewards system, and absence of appropriate legal and regulatory framework to guide dietetic practice."[1]Increasing professional development opportunities in healthcare settings has been shown to improve provider retention and satisfaction. (Cooper E.2009) The gaps in knowledge and practice among Ghanaian dietitians are not due to lack of individual capacity, rather they are due to limited resources, limited opportunity for professional development, and lack of culturally relevant nutrition therapy protocols. Ghanaian nutrition professionals are

dissatisfied with the lack of continuing education opportunities (Aryeetey *et al* 2014)which is evidence of their desire to be involved in the learning process, self-direction, and intrinsic motivation. This project built upon a foundation of relationships between dietetic leaders at the University of North Florida (UNF) and the University of Ghana. Previous workshops were held in Accra, Ghana in 2017 and 2018 focusing on the Nutrition Care Process (NCP) and Nutrition-Focused Physical Examination (NFPE). This project was designed to continue to elevate the level of practice of Ghanaian dietitians by focusing on nutrition support knowledge and skills.

Materials and Methods

Study Design

The University of North Florida Institutional Review Board approved the study protocol and all participants were provided with informed consent information prior to completing the initial survey. No personally identifying information was collected and as such no consent signature was gathered. Participants' returning of surveys constituted consent for study participation.

The aims of this quasi-experimental, prospective, single cohort, pre-test/post-test study were to improve the nutrition support knowledge and confidence in providing nutrition support of an estimated 100 Ghanaian nutrition professionals participating in a 1-day intensive nutrition-support workshop. Participants were asked to complete a socio-demographic survey as well as an enteral nutrition and self-efficacy questionnaire that was adapted from Persenius et al and Reddan, and a case study. Self-assessment questionnaires have previously been shown to be a reliable and valid method for evaluating educational interventions. (D'Eon *et al* 2008)The case study evaluation was used to demonstrate participants' ability to think professionally about practice problems and situations.(Ulanoff *et al* 2009). The intervention for this study was a nutrition support workshop in Accra, Ghana formed through the theoretical lens of Knowles' Adult Learning Theory(Knowles MS 1975) and Moore's Continuing Education Framework.(Moore *et al* 2009) The 6-hour workshop included interactive didactic training designed from an andragogical approach using Knowles' Adult Learning Theory. Topics of the didactic training included nutrition support fundamentals, Nutrition Care Process (NCP) for nutrition support patients covering assessment, diagnosis, intervention (nutrition support access, initiation, advancement, and weaning), monitoring and evaluation (management of complications and acid-base balance), Nutrition-Focused Physical Examination (NFPE) for nutrition support patients (abdominal examination including auscultation and palpation), and micronutrient examination. Following the didactic portion of the workshop, the participants were guided through hands-on small group sessions focusing on NFPE skills of auscultation, palpation, and micronutrient assessment, as well as NCP skills of assessment and diagnosis, intervention, monitoring and evaluation, and managing complications. Participants utilized the knowledge and skills gained during the didactic and skills portions of the workshop in application to case studies on enteral nutrition, parenteral nutrition, and acid-base balance.

Objectives of the training were to enable participants to:

1. Describe the application of the nutrition care process (NCP) for patients requiring nutrition support.
2. Calculate enteral and parenteral nutrition support prescriptions.
3. Explain enteral and parenteral nutrition initiation, advancement, and weaning, including management of nutrition support complications.
4. Describe acid-base balance management for nutrition support patients.
5. Perform nutrition-focused physical exam (NFPE) of a nutrition support patient, including micronutrient examination, abdominal auscultation, and palpation.
6. Apply nutrition support fundamentals to case studies.

Data Collection

The data collection instrument consisted of a 2-part questionnaire comprised of a socio-demographic survey and an enteral nutrition questionnaire. The socio-demographic profile included gender, age, nationality, undergraduate school or university, profession (dietitian, nutritionist, nutrition technical officer, dietetic intern, student or other), current area of practice/work, area of work interest, years in profession, participation in Nutrition Care Process Workshop in 2017, participation in Nutrition-Focused Physical Examination Workshop in 2018, and membership in professional organizations.

The Enteral Nutrition Questionnaire was adapted from a tool utilized by Persenius, Larsson and Hall-Lord.(Persenius *et al* 2006) This questionnaire included 6-subsections containing 53 questions on knowledge of responsibility for nutrition, source of knowledge regarding nutrition , responsibility for enteral nutrition, satisfaction with enteral nutrition

knowledge, enteral nutrition confidence, and knowledge of enteral nutrition interventions. These portions of the questionnaire were not accuracy-based questions, therefore the data from these questions were analyzed based on change in response between the 2 measurements (pre-workshop and post-workshop measurements). The final portion of the survey included knowledge-based questions. Participants knowledge scores were calculated based on the percentage of correct answers out of the total number of questions answered. Any questions that were omitted on either the pre-test or post-test were not included as these questions were not able to be paired to determine a change in accuracy between the pre-workshop and post-workshop measurements. The perceived self-efficacy section of the enteral nutrition questionnaire was adapted from the confidence section of the enteral nutrition questionnaire by Persenius et al and the Work Self-Efficacy Inventory (WSEI).(Reddan G 2016) This portion of the questionnaire evaluated the respondent's confidence in their skills and abilities in providing nutrition support care to patients in a work setting. The case study was utilized to evaluate participant knowledge gains and ability to translate knowledge gains into practice.(Ulanoff *et al* 2009)

Participants

The participants for this study were dietitians, dietetic students, dietetic interns, nutritionists, and nutrition technical officers in Ghana. In Ghana dietitians and nutritionists fulfill different roles with dietitians working primarily in clinical capacities and their nutritionist counterparts working largely in the community. A convenience sample was used in the study based on accessibility of the subjects in the population.(Kim M, and Mallory C 2016) Participants were recruited by invitation through the Ghana Dietetic Association (GDA) by dietitians at the University of Ghana in Accra, Ghana. Over 100 nutrition professionals voluntarily participated in the workshop. Inclusion criteria consisted of profession (dietitian, nutritionist, nutrition technical officer, dietetic intern, or student).

Data Analysis

Demographic characteristics of participants, perceived responsibility for nutrition support, and source of nutrition support knowledge were evaluated using descriptive statistics. Data analysis was conducted using SPSS version 25.0 software, and $p< 0.05$ was considered statistically significant. Change in participant confidence, knowledge, satisfaction with knowledge, and knowledge application were evaluated using paired sample t-tests because only 2 data points were being compared: pre-workshop data and post-workshop data.

Responses from the knowledge section of the enteral nutrition (EN) questionnaire were entered into SPSS with a raw score for the total number of accurate responses for both the pre-workshop and post-workshop questionnaire. Knowledge change from the pre-workshop to post-workshop time measurement was evaluated using a paired sample t-test.

The pre- and post-workshop case studies were graded by two separate, independent raters using a rubric. Cohen's kappa was used to assess for interrater reliability.(Kim M, and Mallory C 2016) The required model assumptions for each statistic were checked to ensure that assumptions were not violated.(Kim M, and Mallory C 2016).

Limitations

The response-shift bias is inherent to pre-test/post-test study design (D'Eon *et al* 2008) Due to time constraints with the workshop, completion of the full post-survey in addition to a retrospective self-assessment was determined to be impractical for this project. A convenience sample, while practical for this research, posed the risk for having a sample that may not be representative of the population.(Kim M, and Mallory C 2016). It is possible that participants upon reviewing the questionnaire decided not to participate in the study leaving those that may have had higher initial confidence in their nutrition support knowledge and skills as participants which could have skewed results. The case study was identified as a potential source of objectivity/subjectivity bias.(D'Eon *et al* 2008) To minimize this concern independent raters were utilized for case study evaluation.

Results

101 pre-workshop survey questionnaires were returned. Of the 101 participants returning a pre-workshop survey, 76 participants completed both a pre-workshop and post-workshop questionnaire and were included in data analysis.

Characteristics of Nutrition Professionals

Tables 1, 2, and 3 show the demographic, professional and practice data of participants in the study. Of those meeting inclusion criteria for data analysis, participants were primarily between the ages of 21 and 30 (*n*=49, 66%), female (*n*=55, 73.3%), Ghanaian (*n*=73, 98.6%),and from the Greater Accra region (*n*=39, 63.9%), current or former students of the University of Ghana (*n*=39, 63.9%), dietitians or dietetic interns (*n*=40, 53.3%), and in practice for 4 or fewer years (*n*=49, 84.5%). Approximately half of participants included in data analysis reported their primary area of practice including inpatient duties in some capacity (*n*=28, 48.4%), though fewer than half of participants reported clinical inpatient as an area they were interested in practicing (*n*=25, 41.4%).

Table 1. Demographics of Participants Included (*n*=76)and Excluded (*n*=39) from Data Analysis

Variable	Participants Excluded from Data Analysis *n*=35		Participants Included in Data Analysis *n*=76	
	n	%	*n*	%
Age *(in years)*	25		74	
< or =20	1	4.0	7	9.5
21-25	6	24.0	25	33.6
26-30	12	48.0	24	32.4
31-35	2	8.0	8	10.9
36-40	3	12.0	7	9.5
41-45	1	4.0	2	2.7
46+	0	0.0	1	1.4
Gender	25		75	
Male	9	36.0	20	26.7
Female	16	64.0	55	73.3
Nationality	25		74	
Ghanaian	24	96.0	73	98.6
Nigerian	1	1.0	1	1.4
Undergraduate School or University	16		61	
University of Ghana	12	75.0	39	63.9
University of Allied Health Sciences	4	25.0	7	11.5
University of the Cape Coast	0	0.0	2	3.3
KNUST	0	0.0	9	14.8
Other	0	0.0	4	6.5

Note: Some participants omitted answers on the demographic survey and as such the number of responses for was not n=35 for excluded participants or n=76 for included participants for all items.

Table 2. Professional Data of Participants Included (*n*=76)and Excluded (*n*=39) from Data Analysis

Variable	Participants Excluded from Data Analysis *n*=35		Participants Included in Data Analysis *n*=76	
	n	%	*n*	%
Profession	26		75	
Dietitian	16	61.5	28	37.3
Nutritionist	2	7.7	7	9.3
Dietetic Intern	5	19.2	12	16.0
Dietetic Student	3	11.5	26	34.7
Other	0	0.0	2	2.7
Years in Profession	22		58	
Less than 1 year	5	22.7	22	37.9
1-4 years	9	40.9	27	46.6
5-9 years	8	36.4	5	8.6
10 or more years	0	0.0	4	6.9
Ghanaian Region of Practice	25		60	
Savannah Region	0	0.0	1	1.7
Northern	0	0.0	1	1.7
Ashanti	1	4.0	7	11.7
Eastern	4	16.0	3	5.0
Western	0	0.0	2	3.3
Western North	0	0.0	1	1.7

Continuation of **Table 2**

Central	1	4.0	2	3.3
Upper West	0	0.0	1	1.7
Upper East	1	4.0	0	0.0
Brong Ahafo	1	4.0	0	0.0
Volta	2	8.0	1	1.3
Greater Accra	14	56.0	39	65.0
Other Regions & Outside of Ghana	1	4.0	2	3.3

Note: Some participants omitted answers on the demographic survey and as such the number of responses for was not n=35 for excluded participants or n=76 for included participants for all items.

Table 3. Practice and Professional Organization Data of Included (*n*=76)and Excluded (*n*=39) Participants

Variable	Participants Excluded from Data Analysis *n*=35		Participants Included in Data Analysis *n*=76	
	n	%	*n*	%
Current Area of Practice	22		57	
Clinical Inpatient	5	22.7	6	10.5
Clinical Inpatient and Clinical Outpatient	6	27.3	9	15.8
Clinical Inpatient, Clinical Outpatient and Pediatrics	0	0.0	9	15.8
Clinical Inpatient, Clinical Outpatient and Community	1	4.5	0	0.0
Clinical Inpatient, Clinical Outpatient, Pediatrics and Community	0	0.0	3	5.3
Clinical Inpatient, Clinical Outpatient and Education	0	0.0	1	1.8
Clinical Outpatient	7	31.8	8	14.0
Pediatrics	1	4.5	0	0.0
Community	1	4.5	2	3.5
Education	0	0.0	12	21.1
Other	1	4.5	7	12.3
Area of Interest for Practice	24		63	
Clinical Inpatient	7	29.2	17	27.0
Clinical Inpatient and Clinical Outpatient	0	0.0	2	3.2
Clinical Inpatient, Clinical Outpatient, and Other	1	4.2	0	0.0
Clinical Inpatient and Pediatrics	0	0.0	2	3.2
Clinical Inpatient, Clinical Outpatient and Pediatrics	0	0.0	1	1.6
Clinical Inpatient, Clinical Outpatient, Pediatrics, and Community	1	4.2	0	0.0
Clinical Inpatient, Clinical Outpatient and Education	0	0.0	1	1.6
Clinical Inpatient, Clinical Outpatient, Pediatrics, and Industry	0	0.0	2	3.2
Clinical Inpatient, Pediatrics and Community	0	0.0	1	1.6
Clinical Outpatient	5	20.8	7	11.1
Clinical Outpatient and Education	0	0.0	1	1.6
Clinical Outpatient and Community	0	0.0	1	1.6
Pediatrics	2	8.3	9	14.3
Industry	4	16.7	4	6.3
Community	2	8.3	2	3.2
Education	1	4.2	11	17.5
Other	1	4.2	2	3.2
Membership in Professional Organizations	25		71	
Yes	23	92.0	47	66.2
Ghana Dietetic Association (GDA)	18	81.8	34	73.9
Academy of Nutrition and Dietetics (AND)	0	0.0	4	8.7
GDA & AND	4	18.2	8	17.4
No	2	8.0	16	22.5
Not sure	0	0.0	8	11.3

Note: Some participants omitted answers on the demographic survey and as such the number of responses for was not *n*=35 for excluded participants or *n*=76 for included participants for all items.

Responsibility for Enteral Nutrition

Few participants reported having written guidelines at their workplace regarding enteral nutrition (*n*=17, 25.0%). However, most participants reported that a dietitian and a nutritionist were responsible for nutrition at their workplace (*n*=60, 85.7% and *n*=44, 63.8%, respectively). Most participants reported a dietitian, sometimes with the aid of other healthcare providers including physicians, nurses, nutritionists, and dietetic interns, was primarily responsible for prescribing the amount, type, and rate of enteral nutrition at their workplace (*n*=57, 86.4%).

Table 4: Responsibility for Enteral Nutrition Among Participants Included in Data Analysis *(n*=76)

	Yes *(n)*	*No* *(n)*	*Don't know* *(n)*
Are there any written guidelines regarding enteral nutrition where you work?	17	35	16
Is there a dietitian responsible for nutrition where you work?	60	5	5
Is there a nutritionist responsible for nutrition where you work?	44	19	6
Is there a nutritional team on your ward?	37	23	6
Is there a nutritional team at your hospital or where you work?	53	14	3
Are there other key persons to consult about enteral nutrition where you work?	36	17	14
Are there other key persons to consult about enteral nutrition outside of where you work?	28	20	20

Note: Some participants omitted answers on the questionnaire and as such the number of responses was not *n*=76 for all items.

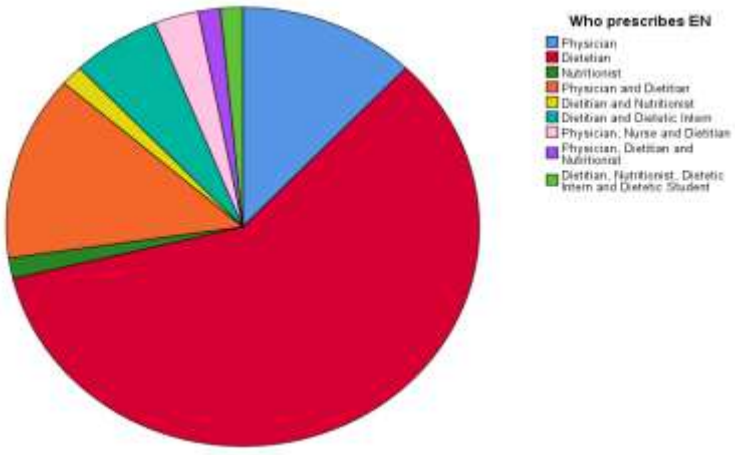

Figure 1. Individual(s) Responsible for Prescribing Enteral Nutrition in Ghana

Participants' perceived responsibility for nutrition support is presented in Table 5. Participants reported a great extent of responsibility for assessment of nutritional status (*M*=4.11, *SD*=1.12), nutrition diagnosis (*M*=4.08, *SD*=0.98), setting the enteral nutrition goal or prescription (*M*=3.34, *SD*=1.45), planning and implementing enteral nutrition interventions (*M*=3.41, *SD*=1.50), and monitoring and evaluation of enteral nutrition (*M*=3.46, *SD*=1.51). Despite having responsibility for many areas of nutrition support care, participants reported limited responsibility for preventing enteral nutrition complications (*M*=3.13, *SD*=1.47).

Table 5: Areas of Perceived Responsibility for Nutrition Support (*n*= 76)

	Mean	*S.D.*
Assessment of Nutritional Status	4.11	1.12
Nutrition Diagnosis	4.08	0.98
Setting the EN Goal or Prescription	3.34	1.45
Planning and Implementing EN Interventions	3.41	1.50
Monitoring and Evaluation of EN	3.46	1.51
Preventing EN Complications	3.13	1.47

S. D.= standard deviation, EN = Enteral Nutrition

Confidence in Nutrition Support Practice

Participants rated their confidence in providing nutrition support both before and after the workshop (see Table 6). Participants were significantly more confident (*p*=.000) in their nutrition support skills in all areas following the workshop. Confidence in nutritional assessment skills improved significantly following the workshop(pre-workshop *M*=3.82, *SE*=.12, post-workshop *M*=4.32, *SE*=.08; *t* (71) = -4.16, *p*=.000). Participant confidence in nutrition diagnosis skills (pre-workshop *M*=3.69, *SE*=.10; post-workshop *M*=4.15, *SE*=.10; *t* (70) = -4.39, *p*=.000), skills in setting the EN goal or prescription (pre-workshop *M*=3.03, *SE*=.13, post-workshop *M*=3.96, *SE*=.12; *t* (38) = -8.69, *p*=.000), skills in planning and implementing EN interventions (pre-workshop *M*=3.00, *SE*=.13, post-workshop *M*=3.93, *SE*=.12; *t* (68) = -8.30, *p*=.000), skills regarding prevention of EN complications (pre-workshop *M*=2.74, *SE*=.13, post-workshop *M*=3.81, *SE*=.11; *t* (69) = -7.82, *p*=.000), and monitoring and evaluation of patients on EN significantly improved following the workshop (pre-workshop *M*=3.06, *SE*=.15, post-workshop *M*=4.03, *SE*=.11; *t* (67) = -7.62, *p*=.000).

Table 6: Confidence in Enteral Nutrition Skills

	Pre-workshop		Post-workshop			
	Mean	*S.E.*	*Mean*	*S.E.*	*t*	*P* value
Confidence with skills regarding assessment of nutritional status	3.82	.12	4.32	.08	-4.16	.000*
Confidence with skills regarding nutrition diagnosis	3.69	.10	4.15	.10	-4.39	.000*
Confidence with skills regarding setting the EN goal or prescription	3.03	.13	3.96	.12	-8.69	.000*
Confidence with skills regarding planning and implementing EN interventions	3.00	.13	3.93	.12	-8.30	.000*
Confidence with skills regarding prevention of EN complications	2.74	.13	3.81	.11	-7.82	.000*
Confidence with skills regarding monitoring and evaluation of enteral nutrition	3.06	.15	4.03	.11	-7.62	.000*

Note: EN= enteral nutrition, PN= parenteral nutrition, S. E.= standard error of the mean, *= statistically significant

Satisfaction with Nutrition Support Knowledge

Participants' satisfaction with their knowledge of nutrition support improved significantly in all areas after the workshop (*p*=.000, see Table 7).

Table 7: Satisfaction with Nutrition Support Knowledge

	Pre-workshop		Post-workshop			
	Mean	*S.E.*	*Mean*	*S.E.*	*t*	*P* value
Satisfaction with knowledge of assessment of nutritional status	3.51	.13	4.34	.09	-6.16	.000*
Satisfaction with knowledge of nutrition diagnosis	3.44	.12	4.19	.09	-5.647	.000*
Satisfaction with knowledge of setting the EN goal or prescription	3.03	.14	3.99	.11	-7.91	.000*
Satisfaction with knowledge of planning and implementing EN interventions	3.06	.14	3.91	.11	-6.76	.000*
Satisfaction with knowledge of prevention of EN complications	2.83	.13	3.92	.12	-8.37	.000*
Satisfaction with knowledge of monitoring and evaluation of enteral nutrition	3.06	.14	4.08	.11	-7.48	.000*

EN= enteral nutrition, PN= parenteral nutrition, S. E.= standard error of the mean, *= statistically significant

Nutrition Support Knowledge

Overall nutrition support knowledge was assessed in the final section of the nutrition support questionnaire with an accuracy score being calculated for the pre-workshop and post-workshop questionnaires (See Figure 2). Participants scores were calculated based on the percentage of correct answers out of the total number of questions answered. Any questions that were omitted on either the pre-test or post-test were not included as these questions were not able to be paired to determine a change in accuracy between the pre-workshop and post-workshop measurements. Participants scored significantly higher in nutrition support knowledge following the workshop with a mean score of 74% accuracy compared with a pre-workshop accuracy score of 65% (pre-workshop: *M*=64.97, *SE*=2.19, post-workshop: *M*=73.70, *SE*=1.76; *t* (73) = -3.94, *p*=.000).

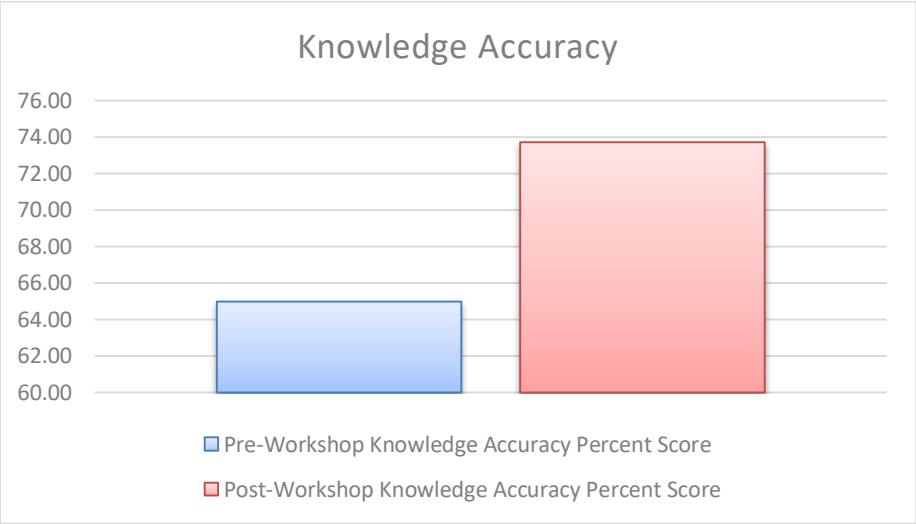

Figure 2. Pre-workshop vs Post-workshop Knowledge Accuracy Raw Score

Nutrition Support Knowledge Change

Nutrition support knowledge improved significantly in many areas following the workshop (see Table 8). For some knowledge questions the pre-workshop knowledge was high making the improvement in score not significant. However, for many questions the change in knowledge improved significantly between the pre-workshop measurement and post-workshop measurement. Participants' knowledge improved significantly in the areas of needing to flush the feeding tube before administration of medications (pre-workshop *M*=1.10, *SE*=.05, post-workshop *M*=1.00, *SE*=.00; *t* (71) =2.16, *p*=.034), need to inspect nostrils for enteral nutrition patients daily (pre-workshop *M*=1.71, *SE*=.11, post-workshop *M*=1.39, *SE*=.09; *t* (69) =2.70, *p*=.009), need to perform an abdominal exam for nutrition support patients daily (pre-workshop *M*=2.08, *SE*=.08, post-workshop *M*=1.92, *SE*=.05; *t* (62) =2.20, *p*=.032), risk for malnutrition among patients receiving enteral nutrition (pre-workshop *M*=1.86, *SE*=.06, post-workshop *M*=1.71, *SE*=.06; *t* (68) =2.09, *p*=.040), risk for micronutrient and macronutrient deficiencies among enteral nutrition patients (pre-workshop *M*=1.99, *SE*=.07, post-workshop *M*=1.84, *SE*=.05; *t* (66) =2.19, *p*=.032), checking of gastric residual volumes (pre-workshop *M*=2.22, *SE*=.08, post-workshop *M*=1.85, *SE*=.074; *t* (67) =3.75, *p*=.000), and enteral nutrition schedule should allow for a night of rest for the patient (pre-workshop *M*=2.01, *SE*=.11, post-workshop *M*=1.56, *SE*=.09; *t* (69) =4.939, *p*=.000), and elevating the enteral nutrition patient's head-of-bed (pre-workshop *M*=2.04, *SE*=.05, post-workshop *M*=1.91, *SE*=.04; *t* (67) =2.247, *p*=.028).

Table 8: Knowledge Change by Question

	Pre-workshop		Post-workshop		
	n accurate	%	*n* accurate	%	*P* value
Feeding tube flushed before administration of nutrition or medication	67	93.1	76	100.0	.034*
Feeding tube does not need to be flushed after administration of nutrition or medication	66	91.7	66	88.0	.045*
Patients receiving EN should have nostrils inspected daily	41	56.9	54	74.0	.009*
Patients receiving EN only need an abdominal exam if they are having abdominal symptoms	41	60.3	57	81.4	.032*
Patients receiving EN are not at risk for malnutrition	55	77.5	53	72.6	.040*
Micronutrient deficiencies are uncommon for patients receiving EN	50	72.5	59	80.8	.032*
Patients receiving EN are at risk for macronutrient deficiencies	34	49.3	40	54.1	.057
Medications not to be crushed may be administered in crushed form through feeding tube	26	60.5	29	43.9	.033*
Gastric residual volumes should only be checked for patients with vomiting	33	47.8	46	61.3	.000*
Patients with diarrhea should have their enteral feedings held until diarrhea resolves	33	46.5	59	79.7	.096
The decision to use EN versus PN should be based on gastrointestinal function	58	81.7	65	86.7	.145
The decision to use EN versus PN should be based on resource availability	30	42.9	32	42.7	.064
Enteral feeding schedule should allow for a night of rest	27	38.0	43	57.3	.000*
Enteral feeding tube placement should be confirmed before feeding is started	64	94.1	72	98.6	.109
Patients on enteral nutrition do not need their head of bed elevated	56	80.0	66	89.2	.028*

Note: Some participants omitted answers on the questionnaire and as such the number of responses was not *n*=76 for all items. EN = enteral nutrition, PN = parenteral nutrition

* = statistically significant

Case Study

Change in application of nutrition support knowledge was evaluated with a case study. Case studies were rated by two independent raters with intraclass correlation of .978 for pre-workshop case studies and .930 for post-workshop case studies showing 97.8% and 93% consistency in ratings between rater 1 and rater 2 for pre-workshop and post-workshop case studies, respectively. The results show significantly higher case study scores after the workshop than before the workshop (pre-workshop, column 1: *M*=9.00, *SE*=.828, post-workshop, column 2: *M*=14.51, *SE*=.601; *t* (38) = -7.289, *p*=.000, see Figure 3).

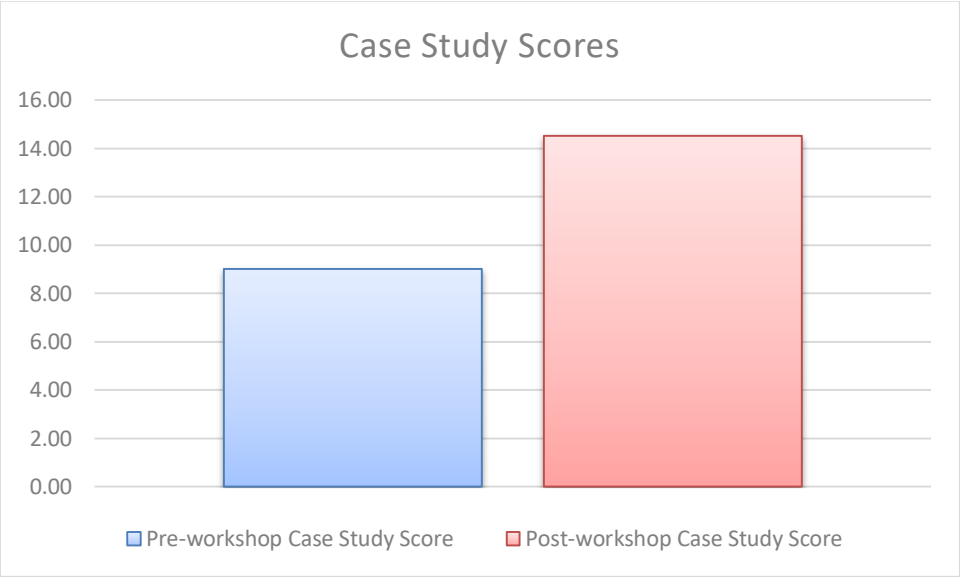

Figure 3. Pre-workshop vs Post-workshop Case Study Scores

Discussion

Ghanaian nutrition professionals demonstrated increased confidence, knowledge, knowledge application, and satisfaction with their nutrition support knowledge following the workshop. These improvements are consistent with previous research showing that Ghanaian nutrition professionals are seeking opportunities for continuing professional education to advance their knowledge and skills which will lead to improved capacity of the nutrition care system (Aryeetey *et al* 2014) Capacity development occurs at many levels within the healthcare system.(Shrimpton *et al* 2014)Capacity development is a "process by which individuals, groups, organizations and societies increase their ability to perform, solve problems, define objectives, understand and deal with development needs to achieve objectives in a sustainable manner." Shrimpton *et al* 2014)Shrimpton noted that capacity building can occur by improving health professionals' in-service training.

Nutrition professionals are key stakeholders in the nutrition care systems within Ghana. Many advances have been made in nutrition care in Ghana during this "Decade of Action on Nutrition," however, the 2015 Global Nutrition Report described a slow rate of change despite Scaling Up Nutrition initiatives, [including] persistent gaps, [and] suboptimal capacity to address malnutrition at the country-level.(Aryeetey R 2016) A key issue in scaling-up nutrition has been "bridging the know-do gap." (World Health Organization 2005)Translating current evidence into practice in developing nations, referred to as knowledge translation (KT), has been identified by the World Health Organization (WHO) as "pos[ing] the greatest opportunity for strengthening health systems." (World Health Organization 2005)Knowledge translation "is defined as 'the synthesis, exchange and application of knowledge by relevant stakeholders to accelerate the benefits of global and local innovation in strengthening health systems and improving people's health.'"(World Health Organization 2005) Providing this workshop to nutrition professionals in Ghana has strengthened the nutrition support care systems in their facilities. Ghanaian nutrition professionals have a great extent of responsibility for and confidence in providing nutrition care to nutrition support patients including nutritional assessment, nutrition diagnosis, setting the enteral nutrition goal or prescription, planning enteral nutrition interventions, and monitoring and evaluating enteral nutrition. The WHO identified "platforms for knowledge exchange and sharing," (World Health Organization 2005)such as workshops, as key strategies for bridging the "know-do gap." (World Health Organization 2005)Tim Evans,

WHO's Assistant Director-General, Evidence and Information for Policy, "underscored the importance of harnessing knowledge to overcome health system constraints and to scale up effective interventions." (World Health Organization 2005)

Nutrition professionals were significantly more satisfied with their knowledge of nutrition support and scored significantly higher on the nutrition support knowledge test following the workshop. This is both statistically and clinically significant as dietitians in Ghana have previously been unsatisfied with opportunities for continuing education. Providing 1-day intensive nutrition education sessions such as this may be a key training method to improve continuing education opportunities and satisfaction among Ghanaian nutrition professionals and throughout West Africa.

Nutrition support care in developing nations lags behind current evidence due to a combination of factors. In a study by Schoeman and colleagues,(Schoeman *et al* 2018) 42% (*n*=23) of pediatric oncology units lacked access to total parenteral nutrition (68.4% of those were in low income countries and 44.4% in lower middle-income countries). Similarly, the authors found that enteral products were also not available in 18.5% (*n*=10) of pediatric oncology units, including 11.1% (*n*=2 of 18) in lower middle-income countries. (Schoeman *et al* 2018) In addition to these logistic challenges, 22.2% (*n*= 4 of 18) of lower middle-income countries (LMICs) reported having no access to commercial nutritional supplements. (Schoeman *et al* 2018) Homemade blenderized enteral nutrition products were frequently relied upon in LMICs (16.7%).(Schoeman *et al* 2018) A blenderized tube feeding (BTF) "is a mixture of food and liquid that is pureed and administered through a feeding tube." (Bobo E 2016) In developed nations in the mid-1900s nasogastric feeding became a viable mode of nutrient delivery and concurrently commercial enteral nutrition formulas were being developed, though BTFs remained the primary source of nutrition for patients receiving tube feedings. (Bobo E 2016) BTFs remain more economical than commercial formulas and "in developing countries, usage of commercial formula for long-term EN may be financially unsustainable, thus making BTFs a necessary option."(Bobo E 2016)

This workshop was feasible due to an ongoing partnership between the University of North Florida and the University of Ghana. Many participants reported knowledge of nutrition support was gained only to a small extent from in-service training. This may be an area where dietitians can expand practice and it shows the benefit of this workshop as in-service training opportunities are likely limited in many areas. Mormina and colleagues(Mormina M, and Pinder S 2018) noted that "Global health partnerships (GHP) between high or low-middle income countries are considered one of the best approaches to health systems strengthening." These partnerships "typically involve highly skilled healthcare workers who volunteer to deliver capacity strengthening projects overseas, often in the form of peer-to-peer support through training and mentoring." (Mormina M, and Pinder S 2018) In developing nations limited access to "training, education, mentoring and continuous professional development (CPD) are all contributing factors that undermine the morale and commitment of healthcare workers." (Mormina M, and Pinder S 2018) GHP are "long-term, sustainable and usually voluntary collaborations between institutions with similar objectives for the mutual exchange of skills, knowledge and experience." (Mormina M, and Pinder S 2018) Healthcare workers' limited number and unequal distribution "in Ghana...is currently one of the most critical issues that prevent improved access to and quality of health services"(Aiga H 2006) throughout the country. The Ghanaian Ministry of Health (MOH) emphasizes the importance of CPE with the In-Service Training Policy (ISTP) which was first developed in 1997 and calls for the systematic delivery of CPE. (Aiga H 2006). The Ghanaian MOH adopted the policy that at least one CPE opportunity should be ensured every three years. (Aiga H 2006) Aiga and colleagues found that only self-perceived CPE needs produced significant odds ratios in dependent variables to the order of the extent to which proactive post-CPE application is expected. Most participants in the nutrition support workshop reported the workshop as relevant to their practice suggesting that the knowledge and confidence gained from participating in the workshop will be applied in their practice.

A limited number of participants reported having key persons to consult about nutrition which represents an area of potential growth for dietitians. If dietitians seek to take on this role, this could elevate the scope of practice and ensure other healthcare providers continue to look to dietitians as experts in nutrition support. Ongoing collaboration between the University of Ghana and Ghana Dietetic Association (GDA) with the University of North and the Academy of Nutrition and Dietetics (AND) will enhance the practice of Ghanaian nutrition professionals and better meet the needs of their patients.

Following the workshop, participants were significantly more able to apply their nutrition support knowledge utilizing the Nutrition Care Process. This is consistent with previous research conducted by Wright, et al, on the 2018 Nutrition-Focused Physical Exam Workshop conducted by faculty and students of the University of North Florida and the University of Ghana which demonstrated that workshop participants had significant increases in knowledge, self-efficacy, and application of malnutrition diagnosis criteria. As Ghana strives to improve its nutrition framework and infrastructure the ability to apply knowledge gained from continuing education will become increasingly important as policies are enacted that standardize the provision of nutrition care. As the incidence of stroke increases in Ghana and throughout West Africa the need for nutrition support is anticipated to rise as patients will have difficulty with self-feeding and will require nutrition support to prevent malnutrition and optimize lean body mass, health and healing. Ghanaian nutrition professionals will be better able to "promote safe, accurate, and effective nutrition support therapy based on the

patient's needs and clinical condition and will provide resource-efficient and fiscally responsible care."(Ukleja et al 2018)

Strengths and Limitations

Strengths of this project include collaboration between faculty from the University of North Florida and University of Ghana to provide a culturally-appropriate, cutting-edge nutrition support workshop that would meet the needs of the nutrition professionals in Ghana; addressing not only their continuing professional education needs, but also their desire to build professional networks and optimize care within the resources available in their work sites.

This research was conducted among a sample of the population of nutrition professionals in Ghana. This research may not be applicable to nutrition professionals in countries other than Ghana or among healthcare professionals that are not nutrition professionals. The workshop was conducted as a one-day, hands-on workshop and results may not be applicable to workshops that are shorter or longer in duration or conducted in a virtual setting.

Conclusions

This workshop expanded the knowledge and confidence of Ghanaian nutrition professionals which will enable them to advocate for their patients and the dietetics profession within Ghana. Ghanaian nutrition professionals have developed the skills that will allow them to advocate for the development and implementation of local nutrition policies to standardize evidence-based nutrition care, allow dietitians to be seen as subject matter experts in nutrition and as such worthy of order-writing privileges, and develop culturally-relevant and resource appropriate nutrition guidelines within Ghana and West Africa.

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