

Interdisciplinary Diabetes Management: Hybrid Course

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Abstract

Due to the growing epidemic of diabetes, a graduate-level, interdisciplinary, hybrid diabetes management course for nurses and public health care professionals was developed. A description of the course, assignments and teaching strategies are provided. In addition, the Diabetes Knowledge Questionnaire (DKQ) was used to evaluate students' diabetes knowledge before and after taking the course. Overall, there were significant improvements in mean scores of the DKQ when pre-test was compared to post-test.

Keywords: Diabetes knowledge; Graduate course; Interdisciplinary; Nursing; Public health

Introduction

In the United States (US), 18.8 million people are diagnosed with diabetes, and there are another 7 million people who are undiagnosed [1]. It is predicted that by 2050, approximately one out of three US adults will be diagnosed with diabetes [2]. As the incidence and prevalence of diabetes is increasing, and given that diabetes is a chronic and complex disease, a multidisciplinary approach is essential. Hence, it is vital that interdisciplinary healthcare providers understand and become knowledgeable of diabetes and its complications while using diabetes guidelines to provide education and care.

Diabetes education can be provided by many different health care providers, including, but not limited to, nurses and public health professionals. Given that interdisciplinary approaches and teams are important in providing comprehensive diabetes education, innovative approaches need to be developed and explored. Hence, a graduate-level, interdisciplinary diabetes education course for graduate nurses and public health students in an urban college setting will be described and discussed.

Literature Review

In August 2013, two different PUBMED searches were conducted of articles published from January 2003 to July 2013. One search used the key words diabetes course, which identified ten studies in English. Another used the keywords interdisciplinary and diabetes courses, which identified zero articles. Of those original ten results, three were studies conducted in the US, and seven were conducted outside the US. Of the three US studies, one was an online training solely for medical students that used ten different case studies [3]. The second was a study on a one-credit diabetes course that met two hours a week for eight weeks [4]. The third was a survey about the usage of web-based, educational diabetes resources solely used to teach pharmacy students—specifically, any of 12 different diabetes modules [5]. Although the first and third study used on-line and web-based technology and the second study was hybrid, the current study unlike these studies, examined a hybrid, graduate-level three-credit course which was interdisciplinary (i.e., public health and nursing students). Hence, this current study is the first published article that describes and evaluates a hybrid, interdisciplinary diabetes course, and examines the diabetes knowledge of students taking the course [6,7].

Purpose

The purpose of this article is twofold: 1) to describe teaching strategies and activities used in a 15-week graduate, interdisciplinary,

diabetes-management hybrid course (i.e., in-person and online) in an urban school of nursing; and 2) examine the diabetes knowledge of students before and after taking the course. The course is available to all graduate students as an elective. The overarching objectives of the course were to provide knowledge of diabetes and its acute and long-term complications, and to practice and discuss different interdisciplinary approaches in delivering diabetes management to patients. The course has been taught twice as a hybrid, with 30 students enrolled in each semester. Information about the course and the students' level of diabetes knowledge will be based on the second semester it was taught; lessons learned, discussed in the Lessons Learned section, will be from the first semester.

The methods and activities used in this course can be modified and adapted by other graduate programs, depending on the resources available and primary chronic diseases of the prevalent patient population (Table 1). The activities developed in this course are interactive and focus on evidence-based diabetes self-management practices essential for providers.

Course information

This hybrid course met in-person for the first two classes, and the following 13 classes were online. To prepare for the course, the two in-person classes were designed to ensure the students knew how to: navigate the Blackboard system, respond to the discussion board assignments, post assignments, attach documents, and access audio-recorded PowerPoint slides, webinars and the online exam. A week before classes started, the faculty member randomly placed students into groups of five for all discussion board assignments. This allowed for students to reflect, have a dialogue, explore and exchange ideas, while incorporating evidenced-based practice and research into the assignment. The faculty member graded each student's assignments individually. All students were assigned to read five to six current peer-reviewed articles weekly that focused on the etiology of diabetes, its related complications and costs, and topics on diabetes self-

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management education (DSME) (e.g., nutrition and carbohydrate counting). For each discussion board assignment, students were required to respond to at least two of the assigned articles. Students were asked to provide their experience of caring for someone with diabetes related to the week's topic. They were also asked to critically think about their role, the role of the other disciplines caring for this

individual, and the ways they could work together to meet the patient's needs. The articles provided a foundation for the different types of diabetes (e.g., type 1, type 2, gestational diabetes) and discussed disparities that affect different ethnic groups; aspects and skills which are essential in managing diabetes (e.g., health literacy, numeracy literacy) for all age groups (e.g., adolescents and adults); the financial

Course Objectives	Methods Used to Meet Course Objectives	Methods of Evaluation
1. Establish a foundation of the etiology of diabetes, different types of diabetes and diagnosis of diabetes that is theoretically and evidenced based.	Using all the components of the criteria for Bb postings, which include the nutritious, diabetes modification and acute/chronic complications papers. Reading assigned articles and integrating them into the course assignments (Bb postings, nutritious, diabetes modification and acute/complications paper. Reading and listening to the audio recorded PowerPoint slides. Completion of the assigned webinars. Completion and passing (80% or greater) of online exam. Student feedback in the course evaluation.	Feedback provided by the faculty member on the progress of the individual and group Bb postings. Rubric for Bb postings. Criteria for nutrition paper. Criteria for modification paper. Criteria for acute/complications paper. Passing (80% or greater) online exam. Integration of evidence-based literature into the course assignments (e.g., Bb postings, papers). Course evaluation.
2. Describe the acute/chronic complications of diabetes to promote optimal wellness to persons with diabetes.	This objective was met through the same methods as that for objective 1.	This objective was evaluated through the same methods as that for objective 1.
3. Describe the cost factors associated with diabetes.	This objective was met through the same methods as that for objective 1.	This objective was evaluated through the same methods as that for objective 1.
4. Describe lifestyle modifications essential to diabetes in promoting and restoring optimal wellness to persons with diabetes in different health care settings.	This objective was met through the same methods as that for objective 1.	This objective was evaluated through the same methods as that for objective 1.
5. Formulate effective teaching plans for the person diagnosed with diabetes.	This objective was met through the same methods as that for objective 1.	This objective was evaluated through the same methods as that for objective 1.
6. Relate selected research findings from socio-cultural and health literature to provide delivery of cultural specific care to people with diabetes.	This objective was met through the same methods as that for objective 1.	This objective was evaluated through the same methods as that for objective 1.

Abbreviation: Bb: Blackboard.

Table 1: Course objectives, methods used to meet objectives and methods of evaluation.

Week No.	Topics	Sample Articles	Examples of Weekly Assignments	Example of Db Questions
1	Introduction to course (objectives, assignment) Overview of diabetes as a PH issue	Tuchman 2009 [8] Gregg et al. 2009 [9]	Since the students are of different disciplines, they shared their experiences and perspectives related to diabetes and the different roles they held (patient navigator, dialysis nurse). Exchanging their experiences allowed students to see different provider roles in teaching DSME	Describe an experience you had when you have cared for a patient/family with diabetes. Explain your role in teaching this person to manage their diabetes.
2	Etiology of diabetes (type 1, type 2 and gestational diabetes)	ADA 2013 [10] Agarwal et al. 2010 [11]	This exercise enabled the public health and nursing students to deepen their understanding of different types of diabetes. They shared ideas and perspectives of different disciplines, what comprises a team and reasons they are important for people with diabetes.	Define the type of diabetes in the person identified in week 1. Describe two needs of this person that affects how they manage their diabetes. Name three disciplines other than your own that are essential members of the team, and explain their role in providing DSME.
3	Acute and long-term complications	Marcovecchio et al. 2011 [12] Scott et al. 2011 [13]	This exercise enabled the students to deepen their understanding of acute and long-term complications. Students researched acute or long-term complications, and statistics. They shared experiences of people they knew and cared for with acute and long-term complications.	Identify and define two acute or long-term complications. Discuss and describe how you would teach them. For each of the two complications identified, what are two things you would teach them to manage these complications.
4	Metabolic Syndrome	Grundy et al. 2012 [14] Prasad et al. 2012 [15]	This exercise enabled the students to deepen their understanding of metabolic syndrome. They learned from each other the risk factors for the different types of disorders (e.g., microalbuminuria) and risk factors (e.g., obesity) of metabolic syndrome.	Define metabolic syndrome. Identify and define three risk factors for metabolic syndrome and the impact they have on diabetes.
5	Cost implications of diabetes Reimbursement for DSME Out-of-pocket costs associated with diabetes	Dall et al. 2010 [16] Desai et al. 2012 [17]	Students examined financial aspects (e.g., co-payments) affecting those with diabetes. They shared information and discussed issues that impact people with type 1 and type 2 diabetes and the out-of-pocket costs that affect them. Based on the responses, they were surprised at the large amount of out-of-pockets costs of people with diabetes and monies spent on diabetes care.	Identify and discuss two financial costs a person with diabetes encounters. Discuss how these two financial costs impact how a person with diabetes manages their diabetes.
6	Principles of Behavioral Modification Teaching and Learning (e.g. Stages of Change, CCM)		Students chose a behavioral modification teaching and learning theory/model they would use in developing a DSME plan for people with diabetes. They shared and learned about different theories/models.	Describe a behavioral modification theory/model you would use in practice in caring for people with diabetes. Define the concepts/constructs of the theory/model.

7	Principles of Behavioral Modification Teaching and Learning (continued)		The students shared the chosen theory/model for a DSME and learned about its application from the perspective of their discipline (e.g., nursing or public health).	Using the above theory/model, provide a detailed plan describing how you would use it as a framework in implementing DSME. In the plan, include the topics of diabetes complications, medication compliance, glucose monitoring, weight loss and increasing physical activity.
8	Diabetes self-management in children/adolescent, adults, and pregnant women	Adi 2010 [18] ADA 2010 [19]	This exercise reinforces the students' understanding of different types of diabetes and its impact on different aspects of diabetes management. Based on the responses, they identified aspects of diabetes management they overlooked before taking this course(e.g., carrying a glucometer and its supplies to dinner to check their glucose level).	Define a type of diabetes (type 1, type 2 or gestational diabetes); discuss two physical (e.g., checking blood glucose levels before administering insulin); two emotional (e.g., coping with lifestyle changes); and two psychosocial aspects (e.g., multiple daily insulin injections) experienced by the person with the type of diabetes defined.
9	Different types of medication therapy (insulin, oral agents, insulin pumps)	Renda et al. 2011 [20]	The students applied their role to educating a person on maintaining their medication regimen. They shared different educational perspectives and views on medication adherence based on their discipline and professional experiences.	Identify and discuss two ways you could teach a person on insulin injections, oral medications and on an insulin pump to follow their medication regimen. Identify two ways for each.
10	Nutrition and Healthy Eating Carbohydrate counting	Dias et al. 2010 [21] Franz et al. 2010 [22]	Students researched carbohydrate counting, and nutritional aspects of different type of foods in order to develop an educational plan. They provided insights on how they are prepared and compared foods that were healthy and unhealthy. The students shared different educational plans through a cultural lens. Based on the responses, many students were surprised about the carbohydrate amount in certain foods of their culture.	Provide examples and details of foods of your culture, for each of the three meals (i.e., breakfast, lunch and dinner). Include the food, calories and carbohydrate count for that food and total the amounts for each meal. Discuss how you would educate this person on a balanced diet. What staple foods would you tell them to avoid and why? Discuss how you will motivate them to overcome their barriers (e.g., eating bread).
11	Impact of HL, NL and GL in diabetes self-management	Osborn et al. 2010 [23] Osborn et al. 2009 [24]	Students examined interpretations of HL. They explained the relationship between literacy and diabetes, provided examples of how they could assess a patient's HL and methods they could use to promote HL. Their responses indicated that they had not realized the number of resources available to assess and educate people on HL; and in the past had not applied the concept of HL to diabetes education.	How do you define HL? What is the relationship between HL and diabetes? Discuss two ways HL is essential for someone with diabetes. Discuss two ways low HL can impact a person manage their diabetes. Discuss three methods you would use to assist the person with diabetes become more HL.
12	Impact of HL, NL and GL in diabetes self-management (continuation)		Students examined interpretations of NL and GL. They explained the relationship between NL and diabetes, and GL and diabetes; provided examples of how they could assess a patient's NL and GL, and methods they could use to promote NL. Their responses indicated that they had not realized the number of resources available to assess and educate people on NL. They also indicated not realizing the number of people with GL and the impact it has on people with diabetes.	How do you define NL and GL? What is the relationship between NL and diabetes and GL and diabetes? Discuss two ways NL is essential for someone with diabetes. Discuss two ways low NL can impact how a person manages their diabetes and two ways a lack of GL can impact how a person manages their diabetes. Discuss three methods you would use to assist the person with diabetes become more numerically literate.
13	Epidemiology of diabetes and disparities among different ethnic groups CC in diabetes education (cultural diet and complementary therapies) CLAS	Aponte 2009 [25] Kalter-Leibovici et al. 2012 [26]	Students completed an online CC exam the faculty member posted from <i>A Physician's Practical Guide to Culturally Competent Care</i> . Questions were selected from this guide, which is a self-directed training course for HCP with a specific interest in CC. Topics in the exam included CC, CLAS, health disparities. The students had 1 week to complete the exam and were able to take it multiple times. The exam had a total of 30 multiple choice questions. Students could only answer one question at a time, and the questions were randomized each time the student retook the exam.	Cultural competency exam. The link is https://ccc.thinkculturalhealth.hhs.gov/GUIs/GUI_AboutthisSite.asp#top They needed to receive an 80% or greater in order to receive credit for the assignment.
14	Psychosocial assessment Depression and diabetes	Hillege et al. 2011 [27] Skinner et al. 2010 [28]	Questions focused on psychosocial issues affecting those with diabetes. Students researched depression and emotional issues. They shared personal and professional experiences, shared methods to approach a person with depression, and provided insights on how to best manage depression and psychosocial issues in people with diabetes.	Discuss two reasons a person with diabetes may become depressed and describe two ways you would try to reduce their depression related to diabetes. Discuss two reasons a person with diabetes would become anxious and become emotionally distressed regarding their diabetes, and describe two ways you would try to reduce their emotional distress.
15	Presentations Evaluation		Each small group conducted a diabetes assessment on a person with diabetes that was of a different ethnic background than the students in their group, which included a genogram showing family members with diabetes; overview of their culture; cultural beliefs; practices related to diabetes management; traditional diet; cultural views on family support systems of the particular ethnic group. Students prepared PP slides on their diabetes assessment.	On the basis of the specific assessment data that was collected, they were required to identify 2 needs of the particular individual within that family or of the family as a whole, and discuss an intervention for each need that would promote better diabetes management in this particular cultural group, and potentially prevent diabetes complications either for the individual or family within that group.

Abbreviations: Db: Discussion Board; PH: Public Health; DSME: Diabetes Self-Management Education; CCM: Chronic Care Model; HL: Health Literacy; NL: Numeracy Literacy; GL: General Literacy; CC: Cultural Competency; CLAS: Cultural and Linguistic Appropriate Services; ADA: American Diabetes Association; HCP: Health Care Professional; PP: Power Point.

Table 2: Sample course outline, articles and discussion board questions.

impact and costs of diabetes and diabetes management (e.g., out-of-pocket costs in glucometer strips, medications); psychosocial aspects of living with diabetes (e.g., depression); and practice creating a teaching plan to educate patients in ways to better manage their diabetes. Topics covered included diabetes as a public health issue (week 1); different types of diabetes (week 2); acute and long-term complications (week 3); metabolic syndrome (week 4); diabetes costs and out-of-pocket costs related to diabetes (week 5); behavioral modification models (weeks 6, 7 & 15); DSME principles (week 8); medication therapy (week 9); nutritional intake and carbohydrate counting (week 10); health literacy, numeracy literacy and general literacy in DSME (weeks 11 & 12); cultural competency (week 13); and psychosocial issues (week 14) (Table 2).

Methods

Sample and procedures

This study was conducted on 30 graduate students who enrolled in a diabetes management hybrid course in Spring 2013. Approval to conduct this study was obtained from the Institutional Review Board (IRB) of the Hunter College, City University of New York.

Data collection

A week before classes began, all enrolled students received an e-mail that explained the purpose of the study and provided information about it. The email stated that they would need to complete a diabetes knowledge questionnaire (DKQ-24) upon consenting (pre-test) and after completing the course (post-test), in addition to a post-course evaluation questionnaire (CEQ). In this same email, a copy of the consent form was attached. The consent form informed the students that participating, refusing to participate or withdrawing from this study in no way would affect their grade or standing in this course or in the university. They were also informed participating in this study was voluntary.

Students interested in participating in the study completed the consent form and returned it in a sealed envelope to the research assistant (RA). Participants then completed the DKQ-24 form (pre-test) in a private office, placed it in a sealed envelope and gave it to the RA.

The DKQ-24 was used in pre- and post-test to assess the students' knowledge about diabetes. Validity and reliability have been established through studies on multiple populations, settings and psychometric testing (Garcia et al., 2001; Firestone et al., 2004). The DKQ-24 is

a reliable and valid measure of diabetes-related knowledge. It was developed from the original DQK-60, which comprised 60 questions (Garcia, Villagomez, Brown, Kouzekanani, & Hanis, 2001). The DKQ-24 consists of 24 questions that assess overall diabetes knowledge as recommended by the National Standards for Diabetes Patient Education programs. The responses to the questions of the DKQ-24 were coded: 1=yes; 2=no; or 3=I don't know.

The CEQ was developed by the Principle Investigator (PI) (Table 3). This evaluation form was used to receive feedback from the students evaluating the course assignments, course structure and course materials. The students completed the DKQ-24 and CEQ forms anonymously, as they only identified themselves by their ID numbers, not their names. The pre and post DKQ-24 and CEQ forms were returned in a sealed envelope to the RA.

Data analysis

SPSS was used to conduct data analysis. The questions were scored: 1=correct response; 0 and "I don't know"=incorrect response.

Descriptive statistics was computed on the pre and post DKQ form. A paired sample *t* test was conducted to determine whether there was significant change in the sample from pre-test to post-test.

Results

Of the total 30 graduate students who participated in the study, 5 were public health students and 25 were nursing students.

DKQ

The DKQ form was administered before and after the diabetes course (Table 4). Items answered correctly were scored "1," and those answered incorrectly or blank were scored "0." Percentages were computed. The pre-test ranged from 20% to 100% (M=18.45, SD=6.13), and the post-test ranged from 53.3% to 100% (M=21.00, SD=1.38). Thirteen of the responses improved to a perfect score. For example, correct responses to question 2 increased from 73.3% (pre-test) to 100% (post-test). Three responses showed no change, two remained at 100% from pre- to post-test, and one remained from 86.6% pre-to post-test. Four showed a decrease in the percentage of correct responses from pre-test to post-test (86.6% pre-test, 80% post-test). A paired sample *t* test was conducted to compare the pre-test to the post-test and determine whether there was significant change in the sample. Significant improvement in mean scores was seen (*t* [21]=-2.301, *p*=.03), with higher scores at post-test compared to pre-test.

•	Was this class what you expected?	Yes	No
o	If yes, why? _____		
o	If no, why not? _____		
•	Did this course meet your needs as a graduate student?	Yes	No
o	If yes, why? _____		
o	If no, why not? _____		
•	What has been your experience on taking a fully online graduate course? _____		
•	Has this fully online course met your needs in learning content related to diabetes management?	Yes	No
o	If yes, how? _____		
o	If no, what would you change? _____		
•	Do you feel the "Discussion board" met your needs or did not meet your needs in communicating with others? _____		
•	How do you feel the Nutrition assignment benefited you or did not? _____		
•	How do you feel the Behavior Modification assignment benefited you or did not? _____		

Table 3: Example of CEQ questions.

CEQ

Findings of the CEQ student evaluation revealed an “excellent” rating for the overall evaluation of the course. All students (100%) reported the course met their academic needs and expectations: they felt the course assignments and readings were current and relevant to the discipline and practice. All students enjoyed the flexibility of the course being primarily online. They also mentioned that the assignments made them read the articles, given that they needed to apply them to the assignments (e.g. discussion board). Of all the students, 94% felt the discussion board met their needs, and 6% mentioned they would have preferred to have more students in a group larger than the five people. For the nutrition assignment, all felt it benefited them in learning to research foods, identify carbohydrate amounts for cultural foods, and formulate a nutritional DSME plan. The students’ most preferred components of the course were the videos, webinars, articles and nutrition assignment. Table 5 gives examples of students’ feedback.

Discussion

Responses that showed improvement from pre- to post-test were those on the pathophysiology of diabetes; diabetes-complications (i.e., vascular disease, nephropathy and neuropathy); foot care and nutrition (i.e., food preparation), which shows that this course enhanced the students’ knowledge on these topics. The one response that remained the same from pre- to post-test (86.6%) regarded normal and abnormal diabetes glucose ranges. Four responses showed a decline in

knowledge:1) advance pathophysiology (i.e., insulin reaction); 2) the use of certain over-the-counter solutions in cleaning wounds; 3) signs of hypoglycemia; and 4) the use of tight socks. Though the course is interdisciplinary and some students are public health care providers, not clinicians, this finding indicates that more content and review on normal and abnormal glucose levels, hypoglycemia, the importance of the patient speaking to their health care provider and podiatrist about using over-the-counter wound care treatment and the impact of tight elastic hose or socks on circulation needs to be emphasized in the course, particularly since this knowledge is essential when providing DSME. Case scenarios and test questions are methods that could be used to incorporate and emphasize this content.

Lessons Learned

During the first semester of teaching the course, there was only one hands-on, in-person lesson to familiarize the students with the online learning environment and course requirements. In their evaluations, students suggested that more time was needed, and that two days would have been helpful, particularly for those who had never taken an online course or who had trouble navigating the discussion board. Students also indicated an interest in learning more about nutrition and carbohydrate counting, stating that they had patients with diabetes who were instructed to count their carbohydrates; because they were not familiar and comfortable with teaching carbohydrate counting, they wanted to better understand it. Therefore, the faculty member added the assignment on carbohydrate counting, caloric intake and

	C P	CCorrect Pretest	Correct Posttest
Item	Question	% (n)	% (n)
1	Eating too much sugar is a cause of diabetes	20 (6)	53.3 (16)
2	The usual cause of diabetes is lack of effective insulin in the body	73.3 (22)	100 (30)
3	Diabetes is caused by a failure of the kidneys to keep sugar out of the urine	86.6 (26)	100 (30)
4	Kidneys produce insulin	100 (30)	100 (30)
5	In untreated diabetes, the amount of sugar in the blood usually increases	86.6 (26)	100 (30)
6	If I am diabetic, my children have a higher chance of being diabetic	86.6 (26)	100 (30)
7	Diabetes can be cured	66.6 (20)	86.6 (26)
8	A fasting blood sugar level of 210 is too high	86.6 (26)	86.6 (26)
9	The best way to check my diabetes is to check my urine	100 (30)	100 (30)
10	Regular exercise will increase the need for insulin or other diabetic medication	73.3 (22)	86.6 (26)
11	There are two main types of diabetes: Type 1 and Type 2	100 (30)	100 (30)
12	An insulin reaction is caused by too much food	86.6 (26)	73.3 (22)
13	Medication is more important than diet and exercise to control my diabetes	86.6 (26)	86.6 (26)
14	Diabetes often causes poor circulation	73.3 (22)	100 (30)
15	Cuts and abrasions on diabetics heal more slowly	60 (18)	100 (30)
16	Diabetics should take extra care when cutting their toenails	86.6 (26)	100 (30)
17	A person with diabetes should cleanse a cut with iodine and alcohol	60 (18)	53.3 (16)
18	The way I prepare my food is as important as the foods I eat	86.6 (26)	100 (30)
19	Diabetes can damage my kidneys	86.6 (26)	100 (30)
20	Diabetes can cause loss of feeling in my hands, fingers, and feet	86.6 (26)	100 (30)
21	Shaking and sweating are signs of high blood sugar	86.6 (26)	80 (24)
22	Frequent urination and thirst are signs of low blood sugar	100 (30)	100 (30)
23	Tight elastic hose or socks are not bad for diabetics	100 (30)	86.6 (26)
24	A diabetic diet consists mostly of special foods	86.6 (26)	86.6 (26)
Total M (SD)		18.45 (6.13)	21.00 (1.38)*

*p=0.05

Abbreviations: n: Number; M: Mean; SD: Standard Deviation; p: Probability

Table 4: Percentages of DKQ questions.

"This course has taught me more about diabetes and ways to help patients manage this disease and has already improved the care I give to my patients."
 "The classes made me think out of the box, and think about all the different aspects people with diabetes need to manage."
 "I was able to learn about key issue of diabetes and diabetes management and different approaches to addressing community health issues."
 "By the course being interdisciplinary the course not only incorporated such approaches in the assignment but we were actually able to interact and learn from each other that are from other another discipline."
 "I have become more knowledgeable about the different types of diabetes."
 "I have increased my knowledge on acute and long-term complications, particularly Hyperglycemic Hyperosmolar Syndrome and Diabetic Ketoacidosis."

Table 5: Example of students' feedback.

nutritional aspects of different types of foods through a cultural lens when developing an educational plan.

In their evaluations at the end of the first semester, the students indicated that the behavioral modification assignment was not beneficial. Despite this feedback, the faculty member decided to keep this assignment because it provided the opportunity to learn about different behavioral modification theories/models, which helped the students understand reasons why people with diabetes change or do not change their diabetes-related behaviors (e.g. healthier eating habits, increasing physical activity). This understanding is important when developing an educational plan.

Conclusion

Students submitted an anonymous CEQ form on the last day of class. Overall, they indicated that they had become more aware of the importance of interdisciplinary roles, diabetes and DSME. They identified the importance of applying knowledge about diabetes and teaching diabetes management, and of incorporating a patient's perspectives in DSME. The students indicated gaining confidence in teaching their patients about diabetes management, and a newfound understanding of the importance of a person's emotional and psychosocial state. They also indicated a change in thinking that supported a growth in gaining knowledge and skills on DSME, and an ongoing desire to learn more about factors that impact a person in managing their diabetes. In the evaluation, they indicated that they were able to see their growth in the following ways: their learning "went above and beyond learning about the disease;" their "understanding other factors, such as health literacy and numeracy literacy, which impact diabetes management;" and that the course "has broadened my thinking and my approach when speaking to people with diabetes." Students also now felt more apt and able to provide diabetes education.

The assignment the students felt was most rewarding was the nutrition assignment. They wrote: "I learned about my cultural foods and the nutritional aspects, including carbohydrate amount in foods, which I was not aware of;" "I learned how to look at diabetes education from a cultural perspective and not as a one size fits all;" "I learned about the more current nutritional needs for people with diabetes, ways to help people change their behavior and motivate them."

The only assignment that the students noted as not beneficial was the behavioral modification theory/models assignment. Students commented: "I have already studied theory in another course;" and "I feel like I did not learn much from the assignment." Although nursing students receive a theory course, a possible solution would be for the faculty member to select specific theories that have been used in evidenced-based practice to develop and implement interventions.

Students reacted quite positively to the online component of the course. In their end-of-semester evaluations, they wrote that the discussion board "provided a means of sharing feelings, thoughts, comments and experiences with others in a safe and supportive environment;" "made me incorporate readings into the postings, making me read the articles and apply them to the topic;" "allowed me

to share my diabetes experiences, and also read my group member's [sic] experiences;" "allowed me to speak more freely;" and "created an actual way to communicate one-to-one and as a group environment to share thoughts and ideas with individual group members, all of my group members and other people in the class."

Overall, course evaluations indicated that the discussion board assignments, the behavioral medication theory/models, nutritional carbohydrate counting, exam, encounters with different cultural and religious groups and the cultural assessment allowed the students to gain knowledge of diabetes and its complications and learn components of DSME, while practicing the skills learned in the course in the different assignments. Student feedback indicated that they believed that taking the course had helped them to learn more about diabetes, interdisciplinary practice in diabetes management and DSME. The faculty member noticed, as the course progressed, that the students demonstrated more understanding of diabetes; became more interested in learning about additional ways to reduce diabetes disparities and in reaching communities to provide awareness of diabetes; increasingly provided examples of both personal and clinical experiences; and independently researched and shared with each other references to articles about diabetes and other related factors (e.g., community initiatives and interventions) that were not part of the assigned readings.

At the end of the 15-week graduate interdisciplinary diabetes course at an urban school of nursing, the faculty member was very pleased with the ease of presenting the material and with students' reactions to, and work with, the topics therein. The faculty member was also extremely satisfied with the level of diabetes knowledge gained by the students. The methods used and the order the material was presented worked smoothly and are recommended for other faculty members to use in future interdisciplinary diabetes courses.

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