Depression and Anxiety Diagnoses Are Not Associated with Delayed Resolution of Abnormal Mammograms and Pap Tests Among Vulnerable Women

Andrea C. Kronman, MD, MSc¹, Karen M. Freund, MD, MPH¹, Tim Heeren, PhD², Kristine A. Beaver, MPH¹, Mary Flynn, BA, MS¹, and Tracy A. Battaglia, MD, MPH¹

¹Women's Health Unit, Section of General Internal Medicine, Department of Medicine, and Women's Health Interdisciplinary Research Center, Boston University School of Medicine, Boston, MA, USA; ²Department of Biostatistics, Boston University School of Public Health, Boston, MA, USA.

BACKGROUND: Delays in care after abnormal cancer screening contribute to disparities in cancer outcomes. Women with psychiatric disorders are less likely to receive cancer screening and may also have delays in diagnostic resolution after an abnormal screening test.

OBJECTIVE: To determine if depression and anxiety are associated with delays in resolution after abnormal mammograms and Pap tests in a vulnerable population of urban women.

DESIGN: We conducted retrospective chart reviews of electronic medical records to identify women who had a diagnosis of depression or anxiety in the year prior to the abnormal mammogram or Pap test. We used time-to-event analysis to analyze the outcome of time to resolution after abnormal cancer screening, and Cox proportional hazards regression modeling to control for confounding.

PARTICIPANTS: Women receiving care in six Boston-area community health centers 2004–2005: 523 with abnormal mammograms, 474 with abnormal Pap tests.

RESULTS: Of the women with abnormal mammogram and pap tests, 19% and 16%, respectively, had comorbid depression. There was no difference in time to diagnostic resolution between depressed and not-depressed women for those with abnormal mammograms (aHR=0.9, 95 CI 0.7, 1.1) or Pap tests (aHR=0.9, 95 CI 0.7, 1.3).

CONCLUSIONS: An active diagnosis of depression and/or anxiety in the year prior to an abnormal mammogram or Pap test was not associated with a prolonged time to diagnostic resolution. Our findings imply that documented mood disorders do not identify an additional barrier to resolution after abnormal cancer screening in a vulnerable population of women.

KEY WORDS: depression; cancer screening; women's health; minority populations.

J Gen Intern Med 27(4):452–7

DOI: 10.1007/s11606-011-1920-5

© Society of General Internal Medicine 2011

BACKGROUND

Depression is associated with high overall mortality,¹ including increased breast cancer mortality². The underlying mechanism explaining the relationship between depression and increased breast cancer mortality is unknown. A possible explanation is underuse of screening mammography, given that screening mammography reduces mortality,^{3,4} and women with psychiatric disorders are less likely to receive standard preventive care,^{5,6} including screening mammography.⁷ Another possible explanation is delayed follow-up after an abnormality is detected on a screening test, since delayed diagnosis can reduce survival if cancer is diagnosed at a later stage. Vulnerable populations of women, as defined by low income or with racial/ethnic minority status, are less likely to receive standard preventive healthcare and therefore experience worse breast and cervical cancer outcomes. Previous studies showed less than 25% of these vulnerable women received adequate follow-up care after an abnormal cancer screening test.^{8,9} In addition, the prevalence of depression is higher in vulnerable populations,^{10–16} and twofold higher in women than men. National annual prevalence estimates for women range between 4–14%.^{17,18}

Our previous work examined factors associated with delays in cancer care among a diverse population of women who received screening at urban community health centers (CHC).^{19,20} We found the individual CHC site was a stronger predictor of timely resolution than race, ethnic group, language, insurance status, or age.^{19,20} We then sought to examine additional patient characteristics that may identify a group of women who are particularly vulnerable to delayed resolution of abnormal cancer screening tests and might benefit from tailored interventions such as patient navigation. We hypothesized that depression would contribute to delays in

Received December 2, 2010

Revised July 5, 2011

Accepted October 10, 2011

Published online November 15, 2011

diagnostic resolution. In addition, since previous studies demonstrated that anxiety may result in more timely care,^{21,22} we hypothesized that anxiety may decrease time to resolution, and modify an association between depression and time to diagnostic resolution. Thus, our objective is to determine if depression and anxiety are independent predictors of delays in care after abnormal mammograms and Pap tests in a vulnerable population of urban women.

METHODS

Study Design

This is a secondary analysis of data collected at baseline of the Boston Patient Navigation Research Program (PNRP), before a patient navigation intervention was implemented.¹⁹ Boston PNRP partnered with six CHCs to collect retrospective medical record data for women who had abnormal mammograms or Pap tests. For this study, data were collected via chart review for psychiatric diagnoses, symptoms, and treatment for the 1-year period preceding the date of the abnormal cancer screening test.

Study Population

Eligible subjects in the baseline PNRP included adult women with an abnormal screening Pap test or mammogram performed between January 1, 2004 and December 30, 2005 at the 6 CHCs.¹⁹ Eligible mammograms included Breast Imaging Reporting and Data System (BIRADS) scores indicating need for follow-up (BIRADS 0, 3, 4, and 5). Eligible Pap tests included cellular abnormalities indicating need for follow-up: atypical squamous cells of undetermined significance positive for human papillomavirus (ASCUS/HPV+), low-grade squamous intraepithelial lesion (LGSIL), and high-grade squamous intraepithelial lesion (HGSIL). All subjects with high-grade abnormalities were included (BIRADS 4, 5; HGSIL), and a random sample of low-grade abnormalities (BIRADS 0, 3; ASCUS/HPV+; LGSIL) to obtain approximately 100 women per site. At sites with fewer than 100 eligible cases, all eligible subjects were included. In order to prevent clustering of cases by CHC, a representative sample of equivalent numbers were selected from each center.

Data Sources

We previously described the details of how the data were retrieved from the EMR and registration databases of the six CHCs.¹⁹ Socio-demographic and eligibility criteria were retrieved automatically, while clinical outcomes and psychiatric diagnosis and treatment data were abstracted manually by trained research staff.

Independent Variables of Interest

We categorized a subject as actively "depressed" if either of the following criteria was documented in the EMR during the 12 months preceding the abnormal test: 1) a new diagnosis of

depression [ICD-9 diagnoses 311.x, 309.28, 309.0-309.1, 300.4] entered into the active problem list¹, or 2) depression diagnosis documented in the free-text "Assessment/Plan" section of office notes. By categorizing depression in this way, we ensured that depression was an active problem in the year prior to the abnormal cancer screening test. In order to further validate our definition of depression diagnosis, we abstracted depressive symptom data (depressed mood, sleep disorders, anxious feelings, fatigue, impaired concentration, appetite change, psychomotor change, social isolation, decreased interest, suicidality, hopelessness, other) from the EMR if documented as free-text in the "History of Present Illness" or "Review Of Systems" sections of provider notes, or listed in the Problem List during the specified time period. We categorized a subject as "anxious" if anxiety was documented either in the active problem list [ICD-9 diagnoses 300.0x, 300.2x] or in the free-text sections of office notes during the specified time period.

Covariate and Intervening Variables

We obtained anti-depressant medication data from the medication list in the EMR, and evidence that the patient received psychotherapy through the following indicia: presence of an office note from a therapist or psychiatrist, mention of therapy in the free text Assessment/Plan section, or referral to behavioral health from the Orders section. We then categorized subjects into one of four mutually exclusive categories based on depression treatment: 1) anti-depressants only, 2) psychotherapy only, 3) both anti-depressants and psychotherapy, or 4) no treatment. Other psychiatric diagnoses were abstracted from the Problem Lists in the EMR, including bipolar, psychoses, and substance abuse. We collapsed the race/ethnicity EMR data into four mutually exclusive categories: White, Black/African American, Hispanic/Latina, or Asian/Other. Because the age distribution is very different for women obtaining breast and cervical cancer screening (older women in the breast cancer screening group), we categorized different age categories for the two screening populations and subdivided them into three age groups that had clinical significance. We categorized primary language as English, Spanish or other. We created the following three mutually exclusive categories from the primary and secondary insurance data in the EMR: no health insurance, publicly financed health insurance (Medicare and/or Medicaid), or private health insurance.

Outcome Variables

Our primary outcome of interest was time (number of days) from index screening abnormality to diagnostic resolution. Subjects were followed for a maximum of one year. We defined *diagnostic resolution* as either a definitive tissue diagnosis (biopsy with pathology report) or clinical evaluation (such as colposcopy) indicating no further need for evaluation. For subjects with LGSIL pathology, we considered the initial colposcopy with biopsy to be definitive, although surveillance is recommended. Similarly, for subjects with a recommended two-year surveillance for BIRADS three results, we considered diagnostic resolution as the next six-month mammogram, subtracting the six-month period for timely resolution in the

analysis²³. Due to the long times to resolution and most of the cases resolving within 6 months, we censored this outcome at a maximum of 365 days.

Data Analysis

Women with abnormal mammograms were analyzed separately from women with abnormal Pap tests, because of marked differences between the groups in age, racial/ethnic distribution and characteristics of cancer screening test. Chi-square tests were used to compare the characteristics of depressed and not-depressed women and to compare the prevalence of depression across demographic subgroups. Next, we examined depressive symptom data in the depressed and not depressed groups to validate our definition of depression diagnosis. In the time-to-event analysis, we first compared time to resolution within 365 days between depressed and not-depressed women via the log-rank test. We then used Cox-proportional hazards modeling to predict timely resolution incorporating all of the covariates, and an interaction term for anxiety and depression. In the final models, we included only those categorical variables with a significant univariate Cox model p-value (< 0.05), excluding the interaction term because it was not significant. In secondary analyses, we modeled separate effects for depressed women with and without treatment, because treatment for depression may modify the effect of depression diagnosis. To determine if depression was associated with outcome for any subgroups of our population, we stratified our analyses by insurance, age and race/ethnicity. For women with abnormal Pap tests, the cumulative incidence curves with and without depression cross at about 120 days; therefore we modeled separate effects of depression for resolution before and after 120 days, using time-dependent indicators for depression in the Cox model. Analyses were conducted using SAS 9.1.²⁴ A two-sided p-value < 0.05 was considered statistically significant for reporting associations.

RESULTS

Among 997 women, 523 had abnormal mammograms and 474 had abnormal Pap tests. Overall, 17% had depression and 8.5% had anxiety. Of the women with abnormal mammogram and Pap tests, 19% and 16%, respectively, had co-morbid depression. As expected, women with abnormal mammograms were older (96% > 40 years old) compared to the women with abnormal Pap tests (70% between ages 18 – 30 years old). For both groups, depressed women were more likely to be on public insurance, and for women with abnormal mammograms, depressed women were less likely to be black. (Table 1) Depressed women in both study groups were more likely to have anxiety.

Depressive symptoms were statistically significantly more common among women defined as depressed compared to those who were not. The most common documented symptoms in the depressed group in decreasing frequency were: depressed mood (57% for both women with abnormal mammograms and Pap tests), sleep problems (41% and 38%), anxious feelings (33% and 15%), fatigue (32% and 18%), impaired

concentration (21% and 14%), and changes in appetite (14% for either abnormal test). For depressed women with abnormal mammograms, 69% had some form of documented treatment (66% prescribed antidepressants), while 51% of depressed women with abnormal Pap tests had some treatment (45% prescribed antidepressants).

The median time to resolution was 27 days for women with abnormal mammograms, and 85 days for women with abnormal Pap tests. Figure 1 compares the time-to-diagnostic-resolution event analysis of women with and without depression diagnosis. In both of these screening groups, we note delays in diagnostic resolution, with less than half receiving a definitive diagnosis within 30 days after abnormal mammograms, and within 90 days after abnormal Pap tests. There was no difference in time to diagnostic resolution between those with and without depression diagnosis either for women with abnormal mammograms (Fig. 1a, $p=0.22$ from the log-rank test) or for women with abnormal Pap tests (Fig. 1b, $p=0.53$).

Tables 2a and b present the bivariate and multivariable findings from the Cox proportional hazard models predicting time to resolution for mammogram and Pap test abnormalities, respectively. In these analyses, a hazard ratio less than 1.0 indicates longer time to diagnostic resolution. When examining the whole study population, neither depression diagnosis nor anxiety was significantly associated with delayed diagnostic resolution for women with abnormal mammograms or abnormal Pap tests. Secondary analyses found no significant interaction between depression and anxiety for women with abnormal mammograms ($p=0.64$) or with abnormal Pap tests ($p=0.16$). The effects of depression remained non-significant when allowing for different effects in depressed women receiving treatment (aHR 0.8 (0.6, 1.1) for mammograms and aHR 1.0 (0.7, 1.4) for Pap tests), or not receiving treatment (aHR 1.0 (0.7, 1.5) for mammograms and aHR 0.8 (0.6, 1.2) for Pap tests) for depression. Among women with abnormal Pap tests, there was no suggestion of a depression effect on time to resolution over the first 120 days of follow-up (aHR 1.0 (0.7, 1.4)); however, there was a non-significant trend toward slower resolution for depressed women after 120 days (aHR 0.6 (0.3, 1.1), $p=0.096$). We performed additional secondary stratified analyses in order to examine associations within subgroups of patient socio-demographics. Separate analyses by insurance status showed no depression effect for those with public or private insurance, but demonstrated a trend of delayed diagnostic resolution for those with no insurance (HR=0.3 (0.1, 1.0) $p=0.06$ for mammograms and HR=0.5 (0.2, 1.2) $p=0.11$ for Pap tests). There were no differences by race, ethnicity, or age.

DISCUSSION

To our knowledge, this is the first examination of the relationship between pre-existing depression with and without anxiety and time to diagnostic resolution of abnormal mammograms and Pap tests. In this vulnerable population seeking care at urban federally qualified community health centers, we found delays in diagnostic resolution after abnormal cancer screening. However, those with a depression diagnosis did not have increased delays compared to not-depressed women. In addition, there was no significant interaction between anxiety and depression.

Table 1. Characteristics of Depressed and Not Depressed With Abnormal Mammography and Pap Test Screening

	Abnormal Mammograms, N = 512			Abnormal Pap Tests, N = 468		
	Depressed (%)	Not Depressed (%)	P	Depressed (%)	Not Depressed (%)	P
N(%)	97 (19)	415 (81)		74 (16)	394 (84)	
Race/Ethnicity			0.009			0.648
White	41 (42)	149 (36)		22(30)	98 (25)	
Black	22 (23)	148 (37)		21 (28)	139(35)	
Hispanic	27 (28)	69 (17)		22 (30)	106 (27)	
Other	7 (7)	49 (12)		9 (12)	51 (13)	
Age			0.550			0.246
18-40	4 (4)	18 (4)		5 (7)	43 (11)	
40-65	84 (87)	343 (83)		37 (50)	231 (59)	
Over 65		54 (13)		32 (43)	120 (30)	
Language			0.194			0.740
English	58 (60)	269 (65)		51 (69)	263 (67)	
Spanish	19 (20)	52 (13)		12 (16)	58 (15)	
Other	20 (21)	94 (23)		11 (15)	73 (19)	
Insurance			0.022			0.002
None	13 (13)	98 (24)		12 (16)	119 (30)	
Public	36 (37)	120 (29)		32 (43)	103 (26)	
Private	48 (49)	197 (47)		30 (41)	172 (44)	
Screening Abnormality						
BIRADS* Results				Pap results		0.798
0	68 (70)	278 (67)		HGSIL†	10 (14)	49 (12)
3	26 (27)	101 (24)		LGSIL‡	64 (86)	345 (88)
4/5	3 (3)	36 (9)				
Community Health Center			0.794			0.172
A	23 (24)	72 (17)		16 (22)	83 (21)	
B	18 (19)	86 (21)		7 (9)	42 (11)	
C	19 (20)	87 (21)		9 (12)	72 (18)	
D	11 (11)	58 (14)		4 (5)	45 (11)	
E	7 (7)	29 (7)		15 (20)	76 (19)	
F	19 (20)	83 (20)		23 (31)	76 (19)	
Other Psychiatric Diagnoses						
Anxiety	23 (24)	14 (3)	0.001	22 (30)	26 (7)	0.001
Psychosis	1 (1)	3 (1)	0.839	0 (0)	0 (0)	0.999
Bipolar	4(4)	4 (1)	0.046	1 (1)	2(<1)	0.934
Substance abuse	0 (0)	1 (<1)	0.811	4 (5)	7 (2)	0.079

*BIRADS = Breast Imaging Reporting and Data System

†HGSIL = High Grade Squamous Intraepithelial Lesion

‡LGSIL = Low Grade Squamous Intraepithelial Lesion

Our findings suggest that for women with the lengthiest delays in diagnostic resolution (> 120 days), depression may contribute to diagnostic delays of abnormal Pap tests, but not abnormal mammograms. This may reflect differences in the populations themselves, as the populations are remarkably different in age, or differences in the perceived implications of delayed diagnostic resolution. For example, a delay of several months for an abnormal mammogram may be clinically more significant than several months of delayed resolution for abnormal Pap tests. However, our results contrast from studies of cancer screening tests reporting depression being associated with less screening mammography,^{2,25} but not with fewer Pap tests.

Prior research found conflicting effects between the relationship of cancer screening behavior and depression. This may be due to depression frequently being confounded with anxiety, and the potential for anxiety having opposite effects on health outcomes. For example, a meta-analysis found that depressed patients were three times less likely to be adherent to treatment recommendations for a variety of illnesses, including breast cancer, but anxiety had little effect⁶. Patten and colleagues surveyed a large population, finding that a major depressive episode was not associated with receiving a screening mammogram in the subsequent

year; however, co-existing anxiety was not accounted for in that analysis.²⁶ Additional analytical complexities are introduced by differential reporting and documentation of depressive and anxious symptoms. Frequently, depression and anxiety symptoms are under-documented.²⁷ Even if symptoms are documented, there remains an analytic challenge of determining if these symptoms reflect a stable psychological “trait” versus a temporary “state,” and determining which is more important in determining future health behavior and outcomes. This distinction is of particular importance when studying the outcomes of follow-up care after abnormal cancer screening, as in this study, for the negative psychological states associated with receipt of an abnormal test could adversely affect the outcome of follow-up care.

In addition to the analytical difficulties, the relationship of depression and cancer screening behavior could vary by populations of women. For example, in our study population of ethnically diverse, economically disadvantaged women, who already have other socioeconomic barriers to reaching timely resolution after abnormal cancer screening,^{28,29} our findings suggest that depression does not contribute to delays in diagnostic care, except perhaps for those who both are depressed and lack insurance. It is possible that depression does delay diagnostic resolution in women not socio-

Figure 1. Time to event analysis comparison of depressed and not-depressed patients (a) Abnormal mammograms (b) Abnormal pap tests.

economically disadvantaged. Conversely, the women in our study were already engaged in the health care system, as having an abnormal cancer screening test was a mandatory inclusion criterion. If depression is a barrier to receiving screening mammography and/or Pap tests in a sub-population of women, they would not have been included in our study.

This study is limited by the relatively small sample size, limiting our power to detect statistical differences between the depressed and not-depressed groups. Using retrospective chart review to classify patients as depressed has the potential for misclassification bias in two ways, each biasing the results toward the null. First, it is possible that patients classified as “not-depressed” were truly depressed. In addition to known under-diagnosis of depression in primary care,³⁰ which may be differential in vulnerable populations³¹ and those without insurance,³² there may be under-documentation of it as well, since primary care providers are frequently not reimbursed if depression is the primary ICD-9 diagnosis. The accuracy of using administrative data or the EMR to determine depression diagnosis ranges from 58 – 83% depending on the contents of the EMR.^{33,34} However, our 12 month depression prevalence was slightly higher than that previously reported for depression using survey tools, suggesting the possible extent to which under-diagnosis and under-reporting of depression were limited in our study.^{15,35,36} Second, patients adequately

treated for depression may be classified as “depressed” even though they are no longer experiencing symptoms. However, since almost all of our depressed patients had corresponding documented depressive symptoms, it is unlikely that a patient classified as depressed did not have depressive symptoms during the year preceding the abnormal cancer screening test. Although depression diagnosis documented in administrative data is more likely to correspond to severe and recurrent depression in patients,³⁷ we were not able to account for the clinical severity of depression or whether it was adequately treated. Finally, as our data was collected via retroactive chart review, there may be some residual confounding that we were not able to account for in our analyses.

This is the first examination of the relationship between pre-existing depression and time to diagnostic resolution of abnormal mammograms and Pap tests.⁹ Previous studies focused on screening mammography and Pap tests. Our findings did not support the notion that pre-existing mood disorders documented in the EMR delays the time to resolution of abnormal cancer screening tests for vulnerable populations, although we did find a trend of delayed care in depressed women who were uninsured or took longer to resolve their Pap abnormalities. It is possible that the timing of depressive symptoms in relation to the time of being informed of abnormal cancer screening is a more informative predictor. Future studies should validate our results by using survey data to classify patients’ depressive symptoms, their severity, and whether they reflect a stable psychological “trait” or temporary “state.”

Our current findings are consistent with our previous work, in that individual characteristics of patients may be less important than system characteristics in determining the time to diagnostic resolution of abnormal mammograms or Pap tests in vulnerable women^{19,20}. However, identifying which patients are most vulnerable may allow for more efficient allocation of resources, as patient-centered-medical-home models emerge and incorporate more elements of case management. Our findings imply that pre-screening the EMR for mood disorders may not be the most reliable approach to identify a group of patients at higher risk of delayed diagnostic resolution of abnormal cancer screening tests in a vulnerable population.

Table 2. Cox Proportional Hazards Analysis^a Predicting Time to Resolution

	Univariate	Bivariate	Multivariate [†]	P
	HR (95% CI)	HR (95% CI)	HR (95% CI)	
Abnormal Mammograms N=538				
Depression	0.9 (0.7, 1.2)	0.9 (0.7, 1.2)	0.9 (0.7, 1.1)	0.31
Anxiety	0.9 (0.6, 1.2)	0.9 (0.6, 1.3)	1.0 (0.7, 1.4)	0.85
Abnormal Pap Tests N=415				
Depression	0.9 (0.7, 1.3)	0.96 (0.7, 1.3)	0.9 (0.7, 1.3)	0.73
Anxiety	0.9 (0.6, 1.3)	0.9 (0.6, 1.3)	1.1 (0.5, 1.1)	0.21

^aLarger hazards ratios are associated with shorter time to resolution. *p* value is testing the HR from the multivariable model

[†]Adjusted for individual community health center and degree of mammogram abnormality

[‡]Adjusted for individual community health center, race, language and insurance status. The cumulative incidence curves for women with and without depression cross at 120 days; therefore we modeled separate effects of depression for resolution within 120 days and after 120 days, using time-dependent indicators for depression in the Cox model

Acknowledgements: This work was presented at the Society for General Internal Medicine National Meeting, in Miami Beach, FL, on 14 May 2009. The authors thank Ignacio De La Cruz, John Pagliaro, and Cynthia Schoettler for their support with manuscript preparation. Dr. Kronman is supported by a Cancer Control Career Development Award for Primary Care Physicians from the American Cancer Society (CCCA-09-217-01 Kronman). This work is also supported by the National Cancer Institute (CA116892 Freund).

Conflict of Interest: None disclosed.

Corresponding Author: Andrea C. Kronman, MD, MSc; Women's Health Unit, Section of General Internal Medicine, Department of Medicine, and Women's Health Interdisciplinary Research Center, Boston University School of Medicine, 801 Massachusetts Avenue, Suite 470, Boston, MA 02118, USA (e-mail: andrea.kronman@bmc.org).

REFERENCES

- Charbonneau A, Rosen AK, Owen RR, et al. Monitoring depression care: in search of an accurate quality indicator. *Medical Care*. 2004;42:522-531.
- Pirraglia P, Singer DE, Ferris TG. Depressive symptom burden as a barrier to screening for breast and cervical cancers. *J Womens Health*. 2004;13:731-738.
- Jørgensen KJ. Mammography reduces breast cancer mortality in women aged 39-69 years; but harms may outweigh benefits in women under 50. *Evid. Based Med*. 2010;15:62-63.
- Nelson HD, Tyne K, Naik A, Bougatsos C, Chan BK, Humphrey L. Screening for Breast Cancer: An Update for the U.S. Preventive Services Task Force. *Ann. Intern. Med*. 2009;151:727-737.
- Lasser KE, Zeytinoglu H, Miller E, Becker AE, Hermann RC, Bor DH. Do women who screen positive for mental disorders in primary care have lower mammography rates? *Gen. Hosp. Psychiatry*. 2003;25:214-216.
- DiMatteo MR, Lepper HS, Croghan TW. Depression is a risk factor for noncompliance with medical treatment: Meta-analysis of the effects of anxiety and depression on patient adherence. *Arch. Intern. Med*. 2000;160:2101-2107.
- Pirraglia PA, Sanyal P, Singer DE, Ferris TG. Depressive symptom burden as a barrier to screening for breast and cervical cancers. *J. Womens Health*. 2004;13:731-738.
- Yabroff KR, Washington KS, Leader A, Neilson E, Mandelblatt J. Is the Promise of Cancer-Screening Programs Being Compromised? Quality of Follow-Up Care after Abnormal Screening Results. *Med. Care Res. Rev*. 2003;60:294-331.
- Bastani RYK, Myers RE, Glenn B. Interventions to improve follow-up of abnormal findings in cancer screening. *Cancer*. 2004;101:1188-1200.
- Breslau J, Kendler KS, Su M, Gaxiola-Aguilar S, Kessler RC. Lifetime risk and persistence of psychiatric disorders across ethnic groups in the United States. *Psychol. Med*. 2005;35:317-27.
- Cutrona C, Russell DW, Brown PA, Clark LA, Hessling RM, Gardner KA. Neighborhood context, personality, and stressful life events as predictors of depression among African American women. *J. Abnorm. Psychol*. 2005;114:3-15.
- Gwynn R, McQuiston HL, McVeigh KH, Garg RK, Frieden TR, Thorpe LE. Prevalence, diagnosis, and treatment of depression and generalized anxiety disorder in a diverse urban community. *Psychiatr. Serv*. 2008;59:641-7.
- Lorant V, Deliège D, Eaton W, Robert A, Philippot P, Anseau M. Socioeconomic inequalities in depression: a meta-analysis. *Am. J. Epidemiol*. 2003;157:98-112.
- Nejtek V, Brown ES, Khan DA, Moore JJ, Van Wagner J, Perantie DC. Prevalence of mood disorders and relationship to asthma severity in patients at an inner-city asthma clinic. *Ann. Allergy Asthma Immunol*. 2001;87:129-33.
- Pratt L, Brody DJ. Depression in the United States household population, 2005-2006. *NCHS Data Brief*. 2008;1-8.
- Trupin L, Tonner MC, Yazdany J, et al. The role of neighborhood and individual socioeconomic status in outcomes of systemic lupus erythematosus. *J. Rheumatol*. 2008;35:1782-8.
- Compton W, Conway KP, Stinson FS, Grant BF. Changes in the prevalence of major depression and comorbid substance use disorders in the United States between 1991-1992 and 2001-2002. *Am. J. Psychiatry*. 2006;163:2141.
- Kessler R, McGonagle KA, Zhao S, et al. Lifetime and 12-month prevalence of DSM-III-R psychiatric disorders in the United States. Results from the National Comorbidity Survey. *Arch. Gen. Psychiatry*. 1994;51:8-19.
- Battaglia TA, Santana CM, Bak S, et al. Predictors of timely follow-up after abnormal cancer screening among women seeking care at urban community health centers. *Cancer*. 2010;116:913-921.
- Battaglia TA, Roloff K, Posner MA, et al. Improving follow-up to abnormal breast cancer screening in an urban population. A patient navigation intervention. *Cancer*. 2007;109:359-367.
- Jones GNAS, Jeffries SK, Scarinci IC, Brantley PJ. Utilization of medical services and quality of life among low-income patients with generalized anxiety disorder attending primary care clinics. *Int J Psychiatry Med*. 2001;31:183-98.
- Fogarty CTSS, Chetty VK, Culpepper L. Mental health conditions are associated with increased health care utilization among urban family medicine patients. *J. Am. Board Fam. Med*. 2008;21:398-407.
- Weir H, Thun MJ, Hankey BF, et al. Annual report to the nation on the status of cancer, 1975-2000, featuring the uses of surveillance data for cancer prevention and control. *J. Natl. Cancer Inst*. 2003;95:1276-1299.
- Kroenke KJ, Jackson JL, Chamberlin J. Depressive and anxiety disorders in patients presenting with physician complaints: clinical predictors and outcome. *Am. J. Med*. 1997;103:339-347.
- Aggarwal AFK, Sato A, Adams-Campbell LL, et al. Are depressive symptoms associated with cancer screening and cancer stage at diagnosis among postmenopausal women? The Women's Health Initiative observational cohort. *J Womens Health*. 2008;17:1353-1361.
- Patten SBWJ, Lavorato DH, Eliasziw M. The effect of major depression on participation in preventive health care activities. *BMC Public Health*. 2009;9:87.
- Calleo JSM, Greisinger A, Wehmanen O, et al. Generalized anxiety disorder in older medical patients: diagnostic recognition, mental health management and service utilization. *J. Clin. Psychol. Med. Settings*. 2009;16:178-185.
- Smith-Bindman R, Miglioretti DL, Lurie N, et al. Does utilization of screening mammography explain racial and ethnic differences in breast cancer? *Ann. Intern. Med*. 2006;144:541-553.
- Yabroff K, Breen N, Vernon SW, Meissner HI, Freedman AN, Ballard-Barbash R. What factors are associated with diagnostic follow-up after abnormal mammograms? Findings from a U.S. National Survey. *Cancer Epidemiol. Biomarkers Prev*. 2004;13:723-732.
- Ani CBM, Hindman D, Bell D, et al. Depression symptomatology and diagnosis: discordance between patients and physicians in primary care settings. *MC Fam Pract*. 2008;9(1):1.
- Simpson SM, Krishnan LL, Kunik ME, Ruiz P. Racial disparities in diagnosis and treatment of depression: a literature review. *Psychiatr. Q*. 2007;78(1):3-14.
- Harman JS, Schulberg HC, Mulsant BH, Reynolds CF. The effect of patient and visit characteristics on diagnosis of depression in primary care. *J Fam Practice*. 2001; 50(12).
- Rawson NS, Malcolm E, D'Arcy C. Reliability of the recording of schizophrenia and depressive disorder in the Saskatchewan health care datafiles. *Soc Psych Psych Epid*. 1997;32(4):191-199.
- Hostetter AM, Egeland JA, Endicott J. Amish Study, II: Consensus diagnoses and reliability results. *Am J Psychiat*. 1983;140(1):62-66.
- Kessler RC, Berglund P, Demler O, et al. The epidemiology of major depressive disorder: Results from the National Comorbidity Survey Replication (NCS-R). *JAMA*. 2003;289(23):3095-3105.
- Williams DR, Gonzalez HM, Neighbors H, et al. Prevalence and distribution of major depressive disorder in african americans, caribbean blacks, and non-hispanic whites: Results from the National Survey of American Life. *Arch. Gen. Psychiatry*. 2007;64(3):305-315.
- Valenstein M, Ritsema T, Green L, et al. Targeting quality improvement activities for depression. Implications of using administrative data. *J Fam Practice*. 2000;49(8):721-728.