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Aligning with Patient-Centered Medical Home Standards: Depression Screening in

Primary Care

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ALIGNING WITH PATIENT-CENTERED MEDICAL HOME STANDARDS:
DEPRESSION SCREENING IN PRIMARY CARE

Doctor of Nursing Practice Project Presented to the
Faculty of Graduate Studies
University of Missouri – St. Louis

In Partial Fulfillment of the Requirements
for the Degree of Doctor of Nursing Practice

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Abstract

Problem: The Patient Centered Medical Home (PCMH) is a model of care that improves the quality and experience of care and decreases cost. Use of a validated depression screening tool for adult patients is a PCMH certification requirement. The purpose of this quality initiative was to obtain baseline data when a depression screening tool was utilized among adult patients in an internal medicine clinic within a Midwestern public health department.

Methods: This was a quality improvement project utilizing a descriptive and observational design. A retrospective medical record review was used to assess the rate of depression screening utilizing the PHQ-2 and PHQ-9, while also assessing use of treatment or referral when indicated.

Results: A total of 941 patients ($N=941$) were seen and 65% ($n = 607$) received a PHQ-2 screening. The rate of a PHQ-9 screening after scoring ≥ 3 on the PHQ-2 was 44% ($n = 42$). The rate of patients treated with either medication, referral, or both was 80% ($n = 93$). Utilizing a Chi-Square analysis, results indicated a significant ($p < .001$) relationship between PHQ-2 and PHQ-9 screenings, as well as PHQ-9 and treatment.

Implications for Practice: Most patients screened with a positive PHQ-2 were likely to be screened positive with the PHQ-9. Likewise, those screened positive with the PHQ-9 were likely to have some treatment initiated. Patients were identified for depression who may not otherwise have been treated. Screening adult patients with the PHQ-2 and PHQ-9 depression screening tool contributed to the public health system achieving a requirement for PCMH recognition.

Aligning with Patient-Centered Medical Home Standards: Depression Screening in Primary Care

Traditional primary care settings often deliver fragmented care and can be confusing for patients and providers to navigate when multiple providers are needed (Appelquist, Miller-Day, Cronholm, Gabbay, & Bowen, 2017). Fragmented care results in higher healthcare costs, lower quality of care, and increased rates of preventable hospitalizations (Frandsen, Joynt, Rebitzer, & Jha, 2015). An increasingly utilized model of care addressing these concerns is the patient-centered medical home (PCMH). The objective of a PCMH is to provide the “triple aim” of care: improved quality of care, decreased cost, and enhanced experience (National Committee for Quality Assurance [NCQA], 2014). The tenets of PCMH include multi-collaborative care across all specialties of the health care system, comprehensive care centered around the person as a whole, efficient and effective communication approaches, utilization of appropriate safety and quality measures, and affordable payment reform (Jackson et al., 2013; Shi et al., 2017). Achieving PCMH recognition is a rigorous process usually taking several years, but small changes over time have been shown to provide consistent care with improved patient outcomes.

Depression greatly affects individuals 15-years and older and is one of the most frequent root causes of disability in the associated population. (Siu & US Preventive Services Task Force [USPSTF], 2016). Depression affects up to 13% of patients in the

primary care setting, when compared to the depression prevalence of up to 9% in the US general population (Maurer, 2012). Depression impacts not only the quality of life of patients, but also their families (USPSTF, 2016). In the United States, depression treatment costs reached \$22.8 billion in 2009, and the cost of lost productivity was an additional \$23 billion in 2011 (USPSTF, 2016). Current recommendations from the USPSTF (2016) reported depression screening should be occurring in the general adult primary and specialty care settings, while also including all women receiving prenatal and postnatal care. By properly screening these populations, accurate and appropriate diagnosis, treatment, and follow-up can be attained (Siu & USPSTF, 2016).

The PCMH guidelines require the utilization of a validated, standardized depression screening tool. One such tool, the Patient Health Questionnaire (PHQ)-2 screens for depression with a fairly high sensitivity (97%) and a moderate specificity (67%) in the adult population (Maurer, 2012). This ultrashort tool has actually been found to be as accurate as lengthier, more tedious standardized screening tools such as the Beck Depression Inventory or Zung Depression Scale (Maurer, 2012). The PHQ-2 consists of two simple questions assessing patient anhedonia and mood over the past two weeks (Kroenke, Spitzer, & Williams, 2003). Scores range from zero to six, with a score of three or more requiring further evaluation with the longer PHQ-9 or by direct interview to determine if the patient meets criteria for depression (Kroenke, Spitzer, & Williams, 2003). The PHQ-9 is often used as a confirmation of depression when a PHQ-2 is positive (Maurer, 2012). The PHQ-9 is a validated tool, demonstrating a lower sensitivity (61%) than the PHQ-2, but a much higher specificity (94%) for detecting

mood disorders in adults (Maurer, 2012). A positive PHQ-2 or PHQ-9 does not always indicate depression, thus a positive screen requires provider follow-up.

Although current recommendations suggested routine depression screenings for primary care patients, the rate of screening has been poor. Akincigil and Mathews (2017) examined the national rates and patterns of depression screening for patients in a primary care setting and found only 4.2% of patients were screened for depression. Also, African American and middle age patients were half as likely to be screened when compared to white and elderly patients (Akincigil & Mathews, 2017).

The purpose of this quality improvement initiative was to obtain baseline data to describe the use of depression screening tools and depression prevalence among adult patients in an internal medicine clinic within a Midwestern public health department. The project was to facilitate the public health department in achieving depression screening standards necessary to align with PCMH recognition. The questions for this quality initiative were: In patients aged 18-60 years receiving care in the internal medicine clinic within a Midwestern public health department during a six-week timeframe:

1. What was the rate of PHQ-2 depression screenings?
2. When the PHQ-2 indicated depression risk, what was the rate of PHQ-9 screening?
3. Of those patients identified at risk for depression, what was the rate of those who
received medication treatment and/or referral?

Review of Literature

Search engines used included Medline, EBSCO HOST, Science Direct, Cochrane, PubMed, and the Cumulative Index to Nursing and Allied Health Literature (CINAHL).

The keywords used were: patient-centered medical homes, PCMH, medical homes, depression screening tool, PHQ-2, depression, family health, internal medicine, and primary care. Publications were selected from 2013 to 2017 except one which was selected from an expanded search from 2007 to 2017. Inclusion criteria were limited to adult patients, PHQ depression screenings, and PCMH. Exclusion criteria were studies greater than 10-years old, involving only adolescent or geriatric patients, other depression screens, and screening tools for other mental health conditions.

PCMH recognition is associated with improved patient outcomes, enriched clinical decisions, and reduced health care costs. Sinaiko et al. (2017) performed a meta-analysis of PCMH initiatives across eight states and found the use of specialty visits decreased by 1.5% with a total cost savings of 4.2%. Shi et al. (2017) compared all health centers with and without PCMH who provided care to over 21 million patients. They found there was substantial improvement in treatment for asthma, diabetes, pap screenings, prenatal care, and tobacco cessation in health centers that were PCMH recognized (Shi et al., 2017).

Reid et al. (2010) examined overall costs, patients' perception of the care experience, and burnout of providers two years after implementation of a PCMH model. They studied before and after evaluations in a random sample of over 6,000 adults treated in a PCMH model clinic or one of two control clinics. Reid et al. (2010) found the PCMH model enhanced the quality of care, decreased costs, and provided a better overall experience for both patients and providers.

Rosenthal et al. (2016) conducted a three-year study comparing differences in patient characteristics and utilization patterns between PCMH and general primary care

practices. The authors found a decrease in ED visits by 9.3% yielding an annual savings of \$5 million dollars (Rosenthal et al., 2016). In addition, cervical cancer screening improved (9%), the overuse of colon cancer screenings decreased by 18.1%, and hemoglobin A1c values decreased by 0.7% (Rosenthal et al., 2016). PCMH utilization also demonstrated a 10.3% decrease in admission rates of patients with multiple comorbidities and decreased the frequency of primary care visits by 1.5% (Rosenthal et al., 2016). Hence, a PCMH allowed for less frequent but more efficient patient care visits.

Similarly, the PCMH has been shown to increase alignment with evidence-based practice recommendations. Elder et al. (2016) conducted a retrospective chart review to assess whether or not PCMH recognition was associated with an increased delivery of practice recommendations for chronic pain. Higher rates of key practice recommendations were implemented in clinics with or in the process of obtaining a PCMH recognition (Elder et al., 2016). This was the first study to assess a PCMH effect on chronic pain.

Nelson et al. (2017) assessed the association between elements of a PCMH and the clinical quality in the Veterans Health Administration (VA). Results found higher scores on each of eight components in the Progress Index and were related to improved quality care indicators (Nelson et al., 2017). Clinics with high care coordination performed significantly better on 33 (69%) of 48 quality measures compared to clinics with lower care coordination (Nelson et al., 2017). Similar results were noted for access (32 [67%]), continuity (29 [60%]), and communication (25 [52%]) (Nelson et al., 2017). In fact, all PCMH components contributed to better performance on clinical quality indicators. (Nelson et al., 2017).

A gap found in the literature was the need for long-term studies related to a PCMH and its health outcomes. Although most short-term research has shown PCMH recognition as associated with better quality of care and decreased acute care usage, further research is necessary to determine whether improved documentation of practice guidelines produces sustainable and long-term improvements in patient outcomes. Furthermore, evaluating whether populations are healthier in the long-term as a result of a PCMH is important.

Practice guidelines for depression screening and the use of a validated screening tool promote optimal patient outcomes and aligns with the standards to become certified as a PCMH. Using a validated depression-screening tool can identify the need for further assessment, but proper follow-up on a positive screen is important. Fuchs et al. (2015) reviewed physician follow-up after a patient received a positive score on the PHQ-2 screening. They sought to determine if a PHQ-9 screening was subsequently completed and if there were any changes in treatment. The PHQ-2 was used to screen 1,744 patients for depression, for which over 400 (24%) screened positive (Fuchs et al., 2015). However, only 20 (5%) of those patients received a PHQ-9 screening (Fuchs et al., 2015). Furthermore, of the patients who tested positive on the PHQ-2 screening, 21% had initial chief complaints of mental health concerns (Fuchs et al., 2015). Discussion of depression was found in 39% of charts, any mental health concerns was found in 55% of charts, and treatment options were discussed in 38% of charts. This study was limited to EHR documentation, so if discussions occurred that weren't documented they were not included (Fuchs et al., 2015). In summary, the authors concluded that PHQ-2 screening

did not substantially improve further assessment, follow-up, or alteration in treatment related to depression (Fuchs et al., 2015).

Although routine depression screenings have the potential to identify depression risks, they are only effective if a positive screen leads to further evaluation and changes in care. Screening instruments can identify depression risk in adult patients, but the finding of depression warrants evaluation and treatment to improve patient outcomes; therefore, system changes may be required to appropriately integrate evidence-based depression screening. Primary care settings may benefit from behavioral health referral services in an attempt improve rates of depression screening, routine follow-up, and proper treatment (Fuchs et al., 2015).

The Plan-Do-Study-Act (PDSA) quality improvement method is a scientific method used to test change. The PDSA helps to provide a foundation, guide a project, and establish boundaries for testing change. This method is well reviewed within health care quality improvement initiatives. Taylor et al. (2013) discussed the application of the PDSA method to improve quality in healthcare. The ‘plan’ stage of the cycle helps identify the change that is needed and determine appropriate interventions. During the ‘plan’ stage of this project, gaps in the process are identified. Once an intervention is planned, the cycle moves to the ‘do’ stage. During this stage, the intervention is put into motion. During the next step of the cycle, the effects of the intervention are evaluated or “studied”. Last, the ‘act’ step of the cycle examines any further changes necessary to continually improve the process (Taylor et al., 2013).

Methods

Design

This was a quality improvement project utilizing a descriptive and observational design. A retrospective medical record review was used to assess the rate of depression screening utilizing the PHQ-2 and PHQ-9. In addition, any treatment (including referrals) in adult patients seen in an internal medicine primary care clinic over a six-week period was recorded. This was the first cycle utilizing the PDSA method.

Setting

The setting was a Midwestern suburban public health department serving approximately one million residents. There were 41,000 visits in 2016. Included within this department were three free-standing clinics serving racially, ethnically, and economically diverse patients throughout the county. Services included primary care in internal medicine, women's health, pediatrics, and dental services.

Sample

A convenience sample of patients who sought care at the internal medicine clinic from February 15-March 31, 2018 was obtained. Inclusion criteria were: patients aged 18-60 years, annual physical exam, routine follow-up, new patient, or a mental health chief complaint. Visits for episodic care were included if the patient had not been screened in over a year. Exclusion criteria included patients less than 18- or greater than 60-years of age, women who were pregnant or up to 6-months postpartum, and appointments for scheduled procedures.

Approval Process

The project was approved by the public health department's internal research review committee (IRRC). In addition, institutional review board (IRB) approval was

attained from the University of Missouri-St. Louis. There were no known risks or ethical considerations related to this study.

Data Collection and Analysis

Data was collected via a retrospective medical record review. Data was collected by the public health department's electronic health record (EHR) specialists, who produced bi-weekly reports. Demographic data included age, gender, race, and payor status. In addition, the type of visit, type of depression screening, and any recommended treatments or referrals was collected. If a PHQ-9 screening was positive for depression, the primary investigator accessed the EHR to determine method of follow up. Data was stored on a password-protected computer by the primary investigator. All data was de-identified and coded by using a subject ID such as A1, A2, A3, etc., for the entirety of the data set.

Procedures

A quality improvement team was formed and included the medical director, a public health nurse, the manager of information technology (IT) operations, and the manager of behavioral health. The team communicated through face-face meetings, emails, and telephone calls to discuss progress, concerns, and recommendations throughout the process. Providers and staff were educated about PCMH and the benefits of achieving certification, the significance of depression screening, the PHQ-2 and PHQ-9 screening tools, as well as the follow-up steps including medication management, treatment, and/or referral. Resources included adding the PHQ-9 screening tool into the EHR, and well as adjusting the documentation process for the depression screenings. The

EHR specialist was used as an additional resource to obtain patient data. A final meeting occurred after completion of data analysis to discuss results and future recommendations.

Results

Summary descriptive statistics were calculated for each interval and ratio variable. Frequencies and percentages were calculated for each nominal variable.

Between February 15 through March 31, 2018, there was a total number of approximately 941 internal medicine patient visits ($N=941$) that aligned with the inclusion and exclusion criteria. Based on the number of patient visits, the most frequently observed category of gender was Female ($n = 589, 63%$). The most frequently observed category of race was Black ($n = 492, 52%$). The most frequently observed category of payor status was Gateway to Better Health ($n = 406, 43%$). The average age of patients screened was 46.16 years ($SD = 10.79$) (Appendix A).

Approximately 65% ($n = 607$) of patients received a PHQ-2 screening. The most frequently observed PHQ-2 score was negative, meaning a score of <3 ($n = 490, 80%$). The least frequently observed PHQ-2 score was a refusal of screening by patient ($n = 3, 0.4%$). The rate of patients who received a score of ≥ 3 on the PHQ-2 was 16% ($n = 96$). The rate of patients who were given a PHQ-9 screening after scoring a ≥ 3 on the PHQ-2 was 44% ($n = 42$). A select number of patients with a history of depression were directly screened with the PHQ-9, bypassing the PHQ-2 ($n = 18$). There was an 80% rate of patients who were treated with either medication ($n = 30$), referral to behavioral health or social services ($n=23$), or both medication and referral ($n = 40$), following a positive depression screening. Depression interventions were not addressed in 20% ($n = 23$) of the

provider notes where patients that had a positive depression screen and 7% ($n = 8$) of patients declined treatment.

A Chi-Square Test of independence was conducted to examine the relationship between PHQ-2 and PHQ-9 screenings. There were four levels in the PHQ-2 variable: Negative, Positive, Refused, and and X (which represents bypassing the PHQ-2 due to history of depression). There were three levels in the PHQ-9 variable: Not applicable to patient, Not done, and Received. The results of the Chi-Square test were significant, $\chi^2(6) = 664.18, p < .001$, indicating if the PHQ-2 was positive, the PHQ-9 was likely positive for a mental health condition such as depression. The PHQ-2 positive screening variable and the PHQ-9 received variable had observed values that were greater than their expected values (Appendix B).

An additional Chi-Square Test of independence was conducted to examine the relationship between PHQ-9 screenings and recommended treatment and/or referral. There were three levels in PHQ-9: Not applicable to patient, Not done, and Received. There were six levels in recommended treatment and/or referral: Medication, Referral, Medication and Referral, Declined Treatment, Not Addressed, and No treatment indicated. The results of the Chi-Square test were significant, $\chi^2(10) = 579.02, p < .001$, indicating a positive PHQ-9 resulted in treatment and/or referral to a mental health specialist (Appendix C). The following level combinations had observed values that were greater than their expected values: PHQ-9 received and Medication and Referral, PHQ-9 received and Medication, PHQ-9 received and Referral, PHQ-9 received and interventions not addressed, PHQ-9 received and declined treatment.

Discussion

Results in this study demonstrated the rate of PHQ-2 screenings were high using a carefully constructed PDSA method. Almost seven out of every 10 visits were screened with the PHQ-2 depression screening tool. While the majority of patients who received a score of ≥ 3 on the PHQ-2 screening did not receive a reflex to the PHQ-9 screening, the relationship between these two variables remained significant in that a positive PHQ-2 or PHQ-9 likely indicated a mental health condition such as depression ($p < .001$). When patients were positively screened for depression, the vast majority of patients (80%) were treated with medication, referral, or both ($p < .001$). When patients were treated with medication, it was found that new medication was started, medication dosages were adjusted, or additional medications were added to current regimen. When patients were referred to behavioral health or social services, they were referred to psychiatry, social work services, or counseling. When a positive depression screening was not addressed, discussion of treatment was not documented in the providers visit note. It is unknown if depression treatment was discussed and not documented.

Based on the results of this study, the continuation of depression screenings with the PHQ-2 and PHQ-9 standardized depression screening tools is recommended. The PHQ-2 screening is ultrashort, easy to administer, and has shown an impressive rate of compliance, demonstrating this to be an appropriate tool for patients with no history of depression. When patients score a ≥ 3 on the PHQ-2, the PHQ-9 should be utilized. Because of the increased specificity and decreased sensitivity of the PHQ-9, patients with a history of depression should be screened with the PHQ-9, bypassing the PHQ-2. Providers might benefit from documentation of any recommended treatment for positive screenings. When patients decline screening and/or treatment, a recommendation would

be to routinely document this in the provider's visit note. Sustainability in screenings may occur if monthly audits occur and discussion about the rates and results a part of staff meetings.

Conclusion

The implementation of the PHQ-2 and PHQ-9 screenings were successfully implemented when no prior standardized depression screening was routinely used. Accessibility to the PHQ-2 and PHQ-9 in the EHR may enhance its use. The implementation of a standardized depression screening tool assisted the public health system to be increasingly prepared to achieve PCMH recognition. A PCMH recognition aligns with the triple aim of improved quality of care, decreased cost, and enhanced patient and provider experiences.

References

- Akincigil, A., & Matthews, E. B. (2017). National Rates and Patterns of Depression Screening in Primary Care: Results From 2012 and 2013. *Psychiatric Services, 68*(7), 660-666. doi:10.1176/appi.ps.201600096
- Appelquist, J., Miller-Day, M., Cronholm, P. F., Gabbay, R. A., & Bowen, D. S. (2017). "In principle we have agreement, but in practice it is a bit more difficult": Obtaining organizational buy-in to patient-centered medical home transformation". *Qualitative Health Research, 27*(6), 909-922. doi:10.1177/1049732316680601
- Elder, N., Penm, M., Pallerla, H., Meulen, M. B., Short, A. D., Diers, T., . . . Boone, J. M. (2016). Provision of recommended chronic pain assessment and management in primary care: Does patient-centered medical home (PCMH) recognition make a difference? *The Journal of the American Board of Family Medicine, 29*(4), 474-481. doi:10.3122/jabfm.2016.04.160037
- Frandsen, B. R., Joynt, K. E., Rebitzer, J. B. & Jha, A. K. (2015). Care fragmentation, quality, and costs among chronically ill patients. *American Journal of Managed Care, 21*(5), 355-362. Retrieved from <http://www.ajmc.com/>
- Fuchs, C. H., Haradhvala, N., Hubley, S., Nash, J. M., Keller, M. B., Ashley, D., . . . Uebelacker, L. A. (2015). Physician actions following a positive PHQ-2: Implications for the implementation of depression screening in family medicine practice. *Families, Systems, & Health, 33*(1), 18-27. doi:10.1037/fsh0000089
- Jackson, G. L., Powers, B. J., Chatterjee, R., Bettger, J. P., Kemper, A. R., Hasselblad, V., . . . Williams Jr., J. W. (2013). The patient-centered medical home. *Annals of*

Internal Medicine, 158(3), 169-178. doi:10.7326/0003-4819-158-3-201302050-00579

Kroenke, K., Spitzer, R. L., & Williams, J. B. (2003). The Patient Health Questionnaire-2: Validity of a two-item depression screener. *Medical Care*, 41(11), 1284-1292. doi:10.1097/01.MLR.0000093487.78664.3C

Kroenke, K., Spitzer, R. L., & Williams, J. B. (2001). The PHQ-9: Validity of a Brief Depression Severity Measure. *Journal of General Internal Medicine*, 16(9), 606-613. doi:10.1046/j.1525-1497.2001.016009606.x

Maurer, D. M. (2012). Screening for depression. *American Family Physician*, 85(2), 139-144.

McHugh, M. L. (2013). The chi-square test of independence. *Biochemia Medica*, 23(2), 143-149.

Intellectus Statistics [Online computer software]. (2017). Retrieved from <https://analyze.intellectusstatistics.com/>

National Committee for Quality Assurance (NCQA). (2014). *Patient-centered medical home recognition*. Retrieved from <http://www.ncqa.org/programs/recognition/practices/patient-centered-medical-home-pcmh>

Nelson, K., Sylling, P. W., Taylor, L., Rose, D., Mori, A., & Fihn, S.D. (2017). Clinical quality and the patient-centered medical home. *JAMA Internal Medicine*, 177(7), 1042-1043. doi: 10.1001/jamainternmed.2017.0963

Reid, R. J., Coleman, K., Johnson, E. A., Fishman, P. A., Hsu, C., Soman, M. P.,

Trescott, C. E., Erikson, M., & Larson, E. B. (2010). The group health medical

- home at year two: Cost savings, higher patient satisfaction, and less burnout for providers. *Health Affairs*, 29(5), 835-843. doi:10.1377/hlthaff.2010.0158
- Rosenthal, M. B., Alidina, S., Friedberg, M. W., Singer, S. J., Eastman, D., Li, Z., & Schneider, E. C. (2016). A difference-in-difference analysis of changes in quality, utilization, and cost following the Colorado multi-payer patient-centered medical home pilot. *Journal of General Internal Medicine*, 31(3), 289-296. doi:10.1007/s11606-015-3521-1
- Shi, L., Lee, D. C., Chung, M., Liang, H., Lock, D., & Sripipatana, A. (2017). Patient-centered medical home recognition and clinical performance in U.S. community health centers. *Health Services Research*, 52(3), 984-1004. doi:10.1111/1475-6773.12523
- Sinaiko, A. D., Landrum, M. B., Meyers, D. J., Alidina, S., Maeng, D. D., Friedberg, M. W., ... Rosenthal, M. B. (2017). Synthesis of research on patient-centered medical homes brings systematic differences into relief. *Health Affairs (Millwood)*, 36(3), 500-508. doi:10.1377/hlthaff.2016.1235
- Siu, A. L., & US Preventive Services Task Force (USPSTF). (2016). Screening for depression in adults: US Preventive Services Task Force recommendation statement. *The Journal of the American Medical Association*, 315(4), 380-387. doi:10.1001/jama.2015.18392
- Taylor, M. J., McNicholas, C., Nicolay, C., Darzi, A., Bell, D., & Reed, J. E. (2013). Systematic review of the application of the plan-do-study-act method to improve quality in healthcare. *BMJ Quality & Safety*, 23(4), 290-298. doi:10.1136/bmjqs-2013-001862

US Preventive Services Task Force (USPSTF). (2016). *Final recommendation statement:*

Depression in adults: Screening. Retrieved from

<https://www.uspreventiveservicestaskforce.org/Page/Document/RecommendationStatementFinal/depression-in-adults-screening1>

Appendix A

Table 1

Frequency Table for Nominal Variables

Variable	<i>n</i>	%
Appt_Type_descr		
FOLLOW-UP	746	79.28
NEW PATIENT	156	16.58
PHYSICAL	39	4.14
Missing	0	0.00
Patient_Sex		
F	589	62.59
M	352	37.41
Missing	0	0.00
Patient_Race		
AMERICAN INDIAN/ALASKAN NATIVE	3	0.32
ASIAN	21	2.23
BLACK	492	52.28
OTHER RACE	14	1.49
WHITE	411	43.68
Missing	0	0.00
Prim_Policy_Carrier_Name		
AETNA PPO	3	0.32
AMBETTER FROM HOME STATE HLTH	4	0.43
ANTHEM BLUE CROSS BLUE SHIELD	26	2.76
CIGNA HEALTHCARE	41	4.36
COVENTRY	2	0.21
GATEWAY TO BETTER HEALTH	406	43.15
HEALTHLINK CORP	1	0.11
HOME STATE HEALTH PLAN	28	2.98
MEDICAID	189	20.09
MEDICARE	108	11.48
UNINSURED	113	12.01
UNITED HEALTHCARE	18	1.91
UNITED MEDICAL RESOURCES	2	0.21
Missing	0	0.00

Note. Due to rounding errors, percentages may not equal 100%.

Appendix B

Table 2

Observed and Expected Frequencies

PHQ_2	PHQ_9		
	Not applicable to patient	Not done	Received
Neg	484[393.13]	5[46.82]	1[50.05]
Pos	0[77.02]	53[9.17]	43[9.81]
Refused	3[2.41]	0[0.29]	0[0.31]
X	0[14.44]	0[1.72]	18[1.84]

Note. $\chi^2(6) = 664.18, p < .001$. Values formatted as Observed[Expected].

Appendix C

Table 3

Observed and Expected Frequencies

PHQ_9	Recommended Treatments and/or Referrals			
	Declined Treatment	Medication	Medication and Referral	Not Addressed
Not applicable to patient	0[6.42]	5[24.07]	0[36.10]	0[20.06]
Not done	4[0.76]	11[2.87]	22[4.30]	10[2.39]
Received	4[0.82]	14[3.06]	23[4.60]	15[2.55]

Note. $\chi^2(10) = 579.02, p < .001$. Values formatted as Observed[Expected].