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A Process Improvement for Depression Screening and Management in a University Health Clinic

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By

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Abstract

Research indicates that among college students, there is a high prevalence of depression that is frequently undiagnosed and untreated, placing students at risk of impaired academic performance and suicidal behavior. The purpose of the evidence-based process improvement was: a) establish a depression screening and management protocol in the university health clinic, and b) increase university health clinic providers' knowledge of evidence-based depression screening and management. Family nurse practitioner providers in the university health clinic (n=6) participated in a depression screening and management education program. Knowledge of evidence-based depression screening and management was measured prior to and after the program. A paired samples *t*-test was conducted to compare mean difference in pre- and post-test scores. Participants' total mean scores increased significantly from pre- test (9.0 $\pm$ 2.28) to post-test (18.50 $\pm$ 1.38), $t(5) = 12.44$, $p =<.001$. Project findings suggest the educational program was effective in increasing participants' knowledge of evidence-based depression screening and management in the university health clinic setting.

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Background and Significance

Problem Identification

Depression among college students is prevalent yet often remains undiagnosed and untreated (American College Health Association, 2016), placing students at risk for impaired academic performance (Keyes et al., 2012) and suicidal behavior (CDC, 2016). In 2016, data from 95,761 college students revealed that during the prior 12 months, 36.7% felt so depressed that it was difficult to function, 9.8% seriously considered suicide, and 1.5% attempted suicide. Seventy percent of students also reported a detrimental affect on their individual academic performance due to anxiety, depression, and stress. Alarmingly, only 13.9% were diagnosed or treated for depression The most common traumatic events or stressors identified were academics (47.3%), finances (33.7%), intimate relationships (30.1%), sleep difficulties (30.1%), family problems (28.8%) and career-related issues (27.5%) (American College Health Association, 2016).

Depression nondisclosure is a significant factor in failure to diagnose and treat depression, with uncertainty about how to initiate a depression discussion being one of the most frequently cited barriers among college students (Meyer, Morrison, Lombardero, Swingle, & Campbell, 2016). With suicide as the third leading cause of death among college students (Centers for Disease Control [CDC], 2016), universal depression screening and evidence-based management is a critical need in the college student population.

Context and Scope of the Problem

Academic success is an overarching goal in higher education, yet research has demonstrated that depression contributes to academic impairment. Among 5,689 students across 13 colleges and universities, 10.8% of students reported six or more days of academic

impairment in the past four weeks due to their mental or emotional health. The study also found that suicidal behaviors and academic impairment was significantly associated with a positive mental health screening (Keyes, et al., 2012) . Findings from studies conducted either on college campuses or in college health clinics clearly support depression screening as effective in identifying students in need of ongoing care (Chung et al., 2011; Farabaugh et al., 2012; Hill, Yaraslavsky & Pettit, 2015; Keyes et al., 2012; Klein, Ciotoli & Chung, 2011; Shepardson & Funderburk, 2014). Evidence also supports that screening increases the likelihood of treatment initiation for college students with clinically significant depression (Asarnow et al., 2005; Chung et al., 2011; Klein et al., 2011).

Mental health issues among college students are a growing concern in higher education and have been identified as a responsibility of the entire campus community (Jed Foundation, 2011). With university counseling centers experiencing increasing demand for services with often decreasing resources (Association for University and College Counseling Center Directors, 2015), there is a need for more effective utilization of available campus resources. Primary care providers are most likely to be the first healthcare contact for depressed persons (Agency for Healthcare Research andQuality[AHRQ], 2012). They are also more likely than mental health professionals to have had healthcare contact with a depressed person in the four weeks prior to a suicide death (Ahmedani et al., 2014; Luoma, Martin & Pearson, 2002). Applied to the at-risk college student population, the evidence is compelling in support of the university health clinic as a critical access point for depression identification, treatment, and the potential for improved mental health outcomes.

The U.S. Preventive Services Task Force (USPSTF) recommends screening for depression in the general adult population with adequate systems in place to provide diagnosis,

effective treatment, and follow-up (USPSTF, 2016). At a regional public university student health clinic, there was no protocol for routine depression screening and no established protocol for management or referral to other available university mental health services. Among students on the campus, the most common mental health concerns reported in 2017 were anxiety, depression, relationship concerns, academics, and family concerns (personal communication, Melissa Bartsch, PhD, November 20, 2017). Identification and treatment of depression is within the formal educational preparation and legal scope of practice of the family nurse practitioner providers that staff the university health clinic, however the clinical experience and comfort level with diagnosis and evidence-based management of depression varied among the providers (personal communication, K. Isaacs, APRN, January 20, 2017).

Purpose of the Project

The purpose of the project was to establish an evidence-based depression screening and management protocol in the university health clinic and increase university health clinic providers' knowledge of evidence-based depression screening and management.

Evidence-based Intervention

In accordance with the USPSTF recommendation for depression screening with adequate systems in place for diagnosis, effective treatment, and follow-up (USPSTF, 2016), a healthcare provider education program delivered evidence-based information on: a) depression screening, diagnosis, and management, and b) a depression screening and management protocol developed by the DNP project leader incorporating appropriate utilization of mental health resources available on the university campus.

Theoretical Approach

Lewin's Theory of Planned Change was chosen to guide the process improvement and involves three steps in bringing about organizational change, with each step influenced by a force field of driving and restraining factors (Lewin, 1947). The first step is unfreezing, in which the organization prepares for change by destabilizing the current state of equilibrium so that old behaviors can be unlearned and new behaviors successfully adopted (Burnes, Wend & By, 2014; Lewin, 1947). Factors for and against the change are considered, and resources and people necessary for the proposed change are mobilized (Shirley, 2013). The second step, moving, approaches the change as a process and requires creation of a detailed plan of action and engaging people to try the proposed plan (Burnes et al., 2014; Lewin, 1947; Mitchell, 2013; Schriner et al., 2010; Shirey, 2013). Refreezing, the final step, establishes the change as the new equilibrium or standard procedure. Driving forces are accentuated in order to counterbalance restraining forces and prevent regression (Lewin, 1947). Within organizations, refreezing usually requires policy and practice changes to make a change permanent (Burnes et al., 2014; Shirey, 2013).

The unfreezing phase of this project began informally with provider-initiated discussions in the university student health clinic regarding the frequency of mental health patient encounters and barriers to providing effective mental health care. In the moving phase, an evidence-based protocol was developed, impact on workflow identified and addressed, the provider education program was conducted, and an implementation plan was finalized. During the refreezing phase, the electronic health record was modified in order to record depression screening scores along with patients' vital signs and an implementation time frame was established. Ongoing communication between the DNP project leader, university health clinic providers and staff will be necessary to ensure

successful refreezing and integration of the process improvement as the new standard of depression care in the university health clinic.

Review of Relevant Literature

The mental health concerns of young adults and college students are well documented in the literature. Most studies measured depressive symptoms using the Patient Health Questionnaire 9 (PHQ-9) or Center for Epidemiologic Studies Depression Scale (CES-D). Both are self-report instruments that have demonstrated validity in this population and the primary care setting (Chung et al., 2011; Hill et al., 2015; Kroenke, Spitzer, Williams & Lowe, 2010).

In a descriptive study of depression and suicidal ideation among college students, Farabaugh et al. (2012), conducted screening sessions of students on three university campuses utilizing the Beck Depression Inventory (BDI). Of the convenience sample of 898 students, 13% met criteria for depression and 10% reported suicidal thoughts, with higher depression scores significantly associated with suicidal ideation ($p<0.0001$, OR 1.20). Prevalence may have been underestimated due to sampling bias since screenings were conducted at main student campus centers during peak hours.

While BDI reliability was not reported and the suicidal ideation item has not been independently validated, reliability data are available and the tool is widely used in clinical practice. The study's large sample was diverse and generally representative of the target student population for the proposed intervention, and findings support the need for screening for depression and the associated risk of suicidal ideation among college students.

Keyes et al., (2012) used descriptive methods to investigate the prevalence of depression, suicidal behavior, and impaired academic performance in college students. College students (N=5689) attending 13 public and private colleges and universities across the United States were

screened for depression using the PHQ-9. Clinically significant depression scores were found in 7.9% of students screened. Rates of suicidal behavior approximated that of depression, with 5.8% of students reporting thoughts about ending their life, 1.4% had planned suicide, and 0.5% had attempted suicide. Suicidal behaviors and academic impairment were found to be significantly associated with a positive mental health screening, with 10.8% of students reporting six or more days in the past four weeks that they were academically impaired due to their mental or emotional health. Findings from this large and diverse sample of college students support routine screening in this population to reduce risk of mental health barriers to academic achievement and suicidal behavior.

In a retrospective descriptive study on the impact of depression screening on detection and treatment engagement in a university health center (Klein et al., 2011), six percent of participants had clinically significant depression at the time of the primary care visit. As scored on the PHQ-9, 64.3% were moderately depressed, 24.6% were moderate to severely depressed, and 11.2 were severely depressed, yet the majority (52.3%) was not receiving treatment. Following depression identification and treatment planning, 35.7% initiated treatment, with those having higher severity scores being significantly more likely to initiate treatment after identification ($p<.01$). Because treatment engagement outside the university setting was not measured, rates of treatment engagement after identification may have been underestimated. While the treatment rate following identification was still lower than desired, it represents a clinically significant improvement for the high-risk college student population. Overall, the depression screening and treatment planning program was successful in identifying a previously untreated group and supports implementation of the proposed depression screening and management protocol in the university health clinic setting.

In a descriptive study, Shepardson and Funderburk (2014) screened 4,126 university health clinic students across two academic semesters for behavioral health problems including depression. Depressive symptoms and suicidal ideation were measured using the PHQ-9 for all students visiting the university primary care health clinic and reported by semester. Rates of positive depression screens in the spring semester (9.1%) and fall semester (12.8%) differed significantly (p=.001), while severity of symptoms was similar between the two semesters. It is notable that of students screening positive, about 30% scored in the moderate-severe or severe range. Of seven students who reported frequency of suicidal ideation as more than half the days and of three students that reported suicidal ideation nearly every day, all had positive PHQ-9 depression screens. The study provides support for the critical need for screening in the university student population and presents a feasible implementation plan. While the study also incorporated referral to on-site behavioral health professionals at the healthcare provider's discretion, education for the primary care providers also included ongoing management with lower level interventions in the university health clinic setting.

O'Connor, Whitlock, Bell & Gaynes (2009) conducted a systematic review for the USPSTF about the benefits and harms of screening for depression in primary care settings and reported findings from 19 fair to good quality randomized controlled trials, controlled clinical trials, systematic reviews, meta-analyses, and observational studies applicable to young adults. Compared to 27% of unscreened patients depressed at baseline, 48% of screened patients were more likely to be in complete remission at follow-up ($p<0.05$). Forty percent of participants with screening and ongoing depression care versus 50% of usual care participants were positive for depression at 12 months ($p=0.001$). Of particular interest in the college student population, the odds of suicidal behavior was highest one month before and one month after initiation of

treatment, with odds being approximately double in patients under age 25 treated with a second-generation antidepressant. Because the studies on suicide-related harms were mostly for the drug industry and regulatory approval rather than controlled trials, those findings must be interpreted with caution. Overall, findings support screening with ongoing care in the primary care setting with careful monitoring for suicidal behavior in the under age 25 population.

Depression prevalence among college students is well documented in the literature; however, there is less evidence for effective management specific to the university health setting. Asarnow et al., (2005) evaluated the effectiveness of a quality improvement intervention for primary care patients aged 13-21. The randomized controlled trial was conducted in five managed care, public sector, and academic medical clinics over a period of four years. Of 4,002 patients completing the CES-D, 1034 (26%) screened positive for depression. Of 418 patients who completed enrollment, 207 were randomly assigned to receive usual care and 211 were assigned to receive the quality improvement intervention, consisting of expert leader teams at each site, care managers who supported primary care providers in managing patients' depression, training for care managers in cognitive behavioral therapy (CBT), and provider education regarding depression evaluation and comprehensive management. Usual care patients had access to standard treatment at the primary care site. At the 6-month follow-up, participants who received the quality improvement intervention had significantly lower mean CES-D scores compared to usual care patients (p=.02). Among the quality improvement patients with severe depression (CES-D $\geq$ 24), CES-D scores also significantly improved (*p*=. 02). Depressed patients receiving usual care were significantly less likely to have received any mental health care (p=<.001), psychotherapy or counseling (p=.007), and if counseling was received, the usual care group attended significantly fewer counseling visits (p=.003).

The study was well designed with a large sample size; however, it included patients under 18, which limits its application to the university health clinic population. The study did not calculate the effect of the individual interventions (CBT, pharmacologic management, referral, or regular follow-up) in the quality improvement group, so it is not possible to determine the effect of lower levels of treatment that are more feasible in the university health clinic

Chung et al., (2011) implemented a quality improvement project for depression identification and treatment in college health utilizing a collaborative care model. Teams from eight college campuses implemented integrated depression diagnostic and treatment approaches for both medical and counseling services. Sixty-nine percent of students seen in primary care were screened for depression using the PHQ-9 (n=49,617). A total of 801 students screening positive for major depressive disorder (PHQ-9 $\geq$10) were tracked for treatment and outcome goals. Of these, 50% initiated mental health treatment. At eight weeks, 40% of students initiating treatment reported a five-point reduction in PHQ9 scores. At 12 weeks, 40% scored below 10 on the PHQ-9. While the study had a large sample size, utilized a well-validated instrument, and appropriately measured outcomes over time, it did not explicate or report adherence to the integrated diagnostic and treatment approach or report outcomes by setting, which limits applicability for the proposed intervention in the university health clinic setting.

Hill et al., (2015) sought to identify variables predicting a persistent course of depression symptoms among college students. A convenience sample of 1,079 undergraduate students was screened using the CES-D (α = .87-.91), with 20% screening positive (CES-D $\geq$ 20) for depression. Telephone based follow-up was conducted at four, eight, and 12 months. Of students with a CES-D score above 20 at baseline, 32% remained positive across 12 months, and

those with persistently elevated scores had significantly higher depressive symptoms at baseline ($p<.01$) and less symptom reduction over time ($p<.001$). With 78.7% of the sample being female and 71.1% Hispanic, findings may not be generalizable to the target student population. Because the convenience sample was taken from an undergraduate psychology pool, sampling bias may have resulted in either under- or over-reporting. Current use of mental health services was dichotomously measured and included as a covariate and did not predict membership in a persistent depressive symptom class. This finding suggests symptom improvement with identification of depression and ongoing depression care and provides support for the proposed intervention.

Finally, in a descriptive study utilizing data from a previously conducted randomized controlled trial, Wells, Tang, Carlson, and Asarnow (2012), studied the effects of treatment that approximated guideline standards for depressed youth aged 13-21 in primary care. At six months, youths receiving evidence-based guideline treatment and individualized for age appropriateness were significantly less likely to have severe depression as compared to usual practice patients (10.9% vs. 45.2%, $p<0.0001$). While the age range of participants must be considered as differing from that of the college student population, treatment was individualized for age appropriateness and supports depression identification and evidence-based treatment as effective in improving mental health outcomes.

Synthesis of Research Findings

Evidence on prevalence of depression and suicide risk supports the need for identification of depression in college students (American College Health Association, 2016; CDC, 2016; Keyes et al., 2012). Findings from studies conducted either on college campuses or in college health clinics also clearly support depression screening as effective in identifying students in

need of mental health care (Chung et al., 2011; Farabaugh et al., 2012; Hill, et al., 2015; Keyes et al., 2012; Klein et al, 2011; Shepardson & Funderburk, 2014). While identification is one goal, effective treatment is also a desired outcome and evidence supports that screening increases the likelihood of treatment initiation for college students with clinically significant depression (Asarnow et al., 2005; Chung et al., 2011; Klein et al., 2011).

Because the university health clinic's focus is primary care services provided by family nurse practitioners, depression screening and treatment studies conducted in the primary care setting are also directly applicable to this diverse student population. Improvement in depressive symptoms with ongoing depression care in either the university or primary care setting was reported in five studies. Asarnow et al., (2005), Chung et al. (2011), and O'Connor et al. (2009) found clinically and statistically significant improvement in depressive symptoms with ongoing depression care, and Hill et al. (2015) found that receiving mental health services was a negative predictor for a persistent depressive course. While the study by Wells et al., (2012) involved some participants younger than the proposed college student population, their findings of significantly less severe depression with evidence-based treatment at 6-month follow-up is consistent with studies involving college students and those conducted in primary care settings. Findings from these studies support the USPSTF (2016) recommendation for depression screening of all adults with adequate resources in place to provide diagnosis, effective treatment, and follow-up.

Suicide is the third leading cause of death among college students (CDC, 2016), and it is important to note that the risk exists even with treated and untreated depression. Of the reviewed studies on college campuses, rates of suicidal thoughts ranged from 2.5% to just under 10% (Farabaugh et al., 2012; Keyes et al., 2012; Shepardson & Funderburk, 2014). While a non-

validated suicidal ideation measurement was used in two of the studies (Farabaugh, et al., 2012; Shepardson & Funderburk, 2014), findings mirror those reported in the American College Health Association National College Health Assessment II (2016). O'Connor et al.'s (2009) findings of increased suicide risk with specific antidepressant medications have important implications among the college student population and underline the need not only for improved identification, but a comprehensive program and training of staff to monitor for adverse effects of pharmacologic treatment.

Application to Evidence-Based Practice

While there were no systematic reviews or randomized controlled trials to support the proposed process improvement specifically in the university health clinic setting, the body of reviewed evidence from good quality descriptive, cohort, and systematic review studies indicate depression screening of the college student population and a program of ongoing care in the university health clinic setting contributes to higher rates of depression identification, treatment initiation for clinically significant depression, and improvement in depressive symptoms. In university health specifically, depression screening was effective in identifying clinically significant depression in two and one half to 20 percent of study participants (Chung et al., 2011; Farabaugh et al., 2012; Hill, et al., 2015; Keyes et al., 2012; Klein et al., 2011; Shepardson & Funderburk, 2014).

Following identification of depression and treatment planning, 35 to 50% of participants initiated treatment (Chung et al., 2011; Klein et al., 2011) or had significantly higher rates of treatment participation than usual care participants (Asarnow et al., 2005). While the treatment initiation rate is still lower than desired, it does represent a clinically significant improvement for the high-risk student population. In studies that measured

symptom improvement after depression identification and treatment initiation, between 40 and 60 percent of study participants were negative for clinically significant depression at follow-up (Chung et al., 2011; O'Connor et al., 2009). Finally, four good quality descriptive, randomized controlled trial, or systematic review studies demonstrated that a program of evidence-based ongoing care after depression identification resulted in improved depressive symptoms in primary care patients (Asarnow et al., 2005; Chung et al., 2011; O'Connor et al., 2009; Wells et al., 2012).

The body of evidence supports the clinical need for identification of depression to effectively capture previously unidentified college students in need of mental health services. The evidence also supports implementation of an evidence-based protocol for depression management in the university primary care health clinic. Together, these process improvements can improve depression outcomes and reduce the risk of impaired academic performance and suicide in the college student population.

Agency Description

The agency is a university health clinic on the campus of a public regional university in the southeastern United States. The total student population is approximately 16,600 students, with 11,400 enrolled on the main campus that houses the university health clinic (personal communication, University Office of Institutional Research – November 17, 2017). All university students may utilize the services of the university health clinic, however primary users are students enrolled on the main campus. During the semester in which the process improvement project was implemented, there were 1,625 student healthcare encounters in the university health clinic (personal communication, P. Nesbitt, January 18, 2018).

The target population for the process improvement included two full-time board certified family nurse practitioners and four part-time board certified family nurse practitioners. Clinical and office staff includes two registered nurses, three medical assistants, an administrative clerk, and the health services manager. Identified stakeholders include patients of the university health clinic, family nurse practitioner providers, clinic staff, and administrators of the public regional university.

The mission of the university health clinic is to provide students with the best quality care within a caring and compassionate environment, while providing the education and the tools needed to make individual choices that promote health and wellness to enrich them for the rest of their lives. Guided by the best available evidence, clinical expertise of the healthcare providers, and patient values, the process improvement was congruent with the mission of the university health clinic.

Statement of Mutual Agreement with Agency

The Senior Family Nurse Practitioner and interim university health clinic manager completed the statement of mutual agreement.

Project Design

The project was a process improvement implementing routine depression screening for all students seen in the university health clinic. A pre-test/post-test study design measured participants' knowledge of evidence-based depression screening and management individualized to the agency and available university mental health resources.

Project Methods

Procedure

Institutional Review Board Approval

Permission to conduct the research project was granted by the University's Institutional Review Board on December 8, 2017 (Appendix A).

Instruments

Central to the process improvement was utilization of validated screening tools to aid in identification of depression and provide measureable treatment outcomes. The Patient Health Questionnaire-2 (PHQ-2) is comprised of the first two items of the PHQ-9 (Appendix B) and is utilized as a pre-screener to the nine-item PHQ-9. The PHQ-2 measures frequency over the last two weeks of: a) feeling down, depressed or hopeless, and b) little interest or pleasure in doing things. Scores on each of the two items range from zero to three, with zero being not at all and three being nearly every day. In the primary care population, a total PHQ-2 score of two or higher has 86% sensitivity and 78% specificity for diagnosing MDD (Arroll et al., 2010) and should prompt further assessment with the PHQ-9.

The PHQ-9 depression screening tool has been widely used in clinical studies both as a diagnostic tool for major depressive disorder (MDD) and as a continuous measure of response to treatment (Kroenke et al., 2010; Kroenke, Spitzer & Williams, 2001). The nine-item, four point Likert scale is self-administered and available by open access. The self-report tool measures frequency of specific depressive symptoms over the last two weeks, with a possible total score range of zero to 27. Scores on each of the nine items range from zero to three, with zero being not at all and three being nearly every day. Degree of difficulty with daily function due to depressive symptoms is scored from 0 to 3, with 0 being not difficult at all and 3 being extremely difficult. A total PHQ-9 score of five to nine indicates mild depression; ten to 14 indicates moderate depression; 15 to 19 indicates moderately severe depression; and 20 to 27 indicates severe depression. The tool also assesses suicide risk by measuring frequency of suicidal

thoughts over the last two weeks, with zero being not at all and three being nearly every day. Any score above zero on the suicide risk item is considered a positive screen and should prompt further assessment (Kroenke et al., 2001).

In a systematic review of four validation studies of the PHQ-9 representing nearly 10,000 patients, the PHQ-9's internal reliability (α = .86 - .89) and sensitivity and specificity (.88) were well-established (Kroenke et al., 2010; Titov, et al., 2010). The tool is easily scored without special training. A score $\geq$10 on the PHQ-9 suggests clinically significant depression and should prompt further assessment (Arroll et al., 2010; Kroenke et al., 2010).

A twenty item, true/false Depression Knowledge, Screening and Management (DKSM) questionnaire (Appendix C) was developed by the DNP project leader as an educational assessment tool specific to the intervention and agency; therefore, Cronbach's alpha was not available or measured. The instrument was reviewed for content validity by a doctorally prepared psychiatric mental health nurse practitioner and doctorally prepared nurse educator. The questionnaire has 20 true/false items with a score range of zero to 20, with higher scores indicating greater knowledge of evidence-based depression screening and management in the university health clinic setting.

Items 1-18 on the DKSM instrument (Appendix C) are knowledge-based with a correct or incorrect response. Correct responses were scored as one and incorrect responses were scored as zero. Examples of the knowledge-based true/false questions are: a) Crisis services are available to students through the Counseling Center outside the Center's regular operating hours by calling an emergency hotline, b) A score of 10 or greater on the Patient Health Questionnaire 9 (PHQ-9) indicates the presence of clinically significant depression, and c) The Food and Drug

Administration (FDA) 2007 black box warning on antidepressants applies to children, adolescents, and young adults under age 21.

Items 19-20 on the DKSM instrument (Appendix C) measured participants' self-perceived knowledge of depression screening tools and available campus mental health resources, with positive responses indicating greater perceived knowledge and negative responses indicating less perceived knowledge. Positive responses were scored as one and negative responses were scored as zero. The true/false questions asked: a) I feel confident using and scoring the PHQ-2 and PHQ-9 to screen for depression, and b) I am knowledgeable of the range and types of mental health services available to students on the EKU campus.

Implementation and Data Collection

An evidence-based universal depression screening and management protocol was developed by the DNP project leader based on American Psychiatric Association (APA)(2010) clinical guidelines for depression treatment. According to the protocol, all students seen in the university health clinic will be screened during triage with the PHQ-2 depression screening tool. Students scoring two or greater will be asked to complete the PHQ-9 and will be assessed for suicide risk. PHQ-9 scores of 10 or higher will be considered a positive depression screen and prompt use of the depression management protocol (Appendix D).

The protocol outlines standardized management for all students screening positive for depression and is further individualized based on severity of depressive symptoms and appropriate utilization of university mental health services. For example, all students with an initial positive depression screen will receive written information detailing on- and off-campus mental health resources. At each subsequent university health clinic visit, a repeat PHQ-9 and suicide risk assessment will be completed. Students with a positive screen will

also be scheduled for follow-up in the university health clinic to monitor for treatment initiation, response to treatment, and for ongoing oversight of care management if referred to the university counseling center, psychology clinic, or to an outside agency.

The protocol further adapts evidence-based treatment guidelines (APA, 2010) to appropriately utilize the university health clinic, counseling center and psychology clinic. For example, for students with severe depression (PHQ-9 $\geq$20) without psychotic features, evidence-based treatment modalities should include pharmacotherapy alone or with psychotherapy (APA, 2010). Accordingly, the protocol specifies initiating pharmacologic treatment in the university health clinic and/or referral to the university counseling center due to availability of both prescribing mental health providers and psychotherapy services. Similarly, for students with risk of suicidality without psychotic features and not requiring medical stabilization, the protocol specifies referral to the university psychology clinic for emergent evaluation by providers with specialized training in suicidality treatment.

All family nurse practitioner providers in the university health clinic (n=6) were invited to participate in the process improvement project. A one-hour provider education program was conducted by the DNP project leader at the university health clinic. The program included background and significance of the project, report of relevant research, application to the population of interest, application to evidence-based nursing practice, screening instruments and their reliability, details of the depression screening and management protocol, and workflow processes involved in implementation (Appendix E). Prior to the education program, participants were provided with a cover letter (Appendix F) explaining the purpose of the project, risks and benefits, and methods for protection of anonymity. Participants were informed verbally and in writing that participation in data collection instruments was voluntary and would not affect their

employment or benefits should they choose not to participate. All providers (n=6) voluntarily participated in the education program and completed data collection instruments.

Each participant received a numbered envelope containing color-coded pre-test and post-test DKSM instruments consisting of twenty identical questions. Numbered envelopes were self-selected by participants in random order. After verbal explanation of the project and immediately prior to the education program, participants were asked to complete the color-coded pre-test instrument and return it to the numbered envelope. Immediately following the education program, participants were asked to complete a color-coded post-test questionnaire and return it to the numbered envelope. In order to protect anonymity of participants, the DNP project leader was not present during completion of the pre-test and post-test instruments.

Findings

Due to agency size and small number of participants, demographic data for study participants may have compromised anonymity and was not collected. Data were analyzed using Statistical Package for Social Services (SPSS) Version 25. Paired *t*-tests were calculated on mean pre- and post-intervention scores for DKSM items 1-20, DKSM items 1-18, DKSM items 19-20, and for each of the twenty questionnaire items. The relationships between participants' perceived pre-test confidence (as measured by the DKSM) in using and scoring the PHQ-2 and PHQ-9 instruments and knowledge (as measured by the DKSM) of the range and types of campus mental health services available to students and the corresponding pre-test items measuring those constructs were investigated using Pearson product-moment correlation coefficient.

A paired samples *t*-test (Table 1) was conducted to evaluate the impact of the education program on participants' DKSM mean scores for items 1-20. Participants' mean

scores increased significantly from pre- test (9.0 ± 2.28) to post-test (18.50 ± 1.38), $t(5) = 12.44$, p=<.001. The mean increase in pre to post-test score was 9.5 with a 95% CI ranging from 7.54 to 11.46. The magnitude of effect was large with an eta squared of .97.

Table 1

Paired t-test comparison of mean scores on Depression Knowledge, Screening and Management items 1-20 before (Pre-test) and after (Post-test) education program

	Mean ± SD	*t*	df	*p*
1-20 Pre-test 1-20 Post-test (n-6)	*9.0 ± 2.28* *18.50 ± 1.38*	12.44	5	<.001

A paired samples *t*-test (Table 2) was conducted to evaluate the impact of the education program on participants' DKSM mean scores for items 1-18. Participants' mean scores increased significantly from pre-test (8.17 ± 2.04) to post-test (16.50 ± 1.38), $t(5) = 11.66$, p=<.001. The mean increase in pre to post-test score was 8.33 with a 95% CI ranging from 6.50 to 10.17. The magnitude of effect was large with an eta squared of .96.

Table 2

Paired t-test comparison of mean scores on Depression Knowledge, Screening and Management items 1-18 before (Pre-test) and after (Post-test) education program

	Mean ± SD	*t*	df	*p*
1-18 Pre-test 1-18 Post-test (n=6)	8.17 ± 2.04 16.50 ± 1.38	11.66	5	<.001

A paired samples *t*-test (Table 3) was conducted to evaluate the impact of the education program on participants' DKSM mean scores for items 19-20. Participants' mean

score increased significantly from pre-test (.83 ± .75) to post-test (2.0 ± 0.00), $t(5) = 3.80$, p=.01. The mean increase in pre to post-test score was 1.17 with a 95% CI ranging from .38 to 1.96. The magnitude of effect was large with an eta squared of .74.

Table 3

Paired t-test comparison of mean scores on Depression Knowledge, Screening and Management items 19-20 before (Pre-Test) and after (Post-Test) education program

	Mean ± SD	*t*	df	*p*
19-20 Pre-Test 19-20 Post-Test (n=6)	.83 ± .75 2.0 ± 0.00	3.80	5	.01

A paired samples *t*-test was conducted to evaluate the impact of the education program on participants' DKSM mean scores for each of 20 items on the scale. Two items could not be computed because the standard error of the difference was zero. The mean score for one item decreased from 1.0 (±0.00) pre-test to .67 (±.21) post-test (p=.18) This decrease reflected six correct responses to the item on pre-test and one incorrect response on the post-test. Participants' mean scores increased significantly from pre-test to post-test on ten of the remaining 17 items measured. The magnitude of effect was small (.05) for one item and large (.33 – .83) for 16 items.

Specifically, the greatest increase in mean scores was seen on four items that measured correct use of the PHQ-2 depression screening tool and knowledge of available campus mental health resources (Table 4), with a mean increase of .83 (±.41). The smallest increase in mean scores on items 1-20 related to correct use of the PHQ-9 depression screening tool and epidemiology of clinically significant depression in college students. While statistical significance was not achieved on those two items, the magnitude of effect

was large for correct use of the PHQ-9 depression screening tool with an eta squared of .16. The magnitude of effect was small for epidemiology of clinically significant depression, with an eta squared of .05.

Table 4

Paired t-test comparison of mean scores on Depression Knowledge, Screening and Management, items 4, 9, 15 & 16 before (Pre-test) and after (Post-test) educational session

	Mean ± SD	*t*	df	*p*	eta
4) Pre-test (n=6) Post-test (n=6)	.17 ± .41 1.0 ± .00	5.00	5	.004	.83
9) Pre-test (n=6) Post-test (n=6)	.17 ± .41 1.0 ± .00	5.00	5	.004	.83
14) Pre-test (n=6) Post-test (n=6)	.17 ± .41 1.0 ± .00	5.00	5	.004	.83
16) Pre-test (n=6) Post-test (n=6)	.17 ± .41 1.0 ± .00	5.00	5	.004	.83

The relationship between participants' perceived pre-test confidence (as measured by the DKSM) in using and scoring the PHQ-2 and PHQ-9 instruments and knowledge (as measured by the DKSM) of the range and types of mental health services available to students on the university campus and the corresponding pre-test items that measured those constructs was investigated using Pearson product-moment correlation coefficient (Table 5). There was a moderate, positive correlation between participants' perceived confidence and correct scoring of the PHQ-2 and PHQ-9, with confidence in correct scoring associated with a correct response on the PHQ-2 and PHQ-9 scoring pre-test item (Table 5).

There was no correlation between participants' perceived confidence in using the PHQ-9 and knowledge of suicide risk assessment on the PHQ-9, r=.00, n=6, p=1.00, with confidence in using the PHQ-9 having no association with knowledge of the tool's assessment of suicide risk.

There was a moderate negative correlation between participants' perceived knowledge of the range and types of mental health services available to students on the university campus and three out of four items that measured knowledge of available resources (Table 5), with participants' perceived knowledge associated with lower scores on questionnaire items measuring actual participant knowledge.

Table 5

Pearson product-moment correlations between measures of perceived provider pre-test confidence and knowledge and corresponding Depression Knowledge, Screening and Management pre-test items (n-6)

DKSM Item Number and Construct	Pretest Q19 Confidence in using and scoring PHQ2 and PHQ9	Pretest Q20 Knowledge of available mental health resources
4. PHQ-2 Scoring	.45 Sig. (2-tailed) .37	
7. PHQ-9 Scoring	.45 Sig. (2-tailed) .37	
8. PHQ-9 Suicidality	.00 Sig. (2-tailed) 1.00	
9. Psychology Clinic		-3.2 Sig. (2-tailed) .54
14. Psychology clinic		-3.2 Sig. (2-tailed) .54

15. Counseling Center		2.5 Sig. (2-tailed) .63
16. Counseling Center		-3.2 Sig. (2-tailed) . 54

Discussion

With implementation of universal screening in the university health clinic, between six and 20% of students screened can be expected to be newly diagnosed with depression (Farabaugh et al., 2012; Hill et al., 2015; Keyes et al., 2012; Klein et al., 2011; Shepardson & Funderburk, 2014). Adequate systems for management and follow-up must be in place as depression is newly identified. University health clinic providers' must have thorough knowledge of evidence-based depression screening and management in order to provide appropriate treatment, follow-up and referral and reduce the risk of impaired academic achievement (Keyes et al., 2012) and suicidal behaviors (CDC, 2016).

Statistically significant increases in total and subscale mean DKSM pre-test/post-test scores indicate increased perceived and actual knowledge of: a) epidemiology of depression in college students, b) correct use and scoring of the PHQ-2 screening instrument, c) evidence-based depression screening guidelines, d) assessment of suicide risk with the PHQ-9, e) degree of suicidality risk with pharmacologic depression treatment, and f) appropriate utilization of available mental health resources on the university campus. The largest increase in mean subscale scores related to correct use and scoring of the PHQ-2 and appropriate use of available mental health resources on the university campus. On subscale items that did not achieve a statistically significant increase in participants' mean scores, a large magnitude of effect (eta squared .33-.83) was achieved

on items measuring: a) evidence-based depression treatment guidelines, and b) absolute risk of suicidality with pharmacologic depression treatment. The smallest improvement was seen in scoring and interpretation of the PHQ-9 depression screening instrument.

The need for additional training in depression diagnosis and management, time constraints, and unfamiliarity with screening tools has been noted in the literature to be serious barriers to effective depression care in the primary care setting (Burman, McCabe & Pepper, 2005), and was specifically identified by the agency as a clinical concern (personal communication, K. Isaacs, January 20, 2017). Findings from this project suggest these factors were barriers to effective depression care within the agency. Increase in mean scores across the scale and subscales indicate the provider education program was effective in addressing barriers to improving depression care of students seen by primary care providers in the university health clinic. While providers were familiar with proper use and scoring of the PHQ-9 instrument, it was not routinely utilized. Due to length of the instrument and time constraints, is not feasible for use as a universal screening tool. The education program provided training in use of the PHQ-2 for universal screening, and the screening and management protocol facilitated its integration into the current clinic workflow.

An unexpected project finding was the significant increase in participants' knowledge of the range and types of mental health services available on the university campus. Pre-test scores indicate that participants' perceived themselves as knowledgeable, yet comparison with pre-test scores measuring actual knowledge indicate there was in fact a lack of knowledge necessary to effectively utilize university mental health resources. This knowledge misperception was confirmed by participants' comments during group

discussion at the conclusion of the education program. The significant increase in mean scores from pre-test to post-test indicates the education program was effective in delivering accurate information on appropriate utilization of the range and types of mental health resources available to students on the university campus. Importantly, the finding underlines the responsibility of the entire campus community in meeting student mental health needs (Jed Foundation, 2011), and the need for a more collaborative model of mental health care between the university health clinic, counseling center, and psychology clinic.

Findings from the research project indicate the educational program was effective in increasing participants' knowledge of evidence-based depression screening and management in the university health clinic setting. Untreated depression places college students at risk for impaired academic performance (Keyes, et al.,2012) and suicidal behaviors (CDC,2016). Considering primary care providers are the most likely first healthcare contact for depressed persons (AHRQ, 2012) and more likely than mental health providers to have contact with depressed persons in the four weeks prior to a suicide death (Ahmedani et al., 2014; Luoma et al., 2002), significance of these finding for the at-risk college student population is noteworthy.

Implications

The process improvement project integrates objective assessment using validated screening tools to aid in capturing previously unidentified depressed students in need of mental health services. Standardization of evidence-based treatment and follow-up with effective utilization of available university mental health services provides the potential for improved mental health outcomes and reduction in risk for impaired academic

performance and suicidal behaviors. The project is judged to be sustainable with no additional personnel required and minimal increase in operating expenses related to reproduction of screening tools and written depression resources for distribution to students.

Limitations

Limitations of the project include the small sample size. While all university health clinic providers (n=6) participated in the process improvement project and completed data collection instruments, findings are specific to the agency and not generalizable to other university health clinics. The pre-test/post test design, with post-testing immediately after the provider education program, cannot be assumed to imply retention of the information provided or future adherence to the evidence-based depression screening and management protocol.

Accurate measurement of participants' perceived and actual knowledge may have been limited by the non-validated tool. Specifically, participants expressed ambiguity in interpreting questions regarding self-perceived knowledge of depression screening instruments and the range and types of mental health services available on the university campus. Although comparison of pre-test to post-test scores suggests self-perceived knowledge was over-estimated prior to the education program, interpretation of findings should consider the non-validated tool.

Due to a temporary decrease in agency staffing and high patient volume, full implementation of the process improvement has not yet occurred. Ongoing communication between the DNP project leader, university health clinic providers and staff

will be necessary to ensure successful refreezing and integration of the process improvement as the new standard of depression care in the university health clinic. Finally, while no inference can be made from this study about the effect on student depression outcomes or adequacy of existing campus resources to meet the mental health needs of the student population, this project does provide the foundation for future research and efforts in this area.

Conclusion

The body of evidence is compelling for the university community at large to be proactive, rather than reactive, in addressing the mental health needs of college students. Findings from this project support previously identified barriers to identifying depression in the at-risk college student population. Findings also support the need for depression screening and management in the university health clinic and the need for a more collaborative model of mental health care among university mental health resources to more effectively meet the mental health needs of the college student population.

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Appendix A

Institutional Review Board Approval

Appendix B

Patient Health Questionnaire-9

Kroenke, K., Spitzer, R.L., & Williams, J.W. (2001)

Appendix C

Depression Knowledge, Screening, and Management Questionnaire

Appendix D

Depression Screening and Management Protocol

Appendix E

Provider Education Program

Appendix F

Cover Letter