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Educational video intervention improves knowledge and self-efficacy in identifying malnutrition among healthcare providers in a cancer center: a pilot study

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Abstract

Purpose—Cancer is the second leading cause of death in the United States, and malnutrition secondary to cancer progression and treatment side effects is common. While abundant evidence indicates that nutrition support improves patient outcomes, it is estimated that up to half of malnutrition cases are misclassified or undiagnosed. The use of a multidisciplinary team to assess nutrition status has been observed previously to reduce delays in nutritional support. Hence, educating all members of the oncology healthcare team to assess nutrition status may encourage earlier diagnosis and lead to improved patient outcomes. Thus, the objective was to perform a pilot study to assess change in knowledge and self-efficacy among oncology team-members after watching an educational video about malnutrition.

Methods—A pre-test post-test educational video intervention was given to 77 ambulatory oncology providers during weekly staff meetings at a community ambulatory oncology center in central Illinois. Change in knowledge and self-efficacy in malnutrition assessment and diagnosis was measured and acceptability of the brief educational video format was also observed.

Results—Mean test scores improved by 1.95 ± 1.48 points ($p < 0.001$). Individual occupational groups improved scores significantly ($p = 0.005$) except for specialty clinical staff. Self-efficacy improved from 38% to 70%. 90.8% of participants indicated the educational video improved their confidence in assessing malnutrition.

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Conclusions—The educational video was well accepted and improved knowledge and self-efficacy of malnutrition assessment and diagnosis among ambulatory oncology providers. Wider implementation of such an educational intervention and longitudinal testing of knowledge retention and behaviors change is warranted.

Keywords

Malnutrition; cancer; educational video; training video; ASPEN guidelines

Introduction

Cancer is the second leading cause of death in the United States, with an estimated 1,735,350 new cases and 609,640 cancer deaths in 2018.¹ Common side effects of cancer progression and treatment include fatigue, loss of appetite, xerostomia, oral pain and ulceration, constipation, nausea, and vomiting.² These side effects, in addition to increased energy needs during treatment and healing, contribute to malnutrition commonly observed in this population. Malnutrition occurs in 20–70% of all oncology patients, with the highest incidence affecting those with gastrointestinal, liver, lung, and head and neck cancers.³

Malnutrition associated loss of lean body mass is associated with immune suppression, increased susceptibility to infection, and delayed wound healing.⁴ In cancers of the head and neck, nutrition support has been observed to lead to better outcomes, including decreased weight loss, increased completion of radiation treatment, and decreased unplanned hospital admissions.⁵ It has been estimated that 10–20% of cancer deaths are the result of malnutrition,^{6,7} but recent studies have observed that almost half of malnutrition cases are misclassified or undiagnosed, highlighting the importance of healthcare provider training to properly assess and diagnose malnutrition.^{8–10}

A Joint Commission of The Academy of Nutrition and Dietetics (AND) and the American Society for Parenteral and Enteral Nutrition (ASPEN) developed and released a consensus statement in 2012 outlining the importance of assessing malnutrition in adult populations.¹¹ Even though the Joint Commission had previously mandated that malnutrition screening take place within 24 hours of hospital admission, the protocols used to assess malnutrition varied widely. Thus, the 2012 consensus statement includes a framework for assessing malnutrition in the clinical setting and provides descriptions of malnutrition in the context of starvation, chronic disease, and acute disease or injury.¹¹ In addition, the importance of a multidisciplinary team approach to improve patient care in respect to undernutrition has been established. Use of a multidisciplinary team to assess nutritional status reduced delay in nutritional support by 47% and hospital length of stay by two days for malnourished patients, and three days for those severely malnourished.¹²

Assessing malnutrition in the clinical setting is an essential component of patient care, particularly for those with chronic disease. Thus, the ability of healthcare professionals to accurately identify malnutrition in adult populations is an important skill to develop. Despite being an important part of health assessment, malnutrition can often be missed or misidentified.¹³ For this reason, accurate and receivable education on the topic must be a priority for healthcare centers. In 2013, the AND released an interdisciplinary call to action

to address adult malnutrition, voicing an essential need to include other members of the healthcare team to decrease the prevalence of malnutrition. As healthcare team members other than dietitians are consistently involved in patient care and interactions with patient caregivers, they are also key to recognizing early changes in nutritional intake and severity of symptoms. Empowering members of the healthcare team to recognize and relay nutrition concerns to the dietitian is important in implementing an intervention as soon as possible.¹³ Therefore, the present pilot study aimed to evaluate the feasibility and the preliminary effectiveness of presenting a short educational video, which provides knowledge on how to assess and diagnose malnutrition, to healthcare team members in an ambulatory oncology setting. We hypothesized that providing an educational video would lead to improved knowledge scores and greater self-efficacy in assessing and diagnosing malnutrition among all healthcare team members. It was also conjectured that providing this video during regularly scheduled meetings would result in adequate enrollment and diverse coverage for the study, and would reveal modifications which would improve the feasibility and impact of the training in future studies.

Methods

Subjects and Setting

A pilot study was performed which provided a brief educational video intervention explaining malnutrition assessment and diagnosis to clinical staff at an ambulatory cancer center. All study activities were approved by the Carle Foundation Hospital Institutional Review Board and participants provided informed consent. The target sample size was 100 participants as this closely reflects the number of employees of the Carle Cancer Center (n=102). Based on a power analysis for paired sample t-test ($\alpha=0.05$, $\beta=80\%$) and an estimated knowledge gain of two points on a ten point scale, it was indicated that 31 individuals would need to be included in the analysis. Healthcare team members were recruited, consented and participated in the intervention given during weekly staff meetings.

Procedures

Prior to watching the video, participants completed a pre-education questionnaire to assess baseline knowledge regarding malnutrition detection in oncology patients. The educational video included a narrated power point presentation, developed by the research team, aimed to improve participant knowledge of malnutrition and self-efficacy regarding malnutrition assessment and diagnosis. Presentation content was based on the consensus statement released by ASPEN and AND, which outlined assessment characteristics for recognizing and diagnosing malnutrition and undernutrition in adults. Expected learning outcomes for participants included 1) Define malnutrition, 2) Identify malnutrition risk factors, 3) Define malnutrition classifications (i.e., moderate or severe; starvation-related, chronic disease-related, or acute disease-related), and 4) Identify clinical symptoms used to diagnose malnutrition. The video included tables, decision flow-charts, and images to support written and verbal content. Emphasis was given to standardized methods for malnutrition assessment and proper referral to a Registered Dietitian Nutritionist. To measure changes in knowledge and self-efficacy upon watching the educational video, a post-education test was

completed related to malnutrition diagnosis. Questions related to acceptability of the educational video intervention and demographics were also included.

Pre- and Post-test

Pre- and post-tests were developed to assess change in knowledge and self-efficacy of healthcare team members after the educational video intervention. Included were eight questions addressing information discussed in the educational video. Specifically, knowledge of parameters used to define and diagnose malnutrition, consequences of malnutrition if not recognized, and the participants' perceived ability to assess and diagnose malnutrition were assessed. Additional post-test questions included demographics, an evaluation of the intervention, and questions regarding participant confidence in recognition of malnutrition post-intervention.

Pre- and post-tests were validated for content, style, and comprehensiveness (i.e., content validity) by an expert panel of eight Registered Dietitian Nutritionists (RDNs) prior to use, using methods adapted from Grant & Davis.¹⁴ The panel members included PhD and Master's-level RDNs who are nutrition and dietetics educators and specialize in the development and instruction of undergraduate and graduate-level coursework, including medical nutrition therapy for cancer and malnutrition. The majority of the panel members also have research expertise in nutrition education and survey development and validation.

Pre-and post-tests were scored identically with multiple-choice responses given two points for a correct response, true or false questions given one point for correct response, and zero points awarded for an incorrect response. The exception was the question asking, 'Which of the following parameters are used in the diagnosis of malnutrition? Check all that apply', which awarded 0.5 points for each correct response; with six choices, for a possible three points. This question was weighted more heavily because it directly addressed the parameters required for diagnosing malnutrition. In total, there were 12 possible points.

Statistical Analysis

A total of 77 cancer center staff members participated in the study out of 102 employed at the cancer center (75.5%). Surveys that had missing responses on the pre- and post-test questions (n=4) were excluded from the analyses assessing change in knowledge, but the total sample was retained for questions assessing changes in self-efficacy, acceptability of the intervention, and open-ended questions. Skewness and kurtosis were used to evaluate normality of data. Descriptive statistics were used to evaluate epidemiologic characteristics of the study population and to examine distribution of change in pre- and post-test scores by participant characteristics. Age was dichotomized as either >45 or ≤45 years. Education was categorized as some college or a bachelor's degree. Occupation was categorized as physicians, nursing staff, specialty clinical staff, research and administrative staff. Nursing staff included registered nurses, nurse practitioners, and medical assistants. Specialty clinical staff included research personnel, registered dietitians, and social workers. Administrative staff included patient services representatives, administrative assistants, and other administrative staff. Wilcoxon signed-rank test was used to evaluate differences in paired pre-and post-test scores. Bonferroni correction was used to account for multiple

comparisons. Participants were asked their level of confidence in assessing malnutrition following the pre-test and post-test, and three models were used to examine the influences on improved post-test scores using age; age and education; or age, education, and occupation as predictors. All occupations were compared to administrative staff in this analysis. Because nine participants skipped the occupation question or were unable to fit into an occupational category, they were excluded from the model examining occupation as a predictor. Chi-square test of independence was used to determine dependence between categorical variables. Three models were fit to evaluate if feeling increased confidence, finding video information to be novel, finding the video easy to understand, and finding the video length appropriate, were predictive of test scores. Statistical analyses were conducted using SPSS 24 and an alpha level <0.05 was considered statistically significant.

Results

Content Validity of Pre- and Post-Test Questions

When responding to content validity survey questions, 100% of the content validity testing panelists “strongly agreed” with 10 of 12 total questions, and 83% “strongly agreed” with the remaining two questions. Panelists were given the opportunity to provide comments and suggestions for each content validation survey question and these suggestions were incorporated into the final version of the pre- and post-test evaluation surveys.

Knowledge Change

Table 1 shows the distribution of age, gender, occupation, highest level of education, race, and ethnicity. The distribution of occupation and gender among the study participants was representative of the overall cancer center staff (Supplementary Table 1). Pre-test scores ranged from 6–11.5 points while post-test scores ranged from 7–12 points out of 12. Pre- and post-test scores for the full study sample and according to demographic characteristics (age, education, occupation) are displayed in Table 2. A significant increase in pre- and post-test scores was observed, with a mean score improvement of 1.95 ± 1.48 points. Following Bonferroni correction, all groups tested had significantly improved scores except for specialty clinical staff. Age and education were not found to be significantly associated with improved test scores in the multivariate regression models. However, Model 3 indicated that physicians and nursing staff were significant predictors of improved test scores, accounting for 7.2% of the variance when combined (Table 3).

Self-efficacy in Assessing Malnutrition

A significant difference between pre- and post-test responses regarding self-efficacy in assessing malnutrition was observed (chi-square $p < 0.001$). On the pre-test, 38% of participants replied that they ‘disagree’, or ‘somewhat disagree’ with the statement stating confidence in assessing malnutrition compared to 9% of participants responding as such for the post test. Conversely, 38% of participants reported they ‘somewhat agree’ or ‘agree’ to feeling confident assessing malnutrition on the pre-test compared to 70% of the participants on the post-test. When responding to the question asking if watching the educational video gave them more confidence in assessing malnutrition, 69 (90.8%) reported ‘yes’ while 7 (9.2%) reported ‘no’, (one participant did not respond). Multivariate regression model

results are displayed in Table 4. Analyses revealed that improved confidence was a significant predictor of improved post-test scores, independently accounting for about 8.1% of the variance in improved test scores. Novelty of information to the participants was not a significant predictor of improved test scores. Ease in understanding the video was a significant predictor of improved test scores. Together with improved confidence, ease of understanding the video accounted for 13.3% of the variance in improved test scores.

Qualitative Feedback

When asked “What kind of education video would you like to see in future staff meetings?” responses included further or more detailed information on nutrition for oncology patients such as “Signs in particular such as parameters to keep an eye on with patients” and “The approach of nutrition to patients with low weight before starting chemo or treatment” (n=5). Several responses (n=5) sought specific dietary information and their relative outcomes in cancer patients including, “Diets specific to cancer patients” and “Impact on nutrition input and outcome”. Other responses comprised of non-nutrition related content or nutrition-related content not related to cancer patients (n=4). The second qualitative question asked for additional comments for the researchers. Some responses praised the video (n=8), while others provided suggestions for improvement (n=4). Other comments (n=2) contrasted their previous experience with knowledge provided in the video, “I worked as a hospice nurse for 10 years. One criteria for the diagnosis of failure to thrive was a low albumin level. Very interesting to know that is not as significant as we once had thought.”

Discussion

This pilot study aimed to assess the feasibility of providing a brief educational video to the multidisciplinary team of an outpatient oncology center. To facilitate acceptability of the intervention, the video was provided during a weekly meeting attended regularly by oncology team members. Indeed, desired participant enrollment was gained within two weeks of recruitment, indicating that this intervention could reach an adequate number of staff members if integrated into routine hospital training. Additionally, use of the multidisciplinary team meeting provided a diverse audience including physicians, nursing staff, specialty clinical staff, and administrative staff, demonstrating that the intervention reached providers at multiple levels of patient care. Further, the distribution by occupation and gender of the sample tested was similar to the overall makeup of the cancer center.

In addition to feasibility, this pilot study investigated changes in knowledge and self-efficacy related to malnutrition assessment and diagnosis in a variety of oncology healthcare workers after video intervention. Intervention acceptability and ease of understanding were also assessed. Consistent with our hypothesis, providing an educational video resulted in improved knowledge scores and greater self-confidence regarding malnutrition assessment and diagnosis among oncology providers. Significant improvement in test scores persisted across occupational groups, with the exception of specialty clinical staff. Additionally, nearly all participants responded that watching the video gave them more confidence in their ability to assess and diagnose malnutrition. Finally, being a nurse or physician was a

significant predictor of improved knowledge scores, as well as ease of understanding the video.

A previous study that tested the effectiveness of a 20–30 minute, self-directed, online training tool for malnutrition diagnosis and treatment showed a non-statistically significant improvement in post-test scores post-intervention. The authors concluded that a required multimodal training approach may be more effective than simple online educational training.¹⁵ In contrast, the results of the present study suggest that a brief 8-minute training video, provided during a mandatory meeting, did improve both knowledge and self-efficacy in malnutrition assessment and diagnosis. It is possible that a brief video shown as part of a mandatory meeting is a more acceptable and effective training tool as compared to a longer, voluntary and self-directed computer education.

Another study investigated pharmacist and physician knowledge, attitudes, and practice toward nutrition support (in the form of nutritional supplementation and counseling) in a tertiary care hospital.¹⁶ Results suggested that while physicians felt more confident in their knowledge than pharmacists, pharmacists had a higher mean score in knowledge assessment. Interestingly, the results of this study indicated that physician participants contributed the greatest variance in the knowledge improvement model, suggesting that physicians may most benefit from additional nutrition education. Also remarkable, with the exception of specialty clinical staff, all groups tested in the present study had significant improvement in knowledge change. An improvement in scores was observed in specialty clinical staff, but was not significant after Bonferonni correction. A potential explanation for this observation may be that specialty clinical staff (n=8) included a dietitian who would have had considerable training in malnutrition guidelines prior to the video intervention.

Current literature consistently shows that there is a lack of training in medical nutrition therapy, including malnutrition assessment and diagnosis, amongst healthcare professionals. Most medical schools only provide 13–19 hours of nutrition education,^{17,18} which is below suggested guidelines from the National Academy of Science and the American Society of Clinical Nutrition (now American Society for Nutrition).^{19,20} Improved education and training will enable providers to inform and motivate patients toward better nutrition, and inform physicians on when to refer to ancillary health providers such as Registered Dietitian Nutritionists. Ongoing education and training, like that in this study, can be easily integrated into the workplace, will keep information fresh and up-to-date, and will allow collaboration among all healthcare team members to provide adequate nutrition care.

Strengths of this study include content validation of the pre- and post-tests by an expert panel of eight Registered Dietitian Nutritionists (RDNs) with advanced degrees who were recruited from an academic setting and have knowledge, skills and expertise relevant to this study. Additionally, the study included a sample size of 77 with a wide variety of oncology healthcare providers, research personnel, and staff members with regular patient interaction, which was representative of the characteristics of the overall staff employed by the cancer center. A limitation was that the study population was comprised of primarily non-Hispanic, White females. Additionally, the cross-sectional study design did not allow for assessment of knowledge retention and confidence in practice post-intervention. Therefore, while an

improvement of knowledge was observed post-intervention, the implementation of that knowledge into clinical practice remains to be assessed.

Conclusions

Overall, preliminary findings from this pilot study suggest that a brief, 8-minute educational video shown to healthcare team members during mandatory staff meetings improved knowledge and self-efficacy in malnutrition assessment and diagnosis. This intervention presents a potentially feasible and acceptable strategy to improve rapid diagnosis and intervention of malnutrition in ambulatory oncology settings. A next step will include refining the intervention by incorporating suggestions from the pilot study participants and further assessing the validity and reliability of the pre- and post-test questionnaire. Future research should focus on examining knowledge retention and potential improvements in the ability of oncology healthcare team members to assess and diagnose malnutrition.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Table 1.**Participant Demographics (n=77)**

	N (%)
<u>Gender</u>	
Male	9 (12)
Female	66 (86)
Other	0
Missing/Declined to answer	2 (3)
<u>Age</u>	
<25	4 (5)
25–35	19 (25)
36–45	16 (21)
46–55	19 (25)
>55	16 (21)
Missing/Declined to answer	3 (4)
<u>Race/Ethnicity</u>	
Asian	8 (10)
Black or African American	5 (6)
Native Hawaiian or Pacific Islander	1 (1)
Caucasian	58 (75)
Other	2 (13)
Hispanic	3 (4)
Missing/Declined to answer	3 (4)
<u>Education</u>	
High school	2 (3)
Some college or technical school	20 (26)
College Graduate	28 (4)
Post-graduate work	22 (29)
Other	3 (4)
Missing/Declined to answer	
<u>Occupation</u>	
Physician	13 (17)
Nurse	20 (26)
Social Work	2 (3)
Dietitian	1 (1)
Medical Assistant	7 (9)
Patient Service Representative	7 (9)
Nurse Practitioner	3 (4)
Research	9 (11)
Other	12 (16)
Missing/Declined to answer	3 (4)

Table 2.

Pre-Post Test Scores by Demographic Characteristics (n = 73)

Occupation	n	Pre-Test Score	Post-Test Score	P value
All	73	9.0±1.3	10.9±1.2	<0.001 *
45 years	38	9.0±1.5	11.0±1.1	<0.001 *
> 45 years	33	8.9±1.0	10.8±1.3	<0.001 *
Less than bachelor's degree	21	8.5±1.2	10.6±1.3	<0.001 *
Bachelor's degree or more	49	9.1±1.2	11.1±1.1	<0.001 *
Physicians	12	8.8±1.1	11.1±1.4	0.004 *
Nursing Staff	29	8.9±1.3	11.3±0.7	<0.001 *
Specialty Clinical Staff	8	9.1±1.4	11.1±1.1	0.062
Administrative Staff	10	9.1±1.4	10.8±1.4	0.005 *

* Statistically significant at p 0.005 after Bonferroni correction

Table 3.

Relationship between Demographics and Post-test Improvement (n = 73)

	Improved Test Scores					
	Model 1		Model 2		Model 3	
	B (se)	95% CI	β	B (se)	95% CI	β
Constant	2.2 (0.2)	1.7 – 2.7		2.3 (0.4)	1.6 – 3.1	
Age	-0.3 (0.4)	-1.0 – 0.4	-0.1	-0.3 (0.4)	-1.2 – 0.4	-0.1
Education				-0.2 (0.4)	-1.0 – 0.6	-0.1
Physician						0.3 *
Nursing Staff						0.4 *
Specialty Clinical Staff						0.2
R	0.1			0.1		
R ²	0.0			0.0		
F	0.6			0.4		
R ²				0.1		

* Statistically significant at p 0.05

Table 4.
Relationships between Educational Video Specific Variables and Improved Test Scores (n=74)

	Improved Test Scores					
	Model 1			Model 2		
	B (se)	95% CI	β	B (se)	95% CI	β
Constant	0.6 (0.5)	1.7-2.6		0.8 (0.6)	-0.5-2.1	-4.3 (2.4)
Improved Confidence	1.5 (0.6)	0.4-2.6	0.3	1.6 (0.6)	0.4-2.7	0.3
New Information				-0.1 (0.2)	-0.4-0.3	-0.1
Easy to understand						0.6 (0.2)
Length						0.9 (0.5)
R	0.3			0.1		0.4
R ²	0.1			0.1		0.1
F	7.2			3.7		3.7
R ²				0.0		0.1

* Statistically significant at p 0.05