Community Health Nursing Students Identifying Depression in Members of the Community with Diabetes, A Quantitative Approach

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Background: The aim of this study was to improve depression screening, monitoring, and treatment of individuals in community-based programs with co-morbid type 2 diabetes by senior nursing students.

Method: This experimental research utilized the Basic Diabetes Knowledge Test (KAT), Depression Knowledge Questionnaire (MCQ), and the Patient Health Questionnaire -9 (PHQ-9) to measure the depression and diabetes knowledge of students before and after an educational intervention over time utilizing ANOVA.

Results: The main effect of time for KAT and MCQ is statistically significant (F^2=16.74, p<0.0001 for KAT and F^2=10.39, p<0.0001 for MCQ). Adjusted KAT and MCQ scores t-tests were run across the test administrations to assess the PHQ-9 mean test score difference.

Results: Indicate statistically significant differences between groups (t (72) =-2.82, p=0.0063).

Conclusions: The findings of this research should compel nursing faculty to integrate teaching strategies in clinical courses to assist new nurses to adequately identify and refer individuals for depression evaluation and treatment.

Keywords: *community health nursing, type 2 diabetes mellitus, depression, health promotion, comorbidities, referrals*

Introduction

High levels of depression are quite common amongst geriatric patients and can contribute to poorer clinical outcomes.[1] Depression remains a significant public health problem for the elderly population in all sectors of healthcare. The failure to detect and treat depression has been associated with higher cost of care, increase morbidity, suicide, and increase mortality from other causes. Depression is a treatable condition.[2] Clear clinical guidelines have been established in the primary care setting related to pharmacotherapy, psychotherapy, and models of care, but there is very little in the literature related to detection and treatment of patients in the home care and community setting. In a study, Brown et al.[2] found that 13.5% of subjects upon admission to homecare suffered from major depression but few received adequate treatment. Nurses positively impact the health care needs of many people in various community settings. Baccalaureate nursing students are required to enroll in community centered nursing courses with a clinical component. Small groups of students, under the auspices of a faculty member, interact with individuals enrolled in various community-based programs. A major objective of these clinicals is screening and teaching.

The aim of this study was to address inadequacies and improve routine depression screening, monitoring, and treatment of individuals in community-based programs with co-morbid type 2 diabetes by college nursing students. Integrating this important skill into the student nurse's cadre of clinical competencies is vital as students transition into practice. The Training in the Assessment of Depression (TRIAD) intervention indicated that nurses who received specific training for depression screening, identified depressed patients 2.5 times more often and referred them for further evaluation which led to better outcome.[2] Additional depression evaluation training leads to increased confidence amongst nurses in screening, treatment, and ongoing monitoring of patients with major depression. It is well documented that homecare nurses do not feel adequately prepared to perform a depression screening and take on the added paperwork burden of this assessment.[3] Once depression has been identified most agencies do not have the infrastructure to provide comprehensive mental health services and referrals are needed for treatment.

Review of the Literature

Depression is one of the most common mental health disorders and is predicted to be the second leading cause of disability worldwide by 2020. [4] According to Pickett, Raue & Bruce[5,] depression is significantly higher among elderly adults in the community and leads to greater medical illness, functional impairment, and chronic pain. Targeting depression in the community has been found to decrease hospitalization rates.[5]Greenberg, Kessler & Birnbaum described the economic burden of depression as substantial putting the combined direct and indirect costs at $83.1 billion per year.[6] Groups that have been identified to be at high risk for depression include minorities, women, patients with low socioeconomic status, and patients with physical disabilities or co-morbid conditions .[7] Opportunities are often missed to improve mental health and general medical outcomes when mental illness is under- recognized and under-treated. [8] If left undetected or not fully treated, depression is associated with higher costs, morbidity, risk of suicide and mortality from other co-morbid conditions.[9]

Challenges in Managing Co-Morbid Depression and Type 2 Diabetes

The research has indicated that depressive disorders are higher among adults with diabetes than in the general population.[10] The incidence of major depression in patients with diabetes estimated to be 11-31%.[11] The research has indicated that patients with type 2 diabetes have increased rates of mortality, cardiac events, hospitalizations, diabetes related complications, functional impairment, healthcare costs, medical symptoms burden and a decreased quality of life than diabetic patients who are not depressed.[12] According to Katon[13], comorbid depression is associated with poor adherence to self-care regimens, medical symptom burden, and functional impairment. People with type 2 diabetes and major depression are at increased risk of microvascular and macrovascular complications and up to 80% of patients with co-morbid diabetes and depression will experience a relapse of depressive symptoms over a five-year period.[14 3] There is a positive correlated relationship between poorer self-care and depressive symptoms and inversely the higher the self-perception of health, the better the A1c levels.[15 10]

Assessing for Depression

Centers for Medicare and Medicaid Services (CMS), Outcome and Assessment Information Set-C (OASIS-C) (2009) has mandated the use of the Patient Health Questionnaire (PHQ-2) to screen for depression in homecare patients. The PHQ-2 assesses for two very significant signs of depression (including little interest or pleasure in doing things and experiencing a depressed mood) one of which is required to assess significant clinical depression. A score of 3 or higher is the recommended indicator for additional assessment. The PHQ-2 has been validated in three studies in which it showed wide variability in sensitivity. [16] The PHQ-2 is not thorough enough to assess the complex dynamic between diabetes and depression so the PHQ-9 will be utilized as a source for referral. The Knowledge of Depression Test (MCQ) is a 27-item multiple choice knowledge test for depression.[17] The MCQ will be utilized to assess student knowledge about depression. Cronbach's alpha for the MCQ was 0.68, there was an

overall agreement between experts about the relevance of the MCQ to test depression knowledge reliability and evidence for content and convergent validity.

Assessing for Diabetes

The Centers for Disease Control and Prevention National Database states there are 34 million people in the United States diagnosed with diabetes. Males, ages 45 and above represent the greatest number of diabetics. Utilizing the Diabetes Knowledge Test (KAT) faculty will assess the diabetes knowledge of nursing students prior to practice entry and allow faculty to measure and design strategies to integrate knowledge into classroom then clinical settings. [18] The KAT is a 27-item multiple choice test that is both reliable ($\alpha \geq 0.70$), and valid or equal to the SD of n ($p = 0.001$).

Research Questions.

The research question to be answered:

Q1. Is there a change in the nursing students' knowledge to conduct a depression assessment in non-hospitalized individuals with type 2 diabetes mellitus in the community setting utilizing the PHQ 9 scale who receive supplementary depression education as compared to nursing students who did not receive the supplementary depression education pretest, immediate posttest, and in one month?

Research Method

An experimental pretest-posttest two-group design was utilized to evaluate the change in the knowledge of nursing students who assess for depression in non-hospitalized community members with diabetes in the community setting pretest, immediately posttest, and one month follow up after an educational intervention utilizing ANOVA. All senior nursing students enrolled in the community centered senior nursing course (didactic and clinical) were invited to participate in the study utilizing Blackboard and emails. Consent and IRB approval were obtained. The only tool that required permission to use was the KAT and it was obtained. All participants in this study were randomly assigned to a treatment or control group. A group of 87 nursing student participants were randomly assigned to three classes. Diabetes and depression knowledge were measured by the Basic Diabetes Knowledge Test (KAT) and Depression Knowledge Questionnaire (MCQ) before the education module and two times after the education intervention (one administration immediately after and one month after). The intervention group received a 4-hour educational protocol designed to measure the knowledge of students assessing depression in diabetics. The education intervention consisted of an overview on depression and diabetes in class by field experts and included nursing care requirements for diabetes and depression, required medical equipment, medications, social services, legal implications, referrals, and community resources. The focus of this intervention was directed towards the student's ability to integrate data appropriately into a plan of care. A case study was utilized to assess students' abilities to correctly refer patients to treatment. Lastly, students took one administration of the Patient Health Questionnaire -9 (PHQ-9), at the end of the course (3 months from the course start) after reading an actual case study in the community to assess the students' ability to properly refer patients for treatment.

Participants

Senior nursing students at the university have a diverse background and vary in age, gender, religious affiliation, ethnicity, and socio-economic background. For this study, the sample size of 87 nursing students resulted in a confidence level of .99 with a sampling error of 1%. Most students across both groups were female (86.2%), in their 20s (75%); no student had taken courses in depression or diabetes outside of their formal education for nursing.

Instruments

Patient Health Questionnaire (PHQ-9), Basic Knowledge in Diabetes (KAT), Depression Knowledge Questionnaire (MCQ), Demographic Questionnaire

Limitations and Delimitations

The limitations of this study may include: (a) students may have done the surveys quickly because of the strains of an upcoming graduation; and (b) students

may have difficulty remembering school experiences over time. The possible delimitations of this study may include: (a) entry-level nursing students may have prior experience caring for diabetics with depression; (b) diabetes and depression topics were taught in lower-level courses and there may be threads throughout the nursing program in a variety of didactic and clinical courses.

Data Analysis

The observed mean KAT scores prior to the education intervention were 80.6 and 82.5 for intervention and control students, respectively. Similarly, the observed mean MCQ scores were 78.5 and 79.4 for intervention and control students, respectively. Immediately after the education module, KAT and MCQ mean scores for intervention students were 85.2 and 82.4, respectively, compared to the KAT and MCQ mean scores of control students of 92.1 and 88.6, respectively. Although observed mean KAT and MCQ dropped a month after the intervention (82.6 and 79.3 for intervention students and 84.5 and 83.1 for control students), the trend shows that the control group tended to perform better than intervention group. Lastly, PHQ-9 observed mean scores were higher for the intervention group rather than the control group (12.5 and 9.2, respectively).

Table 1. Descriptive statistics for KAT, MCQ and PHQ-9 test administrations

	Before education module			Immediately after education module			1 month after education module		
Outcomes	**M**	**SD**	**n**	**M**	**SD**	**n**	**M**	**SD**	**n**
KAT									
Intervention	80.6	10.3	45	85.2	9.7	45	82.6	11.5	43
Control	82.5	8.4	36	92.1	8.2	33	84.5	8.4	31
MCQ									
Intervention	78.5	8.6	45	82.4	11.1	45	79.3	14.4	43
Control	79.4	8.8	36	88.6	5.9	33	83.1	7.7	31
PHQ-9									
Intervention	-	-	-	-	-	-	12.5	5.0	43
Control	-	-	-	-	-	-	9.2	5.0	31

Repeated measures ANOVA was used to measure the interaction effect of the between-subjects factor of education intervention and the within-subjects' factors of time (i.e., test administrations). An independent samples t-test was used to measure mean differences in PHQ-9 scores between the two groups. When reviewing the intervention effect for both KAT and MCQ scores, there was no statistically significant difference between the test scores of the groups based on the alpha level ($F2=3.80$, $p=0.0553$ for KAT and $F2=4.96$, $p=0.0291$ for MCQ). However, the main effect of time for KAT and MCQ is statistically significant ($F2=16.74$,

p<0.0001 for KAT and F2=10.39, p<0.0001 for MCQ). Therefore, there are significant differences of test scores across the timepoints regardless of group membership. Seventy-four participants (79.6%) reviewed the case study and answered the PHQ-9. Patients with scores of five or greater are customarily recommended evaluation. Of these 74 participants, the average score was 11.1(0-27 scoring available). Based on this average score, it is expected that most participants would refer this patient for evaluation. Sixty-one participants (82.0%) gave the patient in the case study a PHQ-9 score of five or greater and 75.7% would refer the patient for evaluation. Of those 61 participants who indicated a PHQ-9 score of five or greater, 82.0% recommended evaluation. Therefore, most students followed proper protocol when the PHQ-9 exceeds a score of five. Conversely, approximately 18.0% (13 individuals) did not designate a PHQ-9 score of five or greater. Of those thirteen participants, 46.2% recommended an evaluation compared to 53.8% who did not recommend an evaluation.

Repeated measures ANOVA was used to measure the interaction effect of the between-subjects factor of education intervention and the within-subjects' factors of time (i.e., test administrations). An independent samples t-test was used to measure mean differences in PHQ-9 scores between the two intervention groups. An alpha level adjustment was utilized to account for multiple significance tests on the same dataset (i.e., 0.05 original alpha level divided by 3 hypotheses to yield a corresponding alpha level of 0.0167). Of the 51 students enrolled in the education module, 84.3% (n=43) took all three test administrations of KAT and MCQ. 86.1% (n=31) of the 36 control students took all three administrations of KAT and MCQ.

Sphericity was evaluated for KAT and MCQ scores via a chi-square test for equality of variances of the experimental groups across the three timepoints. Therefore, the null hypotheses were that the dependence of the scores from each administration is equal for each group. The alternative hypotheses were that these variances are not equal. The assumption of sphericity is upheld when the null hypotheses was accepted. For this study, sphericity for KAT and MCQ is upheld ($\chi 2 = 2.69, p = 0.2603$ for KAT and $\chi 2 = 5.31, p = 0.0702) \chi 2 = 5.31, p = 0.0702)$.

When reviewing the intervention effect for both KAT and MCQ scores, there was no statistically significant difference between the test scores of the groups based on the alpha level (F^2=3.80, p=0.0553 for KAT and F^2=4.96, p=0.0291 for MCQ). However, the main effect of time for KAT and MCQ is statistically significant (F^2=16.74, p<0.0001 for KAT and F^2=10.39, p<0.0001 for MCQ). Therefore, there are significant differences of test scores across the timepoints regardless of group membership. Lastly, the interaction effect of the intervention and time is not statistically significant (F^2=2.19, p=0.1161 for KAT and F^2=1.27, p=0.2837 for MCQ). Thus, changes in test scores across timepoints are not dependent on group membership. Figures 1 and 2 graphically display the adjusted means for the two tests.

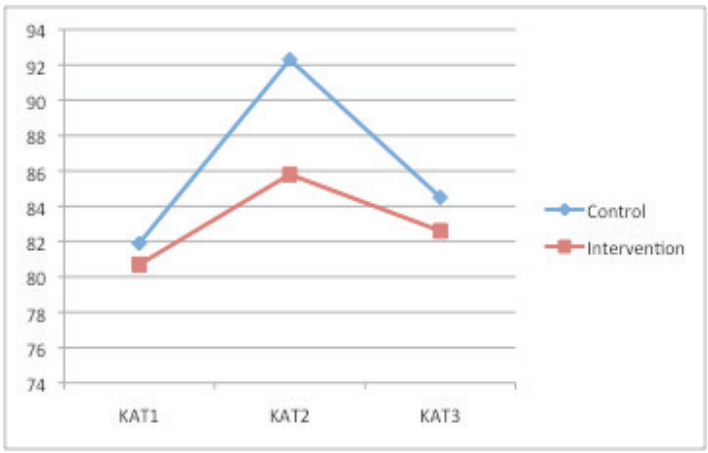
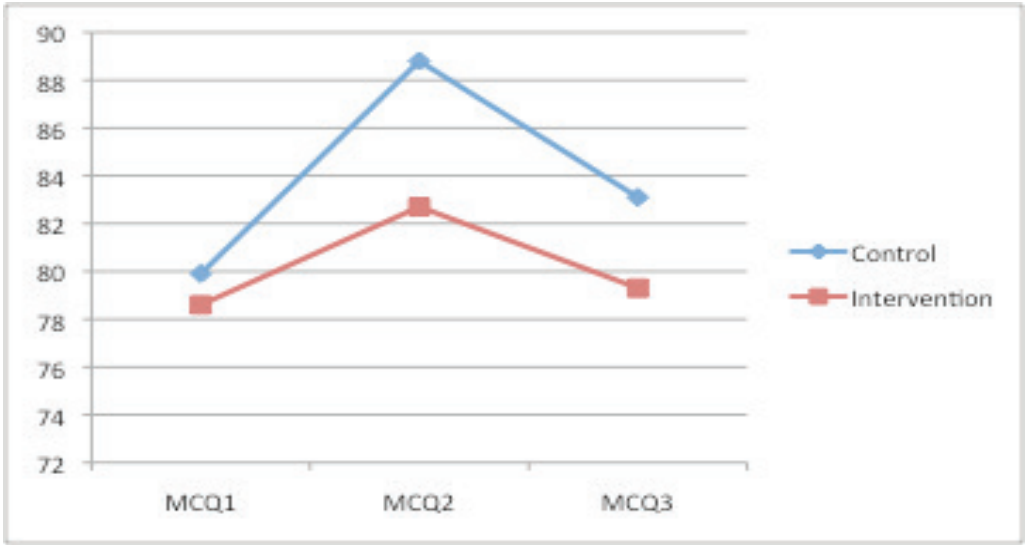


Figure 1. Adjusted KAT means across the three test administrations

Figure 2. ***Adjusted MCQ means across the three test administrations***



t-tests were run to assess mean test score difference on the PHQ-9. Results indicate statistically significant differences between groups ($t(72)$=-2.82, p=0.0063), whereby intervention students tend to score higher than control students.

Table 2.

Refer for Evaluation by PHQ-9 Score				
	PHQ-9 Score of 5 or Higher			
Refer for Evaluation		Yes	No	Total
	Yes	82.0% (50)	46.2% (6)	75.7% (56)

Seventy-four participants (79.6%) reviewed the case study and answered the PHQ-9. Patients with scores of five or greater are customarily recommended evaluation. Of these 74 participants, the average score was 11.1(0-27 scoring available). Based on this average score, it is expected that most participants would refer this patient for evaluation. Sixty-one participants (82.0%) gave the patient in the case study a PHQ-9 score of five or greater and 75.7% would refer the patient for evaluation. Of those 61 participants who indicated a PHQ-9 score of five or greater, 82.0% recommended evaluation. Therefore, most students followed proper protocol when the PHQ-9 exceeds a score of five. Conversely, approximately 18.0% (13 individuals) did not designate a PHQ-9 score of five or greater. Of those thirteen participants, 46.2% recommended an evaluation compared to 53.8% who did not recommend an evaluation.

Implications, Recommendations, and Conclusions

The findings of this research study indicated a significant change in the depression and diabetes knowledge bases of nursing students after an educational intervention. The intervention utilized in this study has resulted in significant results. The nursing students' knowledge base about diabetes and depression were measured utilizing the same tools (KAT, MCQ, PHQ 9) that other healthcare professionals utilize to measure knowledge in non-nursing students. This approach reinforces the need for a multidisciplinary approach to educating healthcare professionals. The unique aspect of this research was the utilization of a case study

to observe if nursing students would appropriately refer potential patients to needed additional resources. Educators need to consistently bridge the gap between the classroom and the clinical arena to assess educational outcomes prior to as well as at time specific time frame during clinical practice. This will assure nursing professionals meet the needs of potential patients while reassessing nursing performance and competency. There are direct implications for nursing faculty to review and include a plethora of instructional modalities related to managing patients in with co-morbidities (e.g., diabetes and depression) that will help transition students safely into practice. Patient outcomes can be positively affected by all members of the healthcare team understanding and learning to manage the complexities of these comorbidities that are both very complex but highly treatable with competent and well-coordinated intervention, management, and ongoing monitoring.

Ethical Clearance: Ethical and IRB approval was obtained from Long Island University, New York, U.S.A.

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Conflict of Interest: None

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