

A Quality Improvement Project Assessing Prevalence of Depression in Orthopedic Spine

Patients

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Abstract

Individuals with back pain who have spine conditions or are undergoing spine surgery may have depression that can lead to negative post-surgical outcomes, such as complications and poor quality of life. Currently depression is not assessed as part of the treatment plan or preoperative visit for spine patients at an urban academic medical center. This project determined the prevalence of depression and need for routine depression screening and referral in orthopedic spine patients at an urban academic medical center. Inclusion criteria were: adults ages 21 and up; the ability to speak, read, and write English; and a candidate for spine surgery or other spine treatment. Current clinic practices for depression screening and referral were evaluated. To establish a depression prevalence rate, eligible participants were invited to be screened for depression using the Patient Health Questionnaire (PHQ-9) tool. The average PHQ-9 score was 11, correlating with moderate depression. Participants scoring above 10 reported depression caused by pain and loss of function in daily activities prior to and after spine care treatment. Recognizing depression in spine patients prior to surgery could lead to earlier interventions, such as counseling, that could promote positive surgical outcomes including better quality of life, stronger self-efficacy in post-operative recovery, and a decrease in depressive symptoms. Initiating counseling along with conservative management of spine conditions and pain could enhance non-surgical treatment.

Keywords: spine surgery, depression, Patient Health Questionnaire, perioperative screening, surgical outcomes.

A Quality Improvement Project Assessing Prevalence of Depression in Orthopedic Spine Patients

Over 80% of the United States population has experienced back pain with 45% of those individuals becoming disabled (Seebach et al., 2012). Back pain and disability increases the chance of depression (Seebach et al., 2012). Mental health screening is uncommon preoperatively for patients with back pain (Menendez et al., 2014). Not screening patients for depression perioperative can be attributed to a clinician's lack of understanding of mental health need among patients with back pain. The United States Preventive Task Force ([USPSTF], 2016) recommends screening for depression in all clinical settings so that patients can be treated appropriately and to avoid worsening conditions. The USPSTF rating for depression screening is a B, moderate recommendation to provide this service based on high certainty that the benefit is substantial for patients and encourages clinicians to offer this service. Even though depression is a very common illness in the United States, a majority of individuals either do not seek care or are not provided the appropriate care to manage their depression (Young et al., 2014). A high number of depression cases go undiagnosed (Young et al., 2014). Complication rates, even death, after spine surgery have also seen a rise over the years, provoking the question "What more can we do in the care of spine patients with back pain?" According to Seebach et al. (2012), along with having back pain, many times these patients also experience poor self-efficacy, depression, and anxiety due to a perceived poor quality of life. Patients with depression undergoing spine surgery are also at increased risk of readmission within thirty days after treatment and increased opioid use compared to non-depressed patients (O'Connell et al., 2017).

Statement of the Problem

Back pain is highly prevalent in the United States and one of the most common ailments seen in the primary care office (Seebach et al., 2012). A significant number of patients with back pain end up needing surgery due to spinal stenosis, spinal column fractures, disk herniation and degeneration that generates pain (Seebach et al., 2012). Spine surgery is one of the most frequently performed surgeries in the United States and along with back pain, can stimulate depression that is either pre-existing or undiagnosed in patients (Seebach et al., 2012). Depressive mood alterations can impact the outcome of a patient's healing after surgery resulting in increased pain, disability, increased opioid use, and declined health-related quality of life (Seebach et al., 2012).

Though a majority of musculoskeletal pain is associated with depression, psychological well-being is often over-looked when assessing patients who experience pain chronically and pre-operatively (Zieger, Schwarz, Konig, Harter & Riedel-Heller, 2009). In a systematic review on depression prevalence in patients undergoing a procedure for a herniated disc, 11 out of 14 studies showed that depression actually increased after the surgery even when pain was decreased (Zieger et al., 2009). A decreased quality of life and lack of motivation to follow post-operative instructions for healing and activity was noted with the increased depression leading to longer recovery time after surgery or complications (Zieger et al., 2009). Because of the link between pain, depression, and post-operative quality of life, orthopedic practices should evaluate depression in the surgical patient undergoing spine surgery so that interventions can be made to improve the patient's quality of life after surgery.

The purpose of this project was to determine the prevalence of depression in patients needing spine surgery or conservative treatment for spine conditions, and the need for practice

change in depression screening and follow-up referral. The identification and referral treatment pre-operatively could benefit patients by promoting better recovery and quality of life after surgery or treatment.

Background and Significance

Prevalence of Back Pain and Depression in the United States

Two of the most common medical conditions affecting those 18 and older is back and neck pain (Singh & Anderson, 2015). The highest incidence of low back and neck pain is in adult ages 45-64 with white non-Hispanic ethnicities in the Midwest of the United States comprising the majority of the population (Singh & Anderson, 2015). Specific back conditions include inflammatory spine conditions, spondylosis, spinal stenosis, lumbago, sciatica, backache and sacrum disorders (Singh & Anderson, 2015). Other disc disorders include herniation, degeneration, and post-laminectomy disorders. Back injuries causing pain include fractures, dislocations, and sprains (Singh & Anderson, 2015). With these back-pain conditions, hardships in activities of daily living and ability to work are experienced by these patients. Among this group it is estimated that four out of 17 individuals are limited or unable to perform their job responsibilities and have increased days spent bed due to pain (Singh & Anderson, 2015).

Medical care is often required for the majority of back and neck pain with the rate of physician visits increasing from 50.6 million in 2010 to 57.1 million in 2013 (Singh & Anderson, 2015). In 2013, 75% of hospitalizations consisted of back and neck pain disorders (Singh & Anderson, 2015). Roughly 62 million back and neck pain conditions were routinely seen in hospitals, emergency departments, outpatient clinics, and physician offices in 2013, with 2.3 million becoming hospitalized (Singh & Anderson, 2015). In 2013, 75% of hospitalizations consisted of back and neck pain disorders (Singh & Anderson, 2015).

One of the hardest decisions a clinician makes is to determine generators of pain. Outside of pain caused by musculoskeletal conditions, pain can be a symptom of depression and depression a symptom of pain (Hall-Flavin, 2016). Combined, depression and pain can cause a vicious cycle for a patient with spine syndromes. Individuals who have been dealing with back pain for a long time can end up developing symptoms that lead to depression, such as issues sleeping and stress (Hall-Flavin, 2016).

Depression is common in the United States. According to the Centers for Disease Control ([CDC] 2018), 8.1% of American adults over the age of 20 reported depression over a two-week time frame in 2013-2016. Of these individuals, 80% reported depression affecting their work, family at home, their social life and creating greater functional impairment with a chronic disease (CDC, 2018). Pain and depression have neurotransmitters in common, serotonin and norepinephrine (Travedi, 2004). When serotonin and or norepinephrine are malfunctioning, then pain and depression can occur (Travedi, 2004). Patients experiencing back and neck pain may have alterations in their serotonin and norepinephrine leading to mood disorders like depression (Travedi, 2004). Individuals experiencing back pain that have underlying depression may tend to hyper focus on their pain, which can lead to perceiving the pain as worse than what it is, or causing more stress to themselves (Seebach et al., 2012). Stress can increase muscle tension, worsening the pain they are experiencing (NIH, 2018).

Significance of Depression in Surgical Recovery

Surgical intervention has shown to improve quality of life in patients with back and neck pain who are candidates for surgery (Miller et al., 2015). A strong correlation is identified in individuals with preoperative depression and post-operative complications, such as poorer quality of life, than those without preoperative depression (Miller et al., 2015). Compared to the

patients without depression after surgery, a majority of patients with preoperative depression showed significantly less improvement after surgery (Whalman et al., 2015). Recovery times were shown to take longer in the preoperative depression group (Wahlman et al., 2015). This may be due to a decrease in immune system and cognitive impairment intensified by depression (Ghoneim & O'Hara, 2016). Post-operative pain has been shown to cause depression in some individuals, lowering the threshold for pain (Ghoneim & O'Hara, 2016).

Impact of Depression and Back Pain on Healthcare Cost for Spine Patients

Billions of dollars are spent each year for back pain and spine conditions (Singh & Anderson, 2015). This includes lost days of work for patients, physician office visits, cost of conservative and surgical treatment, and medications (Singh & Anderson, 2015). For back pain patients requiring spinal fusion surgery, the average cost per hospital stay with surgery was \$112,000 in 2013. If the patient needed a second surgery due to complications, then the cost for revision in 2013 was \$129,000 in addition to the \$112,000 (Singh & Anderson, 2015).

Pain medication has shown a large increase in cost with a 7.3% increase each year (Singh & Anderson, 2015). Between 1996-2014, prescription medication for back pain refills increased from 353 million to 789 million (Singh & Anderson, 2015). Back pain is often treated without consideration for the source of pain (Singh & Anderson, 2015). Depression could be the source of pain that patients are experiencing (Connell et al., 2018). Depression and/or pain may lead to more lost days at work, more days spent in bed, reduction in functional ability, and increased chance of opioid dependency after surgery (Connell et al., 2018).

Screening Tool for Depression

Despite the disability and cost that depression can bring to a patient, it often goes undetected in various clinic settings. Short answer questionnaires that take minimal time to

administer could provide a way to start screening patients who may be in need of help for depression (Manea, Gilbody, & McMillan, 2012). The Patient Health Questionnaire (PHQ-9) is a simple tool consisting of nine questions regarding feelings of depression over the last two weeks. Built into the nine questions are the nine criteria from the fourth version of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) that assist in diagnosing depression (Kroenke & Spitzer, 2002). The advantage of using a tool that incorporates the DSM-IV criteria is not only to diagnose depression, but also to rate depression severity (Kroenke & Spitzer, 2002). Both the sensitivity and specificity of the PHQ-9 are 88% with a score of 10 (Manea, Gilbody, & McMillan, 2012). Each question is scored by the patient and then added together. Scores range from 5 (mild depression) to 20 (severe depression) (Kroenke, Spitzer, & Williams, 2001). Every additional point on the PHQ-9 questionnaire predicts a 10% decrease in a successful surgical recovery (Alvin et al., 2014).

The PHQ-9 has successfully been implemented in a variety of clinic settings ranging from primary care to specialty areas such as perioperative (Stenman & Sartipy, 2018). In a study conducted at a teaching hospital with cardiac patients undergoing surgery, the PHQ-9 was found to be low resource intensive and feasible (Stenman & Sartipy, 2018). Patients scheduled for elective surgery had a high response rate to the PHQ-9 with 64% completion (Stenman & Sartipy, 2018). Fifteen percent of the elective surgery patients screened positive for depression with a score greater than or equal to 10 (Stenman & Sartipy, 2018). To ensure accurate evaluation of feasibility and little interference with clinic flow, the study was implemented in a clinic setting with little use of extra staff (Stenman & Sartipy, 2018). Elective surgery patients' response to the PHQ-9 in the clinic was satisfactory (Stenman & Sartipy, 2018). The study

authors suggested including the PHQ-9 in a patient's admission interview for better depression screening response rates (Stenman & Sartipy, 2018).

Depression screening is being implemented in spine clinics for patients undergoing spine surgery to predict surgical outcomes (Tuck et al., 2018). In a study of 1,000 prospective non-randomized spine patients, the PHQ-9 predicted patient-reported functional outcomes based on scores prior to surgery and scores after surgery (Tuck et al., 2018). Patients filled out the PHQ-9 questionnaire prior to surgery and then again post-operatively at follow-up appointments (Tuck et al., 2018). Patients with severe preoperative depression had a continuous score of at least 10 from one-month post-operation up to 24 months post-operation (Tuck et al., 2018). Previous assessments of spinal functional improvement have been clinician-based (Tuck et al., 2018). These clinician based assessments are found to be biased and do not reflect adequate patient self-report of physical, mental, or emotional function after spine surgery (Tuck et al., 2018). Pre-screening of depression in individuals undergoing spine surgery may lead to enhanced outcomes after surgery by identifying patients that could be at risk for suboptimal surgical outcomes (Menendez et al., 2014).

Project Aims

This QI project was conducted at an outpatient spine clinic at an urban academic medical center. There are three project aims: (1) assess current processes and methods of pre-operative screening and referral for depression in spine patients at the spine clinic, (2) determine the prevalence of depression among spine patients using the PHQ-9 questionnaire at clinic visits, and (3) evaluate the counseling referral need for spine patients with depression.

Project Questions

Aim 1: Assess current methods of pre-operative screening and referral for depression in spine patients at an outpatient spine clinic.

Question 1: What is the current practice for depression screening among preoperative/pre-treatment spine patients?

Question 2: What is the current referral practice for pre-operative/pre-treatment spine patients thought to have depression?

Aim 2: Determine the prevalence of depression among spine patients using the PHQ-9 questionnaire at clinic visits.

Question 3: Will the PHQ-9 provide information to evaluate depression prevalence in spine patients?

Aim 3: Evaluate the referral need for spine patients with depression, especially prior to surgery.

Question 4: Can the need for a referral for depression be assessed from evaluation of PHQ-9 scores?

Question 5: How many spine patients will need a referral for depression?

Definitions

Depression

Depression is an emotional state involving sadness, low self-worth, guilt, and an inability to enjoy life and potentially thoughts of death or suicide. It is a common and serious medical condition that negatively affects the way someone feels, thinks, and acts, leading to a variety of emotional and physical problems that can decrease their ability to function at work and home (American Psychiatric Association, 2019). Operationally, depression is measured by a PHQ-9

score of 5-9 as mild depression, scores 10-14 indicate moderate depression, and scores greater than 15 are major depression (American Psychiatric Association, 2018).

Back Pain

Conceptually, back pain is any pain felt in the lower or upper portion of the spine (Mayo Clinic, 2019). Problems causing pain include conditions affecting the vertebrae of the spine, vertebral discs, ligaments around the spine, the spinal cord and nerves branching out from the spine, muscles surrounding the spine, organs in the chest, pelvis, abdomen, tumors, and skin (Mayo Clinic, 2019). Pain can be measured by self-report using a pain scale ranging from 0-10. Zero is no pain and 10 is worst imaginable pain (Hawker et al., 2011).

Theoretical Framework

The framework guiding this QI project will be the FOCUS portion of the FOCUS-PDSA cycle. FOCUS stands for: finding a process to improve, organize a team that knows the process, clarify certain knowledge of the process, understand the variability and capability of the process, and select a plan for continuous improvement; PDSA stands for Plan, Do, Study, Act (U.S. Department of Health and Human Services, 2015). FOCUS is a strategic framework used in various quality improvement projects to direct a needs assessment in an organized manner, divided into steps. FOCUS is the sequence for an area of improvement identification. The concepts of the FOCUS model in relation to the project components are displayed in Table 1.

Table 1

Concepts of the FOCUS model in relation to the project components

Domain:	Find a Process to Improve	Organize a Team	Clarifying Knowledge	Understanding the Variability	Select a Plan for Continuous Improvement
Project Component:	Depression screening and referral among spine patients	Project director KU SON team Spine clinic team	Data collection: current process need for referral	Flow charts and fishbone diagram Summary statistics of PHQ-9 results	Findings with plan for improvement will be presented to spine clinic staff

Methods

Design

A descriptive quality improvement design using the FOCUS framework was used in this project. Aim 1 involved traditional quality improvement methodologies to develop an understanding of the current process, as well as variations of screening and referring spine patients for depression. For Aims 2 and 3, the PHQ-9 was administered to screen spine patients for depression. The results of the PHQ-9 provide an understanding of the prevalence of depression and the need for referral among the spine patients at the clinic, as well as the acceptability of the tool among this population. For this project, the process to improve was assessing the need to screen orthopedic spine patients for depression. The team that guided the quality improvement process consisted of the project director (D.Herman), the project chair who has extensive research experience and quality improvement experience, the project committee comprised of nursing professors with long-term experience in mental health and orthopedics, orthopedic spine surgeons, and nurses in the orthopedic spine clinic.

The nursing staff involved in the pre-anesthesia testing clinic were interviewed about current processes for screening depression prior to surgery and what referral process was in place. Orthopedic spine surgeons in the urban outpatient spine clinic were interviewed about their thoughts regarding depression in their patient population, thoughts on depression screening in their practice, and positive or negative outcomes they observed in their patient population after surgery and with conservative management for spine conditions. Staff nurses who work alongside orthopedic surgeons in the urban outpatient spine clinic were interviewed about experience with depression in their patient population, what the current process was for screening and referring their patients with depression, and outcomes they observed in their patient population with depression after surgery or with conservative management. Education was provided to the staff in the urban outpatient spine clinic by the project director on the process of observations, assessments, and a referral process for the project during the project data collection.

Each questionnaire was administered via paper handout and saved in a lock box by the project director, who was the only one with a key. These were filled out at the beginning of the pre-operative appointment, or time of conservative management recommendation, by the participants with assistance of the project director. For the purpose of this project, the orthopedic spine surgeons were notified if a patient screened moderate or high for depression, or a score of 10 or greater on the PHQ-9 questionnaire. It was at the discretion of the surgeon to refer their patient to the patient's primary care provider for treatment and counseling of depression. A phone call and/or letter of referral from the spine clinic to the patient's primary care provider was completed by the spine clinic staff. No monetary involvement or stipend was included in the project for participants.

Clarifying knowledge about depression referrals in the urban outpatient spine clinic was accomplished by assessing current systems in place for orthopedic spine patients and developing a process map. Understanding the variability and capability of the improvement process was achieved through data collection and synthesizing the data. A plan for continuous improvement was suggested to the spine surgeon and clinic staff once all data was collected and synthesized. Benefits of screening for depression in the spine clinic included surgeons recognizing when a patient was at risk for a post-surgical unfavorable quality of life outcome. Patients were able to get a referral for counseling if needed prior to surgery or while the patient received conservative management of their spine condition.

Human Subjects Protection

Institutional review board (IRB) quality improvement designation was obtained prior to starting the project. The application was submitted to the IRB at the University of Kansas Medical Center. Consent was not needed for this project because only a questionnaire was administered and no patient identifiers saved. Full disclosure of the project was given to the participants individually in person at the same time as the questionnaire was administered. Participants confidentiality was maintained by the questionnaires being anonymous and no collection of identifiable information. No physical harms were encountered by participants because only a questionnaire was administered and no procedure was performed. In this project, participants with pre-existing depression who may have viewed the questionnaires as distressing did not express any psychological distress about their responses. If this did happen, the patients would have been referred to their primary care provider or mental health counselor for further treatment and evaluation. If patients expressed suicidal ideation, they would have been

immediately directed by a staff member to the emergency department following The University of Kansas Hospital policy.

Setting and Sample

This project took place at an outpatient spine clinic at an academic medical center in Kansas City Kansas, Wyandotte county. It is an outpatient clinic that consists of an orthopedic spine surgeon, a nurse, a medical assistant, and appointment schedulers. Patients are typically referred to the outpatient spine clinic by primary care providers, pain management specialist, and word of mouth when chronic back pain, degenerative and deformity spine conditions, or trauma to the back are experienced. An estimated total of 120 or more patients are seen in each orthopedic spine clinic per month; there are a total of four orthopedic spine surgeons that conduct a clinic every week. Patients were recruited during their clinic visits with the surgeon, clinic nurse, and project director. Each patient seen in the clinic was asked if they would like to participate in the project by the project director, orthopedic spine surgeon, and spine clinic nurse. Participants were selected by convenience sampling, totaling 100 participants within the two-month data collection period. Inclusion criteria for eligibility are (a) male and female adults ages 21 and older; (b) ability to speak, read, and write English; and (c) need for conservative management of back or neck pain, or scheduled for primary or revision spine surgery. Exclusion criteria are (a) anyone with an active diagnosis of depression, (b) taking anxiolytics or antidepressants, or (c) currently being treated for depression by a physician or psychologist. 85 out of the 100 participants met inclusion criteria. The project director checked the clinic schedule the day before each clinic to assess for inclusion criteria patients.

Data Collection

Notes were taken while observing the process of patient encounters during clinic visits with the clinic nurse and surgeon prior to administering the PHQ-9. Interviews with the nurse and surgeon using an interview guide (Appendix A) were used for data collection about depression screening and the referral process for their patient population prior to introducing the PHQ-9 in the spine clinic.

A paper version of the Patient Health Questionnaire Module (PHQ-9) (Appendix B) was administered to patients who met inclusion criteria by the project director at new patient appointments, the beginning of the pre-operative history and physical appointment and at the time of conservative management recommendation at the outpatient spine clinic. A separate questionnaire (Appendix C) was given to each patient that completed the PHQ-9 form to ascertain their thoughts about filling out a depression screening tool at their appointment. Data collection took two months to ensure that a desired minimum number of 50 participants who took part in the project was achieved. PHQ-9 data was entered into the secure KUMC RedCap system until the completion of the entire project and the paper questionnaires will be shredded. Data was transferred from the RedCap to the secure KUMC Q drive and will be saved for seven years per IRB requirements.

Evaluation Plan

The process of depression screening and referral was evaluated in two ways. The first was through flow charts. Flow charts with notes from key steps were created based on observations made during the patient intake and assessment process. A fishbone diagram was constructed to identify key causes of variation in depression screening and referral of spine

patients. Sources of data for the fishbone diagram included process observations, as well as informal discussions and interviews with key spine center providers and staff.

Descriptive statistics were used to describe the health care provider interviews (Appendix A) PHQ-9 results, and follow-up interview questions to completing the PHQ-9 questionnaire (Appendix B, Appendix C). Each PHQ-9 questionnaire completed was scored using the PHQ-9 scoring tool (Appendix D). Data were entered into the RedCap program through the University of Kansas Medical Center secure site and the put into a simple summary of findings. Mean, median, and mode of scores from the questionnaire were computed by the project director and the project chair.

Table 2

Project Timeline

April 15, 2019	April-May 2019	May 2019	May 2019-July 20, 2019	August 2019	December 9, 2019
Present DNP Project	Obtain approval from DNP Project Committee	Submit project to KUMC Human Subjects Committee	Data Collection Observations Interviews Participant Recruitment PHQ-9 Implementation	Data Analysis Establish Conclusions and Recommendation Develop scholarly Document Submit to DNP Project Committee	Present Complete Project to the Public and spine clinic staff

Results

Clinic Processes

All patients completed routine office documents prior to their appointment in the outpatient spine clinic. New patients had more paper work than established patients that assessed

reason for visit, symptoms they are currently experiencing, past medical history, family history, allergies and medications. Established patients filled out paperwork that addressed their current function, mobility, and activities of daily living and how it was affecting their lifestyle since the last appointment or since surgery. A majority of these patients completed the documents on-line where it was then printed off for their clinic visit. Patients who did not fill out the documents on-line, completed it at their visit prior to being taken into an exam room. Depression screening was not included in the routine documents prior to the appointment, but rather was administered during the clinic visit. This was the first time the PHQ-9 questionnaire had been administered in this clinic. Overall, patients and clinic staff were very receptive of the questionnaire.

Figure 1 illustrates the complete and current process that a spine patient may encounter in the spine clinic. The oval represents the start and end points. A line, or arrow, is a connector that shows the path of decision making between the represented shapes. Rectangles represent a process and diamonds indicate a decision.

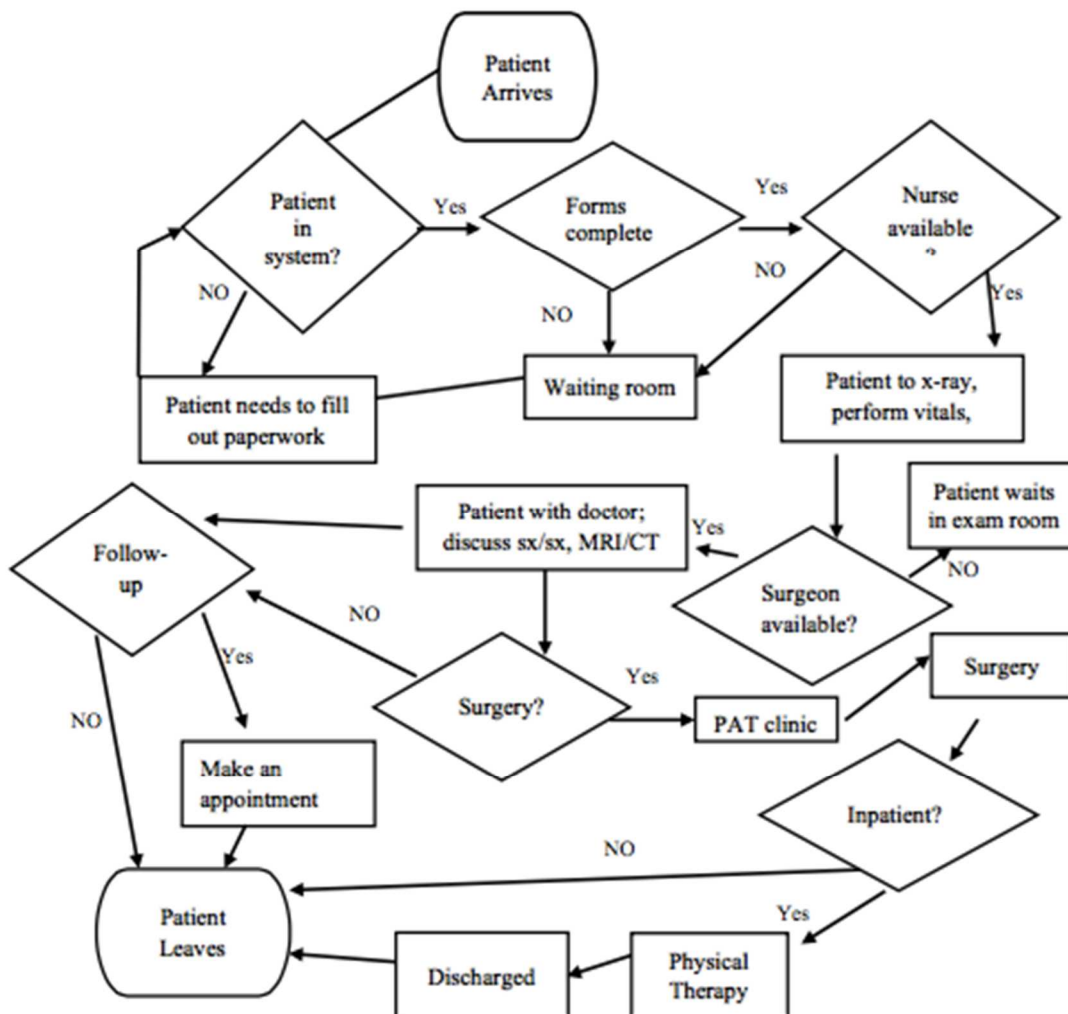


Figure 1. Orthopedic spine clinic visit

Referrals to the patient's primary care provider could be discussed with the patient by the surgeon while in the exam room and at the conclusion of the patient's visit. A referral request to the patient's primary care provider, or the spine clinic psychologist, could be sent at the time the patient schedules a follow-up appointment or in place of a follow-up appointment. The pre-anesthesia testing clinic (PAT) has the potential to request referrals to the spine center clinic psychiatrist or the patient's primary care provider for further evaluation and depression screening follow-up.

Figure 2 is a visualization of the potential cause and effect analysis of why depression screening was not being performed in this outpatient spine clinic. Conclusions drawn from Figure 2 suggest that depression screening is not easily accessible to patients due to lack of an Electronic Health Record integrated depression screening tool, lack of support staff to administer the depression screening, and lack of documenting depression in the clinic visit note.

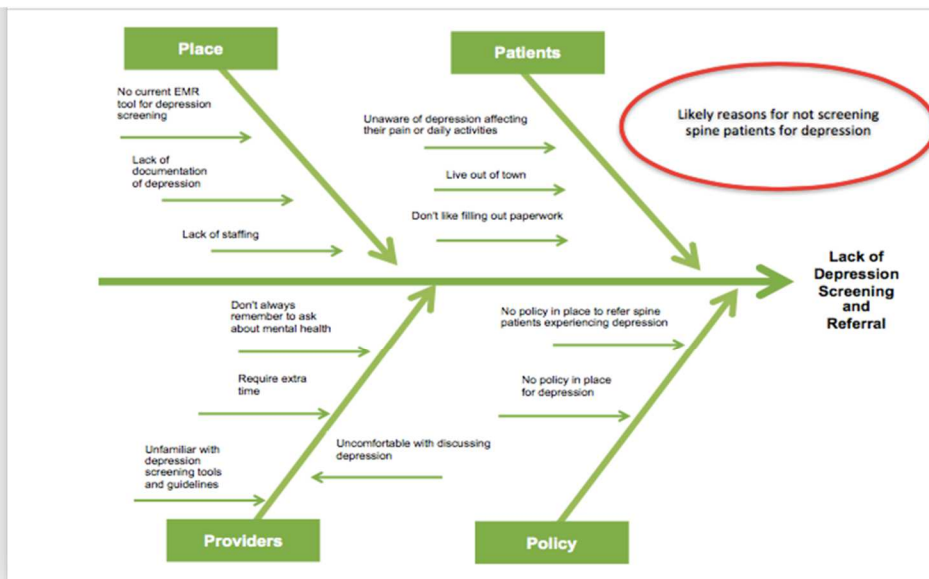


Figure 2.

Likely reasons for not screening spine patients for depression

Patient and Clinic Staff Acceptability of Depression Screening

Among spine clinic staff and staff in the preoperative anesthesia testing clinic interviewed, all felt depression was prevalent among spine patients seen in the clinic. There was not a process in place to screen spine patients for depression in the spine or anesthesia testing clinic, nor was there a process for referring spine patients with depression. A psychologist had recently joined the spine clinic staff and the spine clinic surgeons were beginning to refer patients to the psychologist on an as needed basis for depression. Each staff member reported

that screening spine patients for depression in their spine patients was a good idea as long as the patient would benefit from the referral. Minimal experience with depression screening was reported by the staff members in both clinics. Nursing staff in the spine clinic felt the PHQ-9 was easy to administer and score. Nursing staff were also interested in providing holistic care to their patients. The orthopedic spine surgeon in this clinic was very interested in assessing his patients' depression score. He was knowledgeable on the link between mental health and healing processes. The surgeon viewed the PHQ-9 as easy to use and convenient. The spine clinic nurse stated, "when we have patients who have been in pain for longer periods of time with no relief/minimal relief, it seems they feel more helpless. This is mostly our new patient population, non-surgical patients, or patients post-op in the early recovery phase." When the clinic nurse was asked how she felt about screening patients for depression, she reported, "I do think it could be beneficial for the patient, I do know the pain that our patients report can make them feel depressed. I do not have much experience with the PHQ-9 questionnaire." The spine surgeon in the outpatient spine clinic stated "there is a lot of literature to suggest that depression can affect healing after surgery. I am not very familiar with the PHQ-9 questionnaire but it seems easy to incorporate in clinic and easy to score." The spine surgeon reported "I am very interested in comparing each patient's PHQ-9 scores to their ODI [Oswestri Disability Score] score to see if there is a correlation in depression and functional ability in ADLs [Activities of Daily Living] prior to and after surgery."

PHQ-9 Scores and Referrals

A total of 100 participants were screened using the PHQ-9 questionnaire with 85 meeting inclusion criteria (43 women and 42 men). The mean PHQ-9 score was 11 (10.99), median was 10, minimum was one and the maximum was 28 (Table 3). The spine surgeon was shown each

participants questionnaire that scored 10 or above, and it was at the discretion of the surgeon to refer the patient to their primary care provider or the spine clinic psychiatrist as needed. A total of 58 (68%) participants needed referrals based on PHQ-9 evaluation criteria but only 10 referrals were made; six to the participants' primary care provider and four to the outpatient spine clinic psychologist (Table 4). The reasons for not referring patients who scored 10 or higher included: the patient rejected the referral, more time spent on the patient's physical ailments that left little time to discuss their mental health needs, and the surgeon to making a clinical decision not to refer after having a conversation with the patient about the patient's score.

From the follow-up questionnaire for the PHQ-9, 68 participants (80%) felt it was a good idea or not mind filling it out. Comments from participants included: "helpful," "good idea," "no big deal," and "it's a good idea." Other participants, 8 (10%), felt it did not have anything to do with their visit, and 8 participants (10%) felt filling out the PHQ-9 at their visit was "weird." Responses included, "I thought it was very strange," "I felt it wasn't necessary," and "indifferent." When asked about issues completing the PHQ-9, 83 participants (98%) reported they had no issues filling out the PHQ-9. However, 1 participant (2%) reported difficulty due to tremors they had from a medication or could not concentrate due to pain. Participants stated, "No issues other than hand tremors from medication" (the patient had trouble writing due to hand tremors from a medication the patient was taking at home), "none," and "some things don't fit so it's difficult to answer." When asked if the PHQ-9 was convenient to complete, 76 participants (90%) reported the PHQ-9 was convenient to fill out at their visit, but 8 participants (10%) wanted the PHQ-9 to be on-line with the rest of their paperwork. Comments from participants included "yes, filled it out while waiting on the doctor," "it was fine," "didn't really pertain to visit," and "I could have completed with other on-line questions." Regarding prior experience with the PHQ-9, 25

participants (30%) have filled out the PHQ-9 or other depression questionnaire in the past and 60% (51 participants) had never filled out a depression screening questionnaire. When asked if completing the PHQ-9 was a good idea for spine patients, more than 50% found the PHQ-9 helpful and necessary for spine patients due to chronic pain/limitations in mobility due to a spine condition. Comments from participants included “sure because pain, especially chronic pain, can lead to depression,” “possibly, chronic back pain could cause depression when you are limited by pain,” and “yes, a spine injury is a life changing event physically and emotionally.” The remaining participants felt the questionnaire was unrelated to their visit and did not see why it was necessary and that the questionnaire did not relate to them or their reason for visit. Comments from participants included “No clue,” “No, because they are two separate issues,” “Not sure”, “depends on how the information is used,” “I’m not sure how it applies to the visit,” and “It’s not part of the reason I am here.”

Table 3
PHQ-9 Statistics

Statistical Analysis	PHQ-9	Age	Gender
Mean	10.99	54.3	Male: 42 (49.4%) Female: 43 (50.5%)
Median	10	56	
Minimum	1	21	
Max	28	89	

Table 4
PHQ-9 Score Analysis

Depression Category	Number of Participants	Participant Percentage	Referred
No Depression: 1-4	5	5.88%	0
Mild: 5-9	22	25.88%	0
Moderate: 10-14	43	50.59%	4
Major: >15	15	17.65%	6

Summary

The purpose of this QI project was to determine the need for systematized preoperative depression screening of patients undergoing spine surgery or needing conservative management for back and neck pain. Results of the QI needs assessment justify the need for depression screening in the orthopedic spine patient population at the urban outpatient spine clinic. Analyzing the concept map provides multiple opportunities that depression screening could be performed in the spine clinic. Referrals can easily be made at the conclusion of an office visit with the spine clinicians to the patients' primary care provider or to the spine center psychologist. The percentage of participants screening in the severe depression category was almost 18%, indicating a need exists for depression screening and referral in this patient population. These patients were referred to the spine center psychologist for help in a timely manner. Many but not all of these patients scoring in the severe category were referred to the spine center psychologist for help in a timely manner.

The literature suggests that psychological well-being is often overlooked in the spine patient population yet the majority of those patients experiencing pain are experiencing some

level of depression. Reasons why screening for depression may be overlooked (Figure 2) in the urban outpatient spine clinic and the PHQ-9 mean results, indicate that a majority of the spine patients in this urban outpatient spine clinic are experiencing depression with their pain.

According to Hall-Flavin (2016) depression and pain can cause a vicious cycle for a patient with spine syndromes. Patients who have been dealing with back pain for a long time can develop symptoms that lead to depression, such as sleep disturbance and stress (Hall-Flavin, 2016).

Participants in this QI needs assessment were similar to the participants in Hall-Flavin (2016) study in that many reported feelings of depression due to pain and a decrease in function with daily activities due to pain.

The majority of spine center staff and patients agreed that the PHQ-9 was easy to administer and complete at a clinic visit and would be beneficial for future spine patients. The spine clinic nurse stated that if the PHQ-9 was beneficial for the patient to get support they need for coping with their spine condition, then it is a good idea and should be implemented in clinic. Many spine patients and clinic staff expressed that there is a mind-body connection that can impact daily activities, spine conditions, and healing after surgery. The spine physician expressed his knowledge on the mind impacting the body and how it affects healing after surgery. He thought that if patients had the tools they needed to cope with mental and emotional factors affecting physical issues, optimal outcomes after surgery or conservative management would increase.

The effects of depression on the immune system may lead to post-operative complications, decreased quality of life, and even death (Ghoneim & O'Hara, 2016). If initiated early, counseling may help improve self-efficacy and manage depression to promote positive surgical outcomes and a better quality of life after surgery (Ghoneim & O'Hara, 2016). A

process of screening patients could improve clinical practice in the outpatient spine clinic at the urban academic medical center by providing spine patients enhanced holistic care.

My first recommendation is to provide depression education to the spine clinic staff and surgeon on the importance to screen and identify depression in their patient population, the different ways that depression can be expressed by their patients, and how mental health affects quality of life and healing. Although the surgeon and clinic staff expressed knowledge of the importance of depression treatment for optimal spine surgery and management outcomes, not all patients with moderate or severe depression were referred during this project. My second recommendation is for the spine clinic staff to include the PHQ-9 screening tool in new patient documents offered on-line in the patient portal and when the patients check-in for their visit at the clinic. The clinic nurse or medical assistant in the clinic can score each completed questionnaire with a key to help interpret the score and provide the results to the surgeon for further review and recommendation of referral if needed. At the conclusion of this project, the spine clinic staff were exploring possibly continuing the PHQ-9 in their clinic with more focused inclusion and screening criteria.

Physical comprehensive care is already achieved at this facility, and the mental health component of comprehensive care can be accomplished by utilizing the PHQ-9 to assess for depression. The quality of patient care may be enhanced by addressing one facet of a patient's mental health needs through screening and referral for care in addition to treating their spine issues. By evaluating the current processes, prevalence of depression and need for referrals, along with the patient acceptability of depression screening, the need for routine and standardized depression screening process was demonstrated.

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Appendix A

Interview Guide for Healthcare Providers

1. How often do you notice depression in your spine patient population?
2. What is the current process for depression screening in your clinical practice?
3. What is the referral process in place for spine patients with depression?
4. How do you feel about screening your patients for depression prior to surgery or with conservative management of their spine condition?
5. What is your experience with the PHQ-9 questionnaire?

Appendix B

PATIENT HEALTH QUESTIONNAIRE (PHQ-9)

NAME: _____ DATE: _____

Over the last 2 weeks, how often have you been
bothered by any of the following problems?
(use "✓" to indicate your answer)

	Not at all	Several days	More than half the days	Nearly every day
1. Little interest or pleasure in doing things	0	1	2	3
2. Feeling down, depressed, or hopeless	0	1	2	3
3. Trouble falling or staying asleep, or sleeping too much	0	1	2	3
4. Feeling tired or having little energy	0	1	2	3
5. Poor appetite or overeating	0	1	2	3
6. Feeling bad about yourself—or that you are a failure or have let yourself or your family down	0	1	2	3
7. Trouble concentrating on things, such as reading the newspaper or watching television	0	1	2	3
8. Moving or speaking so slowly that other people could have noticed. Or the opposite —being so fidgety or restless that you have been moving around a lot more than usual	0	1	2	3
9. Thoughts that you would be better off dead, or of hurting yourself	0	1	2	3

add columns + +

(Healthcare professional: For interpretation of TOTAL, TOTAL:
please refer to accompanying scoring card).

10. If you checked off any problems, how difficult have these problems made it for you to do your work, take care of things at home, or get along with other people?	Not difficult at all	_____
	Somewhat difficult	_____
	Very difficult	_____
	Extremely difficult	_____

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Appendix C

Follow-up questionnaire for spine patients completing the PHQ-9 questionnaire

1. What did you think about filling out a depression screening questionnaire at your visit?
2. What issues did you have filling out the questionnaire?
3. Explain how the questionnaire fit into your visit. Was it convenient to fill out at your appointment?
4. Have you ever filled out the PHQ-9 or another depression screening questionnaire in the past?
5. Do you think having spine patients fill out the PHQ-9 depression questionnaire is a good idea? Why or Why not?

Appendix D

PHQ-9 Patient Depression Questionnaire Scoring

1. Patient completes PHQ-9 Quick Depression Assessment.
2. If there are at least 4s in the shaded section (including Questions #1 and #2), consider a depressive disorder. Add score to determine severity.

3. *Consider Major Depressive Disorder*

- if there are at least 5s in the shaded section (one of which corresponds to Question #1 or #2)

Consider Other Depressive Disorder

- if there are 2-4s in the shaded section (one of which corresponds to Question #1 or #2)

Note: Since the questionnaire relies on patient self-report, all responses should be verified by the clinician, and a definitive diagnosis is made on clinical grounds taking into account how well the patient understood the questionnaire, as well as other relevant information from the patient. Diagnoses of Major Depressive Disorder or Other Depressive Disorder also require impairment of social, occupational, or other important areas of functioning (Question #10) and ruling out normal bereavement, a history of a Manic Episode (Bipolar Disorder), and a physical disorder, medication, or other drug as the biological cause of the depressive symptoms.

To monitor severity over time for newly diagnosed patients or patients in current treatment for depression:

1. Patients may complete questionnaires at baseline and at regular intervals (e.g., every 2 weeks) at home and bring them in at their next appointment for scoring or they may complete the

questionnaire during each scheduled appointment.

2. Add ups by column. For every: Several days = 1 More than half the days = 2 Nearly every day

= 3

3. Add together column scores to get a TOTAL score.

4. Refer to the accompanying **PHQ-9 Scoring Box** to interpret the TOTAL score.

5. Results may be included in patient files to assist you in setting up a treatment goal,

determining degree of response, as well as guiding treatment intervention.

Scoring: add up all checked boxes on PHQ-9 For every Not at all = 0; Several days = 1;

More than half the days = 2; Nearly every day = 3

Interpretation of Total Score

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